

2017 Master Catalogue

WIDIA™



For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service.

From turning, indexable milling, solid end milling, holemaking, tapping, and tooling systems — WIDIA offers a broad range of solutions, all delivered from a single source. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialised network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Table of Contents

Introduction ..... **ii–v**

Services and Support ..... **vi–viii**

Stationary Tools

Turning **A1–F101**

Turning Introduction A2–A7

Turning ISO Inserts B1–B218

Tools for External Turning and Internal Boring C1–C129

Tools for Small Hole Boring D1–D91

Grooving and Cut-Off E1–E133

Threading F1–F101

Rotating Tools

Indexable Milling **G1–M130**

Indexable Milling Introduction G2–G19

Face Mills H1–H74

Chamfer Mills I1–I10

90° Shoulder Mills J1–J51

Helical Mills K1–K9

Slotting Mills L1–L33

Copy Mills M1–M130

Solid End Milling **N1–R18**

Solid End Milling Introduction N2–N21

High-Performance Solid Carbide End Mills O1–O212

General Purpose Solid Carbide End Mills P1–P44

High-Performance High-Speed Steel (HSS-E/PM) Q1–Q13

Burs R1–R18

Holemaking **S1–W81**

Holemaking Introduction S2–S8

Solid Carbide Drills T1–T149

Modular Drills U1–U45

Indexable Drills V1–V40

Hole Finishing W1–W81

Tapping **X1–Y115**

Tapping Introduction X2–X9

Tapping Portfolio Y1–Y115

Ordering Information **Z2–Z151**

Index by Order Number Z2–Z75

Index by Catalogue Number Z76–Z145

Global Contacts Z146–Z147

Icon Legend Z148–Z150

Material Overview Z151

1926
Tungsten carbide production begins

1937
WIDIA™ wins the Grand Prix at the world exposition in Paris

1962
First patent granted for coated carbide inserts

1967
WIDIA (India) begins producing carbide and tools

1968
Launch of first global coated grade

A **Powerful History** of **High Performance**

For more than 90 years, WIDIA™ brand products and services have defined excellence in innovation, technology, and customer service. From the world's first patent for carbide indexable inserts to the development of the world's first coated grades, WIDIA delivers extreme results, no matter what the challenge.

From turning, indexable milling, solid end milling, holemaking, tapping, and tooling systems — WIDIA offers a broad range of solutions. Match the most expansive portfolio of precision-engineered products and engineered solution services available today with a global, specialized network of Authorised Distributor partners, and you have the tools you need — and the power that only comes from WIDIA.

WIDIA™

1982
Launch of first PVD TiN coated taps (VTD)

1987
Launch of the Widaflex™ tooling system for turning, holemaking, and milling

2000
QS 9000 TES and VDA 6.4 certification for the WIDIA operations in Germany

2009
The WIDIA, Greenfield Tap & Die, Circle, ClappDiCo, Manchester, Metal Removal, Metcut, and Rübig brands combine to create the WIDIA Products Group

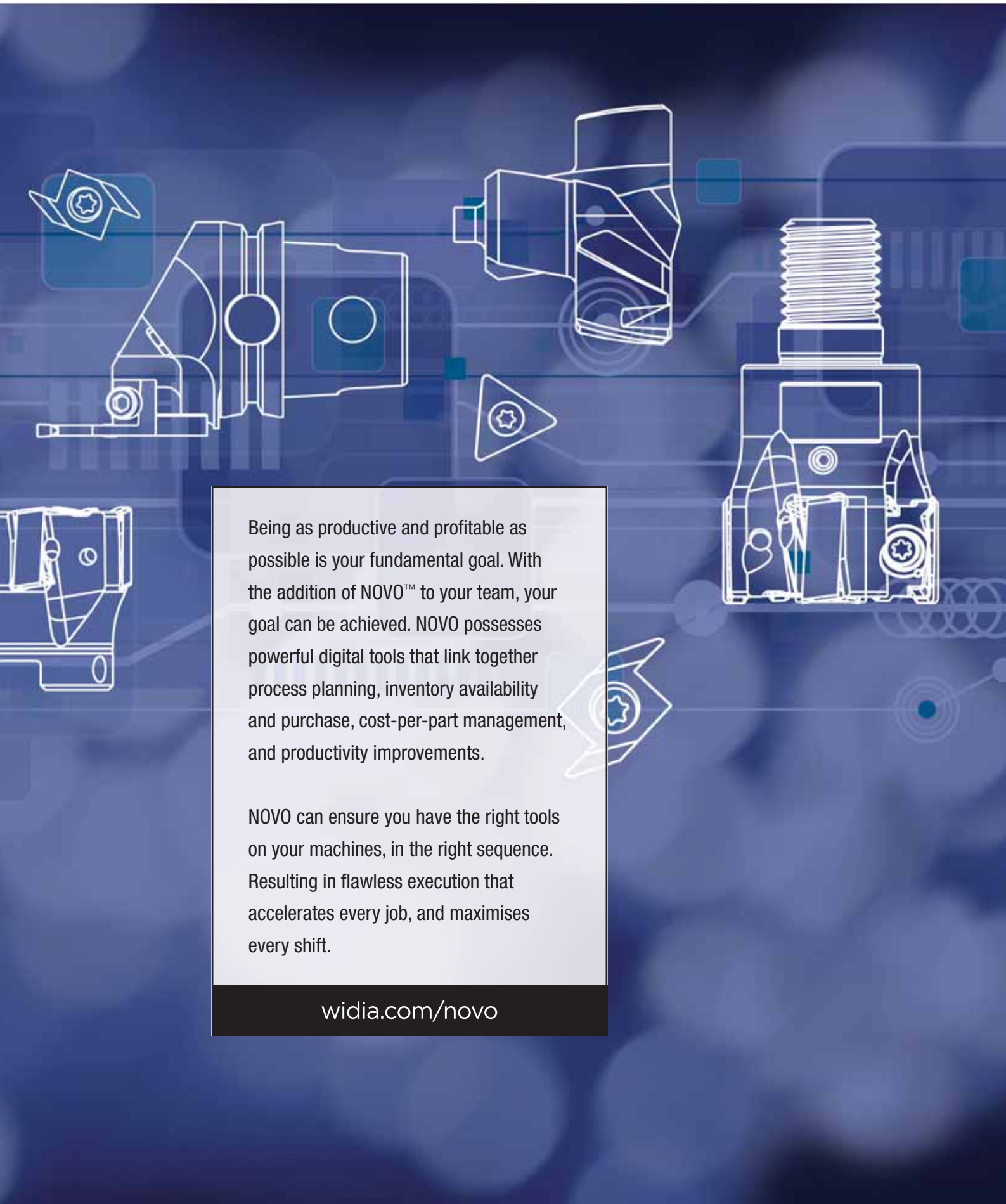
2011
Launch KM™ and ERICKSON™ Portfolio

2013
Launch of new VariTap™ series

2016
WIDIA celebrates 90 years



NOVO KNOWS
ART TO PART TO PROFIT

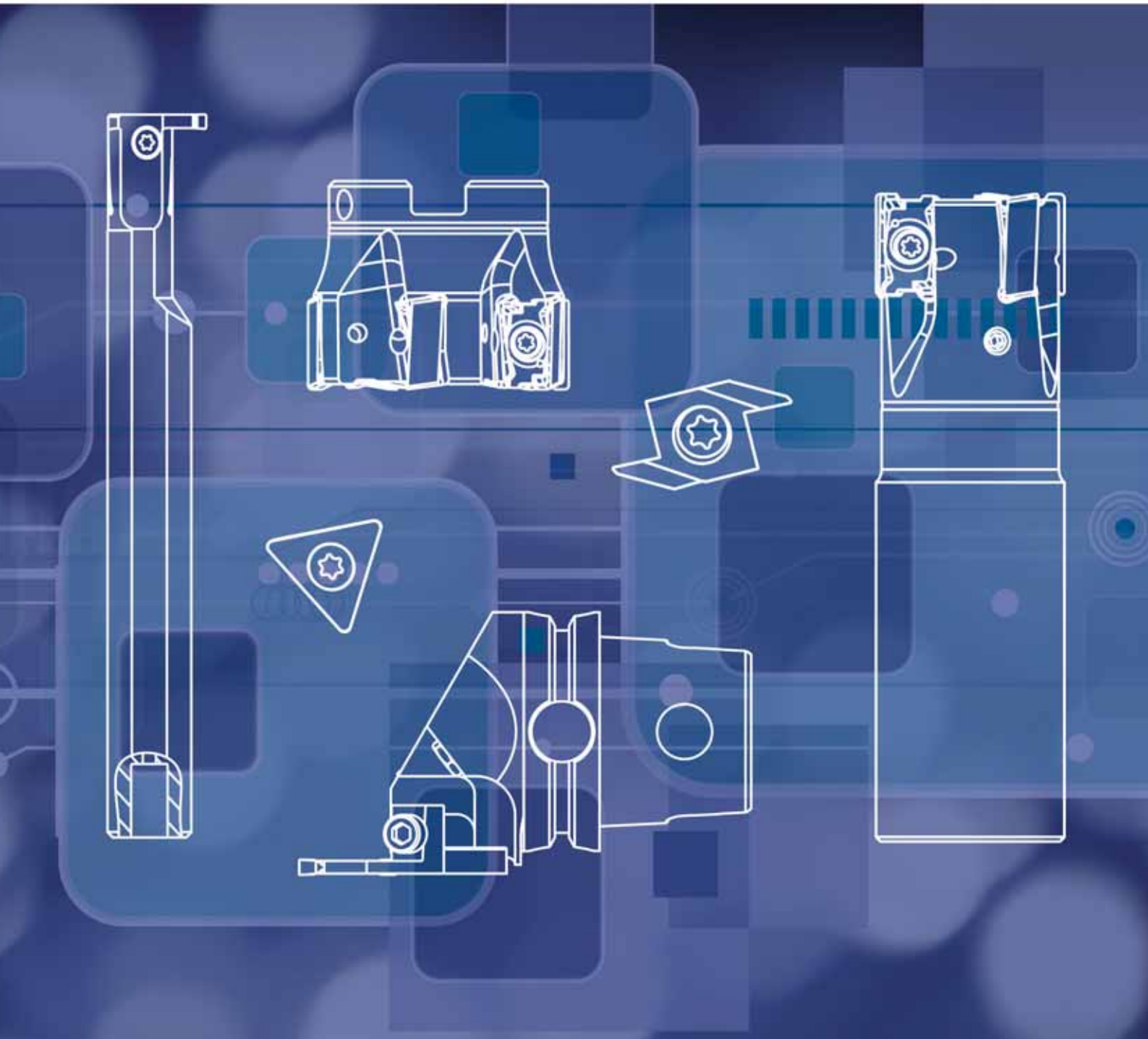


Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift.

widia.com/novo

WIDIA™



01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

WIDIA™ Metalworking Services

WIDIA™ provides an array of products and support services from onsite tool management and engineering personnel, to inventory control systems, to tool manufacturing, reconditioning, and recycling to support tools and their processes throughout their entire lifecycle. Our metalworking services are designed to save your business time, money, and inventory, and protect your cutting tool investment for the long term.

Let WIDIA help you extend the life of your tools and maintain their performance in delivering productivity. Contact your local authorised WIDIA distributor or visit widia.com/services to learn more.

NOVO™

NOVO™ possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

See pages D92–D93, H61, S9, and Y57 to learn more.



ToolBOSS™ Vending Solution

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

See pages M131 and U9 to learn more.

Customer Application Support

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

See pages D75, L15, and W67 to learn more.





Toolholder Service and Repair

When your WIDIA™ advanced tooling products need to be serviced, the WIDIA Service and Repair Department has the highly trained staff to provide expert assistance.

See page M71 to learn more.



Carbide Recycling

The WIDIA™ Carbide Recycling Programme can turn accumulated scrap carbide tooling in your shop into cash.

See pages R19 and T97 to learn more.

KNOWLEDGE CENTER

Knowledge Center

The Knowledge Center offers several ways to get trained. In-person classes include lecture, lab, and machining demonstrations.

See pages L31 and U39 to learn more.



WIDIA and the Machine Tool Industry (MTI)

We have Machine Tool Industry (MTI) specialists in more than 60 countries around the world, so there's always someone near you: W-MTI.Solutions@WIDIA.com.

See page O216–O217 to learn more.



Tool Reconditioning

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

See pages I11, N22–N23, T140–T141, V42–V43, and Y87 to learn more.

Get fast and reliable answers to your toughest metalcutting problems.

Our Customer Application Support (CAS) Team is the metalworking industry's leading help desk resource for tooling application solutions and problem resolution.

Customer Application Support (CAS)

- Easy access to proven metalworking expertise.
- Service level excellence.
- Best-in-class application support tools and technology.

Easy access to proven metalworking expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Service Level Excellence:

- Fast telephone response.
- Quick technical solutions.
- Efficient case management.

Services Provided:

- Tooling selection.
- Operating parameters.
- Troubleshooting.
- Process optimisation.
- Hardware support.

Best-in-Class Support Tools and Technology:

- Tooling performance experts.
- Materials database.
- Application calculators.

ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	+61 001 724 539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049 911 9735 429*	eu.techsupport@widia.com
Belgium	English / French	0800 80410	0049 911 9735 429*	eu.techsupport@widia.com
China	Chinese	+86 400 889 2237	+86 21 58999985 *	w-cn.techsupport@widia.com
Denmark	English	+45 808 89295	001 724 539 6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001 724 539 6830 *	na.techsupport@widia.com
France	Frensh	+33 080 5540 379	0049 911 9735 429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911 9735 429*	eu.techsupport@widia.com
India	English	+91 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Israel	English	+972 1809 449907	001 724 539 6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	+81 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Korea (South)	English	+82 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001 724 539 6830 *	na.techsupport@widia.com
New Zealand	English	+64 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001 724 539 6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504*	eu.techsupport@widia.com
Russia (landline)	Russian	+7 8800 5556395	0048 6166 56504*	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504*	eu.techsupport@widia.com
Singapore	English	+65 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
South Africa	English	+27 0800 981644	001 724 539 6830 *	na.techsupport@widia.com
Sweden	English	+46 020798794	001 724 539 6830 *	na.techsupport@widia.com
Taiwan	English	+886 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

*Noted phone and fax numbers are not toll free.



On the Web

We are here to serve you.

Visit our homepage at widia.com to:

- Find a local WIDIA™ Authorised Distributor near you.
- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
- Purchase WIDIA-branded merchandise.
- Get social with us on Facebook, Twitter, Instagram, YouTube, and more!



NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorized Distributor or visit **widia.com/services**.

WIDIA™



Turning

Turning Introduction A2–A7

Turning ISO Inserts B1–B218

Tools for External Turning and Internal Boring C1–C129

Tools for Small Hole Boring D1–D91

Grooving and Cut-Off E1–E133

Threading F1–F101



Turning Product Highlights

WIDIA™ Victory™ High-Temp Turning

With three geometries and three grades, WIDIA Victory has a complete portfolio for high-temp turning applications in nickel-based (INCONEL®, Udimet®, Rene), cobalt-based (Haynes®), and Fe-based (Airmet 100) materials, as well as difficult-to-machine stainless (460SS, duplex, high-alloy stainless), cobalt-chrome, and stainless-based powdered metals. These materials are commonly found in rings, housings, hubs, compressors, fans, rotors, and medical devices.

-FS Geometry

The -FS Geometry is a ground, highly-positive design best used in finishing cuts where size control, finish, and minimisation of part deflection are considerations.

- Excellent chip control versus similar competitive geometries. This chip control adds process stability and reduces machine stoppages to remove stringers.
- Increased cutting speed and/or feed rate for better chip control to reduce cycle time, gain productivity, and reduce machining cost.
- Reduced cutting forces provide longer tool life and/or better surface finish.
- Improved depth-of-cut (DOC) notching resistance for longer tool life.
- Advanced PVD grades provide more wear resistance and longer tool life.







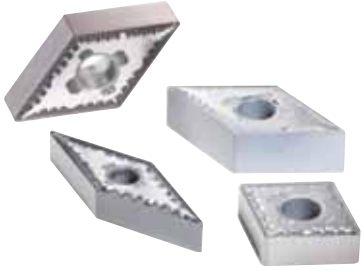
-MS Geometry

-MS geometry is a moulded geometry with increased edge toughness that is best used in medium machining.

- The -MS geometry offers excellent chip control versus similar competitive geometries. This chip control adds process stability and reduces machine stoppages to remove stringers.
- Available in two PVD grades, -MS is a high-performance geometry. Compete with confidence against any competitor. The -MS is also available in an uncoated grade.
- The WIDIA™ Victory™ grades offer better depth-of-cut (DOC) notching resistance and improved edge toughness. This offers customers an improved solution from other competitors.

-UR Geometry

- -UR geometry offers a roughing solution for high-temp materials. Available in WS10PT™ and WS25PT™, the -UR geometry provides smooth chip forming and improved coolant flow for increased tool life. This positive geometry, with its unique chipbreaker without inflection points, reduces cutting forces and improves depth-of-cut (DOC) notching resistance.





Turning Product Highlights

WIDIA™ VariTurn™

Formerly known as WIDIA Value, the WIDIA VariTurn platform offers high-performance inserts with versatility. With eight grades and eight geometries, VariTurn covers 80% of all turning applications.

Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed, maximising the product's value and protecting the workpiece. Also, because WIDIA VariTurn inserts can be used in most applications, a single insert can take on any number of tasks, thus reducing inventory. WIDIA VariTurn products are reliable enough to cut steel, stainless steel, cast iron, and high-temperature alloys, enabling quick changes in workpiece materials without the need to swap inserts, saving time and money.

WMT™ System

The WMT platform is the economical and reliable option for all grooving, face grooving, cut-off, turning, and profiling applications. The WMT system ensures precise insert positioning and provides only the most accurate machining, with exceptionally fast cycle times and superior performance.

The WMT portfolio offers:

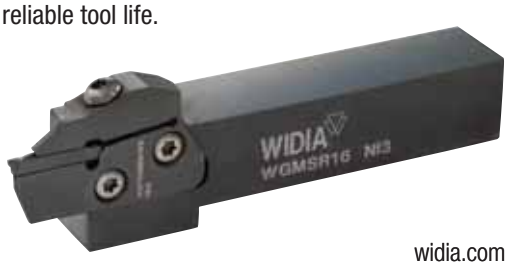
- Proven higher stability.
  - WMT insert design has the best clamping system for stability.
- Platform flexibility, with multiple geometries in single holder for multiple application types.
- Victory™ grades:
  - WU10HT™ — Uncoated
  - WU10PT, WU25PT — PVD
  - WP10CT, WP10CT — CVD
- Greater depth-of-cut (DOC) capability.

Versatile and Well Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even the most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.











WIDIA™ Tools for Small Hole Boring

When the application calls for boring at a D min of less than 35mm, WIDIA offers comprehensive and easy solutions to choose from. Our portfolio of tools for small hole boring offer solutions in either indexable inserts or solid carbide inserts, and inserts are available for boring, profiling, threading, and grooving.

I.D. Indexable Tooling

- Steel and solid carbide shanks with through coolant in inch and metric sizes.
- Ground-in and pressed-type chipbreaker inserts.
- Coated and uncoated carbide grades and cubic boron nitride/polycrystalline diamond-tipped inserts to support all machining applications.

Quadralock™ System

- Versatile and engineered to give exceptional performance for I.D. machining applications. Quick, accurate insert indexing.
- Internal coolant can be used with all tool bodies. Cutting inserts have special slots that direct coolant to the cutting edge.
- Carbide grades for steels, stainless steels, non-ferrous materials, super alloys, titanium, and hard materials.

A/B Series Tooling

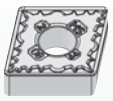
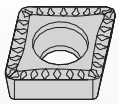
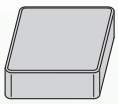
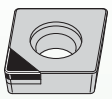
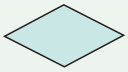
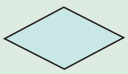
- Inserts repeat within ±0,013mm, allowing quick and accurate setups.
- Elliptical, ground insert shanks allow for maximum strength and rigidity.
- Available in boring, grooving, threading, and profiling insert styles.
- Coated and uncoated carbide grades and cubic boron nitride/polycrystalline diamond-tipped inserts to support all machining applications.



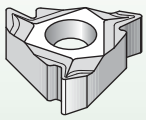
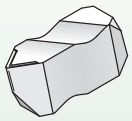
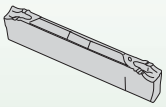
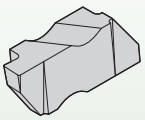
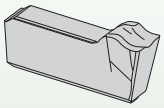


ISO Turning Inserts

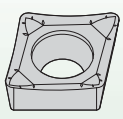
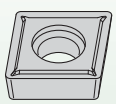
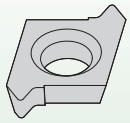
Step 1 • Select Insert Style

			 Carbide Inserts, Negative	 Carbide Inserts, Positive	 Ceramic Inserts	 PcBN/PCD Inserts
C	Rhomboid 80°		B35–B45	B30–B34 B45–B46	B179–B181	B197–B203
D	Rhomboid 55°		B51–B63	B47–B50 B63–B64	B182–B183	B206–B210
R	Round		B67	B65–B66	B184–B186	B210
S	Square 90°		B70–B77	B68–B70 B78–B80	B187–B192	B210–B212
T	Triangular 60°		B83–B91	B91–B93	B193–B195	B212–B215
V	Rhomboid 35°		B95–B99	B94–B95	B196	B216–B218
W	Trigon 80° with enlarged corner angles		B99–B105	B105	B196	B218

Threading, Grooving, and Cut-Off

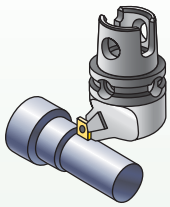
	 LT	 TopThread™	 WMT™	 TopGroove™	 Separator™	 ProGroove™
inserts	F42–F68	F8–F22	E12–E26	E48–E72	E112–E121	E94–E101
toolholders	F69–F77	F23–F35	E28–E39	E73–E79	E122–E128	E102–E104

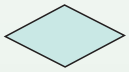
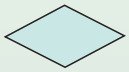
WIDIA™ Turning Solutions

	 Inserts to Machine Aluminium	 VariTurn™	 Tools for Small Hole Boring
inserts	B150–B157	B106–B149	D2–D91

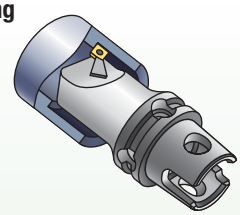
Step 2 • Select Application and Clamping System

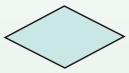
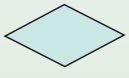
External Machining



				D-Style Clamping	P-Style Clamping	Negative C-Style Clamping	S-Style Clamping	Positive C-Style Clamping
C	Rhomboid 80°		conventional	C8–C10	C20–C22	C31–C32	C42–C43	–
D	Rhomboid 55°			C11	C23–C24	C32–C33	C43–C42	–
R	Round		conventional	C12	–	C35	–	C40–C41
S	Square 90°		conventional	C12–C14	C25–C27	C36–C37	C45	–
T	Triangular 60°		conventional	C15	C28–C29	C37–C39	C46–C47	–
V	Rhomboid 35°		conventional	C16–C17	–	–	C48	–
W	Trigon 80° with enlarged corner angles		conventional	C19	C30	–	C48–C49	–

Internal Machining



				D-Style Clamping	P-Style Clamping	Negative C-Style Clamping	S-Style Clamping	Positive C-Style Clamping
C	Rhomboid 80°		conventional	C56	C60	C62	C66–C70	–
D	Rhomboid 55°			C56–C57	–	C63	C71–C76	–
R	Round		conventional	–	–	–	–	–
S	Square 90°		conventional	–	–	C63–C64	–	–
T	Triangular 60°		conventional	C58	C60	–	C77–C80	C65
V	Rhomboid 35°		conventional	C58	–	–	C80–C81	–
W	Trigon 80° with enlarged corner angles		conventional	C59	C61	C64	–	–



Turning • ISO Inserts

WIDIA Victory High-Performance Inserts B2–B105

WIDIA VariTurn B106–B149

Inserts for Machining Aluminium B150–B157

Ceramic, PcBN, and PCD Inserts.....B158–B218

A Complete High-Performance Turning Portfolio •
WIDIA™ Victory™

Specifically engineered multilayer coating provides high-speed capability for finishing to roughing operations. New geometries enhance chip control for better tool life and superior surface finshes.



Victory

- Market-leading technology.
- Longer tool life.
- Higher productivity through increased speed capability.

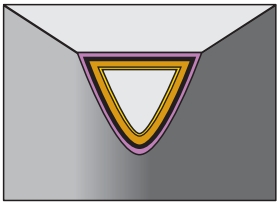
Steel and Stainless Steel Grades

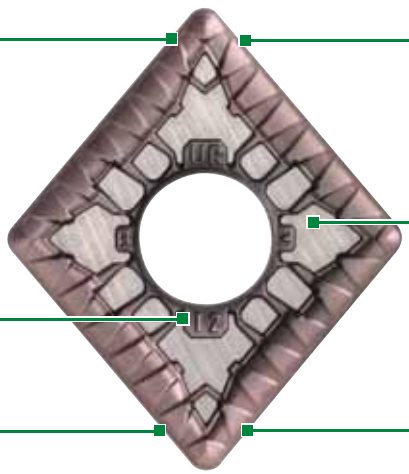
- Reduced cycle times — high speed and feed capability.
- Long tool life — new multilayer coating provides better wear resistance.
- Proven seating — smooth and secure seating surface.
- Outer layer is bronze-colored for easier wear detection.

Post-coat treatment
- Improves edge toughness.
- Long, predictable tool life.
- Reduces depth-of-cut notching.
- Wide range of applications.

New geometry identification system.

MT-CVD/CVD–TiN-TiCN-Al_2O_3-ZrCN





Improved edge toughness
- Provides smooth outer surface to reduce forces, friction, and workpiece sticking.

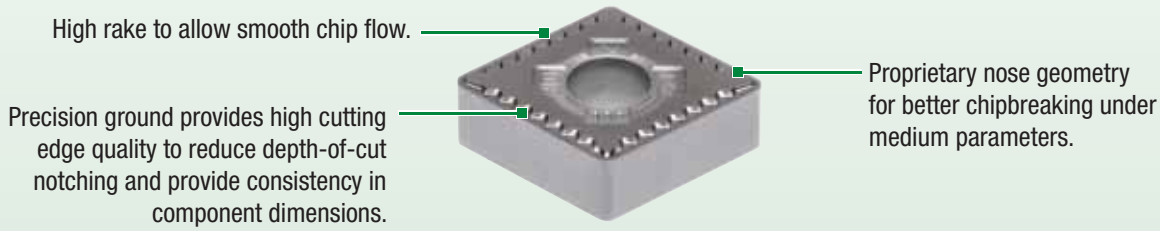
Post-coat grinding
- Provides secure seating surface.

Alpha aluminia layer
- Provides coating integrity at elevated speeds.
- Higher productivity and dependability at high cutting temperatures.

New WIDIA™ Victory™ grades and geometries are designed to offer better tool life and surface finishes.

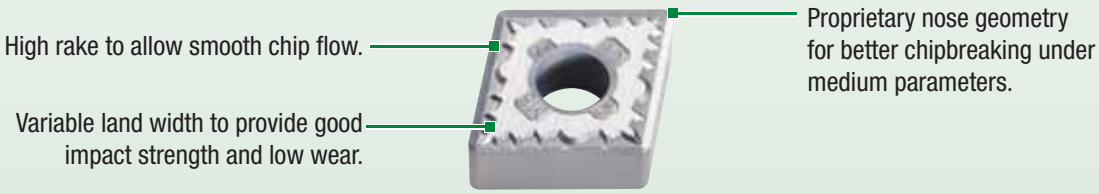
..GG-FS Geometry

- All ..GG-FS inserts are G tolerance inserts. This is a critical feature in some applications, especially the aerospace industry.
- Reduced cycle times — high speed and feed capability.
- Reduced cutting forces — improved dimensional control and reduced deflections.
- New chip forming elements — better chip control.
- Long tool life — new multilayer coating provides better wear resistance.
- Proven seating — smooth and secure seating surface.



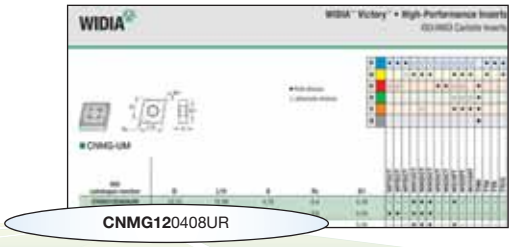
..MG-MS Geometry

- High positive rake angle delivers improved tool life by reducing cutting forces and built-up edge when machining high-temp alloys.
- Improved chip control and reduced crater wear due to proprietary chipbreakers with varying shapes and distances.
- Reduced thermal wear and cracking due to near sharp cutting edge with optimised edge treatment.
- Improved chipbreaking at various depths of cut due to variable land width, which improves impact strength.
- All MG-MS inserts are moulded, which supports increased tool life due to the elimination of grinding stress.



How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



C — Insert Shape

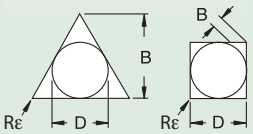
H	Hexagon 120°	
O	Octagon 135°	
P	Pentagon 108°	
R	Round —	
S	Square 90°	
T	Triangular 60°	
C D E M V	Rhomboid 80° 55° 75° 86° 35°	
W	Trigon 80° with enlarged corner angles	
L	Rectangular 90°	
A B N/K	Parallelogram 85° 82° 55°	

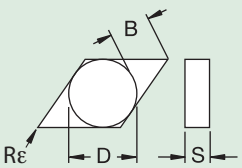
N — Insert Clearance Angle

A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	Indicated for other clearance angles requiring descriptions.

M — Tolerance Class

Tolerances apply prior to edge prep and coating

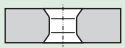
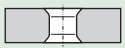
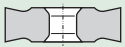




D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

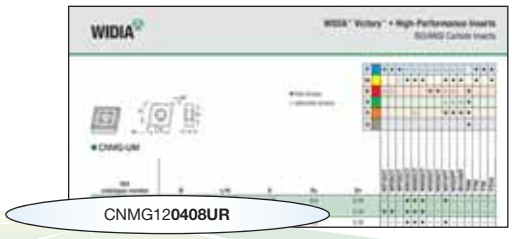
G — Insert Features

N	
R	
F	
A	
M	
G	
W	
T	
Q	
U	
B	
H	
C	
J	
X V	Special Design

12 — Size

"D" mm	Code for mm cutting edge length "L10" C	D	R	S	T	V	W
3,97	S4	04	03	03	06	—	—
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,00	—	—	06	—	—	—	—
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
8,00	—	—	08	—	—	—	—
9,52	09	11	09	09	16	16	06
10,00	—	—	10	—	—	—	—
11,11	11	13	11	11	19	19	07
12,00	—	—	12	—	—	—	—
12,70	12	15	12	12	22	22	08
14,29	14	17	14	14	24	24	09
15,88	16	19	15	15	27	27	10
16,00	—	—	16	—	—	—	—
17,46	17	21	17	17	30	30	11
19,05	19	23	19	19	33	33	13
20,00	—	—	20	—	—	—	—
22,22	22	27	22	22	38	38	15
25,00	—	—	25	—	—	—	—
25,40	25	31	25	25	44	44	17
31,75	32	38	31	31	54	54	21
32,00	—	—	32	—	—	—	—

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



04	08			UR
Thickness S	Corner Radius "Rε"	Hand of Insert (optional)	Cutting Edge (optional)	Chipbreaker (optional)

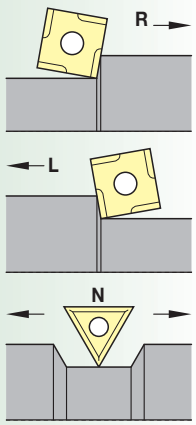
symbol	thickness
mm	mm
–	0,79
T0	1,00
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
9	9,52
11	11,11
12	12,70

symbol	corner radius	
mm	mm	
X0	0,04	
01	0,1	
02	0,2	
04	0,4	
08	0,8	
12	1,2	
16	1,6	
20	2,0	
24	2,4	
28	2,8	
32	3,2	
00		round insert
M0		
–		

R = Right hand

L = Left hand

N = Neutral



F		Sharp
E		Rounded
T		Chamfered
S		Chamfered and Rounded
K		Double-Chamfered
P		Double-Chamfered and Rounded

13	=	Railroad Light
CT	=	Copy Turning
FF	=	Fine Finishing
FP	=	Finish Positive
FW	=	Finish Wiper
ML	=	Medium Light
MR	=	Medium Roughing
MW	=	Medium Wiper
RH	=	Roughing Heavy
T	=	Negative Land
UF	=	Universal Finishing
UM	=	Universal Medium
UR	=	Universal Roughing
.NMP	=	Sharp Medium
MP	=	Medium Positive
FS	=	Finishing High-Temp(S)
MS	=	Medium High-Temp(S)
MU	=	Medium Universal
SR	=	Super Roughing
65	=	Heavy Roughing

"D"	± Tolerance on "D" Class M Tolerance			Class U Tolerance
	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
mm	mm	mm	mm	mm
3,97	0,05	–	–	–
4,76	0,05	–	–	0,08
5,56	0,05	0,05	0,05	0,08
6,35	0,05	0,05	0,05	0,08
7,94	0,05	0,05	0,05	0,08
9,52	0,05	0,05	0,05	0,08
11,11	0,08	0,08	0,08	0,13
12,70	0,08	0,08	0,08	0,13
14,29	0,08	0,08	0,08	0,13
15,88	0,10	0,10	0,10	0,18
17,46	0,10	0,10	0,10	0,18
19,05	0,10	0,10	0,10	0,18
22,22	0,13	–	–	0,25
25,40	0,13	–	–	0,25
31,75	0,15	–	–	0,25

"D"	± Tolerance on "B" Class M Tolerance			Class U Tolerance
	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
mm	mm	mm	mm	mm
3,97	0,08	–	–	–
4,76	0,08	–	–	0,13
5,56	0,08	0,11	–	0,13
6,35	0,08	0,11	–	0,13
7,94	0,08	0,11	–	0,13
9,52	0,08	0,11	0,18	0,13
11,11	0,13	0,15	–	–
12,70	0,13	0,15	0,25	0,20
14,29	0,13	0,15	–	–
15,88	0,15	0,18	–	0,27
17,46	0,15	0,18	–	0,27
19,05	0,15	0,18	–	0,27
22,22	0,15	–	–	0,38
25,40	0,18	–	–	0,38
31,75	0,20	–	–	0,38

A system of grades, geometries, and application guidelines to provide optimal solutions for your metalcutting needs. It's easy to determine which WIDIA™ chip-control cutting tool will work best in your specific workpiece materials and applications!

W	P	15	C	T
Brand	Primary Workpiece Material	Application Range*	Insert Material	Application

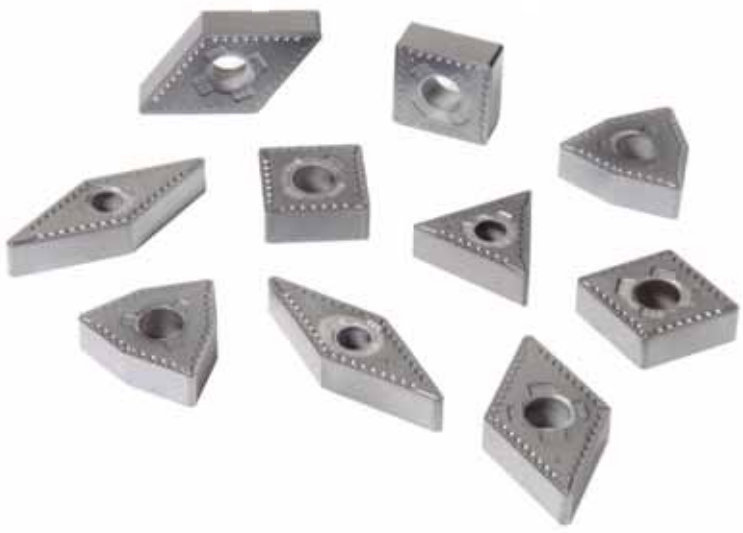
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials
U	Universal Machining

05	=	fine finishing
10	=	finishing
15	=	medium to roughing
20	=	
25	=	
30	=	roughing
35	=	
40	=	heaviest roughing
45	=	
50	=	

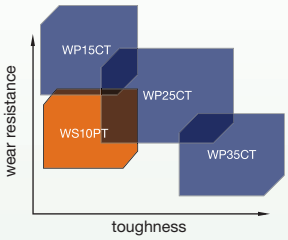
*Samples shown are based on turning and will differ within applications

H	=	Uncoated Carbide
C	=	Carbide + CVD
P	=	Carbide + PVD
T	=	Cermet
Y	=	Ceramics
D	=	Diamond
B	=	PcBN
S	=	HSS
E	=	HSS-E
M	=	HSS-E-PM

T	=	Turning
M	=	Milling
H	=	Holemaking
D	=	Solid Drills
E	=	Solid End Mills
G	=	Taps
R	=	Reamer
V	=	Thread Mills

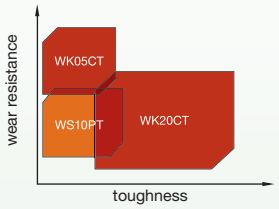


Victory Toughness/Wear Resistance



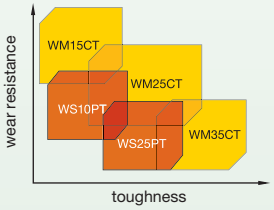
WP Grades for Steel

- Three grades and seven primary geometries for use in roughing to finishing operations.
- Increase cutting speed and/or feed rate to gain productivity.



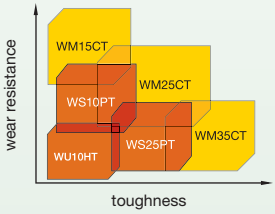
WK Grades for Cast Iron

- Three grades across 12 geometries for use in roughing to finishing operations.
- Very good balance of wear resistance and toughness for long predictable tool life. Flat top geometry for machining cast iron. For finishing to roughing applications.



WM Grades for Stainless Steel

- Two grades to cover all of your cast iron turning operations.
- Increase cutting speed and/or feed rate by up to 30% over similar competitive grades.



WS Grades for High-Temp Alloys

- Two grades for use in roughing to finishing operations.
- Very good wear resistance for longer tool life.
- One uncoated grade for use in titanium.

Positive and Negative Inserts

Positive Inserts



- Screw-on inserts are the first choice for I.D. turning of all materials and O.D. turning on small to medium lathes.
- Suitable for all workpiece materials.

Negative Inserts



- Negative style inserts are your first choice for general machining of all materials on medium to large lathes.
- Negative style inserts offer the best economy for high metal removal rates.
- Available in flat-top and chip-control geometries with both moulded and ground peripheries.
- Suitable for all workpiece materials.

Ceramic Inserts



- Ceramic inserts are a great choice for productive machining of high-temp alloys.
- Negative rake inserts are also recommended for the machining of hardened materials and cast irons.
- Available in flat-top geometries with moulded and ground peripheries.

PcBN and PCD Inserts



- PcBN can be used for machining steels with a hardness higher than 48 HRC.
- PcBN inserts can also be used for productivity improvements in machining cast irons and high-temp alloys.
- PCD inserts are used for machining non-ferrous materials.

Insert Selection System

How to Use

The WIDIA three-step insert selection system makes choosing and applying the most productive tool as easy as 1, 2, 3.
Tool recommendations are based on six workpiece material groups, optimising selection accuracy.

Example:
Six workpiece material groups

■ Step 1 • Select the insert geometry

Given: depths of cut = 1mm (.040")
feed = 4mm (.016 IPR)
Unknown: insert geometry
Solution: -RH

■ Step 2 • Select the grade

Given: cutting conditions:
lightly interrupted cut
Geometry: -RH
Unknown: grade
Solution: WP25CT™

■ Step 3 • Select the cutting speed

Given: grade WP35CT™
cutting conditions
material CK15
Unknown: cutting speed
Solution: 210 m/min

Need help in selecting a product?
Additional information can be obtained by contacting the WIDIA Customer Application Support Team.
Go to widia.com for your country's phone number.

Step 1 • Select the insert geometry

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Negative Inserts



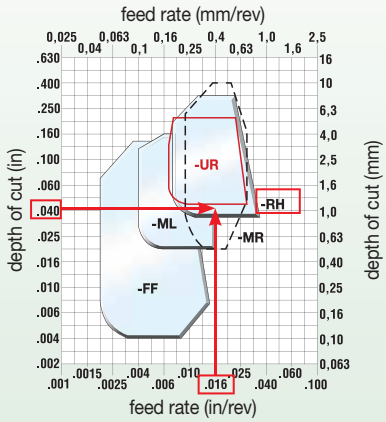
Roughing



Medium Machining



Finishing



Step 2 • Select the grade

		Negative Insert Geometry					Positive Insert Geometry		
cutting condition		-FF	-ML	-MR	-UR	-RH	-FP	-MU	-MP
heavily interrupted cut		WP15CT	WP25CT	WP35CT/ WP25CT	WP35CT	WP35CT	WP25CT/ WS25PT	WP35CT	WM35CT
lightly interrupted cut		WP15CT	WP25CT	WP25CT	WP35CT	WP35CT	WP25CT	WP25CT	WP25CT
varying depth of cut, casting, or forging skin		WP15CT	WP15CT	WP15CT	WP25CT	WP25CT	WP15CT	WP15CT	WP15CT
smooth cut, pre-turned surface		WP15CT	WP15CT	WP15CT	WP25CT	WP25CT	WP15CT	WP15CT	WP15CT

Step 3 • Selecting the cutting speed

Low-Carbon (<0.3% C) and Free-Machining Steel — speed — m/min — Starting Conditions

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	WP15CT					◇					395
	WP25CT			◇							275
	WP35CT		◆								210
	WS10PT		◇								280

WIDIA Material Group Selection Guide:

To optimise speed recommendations, material subgroups have been added to each of the six workpiece material groups.

material	material group ISO code	number of material subgroups
steel	P	1–6
stainless steel	M	1–3
cast iron	K	1–3
non-ferrous materials	N	1–8
high-temp alloys	S	1–4
hardened materials	H	1

Step 1 • Select the insert geometry

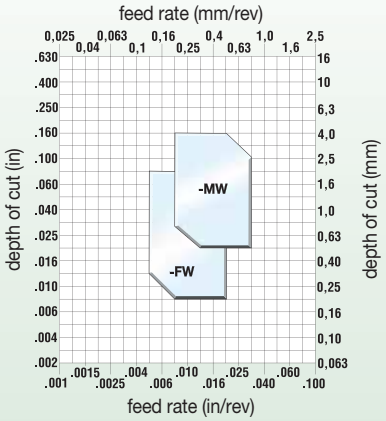
Negative Wiper Inserts



-MW
Medium Wiper



-FW
Finishing Wiper



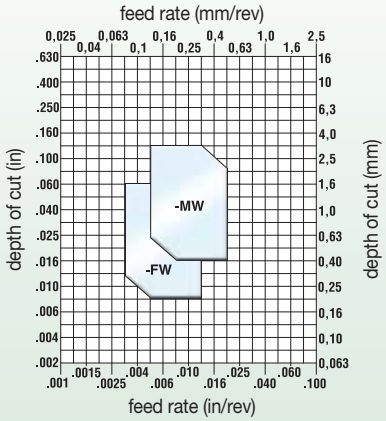
Positive Wiper Inserts



-MW
Medium Wiper



-FW
Finishing Wiper



Step 2 • Select the grade

cutting condition		Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW	Positive Insert Geometry -MW
heavily interrupted cut		WP15CT	WP25CT	–	WP25CT
lightly interrupted cut		WP15CT	WP25CT	WP15CT	WP25CT
varying depth of cut, casting, or forging skin		WP15CT	WP15CT	WP15CT	WP15CT
smooth cut, pre-turned surface		WP15CT	WP15CT	WP15CT	WP15CT

Step 1 • Select the insert geometry

Negative Inserts



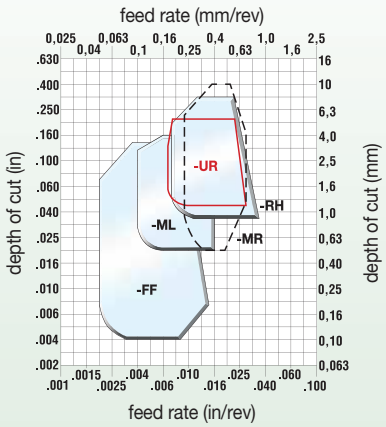
-RH -UR
Roughing



-ML -MR
Medium Machining



-FF
Finishing



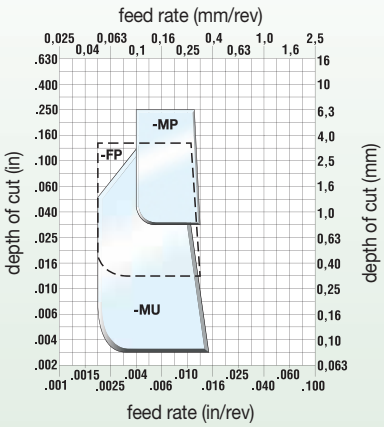
Positive Inserts



-MP -MU
Medium Machining



-FP
Finishing



Step 2 • Select the grade

cutting condition		Negative Insert Geometry -FF	-ML	-MR	-UR	-RH	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut		WP15CT	WP25CT	WP35CT/ WP25CT	WP35CT	WP35CT	WP25CT/ WS25PT	WP35CT	WM35CT
lightly interrupted cut		WP15CT	WP25CT	WP25CT	WP35CT	WP35CT	WP25CT	WP25CT	WP25CT
varying depth of cut, casting, or forging skin		WP15CT	WP15CT	WP15CT	WP25CT/ WP10CT	WP25CT	WP15CT	WP25CT/ WP10CT	WP15CT
smooth cut, pre-turned surface		WP15CT	WP15CT	WP15CT	WP25CT/ WP10CT	WP25CT	WP15CT	WP25CT/ WP10CT	WP15CT

(continued)

■ Step 3 • Select the cutting speed *(continued)*

Low-Carbon (<0.3% C) and Free-Machining Steel — speed — m/min — Starting Conditions ◁▷

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P0/P1	WP15CT							◁▷			395
	WP25CT				◁▷						275
	WP35CT		◁▷								210
	WS10PT			◁▷							280
	WM35CT		◁▷								280

Medium- and High-Carbon Steels (<0.3% C) — speed — m/min — Starting Conditions ◁▷

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P2	WP15CT			◁▷							265
	WP25CT		◁▷								195
	WP35CT	◁▷									150
	WS10PT		◁▷								200
	WM35CT	◁▷									200

Alloy Steels and Tool Steels (≤330 HB) (≤35 HRC) — speed — m/min — Starting Conditions ◁▷

material group	grade	135	180	225	275	320	360	410	455	495	m/min
P3	WP15CT		◁▷								190
	WP25CT		◁▷								155
	WP35CT	◁▷									120
	WS10PT		◁▷								155
	WM35CT	◁▷									155

Alloy steels and Tool Steels (340–450 HB) (36–48 HRC) — speed — m/min — Starting Conditions ◁▷

material group	grade	60	90	120	150	180	210	240	270	300	m/min
P4	WP15CT				◁▷						145
	WP25CT			◁▷							105
	WP35CT		◁▷								95
	WS10PT			◁▷							110
	WM35CT	◁▷									110

Ferritic, Martensitic, and PH Stainless Steels (≤330 HB) (≤35 HB) — speed — m/min — Starting Conditions ◁▷

material group	grade	120	150	180	210	240	270	300	330	360	m/min
P5	WP15CT				◁▷						215
	WP25CT					◁▷					195
	WP35CT		◁▷								135
	WS10PT				◁▷						200

Ferritic, Martensitic, and PH Stainless Steels (340–450 HB) (36–48 HRC) — speed — m/min — Starting Conditions ◁▷

material group	grade	105	135	165	195	225	255	285	315	345	m/min
P6	WP15CT				◁▷						180
	WP25CT			◁▷							150
	WP35CT	◁▷									105
	WS10PT			◁▷							150

Step 1 • Select the insert geometry

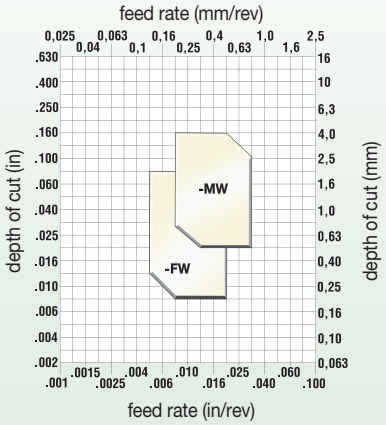
Negative Wiper Inserts



-MW
Medium Wiper



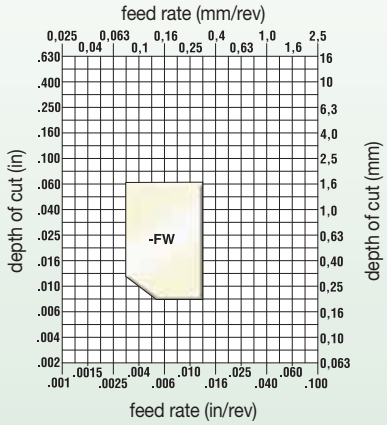
-FW
Finishing Wiper



Positive Wiper Inserts



-FW
Finishing Wiper



Step 2 • Select the grade

cutting condition		Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW
heavily interrupted cut		WM15CT	WM15CT	WM15CT
lightly interrupted cut		WM15CT	WM25CT	WM15CT
varying depth of cut, casting, or forging skin		WM15CT	WM25CT	WM15CT
smooth cut, pre-turned surface		WM15CT	WM25CT	WM15CT

Step 1 • Select the insert geometry

Negative Inserts



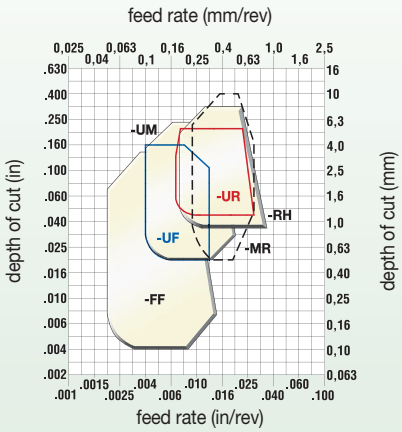
-RH -UR
Roughing



-MR -UM
Medium Machining



-UF -FF
Finishing



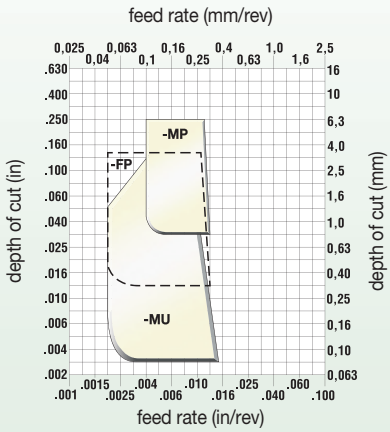
Positive Inserts



-MP -MU
Medium Machining



-FP
Finishing



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	Negative Insert Geometry -FF	-UF	-MR	-UM	-RH	-UR
heavily interrupted cut	WS10PT	WM15CT	WM35CT	WM35CT	–	WM35CT
lightly interrupted cut	WS10PT	WM15CT	WM25CT	WM25CT	WM35CT	WM35CT/ WM25CT
varying depth of cut, casting, or forging skin	WM15CT	WM15CT/ WS10PT	WM15CT	WM15CT	WM35CT	WM25CT
smooth cut, pre-turned surface	WM15CT	WM15CT	WM15CT	WM15CT	–	WM15CT

cutting condition	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut	WM25CT	WM35CT/ WS25PT	WM25CT
lightly interrupted cut	WM25CT	WM25CT/ WS10PT	WM25CT
varying depth of cut, casting, or forging skin	WM25CT/ WM15CT	WM25CT	WM25CT/ WM15CT
smooth cut, pre-turned surface	WM15CT	WM25CT	WM15CT

Step 3 • Select the cutting speed

Austenitic Stainless Steel — speed — m/min — Starting Conditions ◁▷

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M1	WM15CT			◁▷								180
	WM25CT		◁▷									150
	WM35CT	◁▷										120
	WS10PT				◁▷							215
	WS25PT		◁▷									180

Austenitic Stainless Steel — speed — m/min — Starting Conditions ◁▷

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M2	WM15CT			◁▷								165
	WM25CT		◁▷									140
	WM35CT	◁▷										105
	WS10PT			◁▷								200
	WS25PT			◁▷								165

Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture) — speed — m/min — Starting Conditions ◁▷

material group	grade	90	135	180	225	270	315	200	360	405	450	m/min
M3	WM15CT		◁▷									150
	WM25CT		◁▷									120
	WM35CT	◁▷										90
	WS10PT			◁▷								185
	WS25PT		◁▷									150

Step 1 • Select the insert geometry

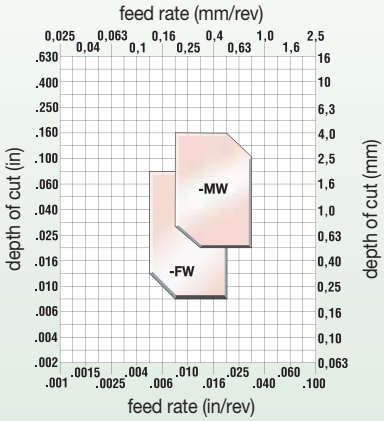
Negative Wiper Inserts



-MW
Medium Wiper



-FW
Finishing Wiper



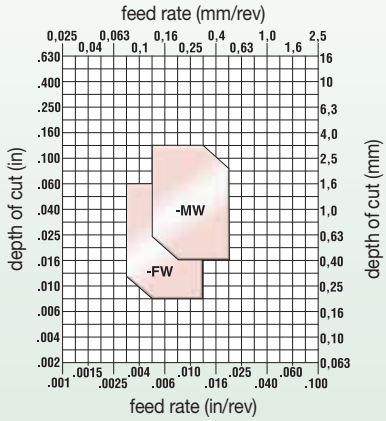
Positive Wiper Inserts



-MW
Medium Wiper



-FW
Finishing Wiper



Step 2 • Select the grade

cutting condition	Negative Insert Geometry -FW	Negative Insert Geometry -MW	Positive Insert Geometry -FW	Positive Insert Geometry -MW
heavily interrupted cut	–	–	–	–
lightly interrupted cut	WK05CT	WK05CT	WK05CT	WK05CT
varying depth of cut, casting, or forging skin	WK05CT	WK05CT	WK05CT	WK05CT
smooth cut, pre-turned surface	WK05CT	WK05CT	WK05CT	WK05CT

Step 1 • Select the insert geometry

Negative Inserts



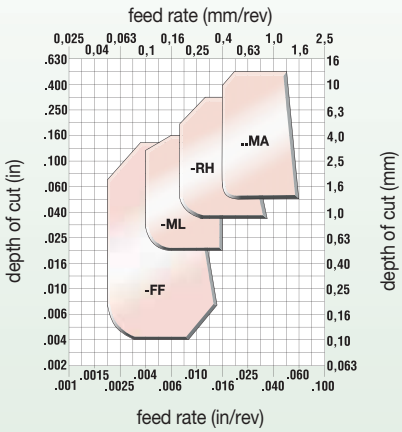
-RH ..MA
Roughing



-ML
Medium Machining



-FF
Finishing



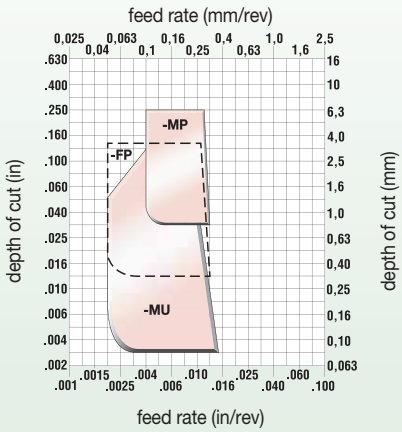
Positive Inserts



-MP -MU
Medium Machining



-FP
Finishing



(continued)

Step 2 • Select the grade *(continued)*

cutting condition	Negative Insert Geometry -FF	-ML	-UR	..MA	Positive Insert Geometry -FP	-MU	-MP
heavily interrupted cut	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT
lightly interrupted cut	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT	WK20CT
varying depth of cut, casting, or forging skin	WK20CT	WK05CT	WK20CT	WK05CT	WK20CT	WK20CT	WK20CT
smooth cut, pre-turned surface	WK20CT	WK05CT	WS10PT	WK05CT	WK20CT	WK20CT/ WK05CT/ WS10PT	WK20CT

Step 3 • Select the cutting speed

Grey Cast Iron

material group	grade	speed — m/min 60	180	305	430	550	675	800	920	1040	1160	Starting Conditions m/min
K1	WK05CT				◇							450
	WK20CT			◇								300

Ductile, Compacted Graphite, and Malleable Cast Irons (<600 MPa tensile strength)

material group	grade	speed — m/min 90	135	180	225	275	320	360	410	460	500	Starting Conditions m/min
K2	WS10PT				◇							200
	WK05CT						◇					360
	WK20CT				◇							240

Ductile, Malleable, and Austempered Cast Irons (>600 MPa tensile strength)

material group	grade	speed — m/min 90	135	180	225	275	320	360	410	460	500	Starting Conditions m/min
K3	WS10PT			◇								150
	WK05CT					◇						240
	WK20CT			◇								210

Step 1 • Select the insert geometry

Negative Inserts



-UR
Roughing



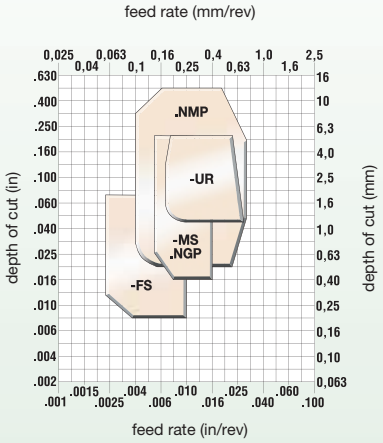
-MS .NMP



.NGP
Medium Machining



-FS
Finishing



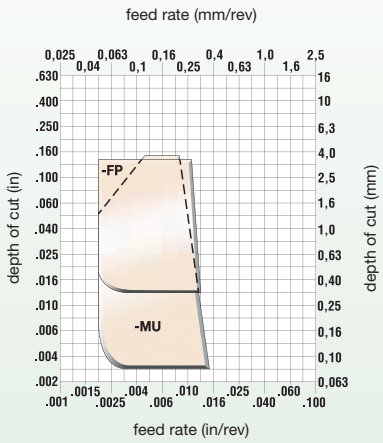
Positive Inserts



-MU
Medium Machining



-FP
Finishing



Step 2 • Select the grade

		Negative Insert Geometry				Positive Insert Geometry	
cutting condition		**-FS**	**-NGP/-NMP**	**-MS**	**-UR**	**-FP**	**-MU**
heavily interrupted cut		**WS25PT**	**WS25PT**	**WS25PT**	**WS25PT/ WM35CT**	**WS25PT/ WM15CT**	**WS25PT**
lightly interrupted cut		**WS10PT**	**WS10PT**	**WS25PT**	**WS25PT/ WM25CT**	**WS25PT**	**WS25PT**
varying depth of cut, casting, or forging skin		**WS10PT**	**WS10PT**	**WS10PT**	**WS25PT**	**WS10PT**	**WS10PT**
smooth cut, pre-turned surface		**WS10PT/ WU10HT**	**WS10PT/ WU10HT**	**WS10PT**	**WS10PT**	**WS10PT**	**WS10PT**

(continued)

■ Step 3 • Select the cutting speed *(continued)*

Iron-Based, Heat-Resistant Alloys (135–320 HB) (≤34 HRC)

material group	grade	speed — m/min: 15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S1	WU10HT		◁▷									30
	WS10PT			◁▷								55
	WS25PT		◁▷									40
	WM15CT			◁▷								55
	WM25CT/WM35CT		◁▷									40

Cobalt-Based, Heat-Resistant Alloys (150–425 HB) (≤45 HRC)

material group	grade	speed — m/min: 15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S2	WU10HT		◁▷									35
	WS10PT			◁▷								60
	WS25PT		◁▷									30
	WM15CT			◁▷								60
	WM25CT/WM35CT		◁▷									30

Nickel-Based, Heat-Resistant Alloys (140–475 HB) (≤48 HRC)

material group	grade	speed — m/min: 15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S3	WU10HT		◁▷									40
	WS10PT			◁▷								70
	WS25PT		◁▷									40
	WM15CT			◁▷								70
	WM25CT/WM35CT		◁▷									40

Titanium and Titanium Alloys (110–450 HB) (≤48 HRC)

material group	grade	speed — m/min: 15	45	75	105	140	170	200	230	290	310	Starting Conditions m/min
S4	WU10HT		◁▷									45
	WM15CT			◁▷								70
	WM25CT/WM35CT		◁▷									55

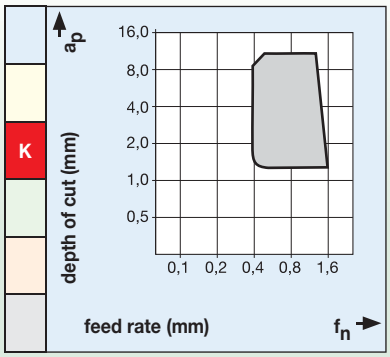
Negative Inserts

..MA



Flat top geometry for machining cast iron. For finishing to roughing applications.

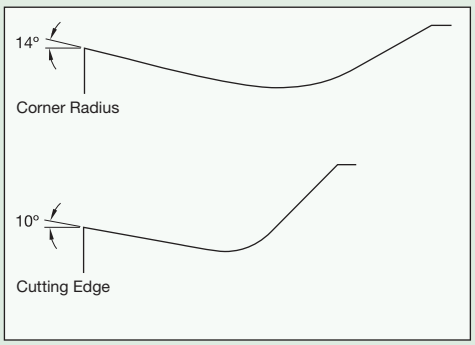


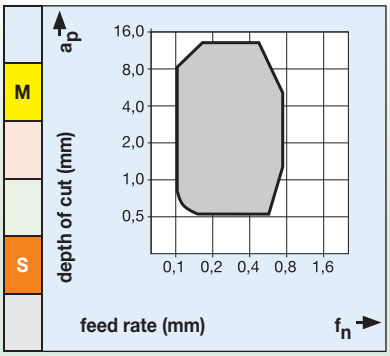


.NMP



For medium-duty machining of tough work materials, such as chrome- and nickel-based alloys. Minimises tendency for materials to adhere to insert.

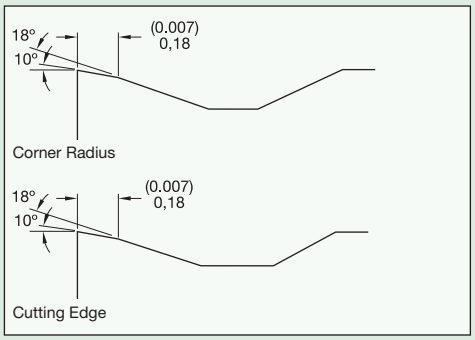


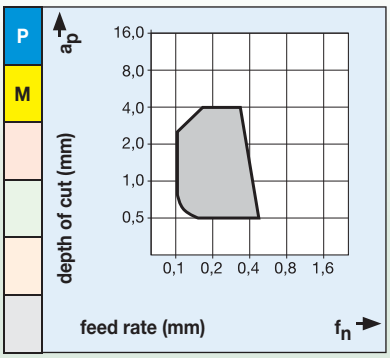


4



Semi-finishing geometry for light- to medium-duty steel machining. Reduced back forces result from adjusted inclination angle. Well-suited for positive, vibration-prone parts.





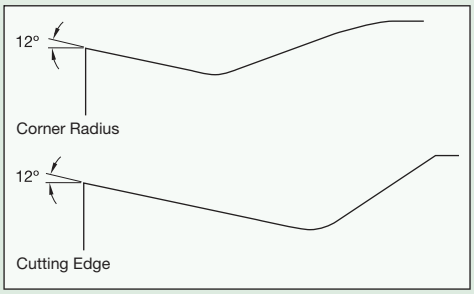
(continued)

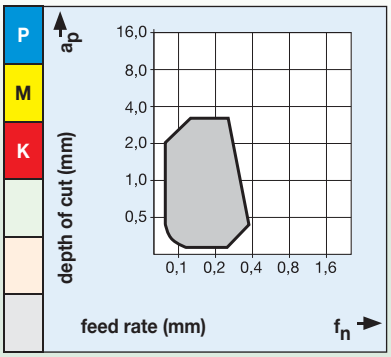
Negative Inserts *(continued)*

22



For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.

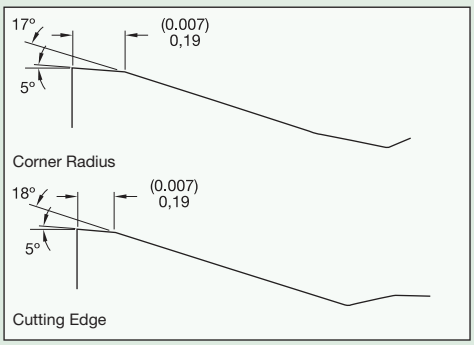


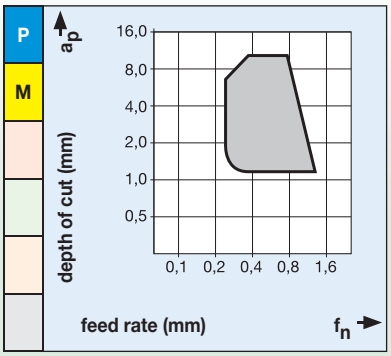


65



Rough-turning geometry with chip control extending to the medium-duty range. Positive rake angle lowers cutting forces, reducing power requirements. Used on low-tensile and stainless steels.

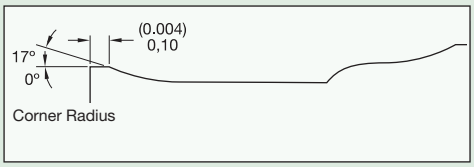


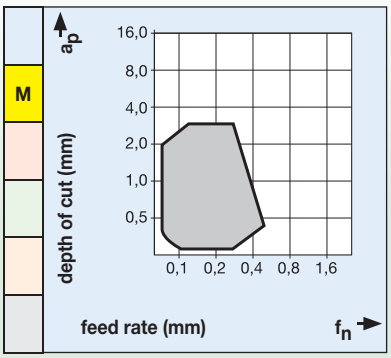


CT



Designed for outward copy turning. Where other geometries produce long chips, the unique distribution of the cut results in good chip control.

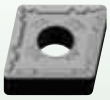




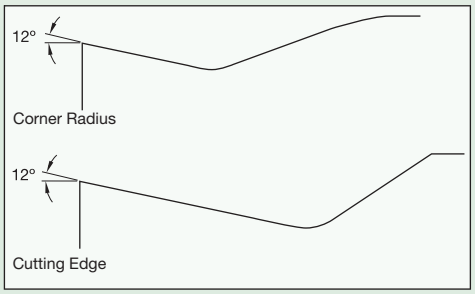
(continued)

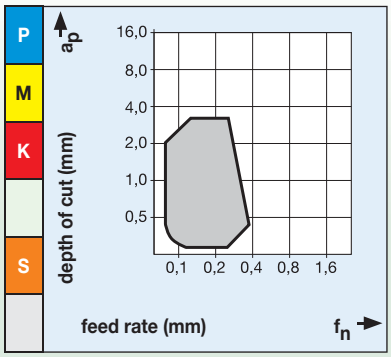
Negative Inserts *(continued)*

FF



For finish turning, producing smooth, accurate surfaces.
Very good chip control, especially at low depths of cut.

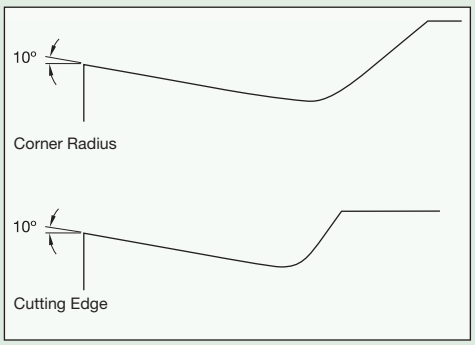


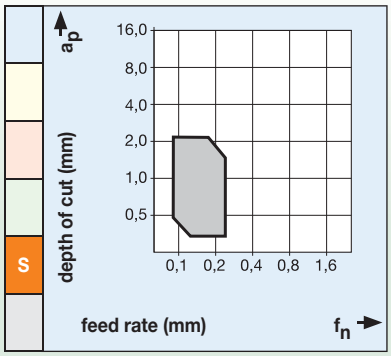


FS



For finishing applications. Ground periphery with positive cutting edge ideally suited for high-temp alloys. Micro finished edge on the ground periphery adds just a slight hone for improved edge integrity and reliability.

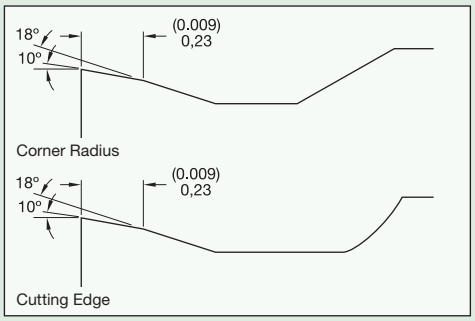


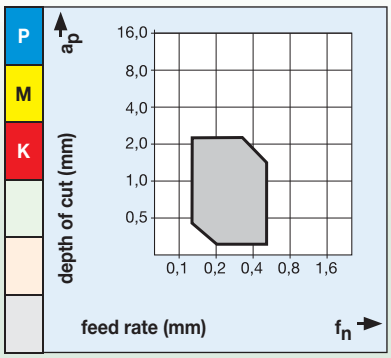


FW



Wiper geometry for finishing when good surface finish is needed using high feed rates.
First choice for high-performance finishing.

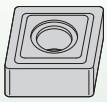




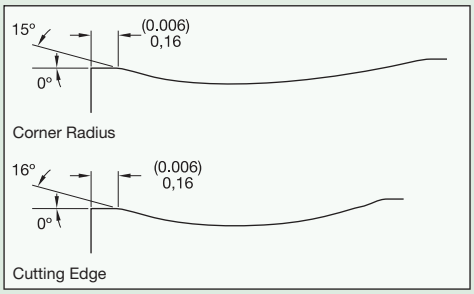
(continued)

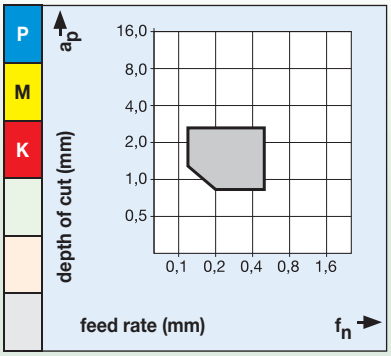
Negative Inserts *(continued)*

MG



For light machining to light roughing.

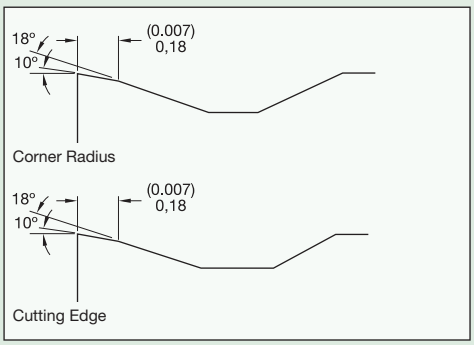


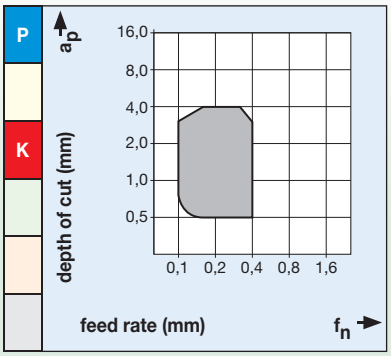


ML



For finishing to medium machining with a negative, stable cutting edge.

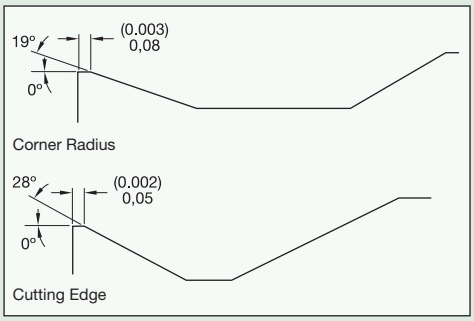


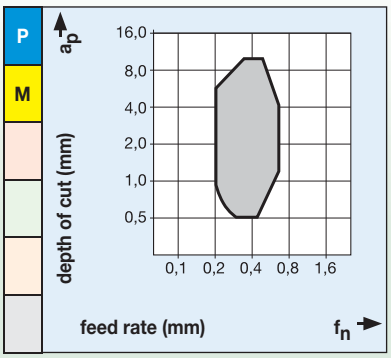


MR



For medium to light roughing of steels, difficult-to-machine high-alloy titanium, and aluminium materials. High strength to deal with heavy chip deformation.

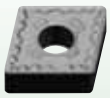




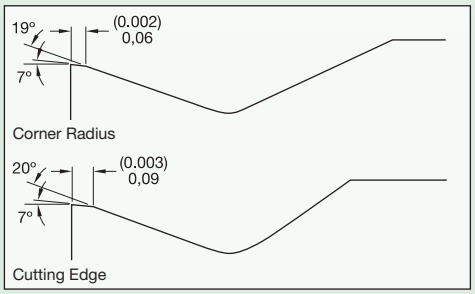
(continued)

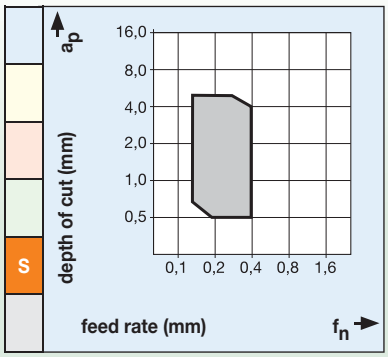
Negative Inserts *(continued)*

MS



For medium machining in high-temp materials. Utilises a micro-finished edge preparation to increase edge toughness.

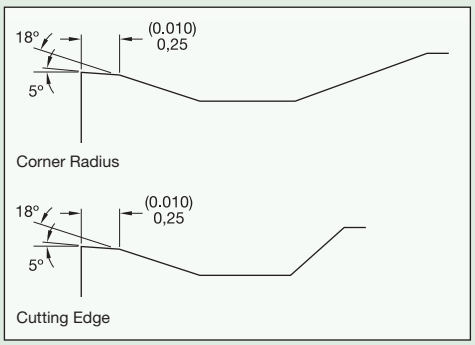


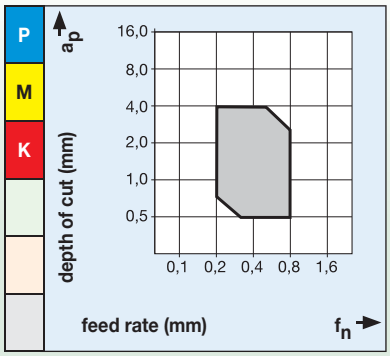


MW



Wiper geometry for light to medium turning with high feed rates. Feed twice as high as with edges with full corner radii to produce same surface finish.

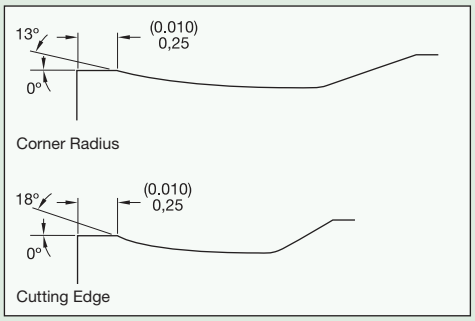


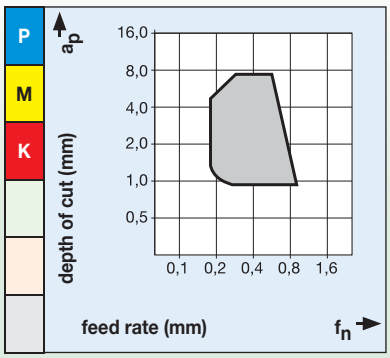


RH



For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin, or scale. Preferred for all cast iron, such as grey, malleable, and nodular.





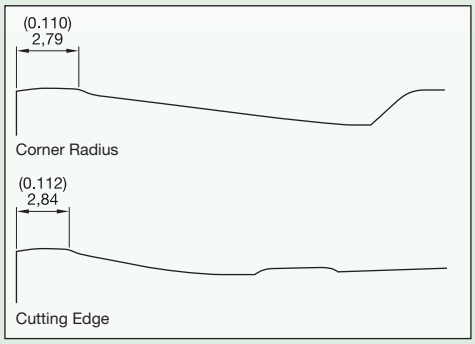
(continued)

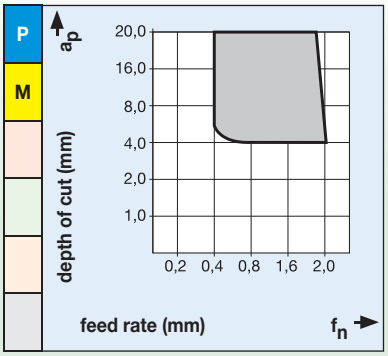
Negative Inserts *(continued)*

SR



A super roughing geometry. The SR has a strong cutting edge to support high cutting loads in roughing applications. Can produce high metal removal rates.

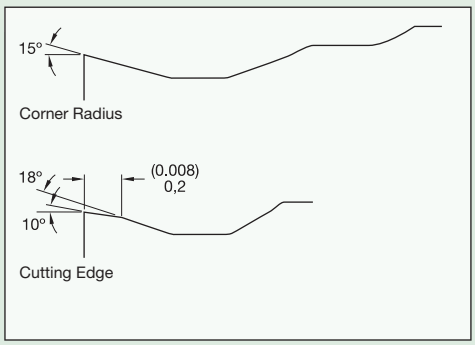


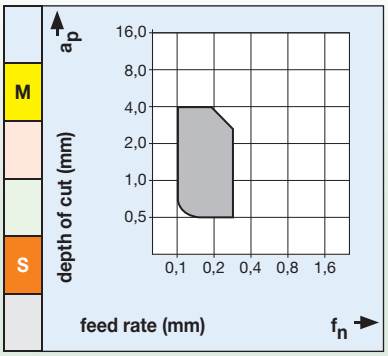


UF



For finishing with a positive cutting edge for reduced cutting forces and superior surface quality.

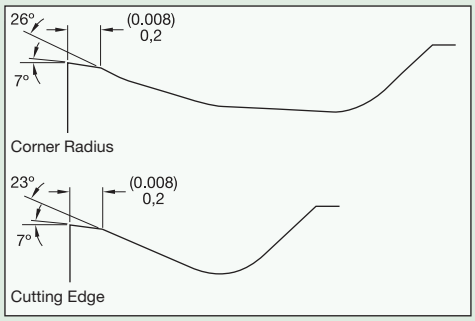


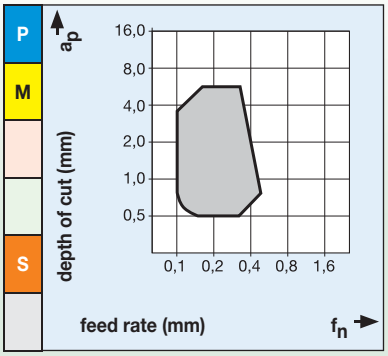


UM



For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.





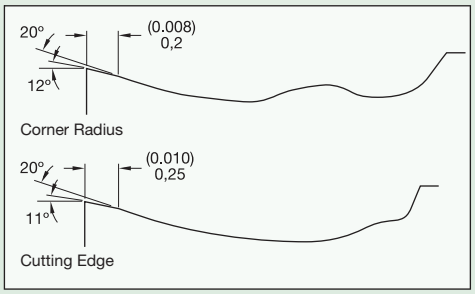
(continued)

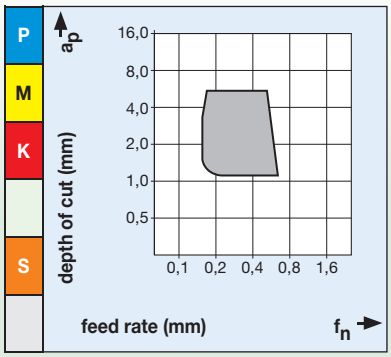
Negative Inserts *(continued)*

UR



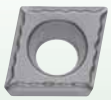
Roughing geometry with smooth chip forming and improved coolant flow for increased tool life. Positive geometry reduces cutting forces and improves depth-of-cut notching resistance. Ideally suitable for stainless steel applications and for smooth machining of steel.



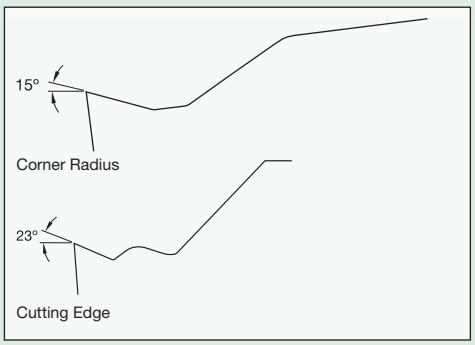


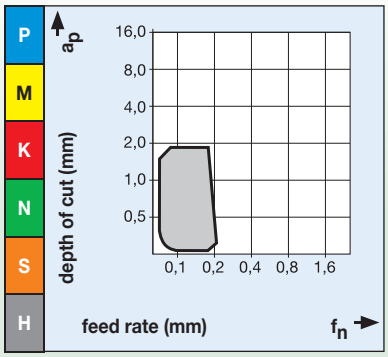
Positive Inserts

2



Sharp edge for finish machining. Good chip control with very small chip sections. High dimensional accuracy and smooth surface finishes. Inserts with .008" corner radius precision-ground on all sides.

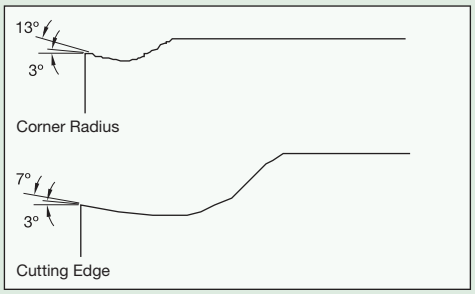


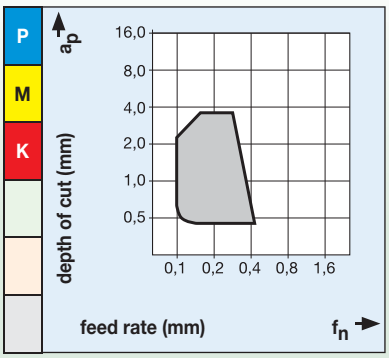


41



Preferred for light- to medium-duty machining. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range. Also used on short-chipping cast iron.





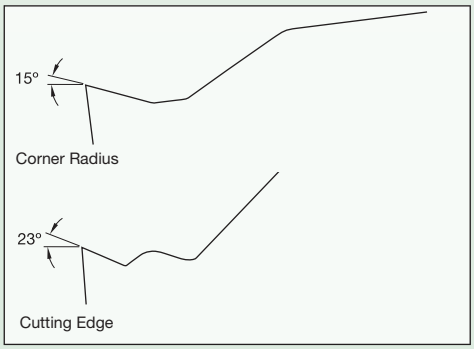
(continued)

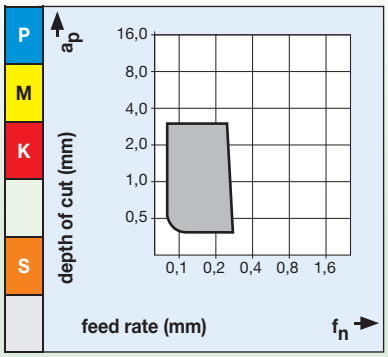
Positive Inserts *(continued)*

FP



For finishing to medium turning operations with optimal chip control over a wide range of cutting conditions and workpiece materials.

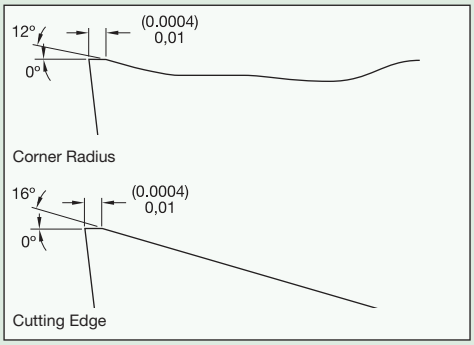


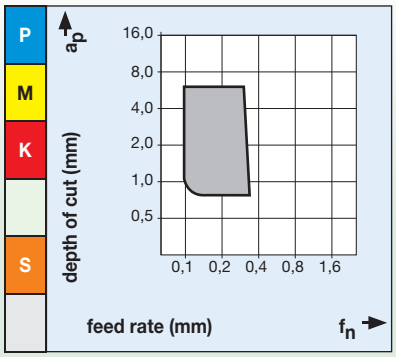


MP

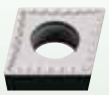


For medium to rough turning with reduced cutting forces and improved chip control for high feed rates. Suitable for high metal removal rates and spindling applications.

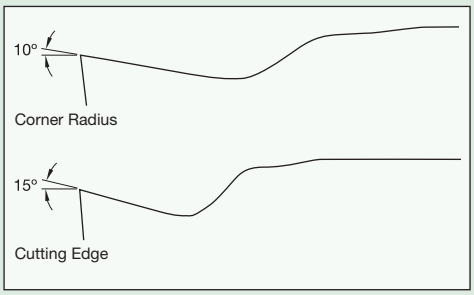


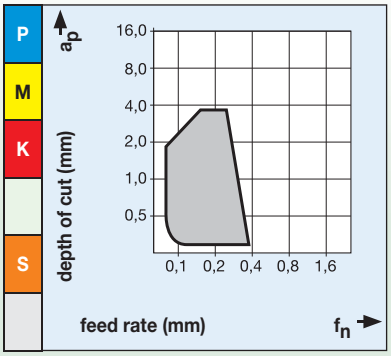


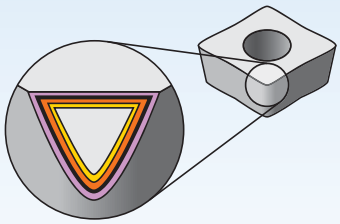
MU



A medium universal geometry with a soft cutting action due to its positive geometry. Has a versatile application range and is suited for turning unstable components and for boring applications.



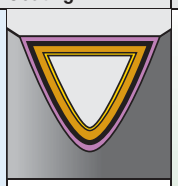
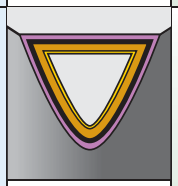
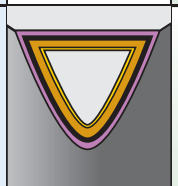
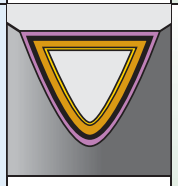
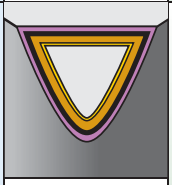
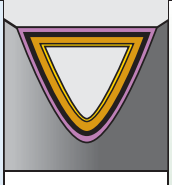


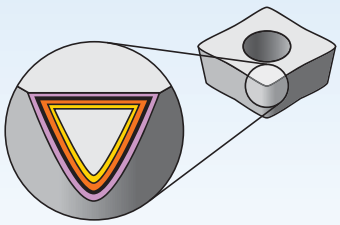


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Grade

Coating	Grade Description	wear resistance ← → toughness	05	10	15	20	25	30	35	40	45
WP15CT  HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good balance of wear resistance and toughness properties. High productivity machining on smooth to lightly interrupted cuts. For steels.	P		■	■	■					
		K				■	■				
WP25CT  HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good toughness properties. Excellent first choice for steel machining, high productivity metal removal for all but the harshest interrupted cuts.	P				■	■	■			
		K						■	■		
WP35CT  HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Proven on all roughing and heavy roughing operations, wet or dry, on interrupted and uninterrupted cuts.	P						■	■	■	
		M					■	■			
WM15CT  HC-M15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. High degree of wear resistance and good resistance to depth-of-cut notching for long tool life in finishing to medium turning applications.	P				■	■				
		M		■	■	■					
		S		■	■	■					
WM25CT  HC-M25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI series.	P							■	■	
		M				■	■	■			
		S				■	■	■			
WM35CT  HC-M35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN. Good toughness and wear resistance balance. For medium to roughing operations with light and heavily interrupted cuts.	P								■	■
		M						■	■	■	
		S						■	■	■	

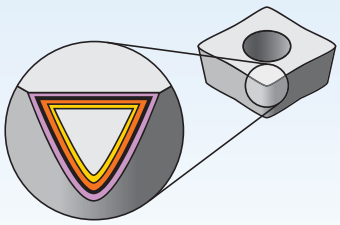


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ◄——► toughness

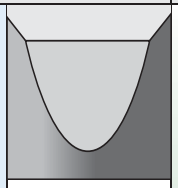
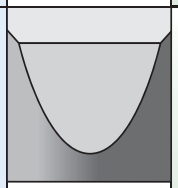
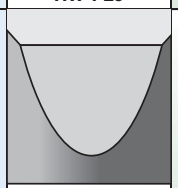
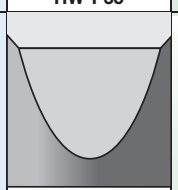
Grade	Coating		Grade Description		05	10	15	20	25	30	35	40	45
	WK05CT	HC-K05	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Increased wear resistance for long tool life at high cutting speeds. Enhanced edge strength against depth-of-cut notching in interrupted cuts. Maximum wear resistance for long tool life at high cutting speeds in finish to medium machining.	P	■								
				K	■	■	■	■					
	WK20CT	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. First choice for a wide range of machining on all grey and ductile irons, light to heavy machining, smooth or interrupted cuts, and wet or dry.	P		■	■						
				K			■	■	■				
	WS10PT	HC-S10	An advanced multilayer PVD coating over a very deformation-resistant unalloyed carbide substrate. The new and improved coating improves edge stability with wide range speed and feed capabilities. WS10PT™ is ideal for finishing to general machining of most workpiece materials at a wide range of speed and feed capabilities. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys with improved edge toughness and higher cutting speed and feed capabilities.	P	■	■	■	■					
				M		■	■	■					
				K		■	■	■					
				N		■	■	■					
				S		■	■	■					
				H		■							
	WS25PT	HC-S25	An advanced PVD grade with hard AlTiN coating and fine-grain unalloyed substrate. The new and improved coating improves edge stability with wide range speed and feed capabilities. WS25PT™ is ideal for general machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials at moderate speeds and over a wide range of feeds, with improved edge toughness for interrupted cut and high feed rates.	P				■	■	■			
				M				■	■	■			
				K				■	■	■			
				N				■	■	■			
				S				■	■	■			
	WU10HT	C3-C4	An uncoated, hard, low-binder content, unalloyed WC/Co fine-grain grade. WU10HT™ offers exceptional edge wear and superior thermal deformation and depth-of-cut notch resistance. The grain structure is well controlled for minimal pits and flaws, which contributes to long, reliable service.	M		■	■	■					
				N		■	■	■					
				S		■	■	■					



Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Grade

Coating		Grade Description	wear resistance ← → toughness	05	10	15	20	25	30	35	40	45
THM	 HW-K15	Uncoated carbide. Extraordinarily good balance of hardness, wear resistance, edge stability, and toughness. Light and medium machining. For cast iron, all non-ferrous metals, and non-metals. Useful in unfavourable conditions.	K									
			N									
			S									
			H									
TTM	 HW-P25	Uncoated carbide. Medium machining. For steel.	P									
			M									
TTR	 HW-P35	Uncoated carbide. Light and medium machining. For steel. To be used at low cutting speeds. Effective in unfavourable conditions.	P									
TTI15	 HT-P15	Cermet. Light machining. Extremely good wear resistance at higher cutting speeds. For steels and nodular cast iron. Recommended for high cutting speeds under favourable conditions.	P									
			M									
			K									

NOVO KNOWS CAD/CAM

With the addition of NOVO™ to your team, your CAD/CAM capabilities become much more accurate, streamlined, and productive.

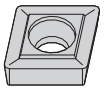
Before NOVO: The programmer would be in their CAD/CAM software, programming a part. Using the outdated method of finding a tool in a catalogue, and then manually inputting the tooling information from the catalogue into the CAD/CAM software.

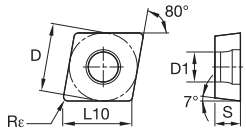
The concern is that assumptions are made, and only partial tooling information is entered.

With NOVO: The powerful digital intelligence of NOVO not only helps the programmer find the right tool for the metalcutting job, but also automatically integrates all the tooling data into a complete CAD/CAM solution. The integration of all the tooling data increases the viability of the part being programmed, and is delivered quickly — saving you time.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**





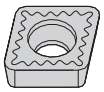


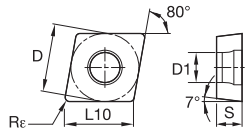
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CCMT

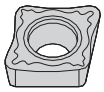
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202	6,35	6,45	2,38	0,2	2,80	■	■	■	■	■	■	■	■	■	■	■	2031658	-	-	-
CCMT060204	6,35	6,45	2,38	0,4	2,80	■	■	■	■	■	■	■	■	■	■	■	2031666	-	2031668	2031665
CCMT090304	9,53	9,67	3,18	0,4	4,40	■	■	■	■	■	■	■	■	■	■	■	2031693	-	2031695	-
CCMT090308	9,53	9,67	3,18	0,8	4,40	■	■	■	■	■	■	■	■	■	■	■	2031706	-	2027339	-
CCMT09T304	9,53	9,67	3,97	0,4	4,40	■	■	■	■	■	■	■	■	■	■	■	2031723	-	-	-
CCMT09T308	9,53	9,67	3,97	0,8	4,40	■	■	■	■	■	■	■	■	■	■	■	2027432	-	-	-
CCMT09T312	9,53	9,67	3,97	1,2	4,40	■	■	■	■	■	■	■	■	■	■	■	-	-	2027465	-
CCMT120408	12,70	12,90	4,76	0,8	5,50	■	■	■	■	■	■	■	■	■	■	■	2027472	-	2027484	-

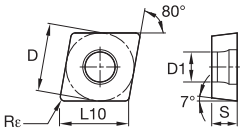




■ CCMT-2

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT0602042	6,35	6,45	2,38	0,4	2,80	■	■	■	■	■	■	■	■	■	■	■	■	-	-	2021947





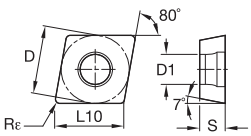
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CCMT-41

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT12040441	12,70	12,90	4,76	0,4	5,50	-	-	-	-	-	-	-	-	-	-	-	2010027	-	-	-
CCMT12040841	12,70	12,90	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2010061	-	-	-





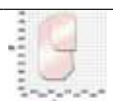
CCMT-FP

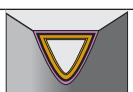
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202FP	6,35	6,45	2,38	0,2	2,80	4169857	4170140	-	-	4168778	-	-	-	-	-	-	-	-	-	-
CCMT060204FP	6,35	6,45	2,38	0,4	2,80	4169858	4170141	-	4168738	4168779	-	-	4170032	5684337	5684340	-	-	-	-	-
CCMT060208FP	6,35	6,45	2,38	0,8	2,80	4169859	4170142	-	4168739	4168780	-	-	4170083	5684342	5684344	-	-	-	-	-
CCMT09T302FP	9,53	9,67	3,97	0,2	4,40	-	4170293	-	-	4168781	-	-	-	-	-	-	-	-	-	-
CCMT09T304FP	9,53	9,67	3,97	0,4	4,40	4169860	4170294	-	4168740	4168782	-	-	4170084	5684341	5684343	-	-	-	-	-
CCMT09T308FP	9,53	9,67	3,97	0,8	4,40	4169861	4170295	-	4168741	4168783	-	-	4170085	-	5684338	-	-	-	-	-
CCMT120404FP	12,70	12,90	4,76	0,4	5,50	4169862	4170296	-	4168742	4168784	-	-	4170086	-	-	-	-	-	-	-
CCMT120408FP	12,70	12,90	4,76	0,8	5,50	4169993	4170297	-	4168763	4168785	-	-	4170087	-	-	-	-	-	-	-
CCMT120412FP	12,70	12,90	4,76	1,2	5,50	4169994	4170298	-	-	4168786	-	-	4170088	-	-	-	-	-	-	-


C2–C49

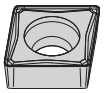

C50–C81

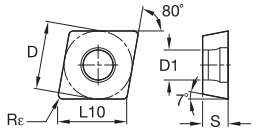

C86–C129


B8–B25


B26–B28


B30–B105



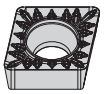


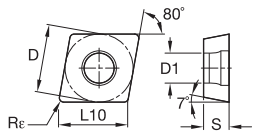
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CCMT-FW

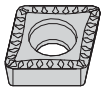
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060202FW	6,35	6,45	2,38	0,2	2,80	5623344	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CCMT060204FW	6,35	6,45	2,38	0,4	2,80	5623345	-	-	5623346	-	-	-	-	-	-	-	-	-	-	-
CCMT060208FW	6,35	6,45	2,38	0,8	2,80	5623347	-	-	5623348	-	-	-	-	-	-	-	-	-	-	-
CCMT09T304FW	9,53	9,67	3,97	0,4	4,40	5623349	-	-	5623470	-	-	-	-	-	-	-	-	-	-	-
CCMT09T308FW	9,53	9,67	3,97	0,8	4,40	5623473	-	-	-	-	-	-	-	-	-	-	-	-	-	-

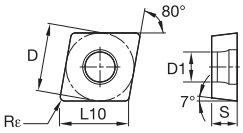




■ CCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060204MP	6,35	6,45	2,38	0,4	2,80	4170197	4170217	-	4168893	4168906	-	-	4170237	5684351	-	-	-	-	-	-
CCMT09T304MP	9,53	9,67	3,97	0,4	4,40	4170198	4170218	-	4168894	4168907	-	-	4170238	5684352	-	-	-	-	-	-
CCMT09T308MP	9,53	9,67	3,97	0,8	4,40	4170199	4170219	-	4168895	4168908	-	-	4170239	5684350	-	-	-	-	-	-
CCMT09T312MP	9,53	9,67	3,97	1,2	4,40	-	4170220	-	-	4168909	-	-	-	-	-	-	-	-	-	-
CCMT120408MP	12,70	12,90	4,76	0,8	5,50	4170200	4170221	-	4168896	4168910	-	-	4170240	5684349	-	-	-	-	-	-
CCMT120412MP	12,70	12,90	4,76	1,2	5,50	-	4170222	-	4168897	4168911	-	-	4170241	-	-	-	-	-	-	-



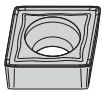


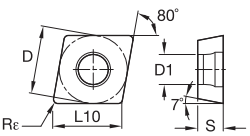
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT060208MU	6,35	6,45	2,38	0,8	2,80	-	-	-	-	5623159	-	-	5623158	-	-	-	-	-	-	-
CCMT090304MU	9,53	9,67	3,18	0,4	4,40	-	5623420	-	-	5623421	-	-	-	-	-	-	-	-	-	-
CCMT090308MU	9,53	9,67	3,18	0,8	4,40	5623425	5623424	-	-	5623423	-	-	-	-	-	-	-	-	-	-
CCMT09T304MU	9,53	9,67	3,97	0,4	4,40	5623431	5623430	-	-	5623427	-	5623429	5623432	5623428	5623426	-	-	-	-	-
CCMT09T308MU	9,53	9,67	3,97	0,8	4,40	5623434	5623436	5623439	-	5623435	-	-	5623433	-	5623437	-	-	-	-	-
CCMT120408MU	12,70	12,90	4,76	0,8	5,50	5623440	5623443	-	-	5623442	-	-	5623441	-	5623444	-	-	-	-	-





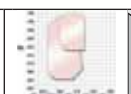
CCMT-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMT09T304MW	9,53	9,67	3,97	0,4	4,40	5623471	5623472	-	-	-	-	-	-	-	-	-	-	-	-	-
CCMT09T308MW	9,53	9,67	3,97	0,8	4,40	5623474	5623475	-	-	-	-	-	-	-	-	-	-	-	-	-
CCMT120404MW	12,70	12,90	4,76	0,4	5,50	5623476	5623477	-	-	-	-	-	-	-	-	-	-	-	-	-
CCMT120408MW	12,70	12,90	4,76	0,8	5,50	5623478	5623479	-	-	-	-	-	-	-	-	-	-	-	-	-


C2–C49

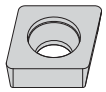

C50–C81

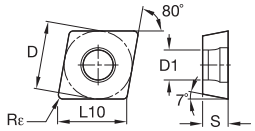

C86–C129


B8–B25


B26–B28


B30–B105



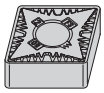


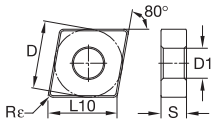
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CCMW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CCMW060202	6,35	6,45	2,38	0,2	2,80	I	I	I	I	I	I	I	I	I	I	I	2031733	I	I	I
CCMW060204	6,35	6,45	2,38	0,4	2,80	I	I	I	I	I	I	4170464	4170368	I	I	I	2027507	I	I	I
CCMW090302	9,53	9,67	3,18	0,2	4,40	I	I	I	I	I	I	I	I	I	I	I	2031734	I	I	I
CCMW090304	9,53	9,67	3,18	0,4	4,40	I	I	I	I	I	I	4170465	4170369	I	I	I	2027509	I	I	I
CCMW090308	9,53	9,67	3,18	0,8	4,40	I	I	I	I	I	I	4170466	4170370	I	I	I	I	I	I	I
CCMW09T304	9,53	9,67	3,97	0,4	4,40	I	I	I	I	I	I	4170467	4170371	I	I	I	2027511	I	I	I
CCMW09T308	9,53	9,67	3,97	0,8	4,40	I	I	I	I	I	I	4170468	4170372	I	I	I	2027512	I	I	I
CCMW120404	12,70	12,90	4,76	0,4	5,50	I	I	I	I	I	I	4170469	4170373	I	I	I	2027524	I	I	I
CCMW120408	12,70	12,90	4,76	0,8	5,50	I	I	I	I	I	I	4170470	4170374	I	I	I	2027525	I	I	I



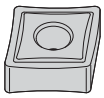


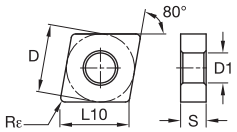
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTi15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTi15
CNGG120401FS	12,70	12,90	4,76	0,1	5,16	-	-	-	-	-	-	-	-	5548576	-	-	-	-	-	-
CNGG120402FS	12,70	12,90	4,76	0,2	5,16	-	-	-	-	-	-	-	-	5548575	-	-	-	-	-	-
CNGG120404FS	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5548577	5538204	5549945	-	-	-	-
CNGG120408FS	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548578	5538205	5549946	-	-	-	-
CNGG120412FS	12,70	12,90	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5548579	-	-	-	-	-	-





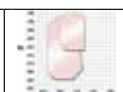
■ CNGP

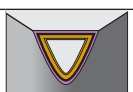
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTi15
CNGP120401	12,70	12,90	4,76	0,1	5,16	-	-	-	-	-	-	-	-	5549137	-	-	-	-	-	-
CNGP120402	12,70	12,90	4,76	0,2	5,16	-	-	-	-	-	-	-	-	5549138	-	5549206	-	-	-	-
CNGP120404	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5549139	-	5549207	-	-	-	-
CNGP120408	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5549190	-	5549208	-	-	-	-


C2–C49

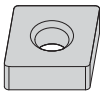

C50–C81

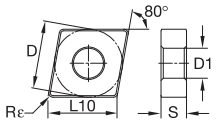

C86–C129


B8–B25


B26–B28


B30–B105



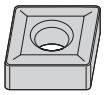


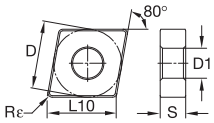
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMA120404	12,70	12,90	4,76	0,4	5,16	I	I	I	I	I	I	4171595	4171863	I	I	I	I	I	I	I
CNMA120408	12,70	12,90	4,76	0,8	5,16	I	I	I	I	I	I	4171596	4171864	I	I	I	I	I	I	I
CNMA120412	12,70	12,90	4,76	1,2	5,16	I	I	I	I	I	I	4171597	4171865	I	I	I	I	I	I	I
CNMA120416	12,70	12,90	4,76	1,6	5,16	I	I	I	I	I	I	4171598	4171866	I	I	I	I	I	I	I
CNMA160608	15,88	16,12	6,35	0,8	6,35	I	I	I	I	I	I	I	4171867	I	I	I	I	I	I	I
CNMA160612	15,88	16,12	6,35	1,2	6,35	I	I	I	I	I	I	4171599	4171868	I	I	I	I	I	I	I
CNMA160616	15,88	16,12	6,35	1,6	6,35	I	I	I	I	I	I	4171600	4171869	I	I	I	I	I	I	I
CNMA190608	19,05	19,34	6,35	0,8	7,93	I	I	I	I	I	I	4171601	4171870	I	I	I	I	I	I	I
CNMA190612	19,05	19,34	6,35	1,2	7,93	I	I	I	I	I	I	4171602	4171871	I	I	I	I	I	I	I
CNMA190616	19,05	19,34	6,35	1,6	7,93	I	I	I	I	I	I	4171633	4171872	I	I	I	I	I	I	I



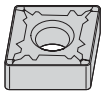


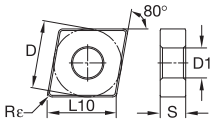
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CNMG

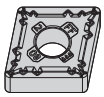
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	-	-	-	2559561	-	-	-
CNMG120408	12,70	12,90	4,76	0,8	5,16	-	-	-	-	-	-	-	-	-	-	-	2027567	-	-	-
CNMG190612	19,05	19,34	6,35	1,2	7,93	-	-	-	-	-	-	-	-	-	-	-	2559382	-	-	-
CNMG190616	19,05	19,34	6,35	1,6	7,93	-	-	-	-	-	-	-	-	-	-	-	2559317	-	-	-

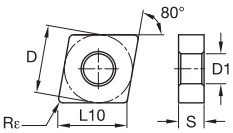




CNMG-22

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG12040422	12,70	12,90	4,76	0,4	5,16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2010175

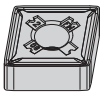


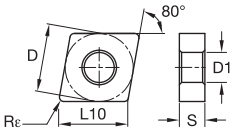


CNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404FF	12,70	12,90	4,76	0,4	5,16	4171025	-	-	-	4172345	-	-	4171318	5684271	-	-	-	-	-	-
CNMG120408FF	12,70	12,90	4,76	0,8	5,16	4171026	-	-	-	4172346	-	-	4171319	5684272	-	-	-	-	-	-
CNMG120412FF	12,70	12,90	4,76	1,2	5,16	4171027	-	-	-	4172347	-	-	4171320	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105





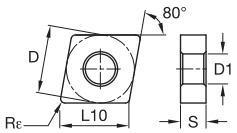
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-FW

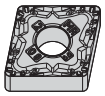
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404FW	12,70	12,90	4,76	0,4	5,16	-	-	-	4171755	4172702	-	4171680	-	-	-	-	-	-	-	-
CNMG120408FW	12,70	12,90	4,76	0,8	5,16	5623480	-	-	4171756	4173103	-	4171681	-	-	-	-	-	-	-	-
CNMG120412FW	12,70	12,90	4,76	1,2	5,16	5623481	-	-	4171757	4173104	-	4171683	-	-	-	-	-	-	-	-

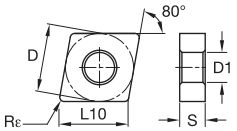




■ CNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404ML	12,70	12,90	4,76	0,4	5,16	4171059	4170458	-	-	-	-	4171657	4171390	-	-	-	-	-	-	-
CNMG120408ML	12,70	12,90	4,76	0,8	5,16	4171060	4170459	-	-	-	-	4171658	4171391	-	-	-	-	-	-	-
CNMG120412ML	12,70	12,90	4,76	1,2	5,16	4171348	4170460	-	-	-	-	4171659	4171392	-	-	-	-	-	-	-
CNMG120416ML	12,70	12,90	4,76	1,6	5,16	-	5684346	-	-	-	-	-	4171393	-	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-MR

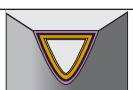
ISO catalogue number	D	L10	S	Rε	D1													
CNMG120404MR	12,70	12,90	4,76	0,4	5,16	4171130	4170546	4170043	-	-	-	-	-	-	-	-	-	-
CNMG120408MR	12,70	12,90	4,76	0,8	5,16	4171131	4170547	4170044	-	4172955	4173120	-	-	-	-	-	-	-
CNMG120412MR	12,70	12,90	4,76	1,2	5,16	4171132	4170548	4170045	-	4172956	4173121	-	-	-	-	-	-	-
CNMG120416MR	12,70	12,90	4,76	1,6	5,16	4171133	5684353	-	-	4172957	4173122	-	-	-	-	-	-	-
CNMG160608MR	15,88	16,12	6,35	0,8	6,35	4171134	4170549	-	-	4172958	4173133	-	-	-	-	-	-	-
CNMG160612MR	15,88	16,12	6,35	1,2	6,35	4171135	4170550	4170046	-	4172959	4173134	-	-	-	-	-	-	-
CNMG160616MR	15,88	16,12	6,35	1,6	6,35	4171136	4170551	4170047	-	4172960	4173135	-	-	-	-	-	-	-
CNMG190612MR	19,05	19,34	6,35	1,2	7,93	4171137	4170552	4170048	-	4172961	4173136	-	-	-	-	-	-	-
CNMG190616MR	19,05	19,34	6,35	1,6	7,93	4171138	4170563	4170049	-	4172962	4173137	-	-	-	-	-	-	-


C2–C49

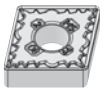

C50–C81

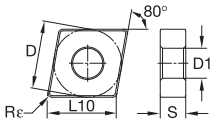

C86–C129


B8–B25


B26–B28


B30–B105



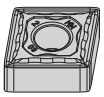


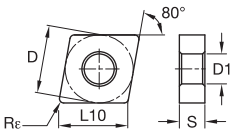
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○	●	●	●	
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-MS

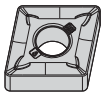
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404MS	12,70	12,90	4,76	0,4	5,16	■	■	■	■	■	■	■	■	5908742	5908743	5908744	■	■	■	■
CNMG120408MS	12,70	12,90	4,76	0,8	5,16	■	■	■	■	■	■	■	■	5908745	5908746	5908747	■	■	■	■
CNMG120412MS	12,70	12,90	4,76	1,2	5,16	■	■	■	■	■	■	■	■	5908748	5908749	5908750	■	■	■	■
CNMG120416MS	12,70	12,90	4,76	1,6	5,16	■	■	■	■	■	■	■	■	5908751	5908752	5908753	■	■	■	■
CNMG160608MS	15,88	16,12	6,35	0,8	6,35	■	■	■	■	■	■	■	■	5908754	5908755	5908756	■	■	■	■
CNMG160612MS	15,88	16,12	6,35	1,2	6,35	■	■	■	■	■	■	■	■	5908757	5908758	5908759	■	■	■	■
CNMG190608MS	19,05	19,34	6,35	0,8	7,93	■	■	■	■	■	■	■	■	5908760	5908761	5908762	■	■	■	■
CNMG190612MS	19,05	19,34	6,35	1,2	7,92	■	■	■	■	■	■	■	■	5908763	5908764	5908765	■	■	■	■
CNMG190616MS	19,05	19,34	6,35	1,6	7,92	■	■	■	■	■	■	■	■	5908766	5908767	5908768	■	■	■	■

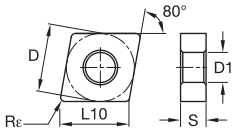




■ CNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120408MW	12,70	12,90	4,76	0,8	5,16	■	■	■	■	4173112	■	4171682	■	■	■	■	■	■	■	■
CNMG120412MW	12,70	12,90	4,76	1,2	5,16	■	■	■	■	4173113	■	4171684	■	■	■	■	■	■	■	■





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

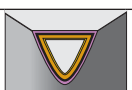
■ CNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120408RH	12,70	12,90	4,76	0,8	5,16	4170979	4171504	5684356	-	4173035	-	-	4171903	-	-	-	-	-	-	-
CNMG120412RH	12,70	12,90	4,76	1,2	5,16	4170980	4171505	4171698	-	4173036	-	-	4171904	-	-	-	-	-	-	-
CNMG120416RH	12,70	12,90	4,76	1,6	5,16	4170981	4171506	4171699	-	4173037	-	-	4171905	-	-	-	-	-	-	-
CNMG160608RH	15,88	16,12	6,35	0,8	6,35	4170982	4171507	4171700	-	4173038	-	-	4171906	-	-	-	-	-	-	-
CNMG160612RH	15,88	16,12	6,35	1,2	6,35	4170983	4171508	4171701	-	4173039	-	-	4171907	-	-	-	-	-	-	-
CNMG160616RH	15,88	16,12	6,35	1,6	6,35	4170984	4171509	4171702	-	4173040	-	-	4171908	-	-	-	-	-	-	-
CNMG190608RH	19,05	19,34	6,35	0,8	7,93	4170985	4171510	4171703	-	4173041	-	-	4171909	-	-	-	-	-	-	-
CNMG190612RH	19,05	19,34	6,35	1,2	7,93	4170986	4171511	4171704	-	4173042	-	-	4171910	-	-	-	-	-	-	-
CNMG190616RH	19,05	19,34	6,35	1,6	7,93	4170987	4171512	4171705	-	4173043	-	-	4171911	-	-	-	-	-	-	-
CNMG190624RH	19,05	19,34	6,35	2,4	7,93	4170988	4171523	4171706	-	4173044	-	-	-	-	-	-	-	-	-	-

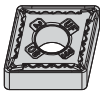

C2–C49

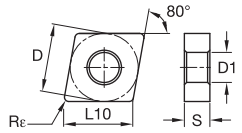
C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



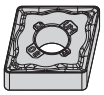


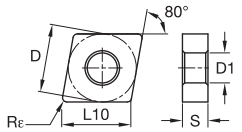
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-UF

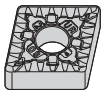
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404UF	12,70	12,90	4,76	0,4	5,16	5645589	-	-	4169353	4169379	-	-	-	5645600	-	-	-	-	-	-
CNMG120408UF	12,70	12,90	4,76	0,8	5,16	-	-	-	4169354	4169380	-	-	-	5645588	-	-	-	-	-	-
CNMG120412UF	12,70	12,90	4,76	1,2	5,16	-	-	-	4169355	4169381	-	-	-	-	-	-	-	-	-	-

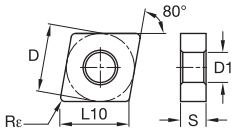




■ CNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMG120404UM	12,70	12,90	4,76	0,4	5,16	-	-	-	4172334	4172380	4172410	-	-	5645217	-	-	-	-	-	-
CNMG120408UM	12,70	12,90	4,76	0,8	5,16	5645250	5645219	-	4172335	4172381	4172411	-	-	-	-	-	-	-	-	-
CNMG120412UM	12,70	12,90	4,76	1,2	5,16	-	-	-	4172336	4172382	4172412	-	-	5301414	-	-	-	-	-	-





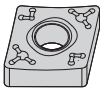
● first choice
○ alternate choice

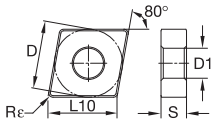
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMG-UR

ISO catalogue number	D	L10	S	Rε	D1												
CNMG120404UR	12,70	12,90	4,76	0,4	5,16	4171022	4170500	-	4169406	4169444	4169479	-	-	5578894	5578895	-	-	-	-	-
CNMG120408UR	12,70	12,90	4,76	0,8	5,16	4171093	4170501	4169960	4169407	4169445	4169480	5680086	5680085	5301400	5301402	-	-	-	-	-
CNMG120412UR	12,70	12,90	4,76	1,2	5,16	4171094	4170502	4169961	4169408	4169446	4169481	5680087	4171419	5301413	5301416	-	-	-	-	-
CNMG120416UR	12,70	12,90	4,76	1,6	5,16	4171095	4170503	-	4169409	4169447	4169482	-	4171420	5680089	5680170	-	-	-	-	-
CNMG160608UR	15,88	16,12	6,35	0,8	6,35	4171096	4170504	-	4169410	4169448	4169483	-	4171421	5578896	5578897	-	-	-	-	-
CNMG160612UR	15,88	16,12	6,35	1,2	6,35	4171097	4170505	4169962	4169411	4169449	4169484	-	4171422	5578898	-	-	-	-	-	-
CNMG160616UR	15,88	16,12	6,35	1,6	6,35	4171098	4170506	4169963	-	4169450	4169485	-	4171423	5578900	5578901	-	-	-	-	-
CNMG190612UR	19,05	19,34	6,35	1,2	7,93	4171099	4170507	4169964	4169412	4169451	4169486	5680088	4171424	5578902	5512536	-	-	-	-	-
CNMG190616UR	19,05	19,34	6,35	1,6	7,93	4171100	4170508	4169965	4169423	4169452	4169487	-	4171425	5345183	5579234	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



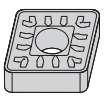


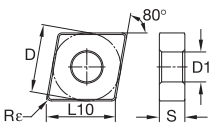
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ CNMM-65

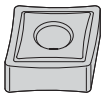
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMM12040865	12,70	12,90	4,76	0,8	5,16	5698348	5698349	5698360	-	5698347	-	-	-	-	-	-	-	-	-	-
CNMM12041265	12,70	12,90	4,76	1,2	5,16	5698362	5698363	-	-	5698361	-	-	-	-	-	-	-	-	-	-
CNMM12041665	12,70	12,90	4,76	1,6	5,16	-	5698365	-	-	5698364	-	-	-	-	-	-	-	-	-	-
CNMM16060865	15,88	16,12	6,35	0,8	6,35	-	5698366	5698367	-	-	-	-	-	-	-	-	-	-	-	-
CNMM16061265	15,88	16,12	6,35	1,2	6,35	5698369	5698370	5698371	-	5698368	-	-	-	-	-	-	-	-	-	-
CNMM16061665	15,88	16,12	6,35	1,6	6,35	5698372	5698373	-	-	-	-	-	-	-	-	-	-	-	-	-
CNMM19061265	19,05	19,34	6,35	1,2	7,93	-	-	5698376	-	5698374	-	-	-	-	-	-	-	-	-	-
CNMM19061665	19,05	19,34	6,35	1,6	7,93	5698378	-	-	-	5698377	-	-	-	-	-	-	-	-	-	-
CNMM19062465	19,05	19,34	6,35	2,4	7,93	5698410	5698411	-	-	5698379	-	-	-	-	-	-	-	-	-	-

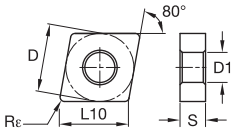




■ CNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMM190616SR	19,05	19,34	6,35	1,6	7,93	5696643	-	-	-	5696642	-	-	-	-	-	-	-	-	-	-
CNMM190624SR	19,05	19,34	6,35	2,4	7,93	-	-	5696644	-	-	-	-	-	-	-	-	-	-	-	-
CNMM250924SR	25,40	25,79	9,53	2,4	9,12	5696645	5696646	5696647	-	-	-	-	-	-	-	-	-	-	-	-



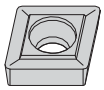


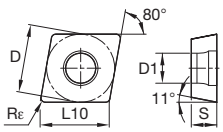
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CNMP120404	12,70	12,90	4,76	0,4	5,16	-	-	-	4171585	4173552	4173681	-	-	4172439	-	-	-	-	-	-
CNMP120408	12,70	12,90	4,76	0,8	5,16	-	-	-	4171586	4173653	4173682	-	-	4172440	4172614	-	-	-	-	-
CNMP120412	12,70	12,90	4,76	1,2	5,16	-	-	-	4171587	4173654	4173693	-	-	4172441	4172615	-	-	-	-	-
CNMP160608	15,88	16,12	6,35	0,8	6,35	-	-	-	4171588	4173655	4173694	-	-	-	-	-	-	-	-	-
CNMP160612	15,88	16,12	6,35	1,2	6,35	-	-	-	4171589	4173656	4173695	-	-	4172442	-	-	-	-	-	-
CNMP190612	19,05	19,34	6,35	1,2	7,93	-	-	-	-	-	-	-	-	4172483	-	-	-	-	-	-
CNMP190616	19,05	19,34	6,35	1,6	7,93	-	-	-	4171590	4173657	4173696	-	-	-	-	-	-	-	-	-





CPGT-3

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPGT04T1043	4,76	4,83	1,98	0,4	2,15	-	-	-	-	-	-	-	-	-	-	-	-	-	2022082	-


C2–C49


C50–C81

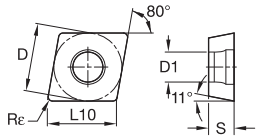

C86–C129


B8–B25


B26–B28


B30–B105



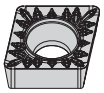


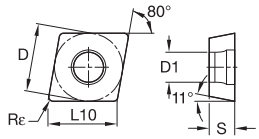
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

CPMT-FP

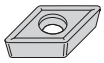
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPMT060202FP	6,35	6,45	2,38	0,2	2,80	4170015	4170325	-	-	4168822	-	-	-	-	-	-	-	-	-	-
CPMT060204FP	6,35	6,45	2,38	0,4	2,80	4170016	4170326	-	4168812	4168823	-	-	4170105	-	-	-	-	-	-	-
CPMT060208FP	6,35	6,45	2,38	0,8	2,80	4170017	4170327	-	4168813	4168824	-	-	4170106	-	-	-	-	-	-	-
CPMT09T302FP	9,53	9,67	3,97	0,2	4,40	-	-	-	-	4168825	-	-	-	-	-	-	-	-	-	-
CPMT09T304FP	9,53	9,67	3,97	0,4	4,40	4170018	4170328	-	4168814	4168826	-	-	4170107	-	-	-	-	-	-	-
CPMT09T308FP	9,53	9,67	3,97	0,8	4,40	4170019	4170329	-	4168815	4168827	-	-	4170108	-	-	-	-	-	-	-

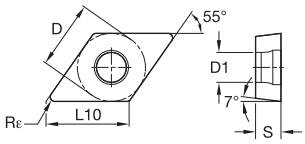




CPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
CPMT060208MP	6,35	6,45	2,38	0,8	2,80	4170255	4170257	-	-	-	-	-	-	-	-	-	-	-	-	-
CPMT09T308MP	9,53	9,67	3,97	0,8	4,40	4170256	4170258	-	4168923	-	-	-	4170266	-	-	-	-	-	-	-
CPMT09T312MP	9,53	9,67	3,97	1,2	4,40	-	4170259	-	4168924	-	-	-	4170267	-	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

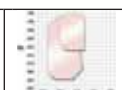
■ DCMT

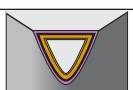
ISO catalogue number	D	L10	S	Rε	D1													
DCMT070204	6,35	7,75	2,38	0,4	2,80	-	-	-	-	-	-	-	-	-	-	-	2027768	-	-	-
DCMT11T304	9,53	11,63	3,97	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	2027805	-	2027807	2027804
DCMT11T308	9,53	11,63	3,97	0,8	4,40	-	-	-	-	-	-	-	-	-	-	-	2027843	-	-	-
DCMT11T312	9,53	11,63	3,97	1,2	4,40	-	-	-	-	-	-	-	-	-	-	-	2027868	-	-	-
DCMT150404	12,70	15,50	4,76	0,4	5,50	-	-	-	-	-	-	-	-	-	-	-	2027887	-	-	-
DCMT150408	12,70	15,50	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2027908	-	2027910	-
DCMT150412	12,70	15,50	4,76	1,2	5,50	-	-	-	-	-	-	-	-	-	-	-	2027932	-	-	-
DCMT150416	12,70	15,50	4,76	1,6	5,50	-	-	-	-	-	-	-	-	-	-	-	2027965	-	-	-


C2–C49

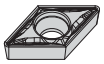

C50–C81

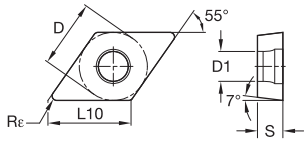

C86–C129


B8–B25


B26–B28


B30–B105



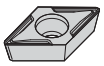


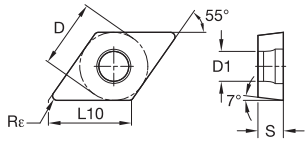
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DCMT-FP

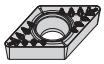
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT070202FP	6,35	7,75	2,38	0,2	2,80	-	4170299	-	-	4168787	-	-	-	-	-	-	-	-	-	-
DCMT070204FP	6,35	7,75	2,38	0,4	2,80	4169995	4170300	-	4168764	4168788	-	-	4170089	-	-	-	-	-	-	-
DCMT070208FP	6,35	7,75	2,38	0,8	2,80	-	4170301	-	-	4168789	-	-	-	-	-	-	-	-	-	-
DCMT11T302FP	9,53	11,63	3,97	0,2	4,40	4169996	4170302	-	-	4168790	-	-	-	-	-	-	-	-	-	-
DCMT11T304FP	9,53	11,63	3,97	0,4	4,40	4169997	4170303	-	4168765	4168791	-	-	4170090	-	-	-	-	-	-	-
DCMT11T308FP	9,53	11,63	3,97	0,8	4,40	4169998	4170304	-	4168766	4168792	-	-	4170091	-	-	-	-	-	-	-
DCMT11T312FP	9,53	11,63	3,97	1,2	4,40	4169999	4170305	-	-	-	-	-	-	-	-	-	-	-	-	-
DCMT150404FP	12,70	15,50	4,76	0,4	5,50	4170000	4170306	-	-	4168793	-	-	-	-	-	-	-	-	-	-
DCMT150408FP	12,70	15,50	4,76	0,8	5,50	4170001	4170307	-	-	4168794	-	-	4170092	-	-	-	-	-	-	-

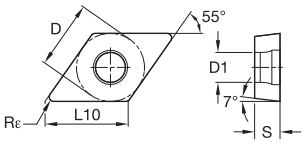




■ DCMT-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304FW	9,53	11,63	3,97	0,2	4,40	5623482	-	-	5623483	-	-	-	-	-	-	-	-	-	-	-
DCMT11T308FW	9,53	11,63	3,97	0,8	4,40	5623486	-	-	5623487	-	-	-	-	-	-	-	-	-	-	-



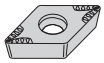


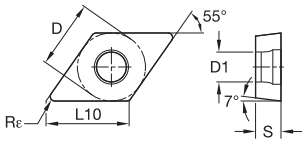
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MP	9,53	11,63	3,97	0,4	4,40	4170201	4170223	-	-	-	-	-	4170242	-	-	-	-	-	-	-
DCMT11T308MP	9,53	11,63	3,97	0,8	4,40	4170202	4170224	-	4168898	4168912	-	-	4170243	-	-	-	-	-	-	-
DCMT11T312MP	9,53	11,63	3,97	1,2	4,40	4170213	4170225	-	-	-	-	-	-	-	-	-	-	-	-	-





■ DCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MU	9,53	11,63	3,97	0,4	4,40	5623585	5623583	-	-	5623581	-	5623586	5623587	5623582	5623584	-	-	-	-	-
DCMT11T308MU	9,52	11,63	3,97	0,8	4,40	5623600	-	-	-	5623588	-	5623602	5623589	5623601	5623603	-	-	-	-	-
DCMT150408MU	12,70	15,50	4,76	0,8	5,50	5623606	5623608	-	-	5623604	-	5623605	5623607	5623609	5623610	-	-	-	-	-
DCMT150412MU	12,70	15,50	4,76	1,2	5,50	-	-	-	-	-	-	5623611	5623612	-	-	-	-	-	-	-


C2–C49

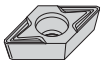

C50–C81

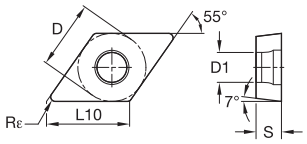

C86–C129


B8–B25


B26–B28


B30–B105



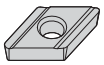


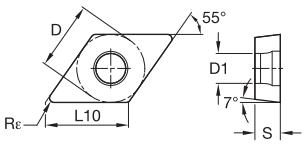
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DCMT-MW

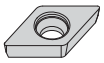
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMT11T304MW	9,52	11,63	3,97	0,2	4,40	5623484	5623485	-	-	-	-	-	-	-	-	-	-	-	-	-
DCMT11T308MW	9,53	11,63	3,97	0,8	4,40	5623488	5623489	-	-	-	-	-	-	-	-	-	-	-	-	-

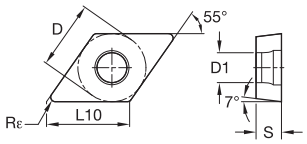




■ DCMX-18

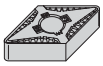
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMX11T302R18	9,53	11,63	3,97	0,2	4,30	-	-	-	-	-	-	-	-	-	-	-	2011507	-	-	-

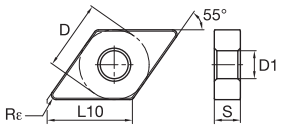




■ DCMW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DCMW070204	6,35	7,75	2,38	0,4	2,80	-	-	-	-	-	-	4170471	4170375	-	-	-	2027966	-	-	-
DCMW11T304	9,53	11,63	3,97	0,4	4,40	-	-	-	-	-	-	4170472	4170376	-	-	-	2027967	-	-	-
DCMW150408	12,70	15,50	4,76	0,8	5,50	-	-	-	-	-	-	4170473	4170377	-	-	-	2031737	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

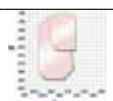
■ DNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNGG110402FS	9,52	11,63	4,76	0,2	3,81	-	-	-	-	-	-	-	-	5548670	5538206	5549947	-	-	-	-
DNGG110404FS	9,52	11,63	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5548671	-	5549948	-	-	-	-
DNGG110408FS	9,52	11,63	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5548672	-	5549949	-	-	-	-
DNGG150401FS	12,70	15,50	4,76	0,1	5,16	-	-	-	-	-	-	-	-	5548674	-	5549991	-	-	-	-
DNGG150402FS	12,70	15,50	4,76	0,2	5,16	-	-	-	-	-	-	-	-	5548673	-	5549990	-	-	-	-
DNGG150404FS	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5548675	5538207	5549992	-	-	-	-
DNGG150408FS	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548676	5538208	5549993	-	-	-	-
DNGG150412FS	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5548677	-	5549994	-	-	-	-
DNGG150604FS	12,70	15,50	6,35	0,4	5,16	-	-	-	-	-	-	-	-	5548678	5538209	5549995	-	-	-	-
DNGG150608FS	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	-	-	-	5548679	5538230	5549996	-	-	-	-


C2–C49

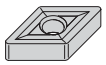

C50–C81

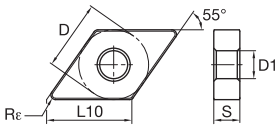

C86–C129


B8–B25


B26–B28


B30–B105



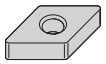


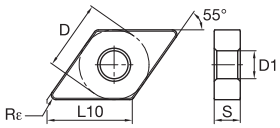
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

DNGP

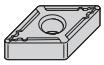
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNGP150401	12,70	15,50	4,76	0,1	5,16	-	-	-	-	-	-	-	-	5549191	-	-	-	-	-	-
DNGP150402	12,70	15,50	4,76	0,2	5,16	-	-	-	-	-	-	-	-	5549192	-	-	-	-	-	-
DNGP150404	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5549193	-	5549209	-	-	-	-
DNGP150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5549194	-	5549210	-	-	-	-

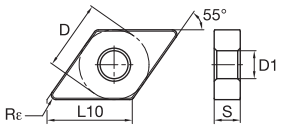




DNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMA110408	9,53	11,63	4,76	0,8	3,81	-	-	-	-	-	-	4171634	4171873	-	-	-	-	-	-	-
DNMA110412	9,53	11,63	4,76	1,2	3,81	-	-	-	-	-	-	-	4171874	-	-	-	-	-	-	-
DNMA150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	4171635	4171875	-	-	-	-	-	-	-
DNMA150412	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	4171636	4171876	-	-	-	-	-	-	-
DNMA150416	12,70	15,50	4,76	1,6	5,16	-	-	-	-	-	-	-	4171877	-	-	-	-	-	-	-
DNMA150608	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	-	4171637	4171878	-	-	-	-	-	-	-
DNMA150612	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	-	4171638	4171879	-	-	-	-	-	-	-
DNMA150616	12,70	15,50	6,35	1,6	5,16	-	-	-	-	-	-	-	4171880	-	-	-	-	-	-	-



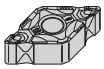


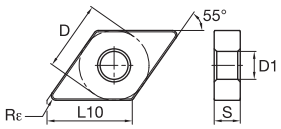
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-22

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG11040822	9,53	11,63	4,76	0,8	3,81	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮	2022221





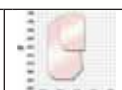
■ DNMG-CT

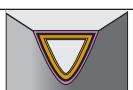
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150604CT	12,70	15,50	6,35	0,3	5,16	▮	▮	▮	4171742	4172699	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮
DNMG150608CT	12,70	15,50	6,35	0,8	5,16	▮	▮	▮	4171753	4172700	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮
DNMG150612CT	12,70	15,50	6,35	1,1	5,16	▮	▮	▮	4171754	4172701	▮	▮	▮	▮	▮	▮	▮	▮	▮	▮


C2–C49

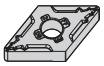

C50–C81

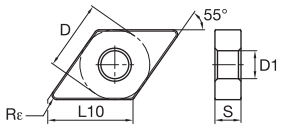

C86–C129


B8–B25


B26–B28


B30–B105



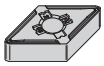


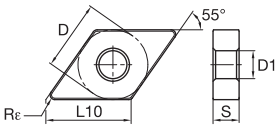
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404FF	9,53	11,63	4,76	0,4	3,81	4171028	-	-	-	4172348	-	-	4171321	5684273	-	-	-	-	-	-
DNMG110408FF	9,53	11,63	4,76	0,8	3,81	4171029	-	-	-	4172349	-	-	4171322	-	-	-	-	-	-	-
DNMG110412FF	9,53	11,63	4,76	1,2	3,81	-	-	-	-	4172350	-	-	-	-	-	-	-	-	-	-
DNMG150404FF	12,70	15,50	4,76	0,4	5,16	4171030	-	-	-	4172351	-	-	-	5684274	-	-	-	-	-	-
DNMG150408FF	12,70	15,50	4,76	0,8	5,16	4171031	-	-	-	4172352	-	-	4171373	5684275	-	-	-	-	-	-
DNMG150412FF	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	-	4171374	-	-	-	-	-	-	-
DNMG150604FF	12,70	15,50	6,35	0,4	5,16	4171032	-	-	-	4172683	-	-	4171375	5684276	-	-	-	-	-	-
DNMG150608FF	12,70	15,50	6,35	0,8	5,16	4171043	-	-	-	4172684	-	-	4171376	-	-	-	-	-	-	-
DNMG150612FF	12,70	15,50	6,35	1,2	5,16	4171044	-	-	-	4172685	-	-	4171377	-	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

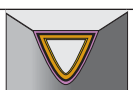
■ DNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404FW	9,53	11,63	4,76	0,4	3,81	5623490	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG110408FW	9,53	11,63	4,76	0,8	3,81	5623491	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404FW	12,70	15,50	4,76	0,4	5,16	5623492	-	-	4171758	4173105	-	4171685	-	-	-	-	-	-	-	-
DNMG150408FW	12,70	15,50	4,76	0,4	5,16	5623493	-	-	4171759	4173106	-	4171686	-	-	-	-	-	-	-	-
DNMG150604FW	12,70	15,50	6,35	0,4	5,16	5623496	-	-	4171760	4173107	-	4171689	-	-	-	-	-	-	-	-
DNMG150608FW	12,70	15,50	6,35	0,4	5,16	5623497	-	-	4171761	4173108	-	4171690	-	-	-	-	-	-	-	-


C2–C49

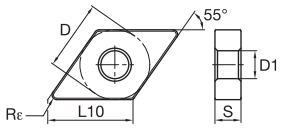
C50–C81

C86–C129

B8–B25

B26–B28

B30–B105





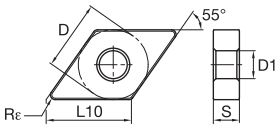
● first choice
○ alternate choice

P	●	●	●	○	○	○	○	○	○	○	○		●	●	●
M			○	●	●	●			●	●	●		●		●
K	○	○					●	●	○	○		●			
N									○	○	○	●			
S					○				●	●	●	●			
H												●			

■ DNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404ML	9,53	11,63	4,76	0,4	3,81	4171062	4170461	-	-	-	-	4171660	4171394	-	-	-	-	-	-	-
DNMG110408ML	9,53	11,63	4,76	0,8	3,81	4171063	4170462	-	-	-	-	4171661	4171395	-	-	-	-	-	-	-
DNMG110412ML	9,53	11,63	4,76	1,2	3,81	4171064	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404ML	12,70	15,50	4,76	0,4	5,16	4171065	4170483	-	-	-	-	4171662	4171396	-	-	-	-	-	-	-
DNMG150408ML	12,70	15,50	4,76	0,8	5,16	4171066	4170484	-	-	-	-	4171663	4171397	-	-	-	-	-	-	-
DNMG150412ML	12,70	15,50	4,76	1,2	5,16	4171067	-	-	-	-	-	4171664	4171398	-	-	-	-	-	-	-
DNMG150604ML	12,70	15,50	6,35	0,4	5,16	4171068	4170485	-	-	-	-	4171665	4171399	-	-	-	-	-	-	-
DNMG150608ML	12,70	15,50	6,35	0,8	5,16	4171069	4170486	-	-	-	-	4171666	4171400	-	-	-	-	-	-	-
DNMG150612ML	12,70	15,50	6,35	1,2	5,16	4171070	4170487	-	-	-	-	4171667	4171401	-	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

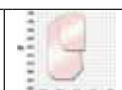
■ DNMG-MR

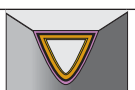
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110408MR	9,53	11,63	4,76	0,8	3,81	4171139	4170564	4170050	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150404MR	12,70	15,50	4,76	0,4	5,16	4171140	4170565	4170051	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150408MR	12,70	15,50	4,76	0,8	5,16	4171141	4170566	4170052	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150412MR	12,70	15,50	4,76	1,2	5,16	4171142	4170567	4170053	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150604MR	12,70	15,50	6,35	0,4	5,16	4171143	4170568	4170054	-	-	-	-	-	-	-	-	-	-	-	-
DNMG150608MR	12,70	15,50	6,35	0,8	5,16	4171144	4170569	4170055	-	4173023	4173138	-	-	-	-	-	-	-	-	-
DNMG150612MR	12,70	15,50	6,35	1,2	5,16	4171145	4170570	4170056	-	4173024	4173139	-	-	-	-	-	-	-	-	-


C2–C49

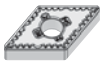

C50–C81

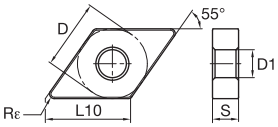

C86–C129


B8–B25


B26–B28


B30–B105



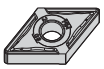


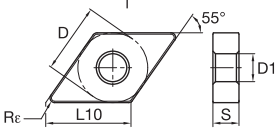
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-MS

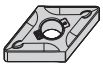
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110408MS	9,53	11,63	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908769	5908770	5908781	-	-	-	-
DNMG150404MS	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908782	5908783	5908784	-	-	-	-
DNMG150408MS	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908785	5908787	5908788	-	-	-	-
DNMG150412MS	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908789	5908790	5908791	-	-	-	-
DNMG150604MS	12,70	15,50	6,35	0,4	5,16	-	-	-	-	-	-	-	-	5908792	5908793	5908794	-	-	-	-
DNMG150608MS	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	-	-	-	5908795	5908796	5908797	-	-	-	-
DNMG150612MS	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	-	-	-	5908798	5908799	5908800	-	-	-	-

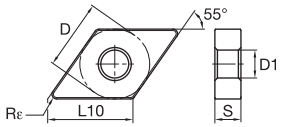




■ DNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150408MW	12,70	15,50	4,76	0,4	5,16	5623494	5623495	-	-	4173114	-	4171687	-	-	-	-	-	-	-	-
DNMG150412MW	12,70	15,50	4,76	1,2	5,16	-	-	-	-	4173115	-	4171688	-	-	-	-	-	-	-	-
DNMG150608MW	12,70	15,50	6,35	0,4	5,16	5623498	5623499	-	-	4173116	-	4171691	-	-	-	-	-	-	-	-
DNMG150612MW	12,70	15,50	6,35	1,2	5,16	-	-	-	-	4173117	-	4171692	-	-	-	-	-	-	-	-





● first choice
○ alternate choice

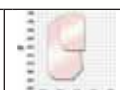
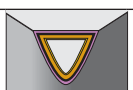
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-RH

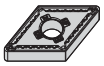
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG150408RH	12,70	15,50	4,76	0,8	5,16	4170989	4171524	4171707	-	4173045	-	-	4171912	-	-	-	-	-	-	-
DNMG150412RH	12,70	15,50	4,76	1,2	5,16	4170990	4171525	4171708	-	-	-	-	4171913	-	-	-	-	-	-	-
DNMG150608RH	12,70	15,50	6,35	0,8	5,16	4170991	4171526	4171709	-	4173046	-	-	4171914	-	-	-	-	-	-	-
DNMG150612RH	12,70	15,50	6,35	1,2	5,16	4170992	4171527	4171710	-	4173047	-	-	4171915	-	-	-	-	-	-	-
DNMG150616RH	12,70	15,50	6,35	1,6	5,16	4170993	4171528	4171711	-	4173048	-	-	4171916	-	-	-	-	-	-	-
DNMG190612RH	15,88	19,38	6,35	1,2	6,35	4170994	4171529	4171712	-	-	-	-	-	-	-	-	-	-	-	-

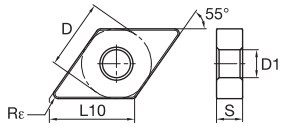

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105





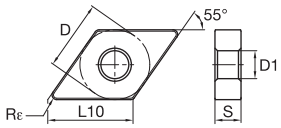
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404UF	9,53	11,63	4,76	0,4	3,81	-	-	-	4169356	4169382	-	-	-	5645603	-	-	-	-	-	-
DNMG110408UF	9,53	11,63	4,76	0,8	3,81	-	-	-	4169357	4169383	-	-	-	5645604	-	-	-	-	-	-
DNMG150404UF	12,70	15,50	4,76	0,4	5,16	-	-	-	4169358	4169384	-	-	-	5645601	-	-	-	-	-	-
DNMG150408UF	12,70	15,50	4,76	0,8	5,16	5645606	5645605	-	4169359	4169385	-	-	-	5645602	-	-	-	-	-	-
DNMG150412UF	12,70	15,50	4,76	1,2	5,16	-	-	-	4169360	4169386	-	-	-	-	-	-	-	-	-	-
DNMG150604UF	12,70	15,50	6,35	0,4	5,16	-	-	-	4169361	4169387	-	-	-	5645608	-	-	-	-	-	-
DNMG150608UF	12,70	15,50	6,35	0,8	5,16	-	5645609	-	4169362	4169388	-	-	-	5645607	-	-	-	-	-	-
DNMG150612UF	12,70	15,50	6,35	1,2	5,16	-	-	-	4169363	4169389	-	-	-	-	-	-	-	-	-	-





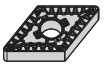
● first choice
○ alternate choice

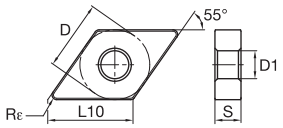
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMG110404UM	9,53	11,63	4,76	0,4	3,81	-	-	-	4172337	4172383	4172413	-	-	-	-	-	-	-	-	-
DNMG110408UM	9,53	11,63	4,76	0,8	3,81	-	-	-	4172338	4172384	4172414	-	-	5645256	-	-	-	-	-	-
DNMG110412UM	9,53	11,63	4,76	1,2	3,81	-	-	-	4172339	4172385	4172415	-	-	-	-	-	-	-	-	-
DNMG150404UM	12,70	15,50	4,76	0,4	5,16	-	-	-	4172340	4172386	4172416	-	-	5645254	-	-	-	-	-	-
DNMG150408UM	12,70	15,50	4,76	0,8	5,16	5645260	5645261	-	4172341	4172387	4172417	-	-	5645251	-	-	-	-	-	-
DNMG150412UM	12,70	15,50	4,76	1,2	5,16	-	-	-	4172342	4172388	4172418	-	-	5645259	-	-	-	-	-	-
DNMG150604UM	12,70	15,50	6,35	0,4	5,16	-	-	-	4172363	4172389	4172419	-	-	5645255	-	-	-	-	-	-
DNMG150608UM	12,70	15,50	6,35	0,8	5,16	-	5645262	-	4172364	4172390	4172420	-	-	5645253	5645264	-	-	-	-	-
DNMG150612UM	12,70	15,50	6,35	1,2	5,16	-	-	-	4172365	4172391	4172421	-	-	5645258	5645257	-	-	-	-	-
DNMG150616UM	12,70	15,50	6,35	1,6	5,16	-	-	-	-	4172392	4172422	-	-	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



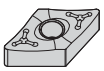


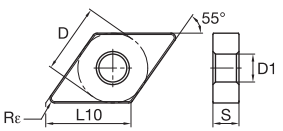
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DNMG-UR

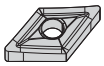
ISO catalogue number	D	L10	S	Rε	D1												
DNMG110408UR	9,53	11,63	4,76	0,8	3,81	4171101	4170509	4169966	4169424	4169453	4169488	-	4171426	-	-	-	-	-
DNMG110412UR	9,53	11,63	4,76	1,2	3,81	4171102	4170510	-	4169425	-	-	-	4171427	-	-	-	-	-
DNMG150408UR	12,70	15,50	4,76	0,8	5,16	4171103	4170511	4169967	4169426	4169454	4169489	-	4171428	-	5579271	-	-	-
DNMG150412UR	12,70	15,50	4,76	1,2	5,16	4171104	4170512	4169968	-	4169455	4169490	-	4171429	-	5579292	-	-	-
DNMG150416UR	12,70	15,50	4,76	1,6	5,16	-	-	-	-	-	4169491	-	4171430	5680171	-	-	-	-
DNMG150608UR	12,70	15,50	6,35	0,8	5,16	4171105	4170513	4169969	4169427	4169456	4169492	-	4171431	-	5579276	-	-	-
DNMG150612UR	12,70	15,50	6,35	1,2	5,16	4171106	4170514	4169970	4169428	4169457	4169493	5680172	4171432	-	-	-	-	-
DNMG150616UR	12,70	15,50	6,35	1,6	5,16	4171107	4170515	4169971	-	-	4169494	-	4171433	-	-	-	-	-

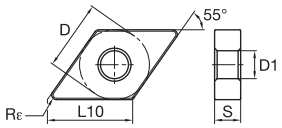




■ DNMM-65

ISO catalogue number	D	L10	S	Rε	D1												
DNMM15060865	12,70	15,50	6,35	0,8	5,16	5698413	5698414	5698415	-	5698412	-	-	-	-	-	-	-	-
DNMM15061265	12,70	15,50	6,35	1,2	5,16	5698417	-	-	-	5698416	-	-	-	-	-	-	-	-
DNMM15061665	12,70	15,50	6,35	1,6	5,16	5698418	5698419	-	-	-	-	-	-	-	-	-	-	-





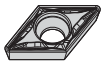
● first choice
○ alternate choice

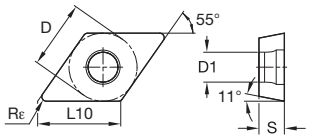
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

DNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DNMP150404	12,70	15,50	4,76	0,4	5,16	-	-	-	4171591	4173658	4173697	-	-	4172484	-	-	-	-	-	-
DNMP150408	12,70	15,50	4,76	0,8	5,16	-	-	-	4171592	4173659	4173698	-	-	4172485	-	-	-	-	-	-
DNMP150412	12,70	15,50	4,76	1,2	5,16	-	-	-	4172133	4173660	4173699	-	-	-	-	-	-	-	-	-
DNMP150604	12,70	15,50	6,35	0,4	5,16	-	-	-	4172134	4173661	4173700	-	-	4172486	-	-	-	-	-	-
DNMP150608	12,70	15,50	6,35	0,8	5,16	-	-	-	4172135	4173662	4173701	-	-	4172487	4172616	-	-	-	-	-
DNMP150612	12,70	15,50	6,35	1,2	5,16	-	-	-	4172136	4173663	4173702	-	-	4172488	4172617	-	-	-	-	-

NOTE: DNMP-style inserts are single sided.





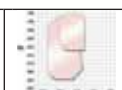
DPMT-FP

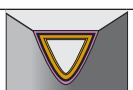
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DPMT070204FP	6,35	7,75	2,38	0,4	2,80	4170020	4170330	-	4168816	4168828	-	-	-	-	-	-	-	-	-	-
DPMT11T304FP	9,53	11,63	3,97	0,4	4,40	4170021	4170331	-	4168817	4168829	-	-	-	-	-	-	-	-	-	-
DPMT11T308FP	9,53	11,63	3,97	0,8	4,40	4170022	4170332	-	-	4168830	-	-	4170109	-	-	-	-	-	-	-


C2–C49

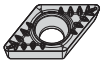

C50–C81

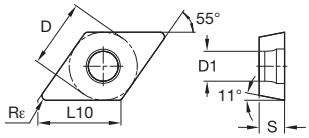

C86–C129


B8–B25


B26–B28


B30–B105



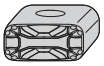


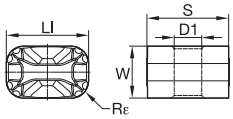
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ DPMT-MP

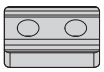
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
DPMT11T308MP	9,53	11,63	3,97	0,8	4,40	-	4170260	-	-	-	-	-	4170268	-	-	-	-	-	-	-

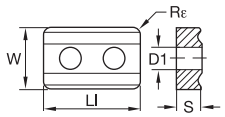




■ LNUX-13

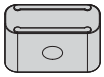
ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX19194013	10,00	19,05	19,05	4,0	6,35	-	-	-	-	-	-	-	4170966	-	-	-	-	-	-	-
LNUX30194013	12,00	30,00	19,05	4,0	6,35	-	-	-	-	-	-	-	4170968	-	-	-	-	-	-	-

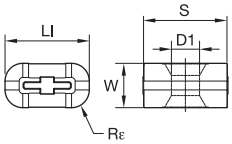




■ LNUX-EN95

ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX400924EN95	25,40	40,00	9,53	2,4	9,12	-	-	-	-	-	-	-	-	-	-	-	-	-	2012231	-





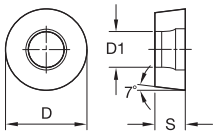
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ LNUX-T

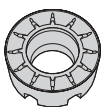
ISO catalogue number	W	LI	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
LNUX191940T	10,00	19,05	19,05	4,0	6,35	-	-	-	-	-	-	-	4170967	-	-	-	-	-	-	-
LNUX301940T	12,00	30,00	19,05	4,0	6,35	-	-	-	-	-	-	-	4170969	-	-	-	-	-	-	-

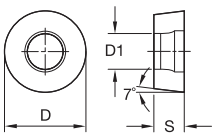




■ RCMT

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT0602M0	6,00	2,38	2,80	4169975	4170536	-	-	-	-	-	4170478	-	-	-	2028115	-	-	-
RCMT0803M0	8,00	3,18	3,40	4169976	4170537	-	-	-	-	-	4170479	-	-	-	2028129	-	-	-
RCMT10T3M0	10,00	3,97	4,40	4169977	4170538	4170752	-	-	-	-	4170480	-	-	-	2028143	-	-	-
RCMT1204M0	12,00	4,76	4,40	4169978	4170539	4170803	-	-	-	-	4170481	-	-	-	2028157	-	2028145	-
RCMT1606M0	16,00	6,35	5,50	4169979	-	4170804	-	-	-	-	4170482	-	-	-	-	-	-	-





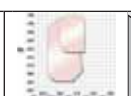
■ RCMT-43

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT1606M043	16,00	6,35	5,50	-	-	-	-	-	-	-	-	-	-	-	2028170	-	-	-


C2–C49


C50–C81

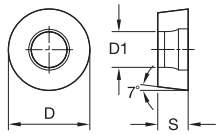

C86–C129


B8–B25


B26–B28


B30–B105



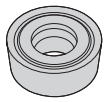


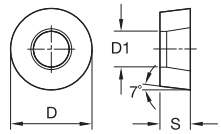
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○	●	●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ RCMT-T

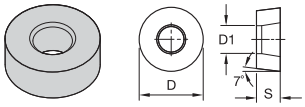
ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMT1606M0T	16,00	6,35	5,50	-	4170540	-	-	-	-	-	-	-	-	-	-	-	-	-





■ RCMX

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RCMX2006M0T	20,00	6,35	6,50	4169980	4170541	4170805	-	-	-	-	4170543	-	-	-	-	-	-	-
RCMX2507M0T	25,00	7,94	7,40	4169981	4170542	4170806	-	-	-	-	4170544	-	-	-	-	-	2028196	-
RCMX3209M0T	32,00	9,53	9,50	4169982	-	-	-	-	-	-	-	-	-	-	-	-	-	-

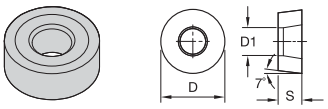


● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

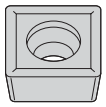
RNMA

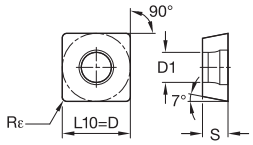
ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RNMA120400	12,70	4,76	5,16	-	-	-	-	-	-	4171639	4171881	-	-	-	-	-	-	-



RNMG-RH

ISO catalogue number	D	S	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
RNMG090300RH	9,53	3,18	3,81	4170995	4171530	-	-	-	-	-	-	-	-	-	-	-	-	-
RNMG120400RH	12,70	4,76	5,16	4170996	4171531	4171713	-	-	-	-	-	-	-	-	-	-	-	-
RNMG190600RH	19,05	6,35	7,93	4170997	4171532	4171714	-	-	-	-	4171917	-	-	-	-	-	-	-



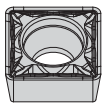


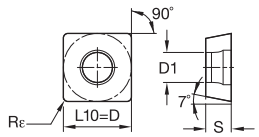
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SCMT

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT090304	9,53	9,53	3,18	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	-	-	2028225	-
SCMT09T304	9,53	9,53	3,97	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	2028255	-	-	-
SCMT09T308	9,53	9,53	3,97	0,8	4,40	-	-	-	-	-	-	-	-	-	-	-	2028270	-	2028272	-
SCMT120408	12,70	12,70	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2028286	-	2028289	-
SCMT120412	12,70	12,70	4,76	1,2	5,50	-	-	-	-	-	-	-	-	-	-	-	2028296	-	-	2028295
SCMT150512	15,88	15,88	5,56	1,2	5,50	-	-	-	-	-	-	-	-	-	-	-	2028306	-	2028307	-

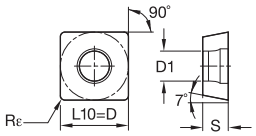




■ SCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT09T304FP	9,53	9,53	3,97	0,4	4,40	4170002	4170308	-	4168767	4168795	-	-	4170093	-	-	-	-	-	-	-
SCMT09T308FP	9,53	9,53	3,97	0,8	4,40	4170003	4170309	-	4168768	4168796	-	-	4170094	-	-	-	-	-	-	-
SCMT120404FP	12,70	12,70	4,76	0,4	5,50	-	4170310	-	-	4168797	-	-	-	-	-	-	-	-	-	-
SCMT120408FP	12,70	12,70	4,76	0,8	5,50	4170004	4170311	-	4168769	4168798	-	-	4170095	-	-	-	-	-	-	-
SCMT120412FP	12,70	12,70	4,76	1,2	5,50	4170005	4170312	-	-	4168799	-	-	4170096	-	-	-	-	-	-	-



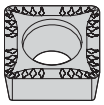


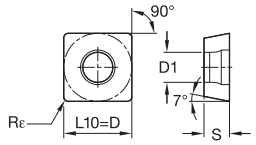
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT09T304MP	9,53	9,53	3,97	0,4	4,40	-	4170226	-	4168899	4168913	-	-	4170244	-	-	-	-	-	-	-
SCMT09T308MP	9,53	9,53	3,97	0,8	4,40	4170214	4170227	-	4168900	4168914	-	-	4170245	-	-	-	-	-	-	-
SCMT120404MP	12,70	12,70	4,76	0,4	5,50	-	4170228	-	4168901	4168915	-	-	4170246	-	-	-	-	-	-	-
SCMT120408MP	12,70	12,70	4,76	0,8	5,50	4170215	4170229	-	4168902	4168916	-	-	4170247	-	-	-	-	-	-	-
SCMT120412MP	12,70	12,70	4,76	1,2	5,50	-	4170230	-	4168903	4168917	-	-	4170248	-	-	-	-	-	-	-





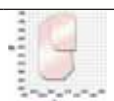
■ SCMT-MU

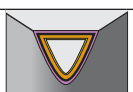
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMT090308MU	9,53	9,53	3,18	0,8	4,40	5623446	-	-	-	-	-	-	5623445	-	-	-	-	-	-	-
SCMT09T304MU	9,53	9,53	3,97	0,4	4,40	-	-	-	-	5623447	-	-	-	-	-	-	-	-	-	-
SCMT09T308MU	9,53	9,53	3,97	0,8	4,40	5623461	5623464	5623462	-	5623448	-	-	5623449	5623460	-	-	-	-	-	-


C2–C49

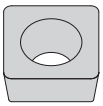

C50–C81

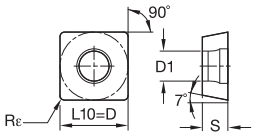

C86–C129


B8–B25


B26–B28


B30–B105





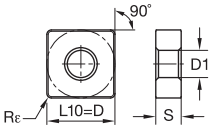
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SCMW

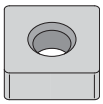
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SCMW090304	9,53	9,53	3,18	0,4	4,40	-	-	-	-	-	-	4170474	4170378	-	-	-	2028308	-	-	-
SCMW09T308	9,53	9,53	3,97	0,8	4,40	-	-	-	-	-	-	-	4170379	-	-	-	-	-	-	-
SCMW120408	12,70	12,70	4,76	0,8	5,50	-	-	-	-	-	-	4170475	4170380	-	-	-	2028310	-	-	-

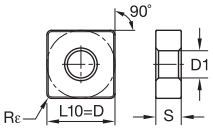




■ SNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNGG120408FS	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548680	-	5549997	-	-	-	-



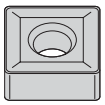


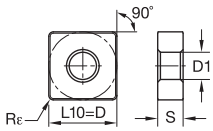
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMA120408	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	-	4171640	4171882	-	-	-	2028371	-	-	-
SNMA120412	12,70	12,70	4,76	1,2	5,16	-	-	-	-	-	-	4171641	4171883	-	-	-	-	-	-	-
SNMA120416	12,70	12,70	4,76	1,6	5,16	-	-	-	-	-	-	4171642	4171884	-	-	-	-	-	-	-
SNMA150608	15,88	15,88	6,35	0,8	6,35	-	-	-	-	-	-	-	4171885	-	-	-	-	-	-	-
SNMA150612	15,88	15,88	6,35	1,2	6,35	-	-	-	-	-	-	4171643	4171886	-	-	-	-	-	-	-
SNMA150616	15,88	15,88	6,35	1,6	6,35	-	-	-	-	-	-	4171644	4171887	-	-	-	-	-	-	-
SNMA190612	19,05	19,05	6,35	1,2	7,93	-	-	-	-	-	-	4171645	4171888	-	-	-	-	-	-	-
SNMA190616	19,05	19,05	6,35	1,6	7,93	-	-	-	-	-	-	4171646	4171889	-	-	-	-	-	-	-

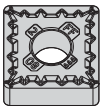


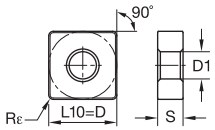


■ SNMG

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG250924	25,40	25,40	9,53	2,4	9,12	-	-	5091303	-	-	-	-	-	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



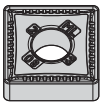


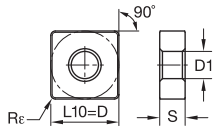
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG090304FF	9,53	9,53	3,18	0,4	3,81	4171045	-	-	-	-	-	-	4171378	5684279	-	-	-	-	-	-
SNMG090308FF	9,53	9,53	3,18	0,8	3,81	4171046	-	-	-	4172686	-	-	4171379	5684277	-	-	-	-	-	-
SNMG120404FF	12,70	12,70	4,76	0,4	5,16	4171047	-	-	-	4172687	-	-	4171380	5684330	-	-	-	-	-	-
SNMG120408FF	12,70	12,70	4,76	0,8	5,16	4171048	-	-	-	4172688	-	-	4171381	5684278	-	-	-	-	-	-
SNMG120412FF	12,70	12,70	4,76	1,2	5,16	4171049	-	-	-	4172689	-	-	4171382	-	-	-	-	-	-	-
SNMG120416FF	12,70	12,70	4,76	1,6	5,16	-	-	-	-	4172690	-	-	-	-	-	-	-	-	-	-

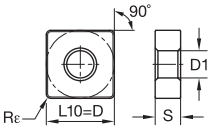




SNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG090304ML	9,53	9,53	3,18	0,4	3,81	4171071	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SNMG090308ML	9,53	9,53	3,18	0,8	3,81	4171072	4170488	-	-	-	-	4171668	4171402	-	-	-	-	-	-	-
SNMG120404ML	12,70	12,70	4,76	0,4	5,16	-	-	-	-	-	-	-	4171403	-	-	-	-	-	-	-
SNMG120408ML	12,70	12,70	4,76	0,8	5,16	4171073	4170489	-	-	-	-	4171669	4171404	-	-	-	-	-	-	-
SNMG120412ML	12,70	12,70	4,76	1,2	5,16	4171074	4170490	-	-	-	-	4171670	4171405	-	-	-	-	-	-	-
SNMG120416ML	12,70	12,70	4,76	1,6	5,16	-	-	-	-	-	-	-	4171406	-	-	-	-	-	-	-





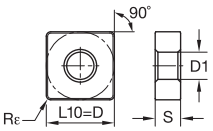
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408MR	12,70	12,70	4,76	0,8	5,16	4171146	4170571	4170057	-	4173025	4173140	-	-	-	-	-	-	-	-	-
SNMG120412MR	12,70	12,70	4,76	1,2	5,16	5684354	5684355	-	-	4173026	4173141	-	-	-	-	-	-	-	-	-
SNMG120416MR	12,70	12,70	4,76	1,6	5,16	-	-	-	-	4173027	4173142	-	-	-	-	-	-	-	-	-
SNMG150608MR	15,88	15,88	6,35	0,8	6,35	-	-	-	-	4173028	4173143	-	-	-	-	-	-	-	-	-
SNMG150612MR	15,88	15,88	6,35	1,2	6,35	4171147	-	-	-	4173029	4173144	-	-	-	-	-	-	-	-	-
SNMG150616MR	15,88	15,88	6,35	1,6	6,35	-	-	-	-	4173030	4173145	-	-	-	-	-	-	-	-	-
SNMG190612MR	19,05	19,05	6,35	1,2	7,93	4171148	4170572	4170058	-	4173031	4173146	-	-	-	-	-	-	-	-	-
SNMG190616MR	19,05	19,05	6,35	1,6	7,93	4171149	-	-	-	4173032	4173147	-	-	-	-	-	-	-	-	-





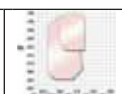
SNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408MS	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908847	5908848	5908849	-	-	-	-
SNMG120412MS	12,70	12,70	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908850	5908921	5908922	-	-	-	-
SNMG150612MS	15,88	15,88	6,35	1,2	6,35	-	-	-	-	-	-	-	-	-	5908923	5908924	-	-	-	-
SNMG190612MS	19,05	19,05	6,35	1,2	7,94	-	-	-	-	-	-	-	-	5908925	5908926	-	-	-	-	-


C2–C49


C50–C81

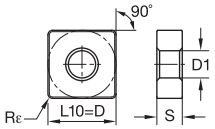

C86–C129


B8–B25


B26–B28


B30–B105



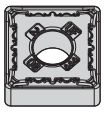


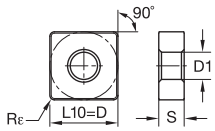
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SNMG-RH

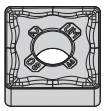
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408RH	12,70	12,70	4,76	0,8	5,16	4170998	4171533	4171715	-	4173049	-	-	4171918	-	-	-	-	-	-	-
SNMG120412RH	12,70	12,70	4,76	1,2	5,16	4170999	4171534	4171716	-	4173050	-	-	4171919	-	-	-	-	-	-	-
SNMG120416RH	12,70	12,70	4,76	1,6	5,16	4171000	4171535	4171717	-	4173051	-	-	4171920	-	-	-	-	-	-	-
SNMG150608RH	15,88	15,88	6,35	0,8	6,35	4171001	4171536	4171718	-	4173052	-	-	4171921	-	-	-	-	-	-	-
SNMG150612RH	15,88	15,88	6,35	1,2	6,35	4171002	4171537	4171719	-	4173053	-	-	4171922	-	-	-	-	-	-	-
SNMG150616RH	15,88	15,88	6,35	1,6	6,35	4171003	4171538	4171720	-	4173054	-	-	4171923	-	-	-	-	-	-	-
SNMG190608RH	19,05	19,05	6,35	0,8	7,93	4171004	4171539	4171721	-	4173055	-	-	4171924	-	-	-	-	-	-	-
SNMG190612RH	19,05	19,05	6,35	1,2	7,93	4171005	4171540	4171722	-	4173056	-	-	4171925	-	-	-	-	-	-	-
SNMG190616RH	19,05	19,05	6,35	1,6	7,93	4171006	4171541	4171723	-	4173057	-	-	4171926	-	-	-	-	-	-	-

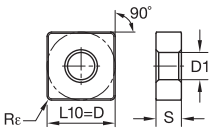




■ SNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120404UF	12,70	12,70	4,76	0,4	5,16	-	-	-	4169364	4169390	-	-	-	5645610	-	-	-	-	-	-
SNMG120408UF	12,70	12,70	4,76	0,8	5,16	-	-	-	4169365	4169391	-	-	-	5645611	-	-	-	-	-	-
SNMG120412UF	12,70	12,70	4,76	1,2	5,16	-	-	-	4169366	4169392	-	-	-	-	-	-	-	-	-	-



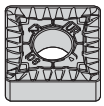


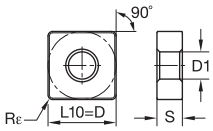
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120404UM	12,70	12,70	4,76	0,4	5,16	-	-	-	4172366	4172393	4172423	-	-	-	-	-	-	-	-	-
SNMG120408UM	12,70	12,70	4,76	0,8	5,16	-	-	-	4172367	4172394	4172424	-	-	-	-	-	-	-	-	-
SNMG120412UM	12,70	12,70	4,76	1,2	5,16	-	-	-	4172368	4172395	4172425	-	-	-	-	-	-	-	-	-





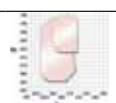
■ SNMG-UR

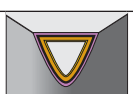
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMG120408UR	12,70	12,70	4,76	0,8	5,16	4171108	4170516	4169989	4169429	4169458	4169495	-	4171434	-	-	-	-	-	-	-
SNMG120412UR	12,70	12,70	4,76	1,2	5,16	4171109	4170517	4169990	4169430	4169459	4169496	-	4171435	-	5579350	-	-	-	-	-
SNMG120416UR	12,70	12,70	4,76	1,6	5,16	4171110	-	-	-	4169460	4169497	-	4171436	5680174	5680173	-	-	-	-	-
SNMG150612UR	15,88	15,88	6,35	1,2	6,35	4171111	4170518	4169991	4169431	4169461	4169498	-	4171437	-	5579352	-	-	-	-	-
SNMG150616UR	15,88	15,88	6,35	1,6	6,35	4171112	4170519	4169992	4169432	4169462	4169499	-	4171438	-	-	-	-	-	-	-
SNMG190612UR	19,05	19,05	6,35	1,2	7,93	4171113	4170520	4170033	-	4169463	4169500	-	4171439	-	5512538	-	-	-	-	-
SNMG190616UR	19,05	19,05	6,35	1,6	7,93	4171114	4170521	4170034	-	4169464	4169501	-	4171440	-	5579357	-	-	-	-	-
SNMG190616UR	19,05	19,05	6,35	1,2	7,93	-	-	-	4169433	-	-	-	-	-	-	-	-	-	-	-


C2–C49

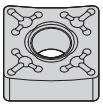

C50–C81

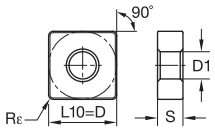

C86–C129


B8–B25


B26–B28


B30–B105



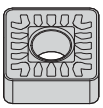


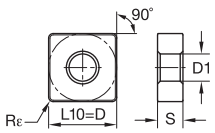
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SNMM-65

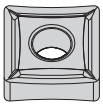
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMM12040865	12,70	12,70	4,76	0,8	5,16	-	5696554	5696555	-	5696553	-	-	-	-	-	-	-	-	-	-
SNMM12041265	12,70	12,70	4,76	1,2	5,16	-	5696557	-	-	5696556	-	-	-	-	-	-	-	-	-	-
SNMM15061665	15,88	15,88	6,35	1,6	6,35	-	5696559	-	-	5696558	-	-	-	-	-	-	-	-	-	-
SNMM19061265	19,05	19,05	6,35	1,2	7,93	5696611	5696612	5696613	-	5696610	-	-	-	-	-	-	-	-	-	-
SNMM19061665	19,05	19,05	6,35	1,6	7,93	5696615	-	-	-	5696614	-	-	-	-	-	-	-	-	-	-
SNMM19062465	19,05	19,05	6,35	2,4	7,93	-	5696617	-	-	5696616	-	-	-	-	-	-	-	-	-	-

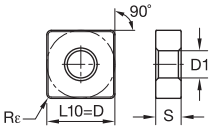




■ SNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMM190616SR	19,05	19,05	6,35	1,6	7,93	-	-	-	-	5696648	-	-	-	-	-	-	-	-	-	-
SNMM190624SR	19,05	19,05	6,35	2,4	7,93	5696680	5696681	-	-	5696649	-	-	-	-	-	-	-	-	-	-



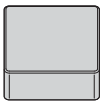


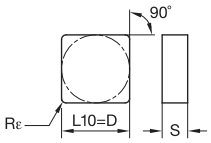
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNMP120408	12,70	12,70	4,76	0,8	5,16	-	-	-	4172137	4173664	4173703	-	-	4172489	4172618	-	-	-	-	-
SNMP120412	12,70	12,70	4,76	1,2	5,16	-	-	-	4172138	4173665	4173704	-	-	4172490	4172619	-	-	-	-	-
SNMP150608	15,88	15,88	6,35	0,8	6,35	-	-	-	4172139	4173666	4173705	-	-	-	4172620	-	-	-	-	-
SNMP150612	15,88	15,88	6,35	1,2	6,35	-	-	-	4172140	4173667	4173706	-	-	-	4172621	-	-	-	-	-
SNMP150616	15,88	15,88	6,35	1,6	6,35	-	-	-	4172141	4173668	4173707	-	-	-	4172622	-	-	-	-	-
SNMP190616	19,05	19,05	6,35	1,6	7,93	-	-	-	4172142	4173669	4173708	-	-	-	-	-	-	-	-	-





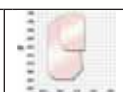
SNU

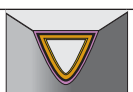
ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SNUN120408	12,70	12,70	4,76	0,8	-	-	-	-	-	-	-	4170962	-	-	-	-	-	-	-
SNUN120412	12,70	12,70	4,76	1,2	-	-	-	-	-	-	-	4170963	-	-	-	-	-	-	-


C2–C49

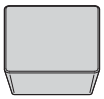

C50–C81

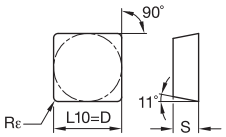

C86–C129


B8–B25


B26–B28


B30–B105



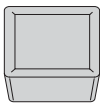


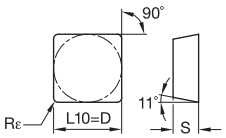
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SPG

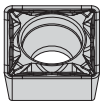
ISO catalogue number	D	L10	S	Rε														
SPGN090308	9,53	9,53	3,18	0,8	-	-	-	-	-	-	-	4170943	-	-	-	-	-	-
SPGN120308	12,70	12,70	3,18	0,8	-	-	-	-	-	-	-	4170944	-	-	-	-	-	-
SPGN120312	12,70	12,70	3,18	1,2	-	-	-	-	-	-	-	4170945	-	-	-	-	-	-

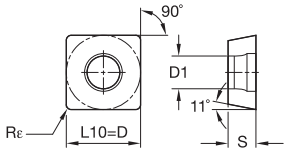




SPMR

ISO catalogue number	D	L10	S	Rε														
SPMR090308	9,53	9,53	3,18	0,8	-	-	4170650	-	-	-	-	4170946	-	-	-	-	-	-
SPMR120304	12,70	12,70	3,18	0,4	4170853	-	4170651	-	-	-	-	4170947	-	-	-	-	-	-
SPMR120308	12,70	12,70	3,18	0,8	4170854	-	4170652	-	-	-	-	4170948	-	-	-	-	-	-
SPMR120312	12,70	12,70	3,18	1,2	-	-	4170783	-	-	-	-	4170949	-	-	-	-	-	-





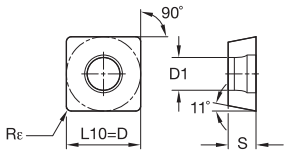
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

SPMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPMT09T304FP	9,53	9,53	3,97	0,4	4,40	4170023	4170333	-	-	4168831	-	-	4170110	-	-	-	-	-	-	-
SPMT09T308FP	9,53	9,53	3,97	0,8	4,40	4170024	4170334	-	-	4168832	-	-	4170111	-	-	-	-	-	-	-

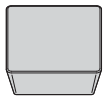


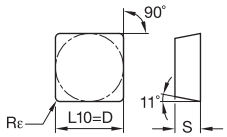


SPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPMT09T308MP	9,53	9,53	3,97	0,8	4,40	-	4170261	-	4168925	-	-	-	4170269	-	-	-	-	-	-	-
SPMT120408MP	12,70	12,70	4,76	0,8	5,50	-	4170262	-	-	-	-	-	4170270	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



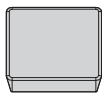


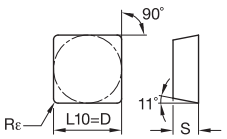
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ SPU

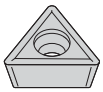
ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPUN090308	9,53	9,53	3,18	0,8	-	-	-	-	-	-	-	-	-	-	-	2028543	-	-	-
SPUN120304	12,70	12,70	3,18	0,4	4170856	-	-	-	-	-	-	-	-	-	-	2028547	-	-	-
SPUN120308	12,70	12,70	3,18	0,8	4170857	-	-	-	-	-	-	4170950	-	-	-	2028555	-	-	-
SPUN120312	12,70	12,70	3,18	1,2	-	-	-	-	-	-	-	4170951	-	-	-	2028560	-	-	-
SPUN120412	12,70	12,70	4,76	1,2	-	-	-	-	-	-	-	-	-	-	-	2028562	-	-	-
SPUN150412	15,88	15,88	4,76	1,2	-	-	-	-	-	-	-	-	-	-	-	2028565	-	2028567	-
SPUN190412	19,05	19,05	4,76	1,2	-	-	-	-	-	-	-	-	-	-	-	2028568	-	-	-
SPUN190416	19,05	19,05	4,76	1,6	-	-	-	-	-	-	-	-	-	-	-	2561892	-	-	-

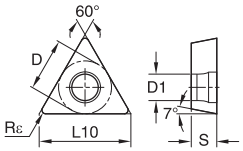




■ SPU-T

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
SPUN250620T	25,40	25,40	6,35	2,0	4170858	-	-	-	-	-	-	-	-	-	-	-	-	-	-





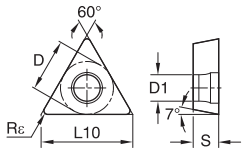
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ TCMT

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110202	6,35	11,00	2,38	0,2	2,80	-	-	-	-	-	-	-	-	-	-	-	2028579	-	-	-
TCMT110204	6,35	11,00	2,38	0,4	2,80	-	-	-	-	-	-	-	-	-	-	-	2028587	-	2028589	-
TCMT16T304	9,53	16,50	3,97	0,4	4,40	-	-	-	-	-	-	-	-	-	-	-	2028607	-	-	-
TCMT16T308	9,53	16,50	3,97	0,8	4,40	-	-	-	-	-	-	-	-	-	-	-	2028624	-	2028627	-
TCMT220408	12,70	22,00	4,76	0,8	5,50	-	-	-	-	-	-	-	-	-	-	-	2028660	-	-	-





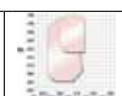
■ TCMT-2

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT1102042	6,35	11,00	2,38	0,4	2,80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2014082


C2–C49

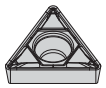

C50–C81

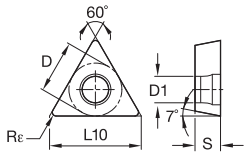

C86–C129


B8–B25


B26–B28


B30–B105





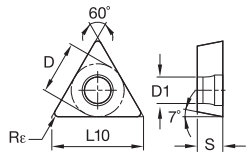
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

■ TCMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110202FP	6,35	11,00	2,38	0,2	2,90	-	-	-	-	4168800	-	-	-	-	-	-	-	-	-	-
TCMT110204FP	6,35	11,00	2,38	0,4	2,80	4170006	4170313	-	4168770	4168801	-	-	4170097	-	-	-	-	-	-	-
TCMT110208FP	6,35	11,00	2,38	0,8	2,80	4170007	4170314	-	4168771	4168802	-	-	4170098	-	-	-	-	-	-	-
TCMT16T304FP	9,53	16,50	3,97	0,4	4,40	4170008	4170315	-	4168772	4168803	-	-	4170099	-	-	-	-	-	-	-
TCMT16T308FP	9,53	16,50	3,97	0,8	4,40	4170009	4170316	-	4168773	4168804	-	-	4170100	-	-	-	-	-	-	-
TCMT16T312FP	9,53	16,50	3,97	1,2	4,40	4170010	-	-	-	4168805	-	-	4170101	-	-	-	-	-	-	-
TCMT220408FP	12,70	22,00	4,76	0,8	5,50	4170011	4170317	-	-	4168806	-	-	4170102	-	-	-	-	-	-	-

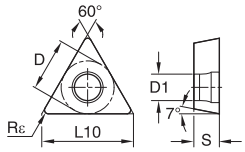




■ TCMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT110208MP	6,35	11,00	2,38	0,8	2,80	-	4170231	-	-	-	-	-	4170249	-	-	-	-	-	-	-
TCMT16T304MP	9,53	16,50	3,97	0,4	4,40	-	4170232	-	4168904	4168918	-	-	4170250	-	-	-	-	-	-	-
TCMT16T308MP	9,53	16,50	3,97	0,8	4,40	4170216	4170233	-	4168905	4168919	-	-	4170251	-	-	-	-	-	-	-
TCMT16T312MP	9,53	16,50	3,97	1,2	4,40	-	4170234	-	-	4168920	-	-	4170252	-	-	-	-	-	-	-



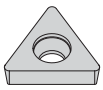


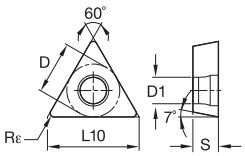
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ TCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMT16T304MU	9,53	16,50	3,97	0,4	4,40	5623614	5623615	-	-	5623613	-	-	5623616	-	5623617	-	-	-	-	-
TCMT16T308MU	9,53	16,50	3,97	0,8	4,40	5623621	5623620	-	-	5623619	-	-	5623618	5623622	-	-	-	-	-	-

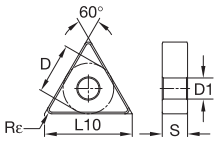




■ TCMW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TCMW110204	6,35	11,00	2,38	0,4	2,80	-	-	-	-	-	-	4170476	4170381	-	-	-	2028668	-	-	-
TCMW16T304	9,53	16,50	3,97	0,4	4,40	-	-	-	-	-	-	4170477	4170382	-	-	-	2028670	-	-	-





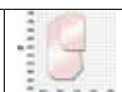
■ TNGG-FS

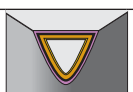
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNGG160404FS	9,53	16,50	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5548681	5538231	5549998	-	-	-	-
TNGG220408FS	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548682	-	-	-	-	-	-


C2–C49

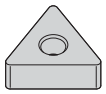

C50–C81

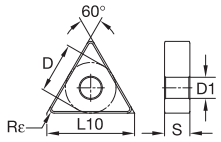

C86–C129


B8–B25


B26–B28


B30–B105





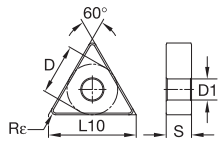
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMA160408	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	-	4171647	4171890	-	-	-	-	-	-	-
TNMA160412	9,53	16,50	4,76	1,2	3,81	-	-	-	-	-	-	4171648	4171891	-	-	-	-	-	-	-
TNMA160416	9,53	16,50	4,76	1,6	3,81	-	-	-	-	-	-	-	4171892	-	-	-	-	-	-	-
TNMA220408	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	-	4171649	4171893	-	-	-	-	-	-	-
TNMA220412	12,70	22,00	4,76	1,2	5,16	-	-	-	-	-	-	4172230	4171894	-	-	-	-	-	-	-
TNMA220416	12,70	22,00	4,76	1,6	5,16	-	-	-	-	-	-	4171651	4171895	-	-	-	-	-	-	-
TNMA270616	15,88	27,50	6,35	1,6	6,35	-	-	-	-	-	-	-	4171896	-	-	-	-	-	-	-

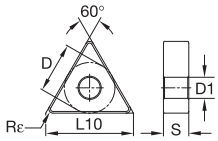




TNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG110304FF	6,35	11,00	3,18	0,4	2,26	-	-	-	-	-	-	-	4171383	5684331	-	-	-	-	-	-
TNMG110308FF	6,35	11,00	3,18	0,8	2,26	-	-	-	-	-	-	-	4171384	5684332	-	-	-	-	-	-
TNMG160404FF	9,53	16,50	4,76	0,4	3,81	4171050	-	-	-	4172691	-	-	4171385	-	-	-	-	-	-	-
TNMG160408FF	9,53	16,50	4,76	0,8	3,81	4171051	-	-	-	4172692	-	-	4171386	-	-	-	-	-	-	-
TNMG160412FF	9,53	16,50	4,76	1,2	3,81	4171052	-	-	-	4172693	-	-	4171387	-	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

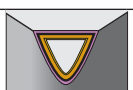
■ TNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG110304ML	6,35	11,00	3,18	0,4	2,26	-	5684347	-	-	-	-	-	4171407	-	-	-	-	-	-	-
TNMG110308ML	6,35	11,00	3,18	0,8	2,26	-	-	-	-	-	-	-	4171408	-	-	-	-	-	-	-
TNMG160404ML	9,53	16,50	4,76	0,4	3,81	4171075	4170491	-	-	-	-	4171671	4171409	-	-	-	-	-	-	-
TNMG160408ML	9,53	16,50	4,76	0,8	3,81	4171076	4170492	-	-	-	-	4171672	4171410	-	-	-	-	-	-	-
TNMG160412ML	9,53	16,50	4,76	1,2	3,81	4171077	4170493	-	-	-	-	4171673	4171411	-	-	-	-	-	-	-
TNMG220404ML	12,70	22,00	4,76	0,4	5,16	5684348	-	-	-	-	-	-	4171412	-	-	-	-	-	-	-
TNMG220408ML	12,70	22,00	4,76	0,8	5,16	4171078	4170494	-	-	-	-	-	-	-	-	-	-	-	-	-


C2–C49

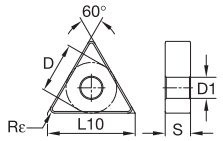
C50–C81

C86–C129

B8–B25

B26–B28

B30–B105





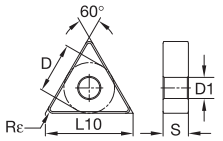
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

TNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404MR	9,53	16,50	4,76	0,4	3,81	4171150	4170573	4170059	-	-	-	-	-	-	-	-	-	-	-	-
TNMG160408MR	9,53	16,50	4,76	0,8	3,81	4171151	4170574	4170060	-	-	-	-	-	-	-	-	-	-	-	-
TNMG160412MR	9,53	16,50	4,76	1,2	3,81	4171152	4170575	4170061	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220404MR	12,70	22,00	4,76	0,4	5,16	4171153	4170576	4170062	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220408MR	12,70	22,00	4,76	0,8	5,16	4171154	4170577	4170063	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220412MR	12,70	22,00	4,76	1,2	5,16	4171155	4170578	4170064	-	-	-	-	-	-	-	-	-	-	-	-
TNMG220416MR	12,70	22,00	4,76	1,6	5,16	4171156	4170579	4170065	-	-	-	-	-	-	-	-	-	-	-	-

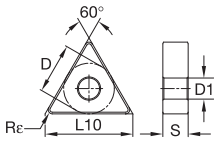




TNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404MS	9,53	16,50	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5908927	5908928	5908929	-	-	-	-
TNMG160408MS	9,53	16,50	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908930	5908931	5908932	-	-	-	-
TNMG220404MS	12,70	22,00	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908933	5908934	5908935	-	-	-	-
TNMG220408MS	12,70	22,00	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908936	5908937	5908938	-	-	-	-
TNMG220412MS	12,70	22,00	4,76	1,2	5,16	-	-	-	-	-	-	-	-	5908939	5908940	5908941	-	-	-	-
TNMG270608MS	15,88	27,50	6,35	0,8	6,35	-	-	-	-	-	-	-	-	-	5908942	5908943	-	-	-	-





● first choice
○ alternate choice

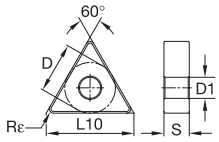
		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ TNMG-RH

ISO catalogue number	D	L10	S	Rε	D1														
TNMG160408RH	9,53	16,50	4,76	0,8	3,81	4171007	4171542	4171724	-	4173058	-	-	4171927	-	-	-	-	-	-
TNMG160412RH	9,53	16,50	4,76	1,2	3,81	4171008	4171543	4171725	-	4173059	-	-	4171928	-	-	-	-	-	-
TNMG220408RH	12,70	22,00	4,76	0,8	5,16	4171009	4171544	4171726	-	4173060	-	-	4171929	-	-	-	-	-	-
TNMG220412RH	12,70	22,00	4,76	1,2	5,16	4171010	4171545	4171727	-	4173061	-	-	4171930	-	-	-	-	-	-
TNMG220416RH	12,70	22,00	4,76	1,6	5,16	4171011	4171546	4171728	-	4173062	-	-	4171931	-	-	-	-	-	-
TNMG270612RH	15,88	27,50	6,35	1,2	6,35	4171012	4171547	4171729	-	-	-	-	-	-	-	-	-	-	-
TNMG270616RH	15,88	27,50	6,35	1,6	6,35	4171013	4171548	4171730	-	-	-	-	-	-	-	-	-	-	-
TNMG330924RH	19,05	33,00	9,53	2,4	7,93	4171014	4171549	4171731	-	-	-	-	-	-	-	-	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



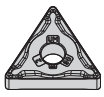


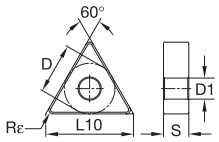
● first choice
○ alternate choice

P		●	●	●	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404UF	9,53	16,50	4,76	0,4	3,81	-	-	-	4169367	4169393	-	-	-	5432605	-	-	-	-	-	-
TNMG160408UF	9,53	16,50	4,76	0,8	3,81	5645615	-	-	4169368	4169394	-	-	-	5432606	-	-	-	-	-	-
TNMG160412UF	9,53	16,50	4,76	1,2	3,81	-	-	-	4169369	4169395	-	-	-	5645613	-	-	-	-	-	-
TNMG220404UF	12,70	22,00	4,76	0,4	5,16	-	-	-	4169370	4169396	-	-	-	5645612	-	-	-	-	-	-
TNMG220408UF	12,70	22,00	4,76	0,8	5,16	-	-	-	4169371	4169397	-	-	-	5645614	-	-	-	-	-	-

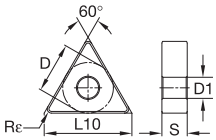




TNMG-UM

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160404UM	9,53	16,50	4,76	0,4	3,81	-	-	-	4172369	4172396	4172426	-	-	5550226	-	-	-	-	-	-
TNMG160408UM	9,53	16,50	4,76	0,8	3,81	-	-	-	4172370	4172397	4172427	-	-	5550228	-	-	-	-	-	-
TNMG160412UM	9,53	16,50	4,76	1,2	3,81	-	-	-	4172371	4172398	4172428	-	-	-	-	-	-	-	-	-
TNMG160416UM	9,53	16,50	4,76	1,6	3,81	-	-	-	-	4172399	4172429	-	-	-	-	-	-	-	-	-
TNMG220404UM	12,70	22,00	4,76	0,4	5,16	-	-	-	4172372	4172400	4172430	-	-	-	-	-	-	-	-	-
TNMG220408UM	12,70	22,00	4,76	0,8	5,16	5645266	-	-	4172373	4172401	4172431	-	-	5645265	-	-	-	-	-	-
TNMG220412UM	12,70	22,00	4,76	1,2	5,16	-	-	-	4172374	4172402	-	-	-	5473222	-	-	-	-	-	-





● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

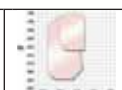
■ TNMG-UR

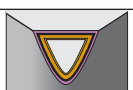
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMG160408UR	9,53	16,50	4,76	0,8	3,81	4171115	4170522	4170035	4169434	4169465	-	-	4171441	-	5579395	-	-	-	-	-
TNMG160412UR	9,53	16,50	4,76	1,2	3,81	4171116	4170523	-	-	4169466	4169502	-	4171442	-	5680175	-	-	-	-	-
TNMG160416UR	9,53	16,50	4,76	1,6	3,81	4171117	-	-	-	4169467	-	-	4171443	-	-	-	-	-	-	-
TNMG220408UR	12,70	22,00	4,76	0,8	5,16	4171118	4170524	4170036	4169435	4169468	4169503	-	4171444	-	5579397	-	-	-	-	-
TNMG220412UR	12,70	22,00	4,76	1,2	5,16	4171119	4170525	4170037	4169436	4169469	4169504	-	4171445	-	5473198	-	-	-	-	-
TNMG220416UR	12,70	22,00	4,76	1,6	5,16	4171120	4170526	-	-	4169470	4169505	-	4171446	-	-	-	-	-	-	-
TNMG270612UR	15,88	27,50	6,35	1,2	6,35	4171121	4170527	-	4169437	4169471	4169506	-	4171447	-	5579405	-	-	-	-	-
TNMG270616UR	15,88	27,50	6,35	1,6	6,35	4171122	4170528	-	4169438	4169472	4169507	-	4171448	-	-	-	-	-	-	-


C2–C49

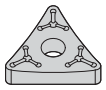

C50–C81

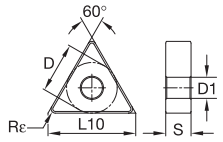

C86–C129


B8–B25


B26–B28


B30–B105





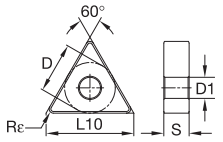
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

■ TNMM-65

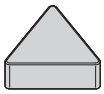
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMM16040865	9,53	16,50	4,76	0,8	3,81	-	5696618	5696619	-	-	-	-	-	-	-	-	-	-	-	-
TNMM16041265	9,53	16,50	4,76	1,2	3,81	-	-	5696620	-	-	-	-	-	-	-	-	-	-	-	-
TNMM22040865	12,70	22,00	4,76	0,8	5,16	5696621	5696622	5696623	-	-	-	-	-	-	-	-	-	-	-	-
TNMM22041265	12,70	22,00	4,76	1,2	5,16	-	5696625	5696626	-	5696624	-	-	-	-	-	-	-	-	-	-
TNMM22041665	12,70	22,00	4,76	1,6	5,16	5696628	5696629	-	-	5696627	-	-	-	-	-	-	-	-	-	-

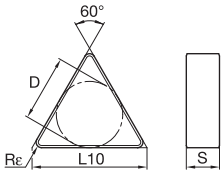




■ TNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNMP160404	9,53	16,50	4,76	0,4	3,81	-	-	-	4172143	4173670	4173709	-	-	4172491	-	-	-	-	-	-
TNMP160408	9,53	16,50	4,76	0,8	3,81	-	-	-	4172144	4173671	4173710	-	-	4172492	4172623	-	-	-	-	-
TNMP160412	9,53	16,50	4,76	1,2	3,81	-	-	-	4172145	4173672	4173711	-	-	4172493	4172624	-	-	-	-	-
TNMP220404	12,70	22,00	4,76	0,4	5,16	-	-	-	4172146	4173673	4173712	-	-	4172494	-	-	-	-	-	-
TNMP220408	12,70	22,00	4,76	0,8	5,16	-	-	-	4172147	4173674	4173713	-	-	4172495	4172625	-	-	-	-	-
TNMP220412	12,70	22,00	4,76	1,2	5,16	-	-	-	4172148	4173675	4173714	-	-	4172496	4172626	-	-	-	-	-



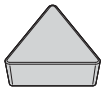


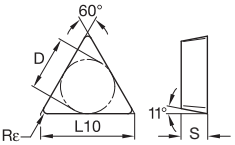
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TNU

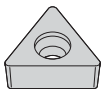
ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TNUN160408	9,53	16,50	4,76	0,8	-	-	-	-	-	-	-	4170964	-	-	-	-	-	-	-

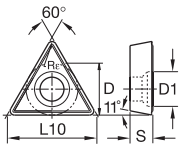




TPG

ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPGN110308	6,35	11,00	3,18	0,8	-	-	-	-	-	-	-	4170952	-	-	-	-	-	-	-
TPGN160308	9,53	16,50	3,18	0,8	-	-	-	-	-	-	-	4170953	-	-	-	-	-	-	-





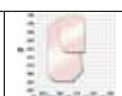
TPGA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPGA110204	6,35	11,00	2,38	0,4	2,80	-	-	-	-	-	-	-	-	-	-	-	2015081	-	-	-
TPGA110208	6,35	11,00	2,38	0,8	2,80	-	-	-	-	-	-	-	-	-	-	-	2031786	-	-	-


C2–C49

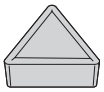

C50–C81

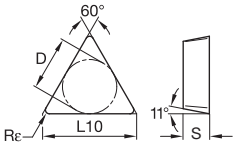

C86–C129


B8–B25


B26–B28


B30–B105



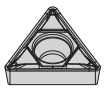


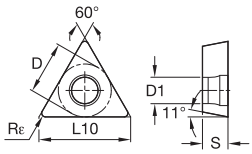
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

TPMR

ISO catalogue number	D	L10	S	Rε		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMR110304	6,35	11,00	3,18	0,4		4170859	-	4170784	-	-	-	-	-	-	-	-	-	-	-	-
TPMR110308	6,35	11,00	3,18	0,8		4170860	-	4170785	-	-	-	-	4170954	-	-	-	-	-	-	-
TPMR160304	9,53	16,50	3,18	0,4		4170861	-	4170786	-	-	-	-	4170955	-	-	-	-	-	-	-
TPMR160308	9,53	16,50	3,18	0,8		4170862	-	4170787	-	-	-	-	4170956	-	-	-	-	-	-	-
TPMR160312	9,53	16,50	3,18	1,2		4170863	-	4170788	-	-	-	-	4170957	-	-	-	-	-	-	-

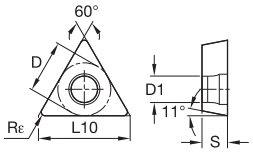




TPMT-FP

ISO catalogue number	D	L10	S	Rε	D1		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMT090208FP	5,56	9,63	2,38	0,8	2,50		4170025	4170335	-	4168818	4168833	-	-	4170112	-	-	-	-	-	-	-
TPMT110204FP	6,35	11,00	2,38	0,4	2,80		4170026	4170336	-	4168819	4168834	-	-	4170113	-	-	-	-	-	-	-
TPMT110208FP	6,35	11,00	2,38	0,8	2,80		4170027	4170337	-	4168820	4168835	-	-	4170114	-	-	-	-	-	-	-
TPMT16T304FP	9,53	16,50	3,97	0,4	4,40		4170028	4170338	-	-	4168836	-	-	4170115	-	-	-	-	-	-	-
TPMT16T308FP	9,53	16,50	3,97	0,8	4,40		4170029	4170339	-	-	4168837	-	-	4170116	-	-	-	-	-	-	-
TPMT16T312FP	9,53	16,50	3,97	1,2	4,40		-	-	-	-	4168838	-	-	-	-	-	-	-	-	-	-
TPMT220408FP	12,70	22,00	4,76	0,8	5,50		-	4170340	-	-	-	-	-	-	-	-	-	-	-	-	-



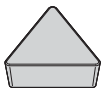


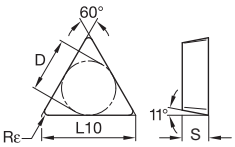
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

TPMT-MP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPMT110208MP	6,35	11,00	2,38	0,8	2,80	-	4170263	-	-	-	-	-	4170271	-	-	-	-	-	-	-
TPMT16T308MP	9,53	16,50	3,97	0,8	4,40	-	4170264	-	-	-	-	-	4170272	-	-	-	-	-	-	-
TPMT16T312MP	9,53	16,50	3,97	1,2	4,40	-	4170265	-	-	-	-	-	4170273	-	-	-	-	-	-	-





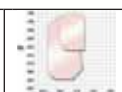
TPU

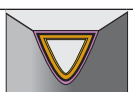
ISO catalogue number	D	L10	S	Rε	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
TPUN110304	6,35	11,00	3,18	0,4	4170864	-	4170789	-	-	-	-	-	-	-	-	2028806	-	-	-
TPUN110308	6,35	11,00	3,18	0,8	4170865	-	-	-	-	-	-	-	-	-	-	2028814	-	-	-
TPUN160304	9,53	16,50	3,18	0,4	4170866	4170645	-	-	-	-	-	4170958	-	-	-	2028821	-	-	-
TPUN160308	9,53	16,50	3,18	0,8	4170867	4170646	-	-	-	-	-	4170959	-	-	-	2028830	-	2028832	-
TPUN160312	9,53	16,50	3,18	1,2	-	4170647	-	-	-	-	-	4170960	-	-	-	2028833	-	-	-
TPUN220408	12,70	22,00	4,76	0,8	4170868	4170648	4170790	-	-	-	-	-	-	-	-	-	-	-	-
TPUN220412	12,70	22,00	4,76	1,2	-	4170649	4170791	-	-	-	-	4170961	-	-	-	2028843	-	2028847	-


C2–C49


C50–C81

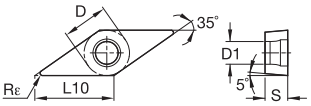

C86–C129


B8–B25


B26–B28


B30–B105





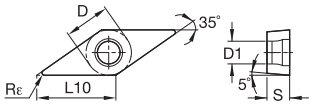
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

VBMT

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT160404	9,53	16,61	4,76	0,4	4,40	4169983	4170553	4170807	-	-	-	-	-	-	-	-	-	-	-	-
VBMT160408	9,53	16,61	4,76	0,8	4,40	4169984	4170554	4170808	-	-	-	-	-	-	-	-	-	-	-	-
VBMT160412	9,53	16,61	4,76	1,2	4,40	4169985	4170555	4170809	-	-	-	-	-	-	-	-	-	-	-	-

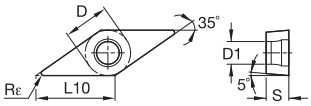




VBMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT110302FP	6,35	11,07	3,18	0,2	2,80	-	4170318	-	-	-	-	-	-	-	-	-	-	-	-	-
VBMT110304FP	6,35	11,07	3,18	0,4	2,80	4170012	4170319	-	4168774	4168807	-	-	-	-	-	-	-	-	-	-
VBMT110308FP	6,35	11,07	3,18	0,8	2,80	-	4170320	-	4168775	4168808	-	-	-	-	-	-	-	-	-	-
VBMT160402FP	9,53	16,61	4,76	0,2	4,40	-	4170321	-	-	4168809	-	-	-	-	-	-	-	-	-	-
VBMT160404FP	9,53	16,61	4,76	0,4	4,40	4170013	4170322	-	4168776	4168810	-	-	4170103	-	-	-	-	-	-	-
VBMT160408FP	9,53	16,61	4,76	0,8	4,40	4170014	4170323	-	4168777	4168811	-	-	4170104	-	-	-	-	-	-	-
VBMT160412FP	9,53	16,61	4,76	1,2	4,40	-	4170324	-	-	-	-	-	-	-	-	-	-	-	-	-





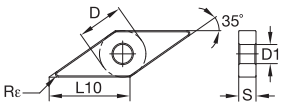
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ VBMT-MP

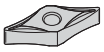
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VBMT160404MP	9,53	16,61	4,76	0,4	4,40	-	4170235	-	-	4168921	-	-	4170253	-	-	-	-	-	-	-
VBMT160408MP	9,53	16,61	4,76	0,8	4,40	-	4170236	-	-	4168922	-	-	4170254	-	-	-	-	-	-	-

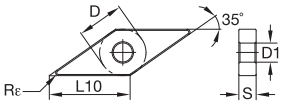




■ VNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNGG160401FS	9,53	16,61	4,76	0,1	3,81	-	-	-	-	-	-	-	-	5548684	-	5550000	-	-	-	-
VNGG160402FS	9,53	16,61	4,76	0,2	3,81	-	-	-	-	-	-	-	-	5548683	-	5549999	-	-	-	-
VNGG160404FS	9,53	16,61	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5548685	5538232	5550001	-	-	-	-
VNGG160408FS	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5548686	5538233	5550002	-	-	-	-



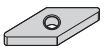


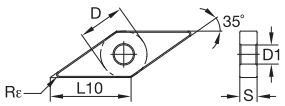
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ VNGP

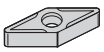
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNGP160401	9,53	16,61	4,76	0,1	3,81	-	-	-	-	-	-	-	-	5549195	-	5549211	-	-	-	-
VNGP160402	9,53	16,61	4,76	0,2	3,81	-	-	-	-	-	-	-	-	5549196	-	-	-	-	-	-
VNGP220404	12,70	22,14	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5549197	-	-	-	-	-	-
VNGP220408	12,70	22,14	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5549198	-	5549212	-	-	-	-

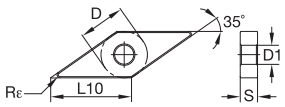




■ VNMA

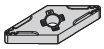
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMA160408	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	4171652	4171897	-	-	-	-	-	-	-

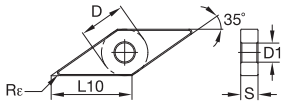




■ VNMG

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG12T304	7,14	12,45	3,97	0,4	3,60	-	-	-	-	-	-	-	-	5095163	5095164	-	-	-	-	-
VNMG12T308	7,14	12,45	3,97	0,8	3,65	-	-	-	-	-	-	-	4170965	5095165	5095166	-	-	-	-	-





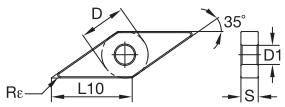
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

VNMG-FF

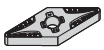
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404FF	9,53	16,61	4,76	0,4	3,81	4171053	-	-	-	4172694	-	-	-	5684334	-	-	-	-	-	-
VNMG160408FF	9,53	16,61	4,76	0,8	3,81	4171054	-	-	-	4172695	-	-	-	5684333	-	-	-	-	-	-

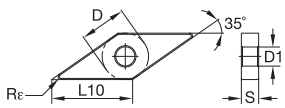




VNMG-ML

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404ML	9,53	16,61	4,76	0,4	3,81	4171079	4170495	-	-	-	-	4171674	4171413	-	-	-	-	-	-	-
VNMG160408ML	9,53	16,61	4,76	0,8	3,81	4171080	4170496	-	-	-	-	4171675	4171414	-	-	-	-	-	-	-

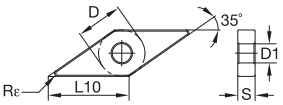




VNMG-MR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408MR	9,53	16,61	4,76	0,8	3,81	4171157	4170580	4170066	-	-	-	-	-	-	-	-	-	-	-	-





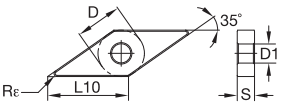
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ VNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404MS	9,53	16,61	4,76	0,4	3,81	-	-	-	-	-	-	-	-	5908944	5908945	5908946	-	-	-	-
VNMG160408MS	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908947	5908948	5908949	-	-	-	-
VNMG220404MS	12,70	22,14	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908950	5908961	5908962	-	-	-	-
VNMG220408MS	12,70	22,14	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908963	5908964	5908965	-	-	-	-

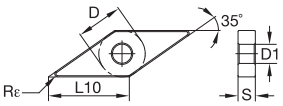




■ VNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408RH	9,53	16,61	4,76	0,8	3,81	4171015	4171550	4171732	-	-	-	-	-	-	-	-	-	-	-	-
VNMG220408RH	12,70	22,14	4,76	0,8	5,16	4171016	4171551	4171733	-	-	-	-	-	-	-	-	-	-	-	-
VNMG220412RH	12,70	22,14	4,76	1,2	5,16	4171017	4171552	4171734	-	-	-	-	-	-	-	-	-	-	-	-

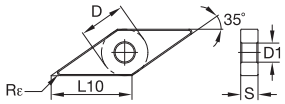




■ VNMG-UF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160404UF	9,53	16,61	4,76	0,4	3,81	-	-	-	4169372	4169398	-	-	-	5645616	-	-	-	-	-	-
VNMG160408UF	9,53	16,61	4,76	0,8	3,81	5645618	-	-	4169373	4169399	-	-	-	5645617	-	-	-	-	-	-



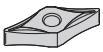


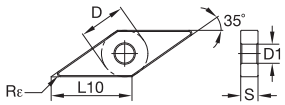
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ VNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMG160408UR	9,53	16,61	4,76	0,8	3,81	4171123	4170529	4170038	4169439	4169473	4169508	-	4171449	-	5579416	-	-	-	-	-
VNMG160412UR	9,53	16,61	4,76	1,2	3,81	4171124	4170530	-	4169440	4169474	-	-	4171450	5680176	-	-	-	-	-	-

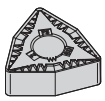


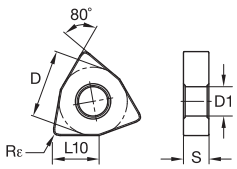


■ VNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
VNMP160404	9,53	16,61	4,76	0,4	3,81	-	-	-	-	-	-	-	-	4172497	-	-	-	-	-	-
VNMP160408	9,52	16,61	4,76	0,8	3,81	-	-	-	-	-	-	-	-	4172498	-	-	-	-	-	-

NOTE: DNMP-style inserts are single-sided.





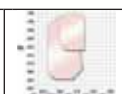
■ WNGG-FS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNGG080404FS	12,70	8,69	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5548687	5538234	5550003	-	-	-	-
WNGG080408FS	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5548688	5538235	5550004	-	-	-	-


C2–C49

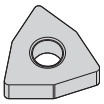

C50–C81

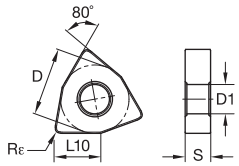

C86–C129


B8–B25


B26–B28


B30–B105





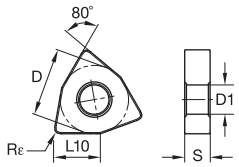
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ WNMA

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMA060408	9,53	6,52	4,76	0,8	3,81	-	-	-	-	-	-	4171653	4171898	-	-	-	-	-	-	-
WNMA060412	9,53	6,52	4,76	1,2	3,81	-	-	-	-	-	-	-	4171899	-	-	-	-	-	-	-
WNMA080408	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	-	4171654	4171900	-	-	-	-	-	-	-
WNMA080412	12,70	8,69	4,76	1,2	5,16	-	-	-	-	-	-	4171655	4171901	-	-	-	-	-	-	-
WNMA080416	12,70	8,69	4,76	1,6	5,16	-	-	-	-	-	-	4171656	4171902	-	-	-	-	-	-	-

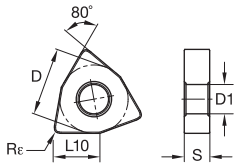




■ WNMG-FF

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404FF	9,53	6,52	4,76	0,4	3,81	4171055	-	-	-	4172696	-	-	4171388	-	-	-	-	-	-	-
WNMG060408FF	9,53	6,52	4,76	0,8	3,81	4171056	-	-	-	-	-	-	4171389	-	-	-	-	-	-	-
WNMG080404FF	12,70	8,69	4,76	0,4	5,16	4171057	-	-	-	4172697	-	-	-	5684336	-	-	-	-	-	-
WNMG080408FF	12,70	8,69	4,76	0,8	5,16	4171058	-	-	-	4172698	-	-	-	5684335	-	-	-	-	-	-





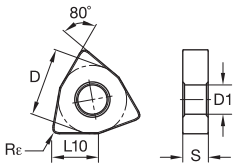
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

WNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404FW	9,53	6,52	4,76	0,4	3,81	5623510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG060408FW	9,53	6,52	4,76	0,8	3,81	5623511	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG080404FW	12,70	8,69	4,76	0,4	5,16	5623514	-	-	4171762	4173109	-	4171693	-	-	-	-	-	-	-	-
WNMG080408FW	12,70	8,69	4,76	0,8	5,16	5623515	-	-	4171763	4173110	-	4171694	-	-	-	-	-	-	-	-
WNMG080412FW	12,70	8,69	4,76	1,2	5,16	-	-	-	4171764	4173111	-	4171696	-	-	-	-	-	-	-	-





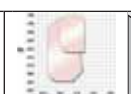
WNMG-ML

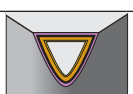
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404ML	9,53	6,52	4,76	0,4	3,81	4171081	-	-	-	-	-	4171676	4171415	-	-	-	-	-	-	-
WNMG060408ML	9,53	6,52	4,76	0,8	3,81	4171082	4170497	-	-	-	-	4171677	4171416	-	-	-	-	-	-	-
WNMG080404ML	12,70	8,69	4,76	0,4	5,16	4171083	4170498	-	-	-	-	4171678	4171417	-	-	-	-	-	-	-
WNMG080408ML	12,70	8,69	4,76	0,8	5,16	4171084	4170499	-	-	-	-	4171679	4171418	-	-	-	-	-	-	-


C2–C49


C50–C81

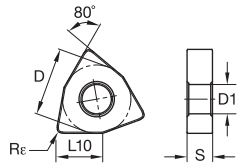

C86–C129


B8–B25


B26–B28


B30–B105



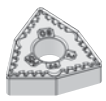


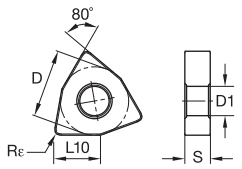
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ WNMG-MR

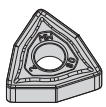
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG080408MR	12,70	8,69	4,76	0,8	5,16	4171158	4170581	4170067	-	4173033	4173148	-	-	-	-	-	-	-	-	-
WNMG080412MR	12,70	8,69	4,76	1,2	5,16	4171159	4170582	4170068	-	4173034	4173149	-	-	-	-	-	-	-	-	-
WNMG080416MR	12,70	8,69	4,76	1,6	5,16	4171160	4170583	-	-	-	-	-	-	-	-	-	-	-	-	-

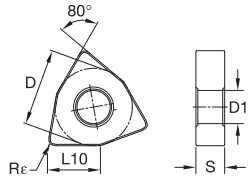




■ WNMG-MS

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408MS	9,53	6,52	4,76	0,8	3,81	-	-	-	-	-	-	-	-	5908966	5908967	5908968	-	-	-	-
WNMG080404MS	12,70	8,69	4,76	0,4	5,16	-	-	-	-	-	-	-	-	5908969	5908970	5908971	-	-	-	-
WNMG080408MS	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	-	-	-	5908972	5908973	5908974	-	-	-	-

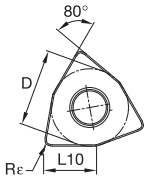




■ WNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408MW	9,53	6,52	4,76	0,8	3,81	5623512	5623513	-	-	-	-	-	-	-	-	-	-	-	-	-
WNMG080408MW	12,70	8,69	4,76	0,8	5,16	5623516	5623517	-	-	4173118	-	4171695	-	-	-	-	-	-	-	-
WNMG080412MW	12,70	8,69	4,76	1,2	5,16	-	-	-	-	4173119	-	4171697	-	-	-	-	-	-	-	-





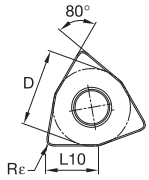
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

■ WNMG-RH

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408RH	9,53	6,52	4,76	0,8	3,81	4171018	4171553	4171735	-	4173063	-	-	-	-	-	-	-	-	-	-
WNMG080408RH	12,70	8,69	4,76	0,8	5,16	4171019	4171554	4171736	-	4173064	-	-	4171932	-	-	-	-	-	-	-
WNMG080412RH	12,70	8,69	4,76	1,2	5,16	4171020	4171555	4171737	-	4173065	-	-	4171933	-	-	-	-	-	-	-
WNMG080416RH	12,70	8,69	4,76	1,6	5,16	4171021	4171556	4171738	-	4173066	-	-	4171934	-	-	-	-	-	-	-





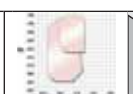
■ WNMG-UF

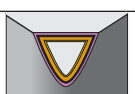
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404UF	9,53	6,52	4,76	0,4	3,81	-	-	-	4169374	4169400	-	-	-	5645621	-	-	-	-	-	-
WNMG060408UF	9,53	6,52	4,76	0,8	3,81	-	-	-	4169375	4169401	-	-	-	5645622	-	-	-	-	-	-
WNMG080404UF	12,70	8,69	4,76	0,4	5,16	-	-	-	4169376	4169402	-	-	-	5645619	-	-	-	-	-	-
WNMG080408UF	12,70	8,69	4,76	0,8	5,16	-	-	-	4169377	4169403	-	-	-	5645623	-	-	-	-	-	-
WNMG080412UF	12,70	8,69	4,76	1,2	5,16	-	-	-	4169378	4169404	-	-	-	5645624	-	-	-	-	-	-


C2–C49

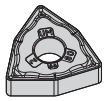

C50–C81

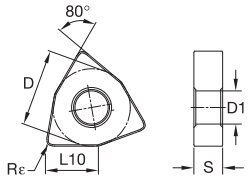

C86–C129


B8–B25


B26–B28


B30–B105



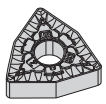


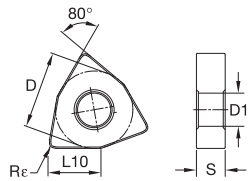
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S					○					●	●	●	●			
H													●			

■ WNMG-UM

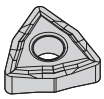
ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060404UM	9,53	6,52	4,76	0,4	3,81	-	-	-	4172375	4172403	4172432	-	-	5645268	-	-	-	-	-	-
WNMG060408UM	9,53	6,52	4,76	0,8	3,81	-	-	-	4172376	4172404	4172433	-	-	5645267	-	-	-	-	-	-
WNMG060412UM	9,53	6,52	4,76	1,2	3,81	-	-	-	-	4172405	4172434	-	-	-	-	-	-	-	-	-
WNMG080404UM	12,70	8,69	4,76	0,4	5,16	-	-	-	4172377	4172406	4172435	-	-	-	-	-	-	-	-	-
WNMG080408UM	12,70	8,69	4,76	0,8	5,16	-	5645270	-	4172378	4172407	4172436	-	-	-	-	-	-	-	-	-
WNMG080412UM	12,70	8,69	4,76	1,2	5,16	5645271	-	-	4172379	4172408	4172437	-	-	5645269	-	-	-	-	-	-
WNMG080416UM	12,70	8,69	4,76	1,6	5,16	-	-	-	-	4172409	4172438	-	-	-	-	-	-	-	-	-

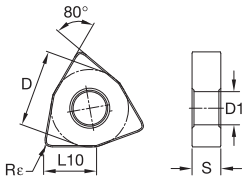




■ WNMG-UR

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMG060408UR	9,53	6,52	4,76	0,8	3,81	4171125	4170531	4170039	4169441	4169475	-	-	4171451	5680178	5680177	-	-	-	-	-
WNMG060412UR	9,53	6,52	4,76	1,2	3,81	4171126	4170532	-	-	-	-	-	4171452	-	-	-	-	-	-	-
WNMG080408UR	12,70	8,69	4,76	0,8	5,16	4171127	4170533	4170040	4169442	4169476	4169509	5680179	4171453	-	-	-	-	-	-	-
WNMG080412UR	12,70	8,69	4,76	1,2	5,16	4171128	4170534	4170041	4169443	4169477	4169510	-	4171454	5579420	-	-	-	-	-	-
WNMG080416UR	12,70	8,69	4,76	1,6	5,16	4171129	4170535	4170042	-	4169478	4169511	-	4171455	-	-	-	-	-	-	-



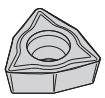


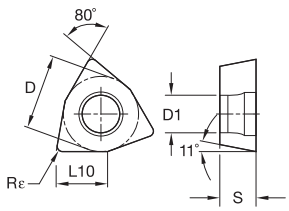
● first choice
○ alternate choice

		WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
P		●	●	●	○	○	○	○	○	○	○	○		●	●	●
M				○	●	●	●			●	●	●		●		●
K		○	○					●	●	○	○		●			
N										○	○	○	●			
S						○				●	●	●	●			
H													●			

WNMP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WNMP080408	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	-	-	-	4172499	-	-	-	-	-	-
WNMP080412	12,70	8,69	4,76	1,2	5,16	-	-	-	-	-	-	-	-	4172500	-	-	-	-	-	-

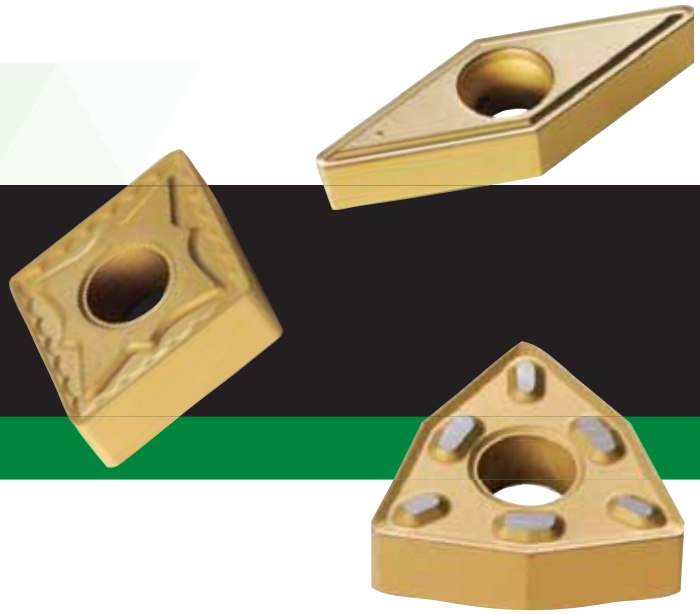




WPMT-FP

ISO catalogue number	D	L10	S	Rε	D1	WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WM35CT	WK05CT	WK20CT	WS10PT	WS25PT	WU10HT	THM	TTM	TTR	TTI15
WPMT040204FP	6,35	4,34	2,38	0,4	2,80	-	4170341	-	-	-	-	-	-	-	-	-	-	-	-	-
WPMT06T304FP	9,53	6,52	3,97	0,4	4,40	4170030	-	-	4168821	4168839	-	-	-	-	-	-	-	-	-	-
WPMT06T308FP	9,53	6,52	3,97	0,8	4,40	4170031	4170342	-	-	4168840	-	-	-	-	-	-	-	-	-	-
WPMTS3T104FP	4,76	3,25	1,98	0,4	2,15	-	4170343	-	-	4168841	-	-	-	-	-	-	-	-	-	-

VariTurn



WIDIA VariTurn is the cost-effective line of inserts from the brand you already know and trust for quality. Each insert is 100% manufactured by WIDIA to outperform the competition. WIDIA VariTurn offers the versatility for those operators that are cutting steel today and cast iron tomorrow and need an insert to get the job done. A focused portfolio with a simple grade selection method allows WIDIA VariTurn to be used for up to approximately 80% of all turning applications.

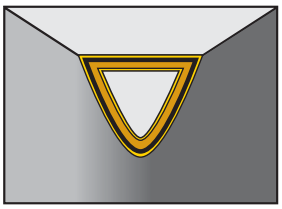


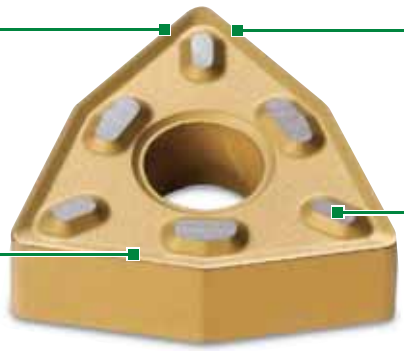
- Engineered to optimise performance.
- Gold coating on every insert.
- Proven grade technologies.



Post-coat treatment
- Improves edge toughness.
- Wide range of applications.

MT-CVD/CVD–
TiN-TiCN-Al203-TiN





Improved edge toughness
- Provides smooth outer surface to reduce forces, friction, and workpiece sticking.

Post-coat grinding
- Provides secure seating surface.

Getting the Most from Every Insert

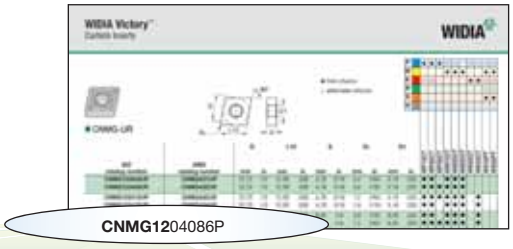
WIDIA™ VariTurn™ products make it simple to get the most out of your inserts, and your money. Every insert is gold, which exposes wear as the tool continues to be used. This makes it easy to detect when an insert is ready to be changed — maximising the product's value and protecting the workpiece. Also, because WIDIA VariTurn inserts can be used in most applications, a single insert can take on any number of tasks, thus reducing your inventory. WIDIA VariTurn products are also reliable enough to cut steel, stainless steel, cast iron, and high-temperature alloys, enabling quick changes in workpiece materials without the need to swap inserts, saving time and money.

WIDIA VariTurn Options

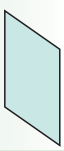
This versatile line offers a simple geometry selection system, eight grades, and eight geometries, including negative rake and screw-on. With these options, WIDIA VariTurn inserts cover 80% of all general turning applications.

How Do Catalogue Numbers Work?

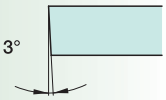
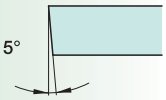
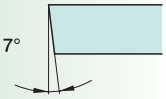
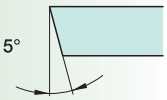
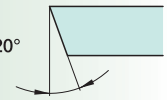
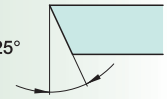
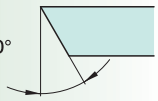
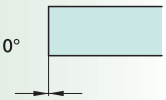
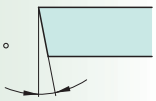
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



C — Insert Shape

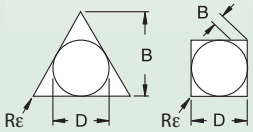
H	Hexagon 120°	
O	Octagon 135°	
P	Pentagon 108°	
R	Round —	
S	Square 90°	
T	Triangular 60°	
C D E M V	Rhomboid 80° 55° 75° 86° 35°	
W	Trigon 80° with enlarged corner angles	
L	Rectangular 90°	
A B N/K	Parallelogram 85° 82° 55°	

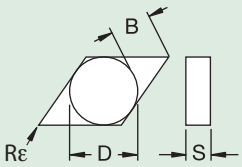
N — Insert Clearance Angle

A	3°	
B	5°	
C	7°	
D	15°	
E	20°	
F	25°	
G	30°	
N	0°	
P	11°	
O	Indicated for other clearance angles requiring descriptions.	

M — Tolerance Class

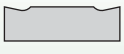
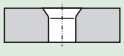
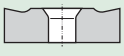
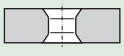
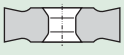
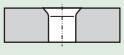
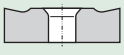
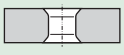
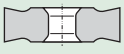
Tolerances apply prior to edge prep and coating





D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

G — Insert Features

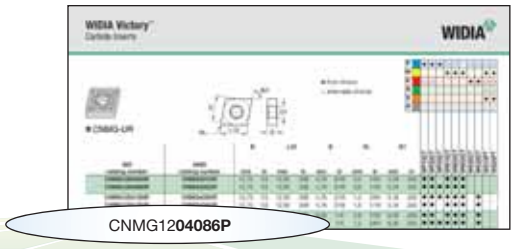
N	
R	
F	
A	
M	
G	
W	
T	
Q	
U	
B	
H	
C	
J	
X V	Special Design

12 — Size

"D" mm	"Code for mm cutting edge length "L10" C D R S T V W
3,97	S4 04 03 03 06 – –
4,76	04 05 04 04 08 08 S3
5,56	05 06 05 05 09 09 03
6,00	– – 06 – – – –
6,35	06 07 06 06 11 11 04
7,94	08 09 07 07 13 13 05
8,00	– – 08 – – – –
9,52	09 11 09 09 16 16 06
10,00	– – 10 – – – –
11,11	11 13 11 11 19 19 07
12,00	– – 12 – – – –
12,70	12 15 12 12 22 22 08
14,29	14 17 14 14 24 24 09
15,88	16 19 15 15 27 27 10
16,00	– – 16 – – – –
17,46	17 21 17 17 30 30 11
19,05	19 23 19 19 33 33 13
20,00	– – 20 – – – –
22,22	22 27 22 22 38 38 15
25,00	– – 25 – – – –
25,40	25 31 25 25 44 44 17
31,75	32 38 31 31 54 54 21
32,00	– – 32 – – – –

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,13
M	See tables on next page		±0,13
U	See tables on next page		±0,13

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



04	**08**			**6P**
Thickness S	Corner Radius "Rε"	Hand of Insert (optional)	Cutting Edge (optional)	Chipbreaker (optional)

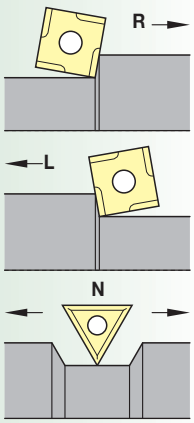
symbol mm	thickness mm
–	0,79
T0	1,00
01	1,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
9	9,52
11	11,11
12	12,70

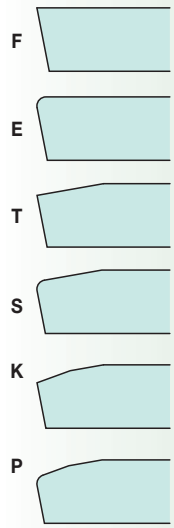
symbol mm	corner radius mm
X0	0,04
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
20	2,0
24	2,4
28	2,8
32	3,2
00	round insert
M0	round insert
–	round insert

R = Right hand

L = Left hand

N = Neutral





1P = Finishing

2P = Finishing

..GP = Medium Machining

4P = Medium Machining

6P = Medium Roughing

..MA = Roughing

7N = Heavy Roughing

"D" mm	± Tolerance on "D" Class M Tolerance Shapes S, T, C, R, & W mm	Class M Tolerance Shape D mm	Class M Tolerance Shape V mm	Class U Tolerance Shapes S, T, & C mm
3,97	0,05	–	–	–
4,76	0,05	–	–	0,08
5,56	0,05	0,05	0,05	0,08
6,35	0,05	0,05	0,05	0,08
7,94	0,05	0,05	0,05	0,08
9,52	0,05	0,05	0,05	0,08
11,11	0,08	0,08	0,08	0,13
12,70	0,08	0,08	0,08	0,13
14,29	0,08	0,08	0,08	0,13
15,88	0,10	0,10	0,10	0,18
17,46	0,10	0,10	0,10	0,18
19,05	0,10	0,10	0,10	0,18
22,22	0,13	–	–	0,25
25,40	0,13	–	–	0,25
31,75	0,15	–	–	0,25

"D" mm	± Tolerance on "B" Class M Tolerance Shapes S, T, C, R, & W mm	Class M Tolerance Shape D mm	Class M Tolerance Shape V mm	Class U Tolerance Shapes S, T, & C mm
3,97	0,08	–	–	–
4,76	0,08	–	–	0,13
5,56	0,08	0,11	–	0,13
6,35	0,08	0,11	–	0,13
7,94	0,08	0,11	–	0,13
9,52	0,08	0,11	0,18	0,13
11,11	0,13	0,15	–	–
12,70	0,13	0,15	0,25	0,20
14,29	0,13	0,15	–	–
15,88	0,15	0,18	–	0,27
17,46	0,15	0,18	–	0,27
19,05	0,15	0,18	–	0,27
22,22	0,15	–	–	0,38
25,40	0,18	–	–	0,38
31,75	0,20	–	–	0,38

A system of grades, geometries, and application guidelines to provide optimal solutions for your metalcutting needs. It's easy to determine which WIDIA™ chip-control cutting tool will work best in your specific workpiece materials and applications!

TN

Brand

TN = WIDIA

15

Relative Hardness
(ISO 513)

01 = **Hardest**
10
20
30
40
50 = **Toughest**

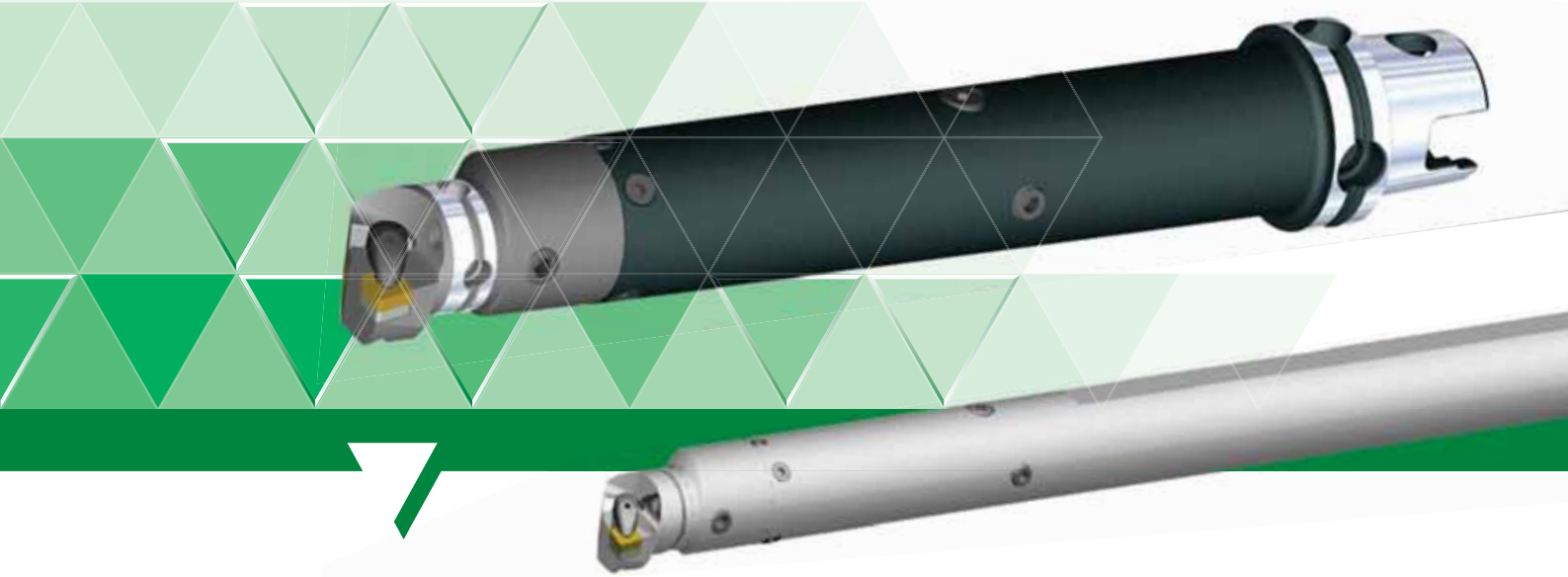
M

Primary
Workpiece
Material (ISO 513)

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials
U	Universal Machining



WIDIA™ Tunable Tooling



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Internal dampening package eliminates chatter, vibration, and harmonics in all your deep-hole boring applications!

- Proprietary features provide superior surface finish and increased productivity.
- Wide product offering — from boring bars, extensions, and holders to rotating adaptors and modular sections.
- Reduce setup time with KM™ Quick Change Tooling — now an ISO Standard!
- Customise WIDIA pre-tuned boring bars — after they're on the machine — to optimise performance in your specific machining operations.

For tighter tolerances, reduced scrap rates, and improved tool life, you can rely on WIDIA Tunable Tooling!

To learn more, contact your local Authorised Distributor or visit **widia.com**

WIDIA™

Step 1 • Select the insert geometry

Negative Inserts



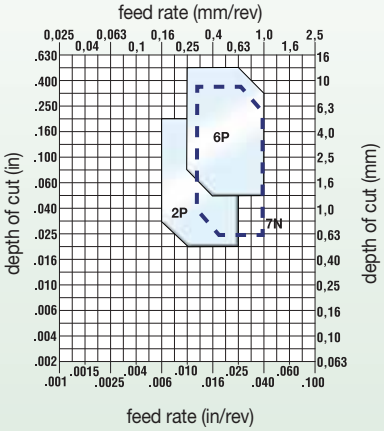
2P
Finishing



6P
Roughing



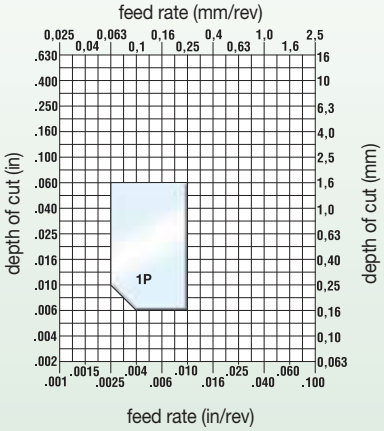
7N
Heavy Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

		Negative Insert Geometry			Positive Insert Geometry
cutting condition		**2P**	**6P**	**7N**	**1P**
heavily interrupted cut		**TN30P**	**TN30P**	**TN30P**	**TN30P**
lightly interrupted cut		**TN20P/TN30P**	**TN20P/TN30P**	**TN20P/TN30P**	**TN20P**
varying depth of cut, casting, or forging skin		**TN20P/TN30P**	**TN20P/TN30P**	**TN20P/TN30P**	**TN10P**
smooth cut, pre-turned surface		**TN10P**	**TN10P**	**TN10P**	**TN10P**

(continued)

Step 3 • Selecting the cutting speed *(continued)*

Low-Carbon (<0.3% C) and Free-Machining Steel

Material Group	grade	135	180	225	275	320	360	410	455	495	Starting Conditions m/min
		speed — m/min									
P0/P1	TN10P					◁▷					316
	TN20P				◁▷						248
	TN30P		◁▷								189

Medium- and High-Carbon Steels (>0.3% C)

Material Group	grade	135	180	225	275	320	360	410	455	495	Starting Conditions m/min
		speed — m/min									
P2	TN10P			◁▷							212
	TN20P		◁▷								176
	TN30P	◁▷									135

Alloy Steels and Tool Steels (≤330 HB) (≤35 HRC)

Material Group	grade	135	180	225	275	320	360	410	455	495	Starting Conditions m/min
		speed — m/min									
P3	TN10P		◁▷								152
	TN20P	◁▷									140
	TN30P	◁▷									108

Alloy Steels and Tool Steels (340–450 HB) (36–48 HRC)

Material Group	grade	60	90	120	150	180	210	240	270	300	Starting Conditions m/min
		speed — m/min									
P4	TN10P			◁▷							116
	TN20P		◁▷								95
	TN30P		◁▷								86

Ferritic, Martensitic, and PH Stainless Steels (≤330 HB) (≤35 HRC)

Material Group	grade	120	150	180	210	240	270	300	330	360	Starting Conditions m/min
		speed — m/min									
P5	TN10P			◁▷							172
	TN20P			◁▷							176
	TN30P	◁▷									122

Ferritic, Martensitic, and PH Stainless Steels (340–450 HB) (36–48 HRC)

Material Group	grade	105	135	165	195	225	255	285	315	345	Starting Conditions m/min
		speed — m/min									
P6	TN10P		◁▷								144
	TN20P		◁▷								135
	TN30P	◁▷									95

Step 1 • Select the insert geometry

Negative Inserts



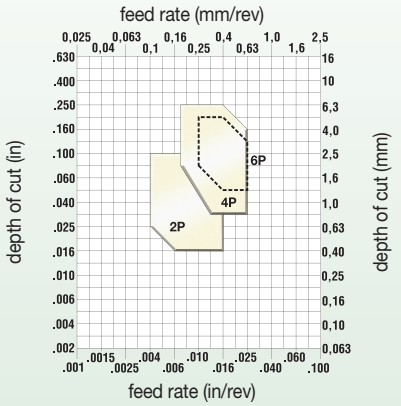
2P
Finishing



4P
Medium



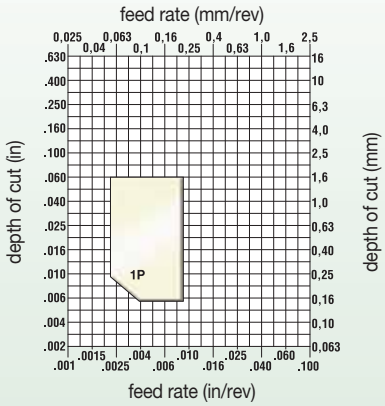
6P
Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

		Negative Insert Geometry			Positive Insert Geometry
cutting condition		**2P**	**4P**	**6P**	**1P**
heavily interrupted cut		**TN15M/TN10**	**TN30M**	**TN30M**	**TN30M/TN10**
lightly interrupted cut		**TN15M/TN10**	**TN30M**	**TN30M**	**TN30M**
varying depth of cut, casting, or forging skin		**TN15M**	**TN15M/TN30M**	**TN15M/TN30M**	**TN15M/TN30M**
smooth cut, pre-turned surface		**TN15M**	**TN15M**	**TN15M**	**TN15M**

Step 3 • Selecting the cutting speed

Austenitic Stainless Steel — speed — m/min — Starting Conditions ◁▷

Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M1	TN15M		◁▷								162
	TN30M		◁▷								135
	TN10U			◁▷							194
	TN15U		◁▷								129

Austenitic Stainless Steel — speed — m/min — Starting Conditions ◁▷

Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M2	TN15M		◁▷								149
	TN30M		◁▷								135
	TN10U			◁▷							180
	TN15U										120

Austenitic Stainless Steel: Duplex (Ferritic and Austenitic Mixture) — speed — m/min — Starting Conditions ◁▷

Material Group	grade	90	135	180	225	270	315	360	405	450	m/min
M3	TN15M		◁▷								135
	TN30M		◁▷								108
	TN10U			◁▷							167
	TN15U		◁▷								111

Step 1 • Select the insert geometry

Negative Inserts



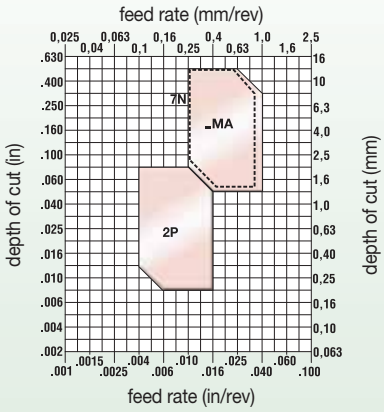
2P
Finishing



..MA
Heavy Roughing



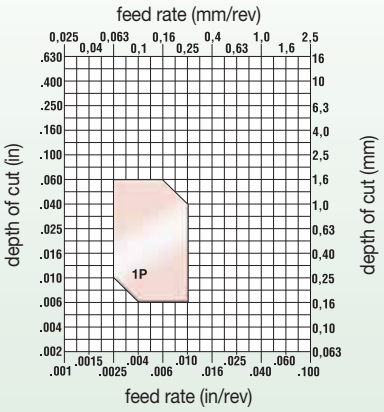
7N
Heavy Roughing



Positive Inserts



1P
Finishing



Step 2 • Select the grade

	Negative Insert Geometry			Positive Insert Geometry
cutting condition	**2P**	**..MA**	**7N**	**1P**
heavily interrupted cut	**TN20K**	**TN20K**	**TN20K**	**TN20K**
lightly interrupted cut	**TN20K**	**TN20K**	**TN20K**	**TN20K**
varying depth of cut, casting, or forging skin	**TN20K**	**TN20K**	**TN20K**	**TN20K**
smooth cut, pre-turned surface	**TN20K**	**TN20K**	**TN20K**	**TN20K**

Step 3 • Selecting the cutting speed

Grey Cast Iron

Material Group	grade	speed — m/min 60	150	240	330	420	510	600	690	780	Starting Conditions m/min
K1	TN20K			◇							270

Ductile, Compacted Graphite, and Malleable Cast Irons (<80 KSI tensile strength)

Material Group	grade	speed — m/min 60	150	240	330	420	510	600	690	780	Starting Conditions m/min
K2	TN20K		◇								216

Ductile, Compacted Graphite, and Malleable Cast Irons (>80 KSI tensile strength)

Material Group	grade	speed — m/min 60	150	240	330	420	510	600	690	780	Starting Conditions m/min
K3	TN20K		◇								189

Step 1 • Select the insert geometry

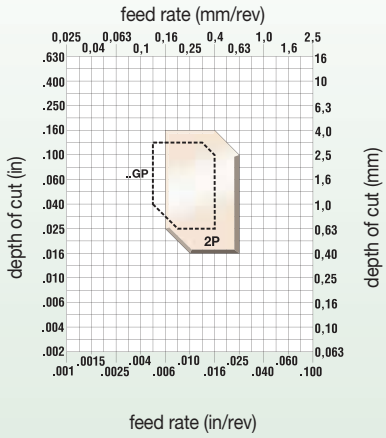
Negative Inserts



2P
Finishing



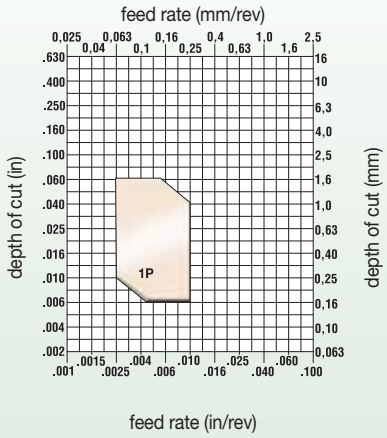
..GP
Medium



Positive Inserts



1P
Finishing



Step 2 • Select the grade

cutting condition	Negative Insert Geometry 2P	Negative Insert Geometry ..GP	Positive Insert Geometry 1P
heavily interrupted cut	TN15U	–	TN15U
lightly interrupted cut	TN10U	TN10U	TN15U
varying depth of cut, casting, or forging skin	TN10U	TN10U	TN10U
smooth cut, pre-turned surface	TN10U	TN10U	TN10U

Step 3 • Select the cutting speed

Iron-Based, Heat-Resistant Alloys (135–320 HB) (≤34 HRC)

Material Group	grade	15	45	75	105	140	170	200	230	260	speed — m/min	Starting Conditions m/min
S1	TN10U		◁▷									50
	TN15U		◁▷									33

Cobalt-Based, Heat-Resistant Alloys (150–425 HB) (≤45 HRC)

Material Group	grade	15	45	75	105	140	170	200	230	260	speed — m/min	Starting Conditions m/min
S2	TN10U		◁▷									54
	TN15U		◁▷									36

Nickel-Based, Heat-Resistant Alloys (140–475 HB) (≤48 HRC)

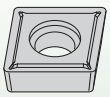
Material Group	grade	15	45	75	105	140	170	200	230	260	speed — m/min	Starting Conditions m/min
S3	TN10U			◁▷								63
	TN15U		◁▷									42

Titanium and Titanium Alloys (110–450 HB) (≤48 HRC)

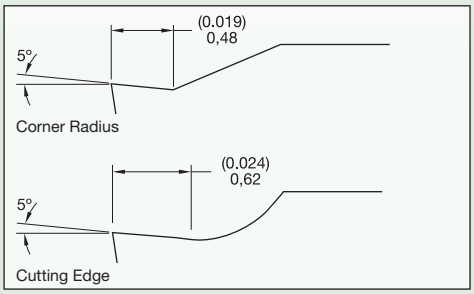
Material Group	grade	15	45	75	105	140	170	200	230	260	speed — m/min	Starting Conditions m/min
S4	TN10U			◁▷								63
	TN15U			◁▷								42

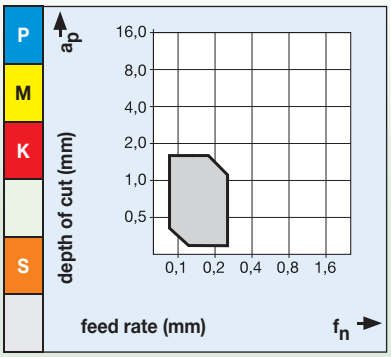
Positive and Negative Inserts

1P

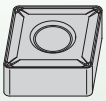


Preferred for light finishing. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range.

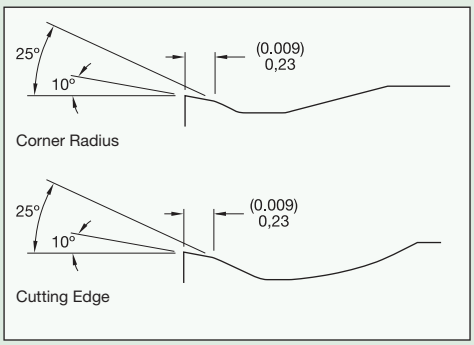


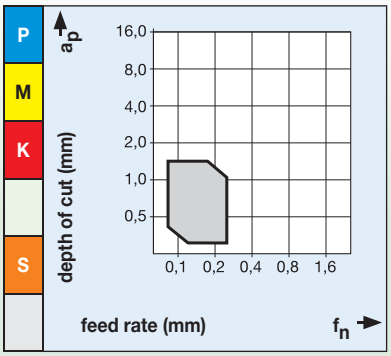


2P

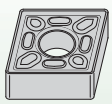


For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.

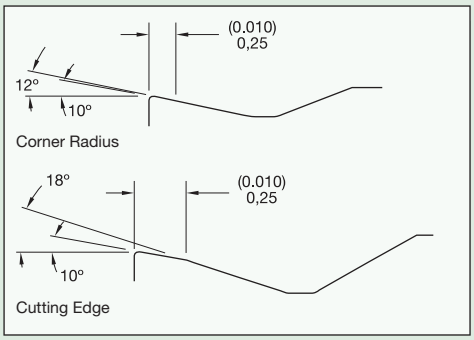


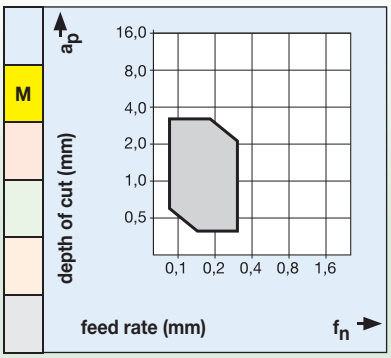


4P



For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.





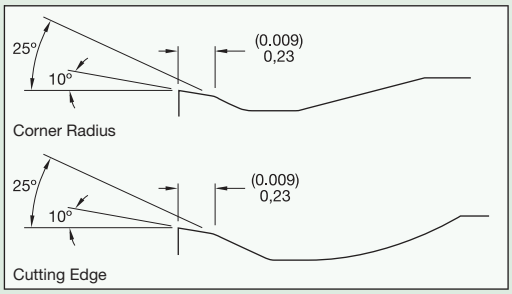
(continued)

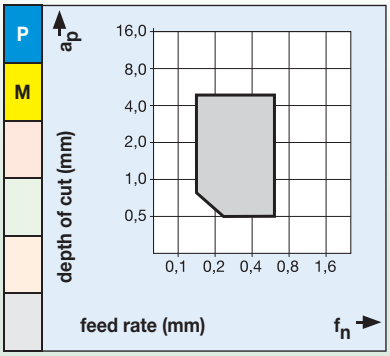
Positive and Negative Inserts *(continued)*

6P

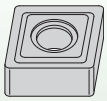


For medium to rough turning. Outstanding chip control due to specially configured chipbreaker element in corner area. Good chip forming with low depths of cut.

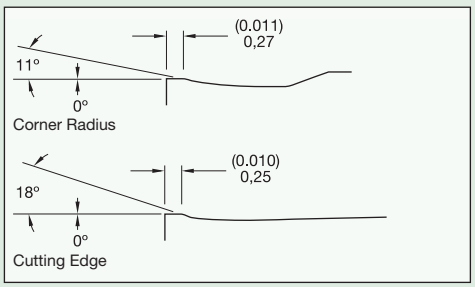


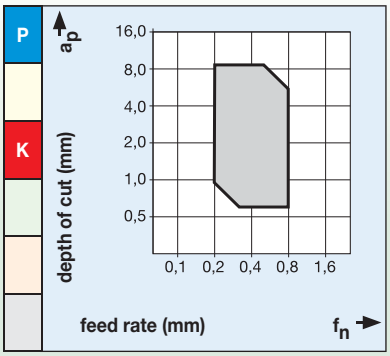


7N



For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin, or scale. Preferred for all cast iron such as grey, malleable, and nodular.

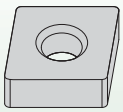




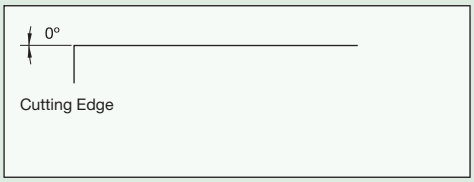
(continued)

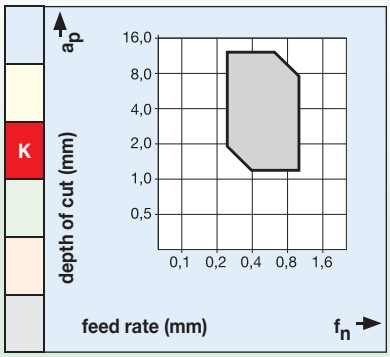
Positive and Negative Inserts *(continued)*

..MA

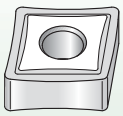


Flat top geometry for machining cast iron. For finishing to roughing applications.

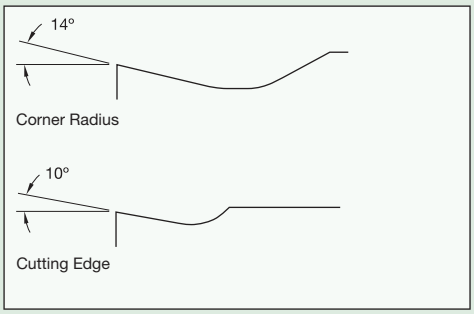


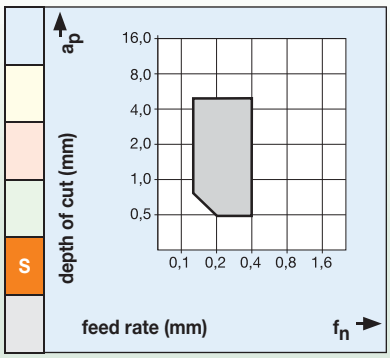


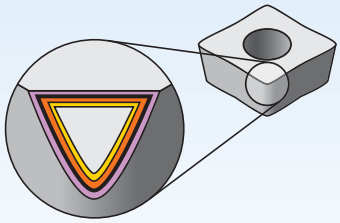
..GP



For light machining to light roughing.



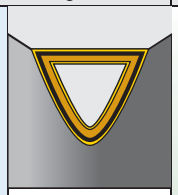
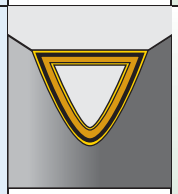
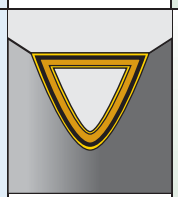
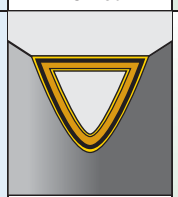


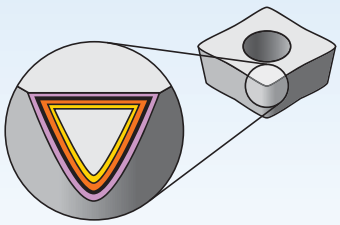


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

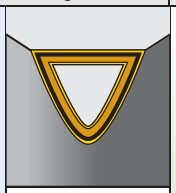
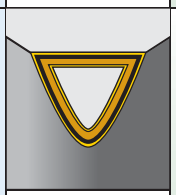
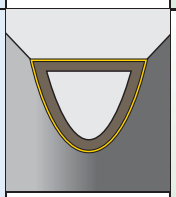
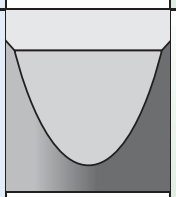
Grade	Coating		Grade Description		05	10	15	20	25	30	35	40	45
	TN10P	 HC-P10	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for light finishing to medium machining applications. Superior wear resistance.	P									
				K									
	TN20P	 HC-P20	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Great general-purpose turning grade for steels. Ideal for semi-finishing to moderately heavy roughing.	P									
				K									
	TN30P	 HC-P30	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Tough carbide grade. Ideal for roughing and heavy roughing applications.	P									
	TN15M	 HC-M15	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for general-purpose machining of stainless steels.	P									
				M									
				S									

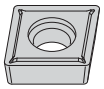


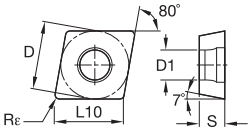
Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description	05	10	15	20	25	30	35	40	45
TN30M	 HC-M30	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Ideal for general-purpose machining of stainless steels.	P									
			M									
			S									
TN20K	 HC-K20	Coated carbide. MTCVD-TiN-TiCN-Al_2O_3-TiN. Great when used for straight or lightly interrupted cut applications of ductile and cast irons.	P									
			K									
TN10U	 HC-S10	Coated carbide. PVD-TiAlN-TiN. Ideal for finishing of difficult to machine alloys and stainless steels.	P									
			M									
			K									
			N									
			S									
TN15U	 HW-P15	Uncoated carbide. Excellent abarasion resistance for machining cast irons, austentic stainless steels, and most high-temperature alloys.	P									
			M									
			K									
			N									
			S									



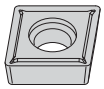


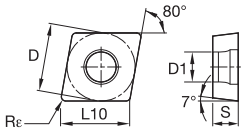
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CCGT0602021P	6,35	6,45	2,38	0,2	2,80	▮	▮	▮	▮	▮	▮	4163978	4163979
CCGT0602041P	6,35	6,45	2,38	0,4	2,80	▮	▮	▮	▮	▮	▮	4163980	4163981
CCGT0602081P	6,35	6,45	2,38	0,8	2,80	▮	▮	▮	▮	▮	▮	4163982	-
CCGT09T3011P	9,53	9,67	3,97	0,1	4,40	▮	▮	▮	▮	▮	▮	4164495	4164496
CCGT09T3021P	9,53	9,67	3,97	0,2	4,40	▮	▮	▮	▮	▮	▮	4164493	4164494
CCGT09T3041P	9,53	9,67	3,97	0,4	4,40	▮	▮	▮	▮	▮	▮	4164497	4164498
CCGT09T3081P	9,53	9,67	3,97	0,8	4,40	▮	▮	▮	▮	▮	▮	4164499	4164500





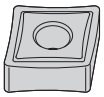
● first choice
○ alternate choice

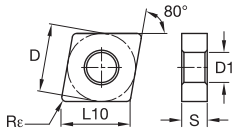
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CCMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CCMT0602021P	6,35	6,45	2,38	0,2	2,80	4165244	-	-	4166242	4166323	4165245	4166324	4166325
CCMT0602041P	6,35	6,45	2,38	0,4	2,80	4166326	4166327	-	4166329	4166330	4166328	4166331	4166332
CCMT0602081P	6,35	6,45	2,38	0,8	2,80	4166333	4166334	-	4166336	4166337	4166335	4166338	-
CCMT09T3021P	9,53	9,67	3,97	0,2	4,40	-	-	-	-	-	-	4166339	4166340
CCMT09T3041P	9,53	9,67	3,97	0,4	4,40	4166341	4166342	-	4166344	4166345	4166343	4166346	4166347
CCMT09T3081P	9,53	9,67	3,97	0,8	4,40	4166348	4166349	-	4166351	4166352	4166350	4166353	4166354
CCMT1204041P	12,70	12,90	4,76	0,4	5,50	4166355	4166356	-	4166358	4166359	4166357	4166558	-
CCMT1204081P	12,70	12,90	4,76	0,8	5,50	4166559	4166560	-	4166562	4166623	4166561	4166624	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



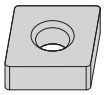


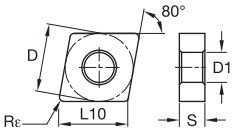
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CNGP

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNGP120401	12,70	12,90	4,76	0,1	5,16	■	■	■	■	■	■	4164565	■
CNGP120402	12,70	12,90	4,76	0,2	5,16	■	■	■	■	■	■	4164564	■
CNGP120404	12,70	12,90	4,76	0,4	5,16	■	■	■	■	■	■	4164566	4164567
CNGP120408	12,70	12,90	4,76	0,8	5,16	■	■	■	■	■	■	4164568	4164569
CNGP120412	12,70	12,90	4,76	1,2	5,16	■	■	■	■	■	■	4164570	4164571





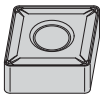
● first choice
○ alternate choice

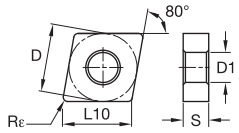
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

CNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMA120404	12,70	12,90	4,76	0,4	5,16	■	■	■	■	■	4165470	■	■
CNMA120408	12,70	12,90	4,76	0,8	5,16	■	■	■	■	■	4165471	■	■
CNMA120412	12,70	12,90	4,76	1,2	5,16	■	■	■	■	■	4165472	■	■
CNMA120416	12,70	12,90	4,76	1,6	5,16	■	■	■	■	■	4165833	■	■
CNMA160612	15,88	16,12	6,35	1,2	6,35	■	■	■	■	■	4165834	■	■
CNMA160616	15,88	16,12	6,35	1,6	6,35	■	■	■	■	■	4165835	■	■
CNMA190612	19,05	19,34	6,35	1,2	7,93	■	■	■	■	■	4165836	■	■
CNMA190616	19,05	19,34	6,35	1,6	7,93	■	■	■	■	■	4165837	■	■

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105





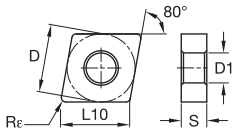
● first choice
○ alternate choice

P	●	●	●	○	○	○	○	○	
M				●	●		●	●	
K	○	○				●	○	○	
N							○	○	
S				○	○		●	●	
H									

■ CNMG-2P

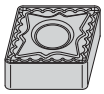
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204042P	12,70	12,90	4,76	0,4	5,16	4166171	4166172	-	4166244	4166245	4166243	4166246	4166247
CNMG1204082P	12,70	12,90	4,76	0,8	5,16	4166248	4166249	-	4166251	4166252	4166250	4166253	4166254
CNMG1204122P	12,70	12,90	4,76	1,2	5,16	4166255	4166256	-	4166258	-	4166257	4166259	-

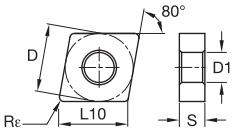




■ CNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204044P	12,70	12,90	4,76	0,4	5,16	-	5359116	-	4165830	4165831	-	5359117	-
CNMG1204084P	12,70	12,90	4,76	0,8	5,16	-	5359118	-	4165832	4165853	-	5359119	-
CNMG1204124P	12,70	12,90	4,76	1,2	5,16	-	5359240	-	4165854	4165855	-	5359241	-
CNMG1606124P	15,88	16,12	6,35	1,2	6,35	-	-	-	4165856	4165857	-	-	-
CNMG1906124P	19,05	19,34	6,35	1,2	7,93	-	-	-	4165858	4165859	-	-	-





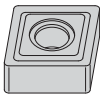
● first choice
○ alternate choice

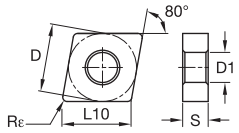
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

CNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG0903086P	9,53	9,67	3,18	0,8	3,81	4165948	4165949	-	4165950	4165951	-	-	-
CNMG1204046P	12,70	12,90	4,76	0,4	5,16	4165952	4165963	-	4165964	4165965	-	-	-
CNMG1204086P	12,70	12,90	4,76	0,8	5,16	4165966	4165967	4165968	4165969	4165970	-	-	-
CNMG1204126P	12,70	12,90	4,76	1,2	5,16	4165971	4165972	4165973	4165974	4165975	-	-	-
CNMG1606126P	15,88	16,12	6,35	1,2	6,35	-	4165976	4165977	4165978	4165979	-	-	-
CNMG1906126P	19,05	19,34	6,35	1,2	7,93	-	4165980	4165981	4165982	4165983	-	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



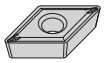


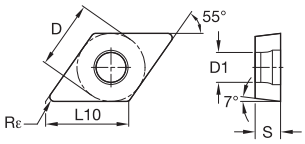
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ CNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
CNMG1204047N	12,70	12,90	4,76	0,4	5,16	4166386	4166387	-	-	-	4166388	-	-
CNMG1204087N	12,70	12,90	4,76	0,8	5,16	4166389	4166390	4166391	-	-	4166392	-	-
CNMG1204127N	12,70	12,90	4,76	1,2	5,16	4166433	4166434	4166435	-	-	4166436	-	-
CNMG1204167N	12,70	12,90	4,76	1,6	5,16	4166437	4166438	-	-	-	4166439	-	-
CNMG1606127N	15,88	16,12	6,35	1,2	6,35	4166440	4166441	4166442	-	-	4166443	-	-
CNMG1606167N	15,88	16,12	6,35	1,6	6,35	4166444	4166445	-	-	-	4166446	-	-
CNMG1906087N	19,05	19,34	6,35	0,8	7,93	4166447	-	-	-	-	4166448	-	-
CNMG1906127N	19,05	19,34	6,35	1,2	7,93	4166449	4166450	4166451	-	-	4166452	-	-
CNMG1906167N	19,05	19,34	6,35	1,6	7,93	4166453	4166454	4166455	-	-	4166456	-	-
CNMG2509247N	25,40	25,79	9,53	2,4	9,12	-	-	4166457	-	-	-	-	-



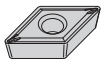


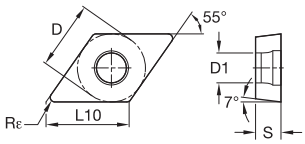
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

DCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DCGT0702011P	6,35	7,75	2,38	0,1	2,80	-	-	-	-	-	-	4164501	4164502
DCGT11T3011P	9,53	11,63	3,97	0,1	4,40	-	-	-	-	-	-	4164523	4164524
DCGT1504081P	12,70	15,50	4,76	0,8	5,50	-	-	-	-	-	-	4164525	-





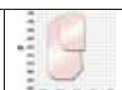
DCMT-1P

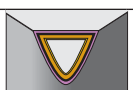
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DCMT0702021P	6,35	7,75	2,38	0,2	2,80	-	-	-	-	-	-	4166625	4166626
DCMT0702041P	6,35	7,75	2,38	0,4	2,80	4166627	4166628	-	4166630	4166631	4166629	4166632	4166633
DCMT11T3021P	9,53	11,63	3,97	0,2	4,40	-	-	-	-	-	-	4166634	4166635
DCMT11T3041P	9,53	11,63	3,97	0,4	4,40	4166636	4166637	-	4166639	4166640	4166638	4166641	4166642
DCMT11T3081P	9,53	11,63	3,97	0,8	4,40	4166643	4166644	-	4166646	4166647	4166645	4166648	-
DCMT11T3121P	9,53	11,63	3,97	1,2	4,40	4166649	-	-	4166651	-	4166650	4166652	-
DCMT1504041P	12,70	15,50	4,76	0,4	5,50	4166653	4166654	-	-	-	4166655	-	-
DCMT1504081P	12,70	15,50	4,76	0,8	5,50	4166656	4166657	-	-	-	4166361	-	-


C2–C49

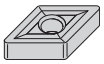

C50–C81

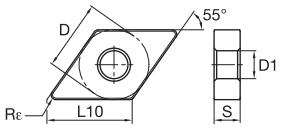

C86–C129


B8–B25


B26–B28


B30–B105



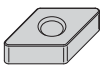


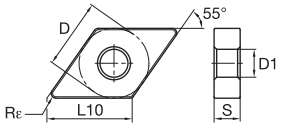
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ DNGP

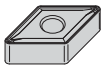
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNGP150401	12,70	15,50	4,76	0,1	5,16	-	-	-	-	-	-	4164784	-
DNGP150402	12,70	15,50	4,76	0,2	5,16	-	-	-	-	-	-	4164572	4164783
DNGP150404	12,70	15,50	4,76	0,4	5,16	-	-	-	-	-	-	4164785	4164786
DNGP150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	-	4164787	4164788

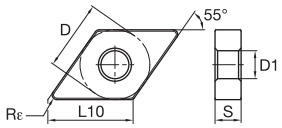




■ DNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMA150408	12,70	15,50	4,76	0,8	5,16	-	-	-	-	-	4165838	-	-
DNMA150608	12,70	15,50	6,35	0,8	5,16	-	-	-	-	-	4165840	-	-
DNMA150412	12,70	15,50	4,76	1,2	5,16	-	-	-	-	-	4165839	-	-
DNMA150612	12,70	15,50	6,35	1,2	5,16	-	-	-	-	-	4165841	-	-



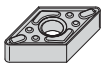


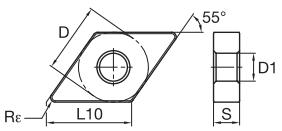
● first choice
○ alternate choice

P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ DNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504042P	12,70	15,50	4,76	0,4	5,16	4166260	4166261	-	4166263	4166264	4166262	4166265	4166266
DNMG1506042P	12,70	15,50	6,35	0,4	5,16	4166825	4166826	-	4166828	-	4166827	4166829	4166830
DNMG1504082P	12,70	15,50	4,76	0,8	5,16	4166267	4166269	-	4166273	4166275	4166271	4166277	4166279
DNMG1506082P	12,70	15,50	6,35	0,8	5,16	4166831	4166832	-	4166844	-	4166843	4166845	4166846
DNMG1506122P	12,70	15,50	6,35	1,2	5,16	4166847	4166848	-	4166850	4166851	4166849	4166852	-





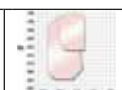
■ DNMG-4P

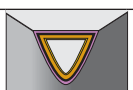
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504044P	12,70	15,50	4,76	0,4	5,16	-	-	-	4165860	4165861	-	-	-
DNMG1506044P	12,70	15,50	6,35	0,4	5,16	-	5359244	-	4165864	4165865	-	-	-
DNMG1504084P	12,70	15,50	4,76	0,8	5,16	-	5359242	-	4165862	4165863	-	5359243	-
DNMG1506084P	12,70	15,50	6,35	0,8	5,16	-	5359245	-	4165866	4165867	-	-	-
DNMG1506124P	12,70	15,50	6,35	1,2	5,16	-	-	-	4165868	4165869	-	-	-


C2–C49

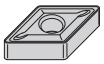

C50–C81

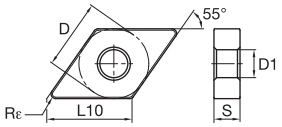

C86–C129


B8–B25


B26–B28


B30–B105



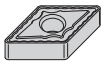


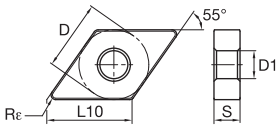
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

DNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1104086P	9,53	11,63	4,76	0,8	3,81	4165984	4165985	-	-	4165986	-	-	-
DNMG1504046P	12,70	15,50	4,76	0,4	5,16	4165987	4165988	-	4165989	4165990	-	-	-
DNMG1506046P	12,70	15,50	6,35	0,4	5,16	4166767	4166768	-	4166769	4166770	-	-	-
DNMG1504086P	12,70	15,50	4,76	0,8	5,16	4165991	4165992	4165993	4165994	4165995	-	-	-
DNMG1506086P	12,70	15,50	6,35	0,8	5,16	4166771	4166772	4166793	4166794	4166795	-	-	-
DNMG1504126P	12,70	15,50	4,76	1,2	5,16	4165996	4165997	-	4166765	4166766	-	-	-
DNMG1506126P	12,70	15,50	6,35	1,2	5,16	4166796	4166797	4166798	4166799	4166800	-	-	-
DNMG1906126P	15,88	19,38	6,35	1,2	6,35	-	-	4166801	-	-	-	-	-



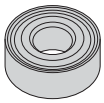


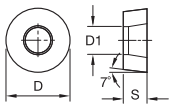
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

DNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
DNMG1504047N	12,70	15,50	4,76	0,4	5,16	4166458	4166459	-	-	-	-	-	-
DNMG1504087N	12,70	15,50	4,76	0,8	5,16	4166460	4166461	4166462	-	-	4166463	-	-
DNMG1506087N	12,70	15,50	6,35	0,8	5,16	4166484	4166485	4166486	-	-		-	-
DNMG1504127N	12,70	15,50	4,76	1,2	5,16	4166464	4166465	4166432	-	-	4166483	-	-
DNMG1506127N	12,70	15,50	6,35	1,2	5,16	4166488	4166489	4166490	-	-	4166491	-	-
DNMG1906127N	15,88	19,38	6,35	1,2	6,35	-	4166492	4166493	-	-	-	-	-





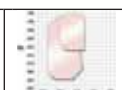
RNMG-7N

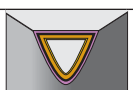
ISO catalogue number	D	S	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
RNMG12047N	12,70	4,76	5,16	-	4166494	-	-	-	4166495	-	-
RNMG19067N	19,05	6,35	7,93	4166496	4166497	-	-	-	-	-	-


C2–C49

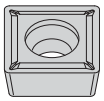

C50–C81

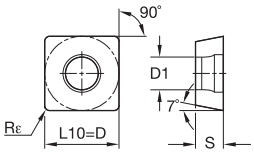

C86–C129


B8–B25


B26–B28


B30–B105



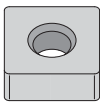


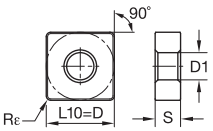
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SCMT-1P

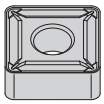
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SCMT09T3041P	9,53	9,53	3,97	0,4	4,40	4166362	4166393	-	4166395	4166396	4166394	4166397	-
SCMT09T3081P	9,53	9,53	3,97	0,8	4,40	4166398	4166399	-	4166401	4166402	4166400	4166403	-
SCMT1204041P	12,70	12,70	4,76	0,4	5,50	-	-	-	-	-	-	4166404	-
SCMT1204081P	12,70	12,70	4,76	0,8	5,50	4166405	4166406	-	4166408	4166409	4166407	4166410	-

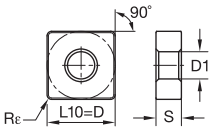




SNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMA120408	12,70	12,70	4,76	0,8	5,16	-	-	-	-	-	4165842	-	-
SNMA120412	12,70	12,70	4,76	1,2	5,16	-	-	-	-	-	4165843	-	-
SNMA150612	15,88	15,88	6,35	1,2	6,35	-	-	-	-	-	4165844	-	-
SNMA190612	19,05	19,05	6,35	1,2	7,93	-	-	-	-	-	4165845	-	-





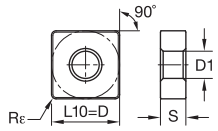
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SNMG-2P

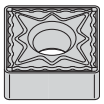
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG0903082P	9,53	9,53	3,18	0,8	3,81	4166853	4166854	-	-	-	4166855	4166856	-
SNMG1204082P	12,70	12,70	4,76	0,8	5,16	4166857	4166858	-	4166860	-	4166859	4166861	4166862

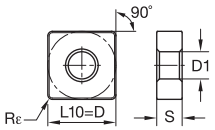




SNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG1204084P	12,70	12,70	4,76	0,8	5,16	-	-	-	4165870	4165871	-	-	-
SNMG1204124P	12,70	12,70	4,76	1,2	5,16	-	-	-	4165872	4165873	-	-	-



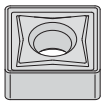


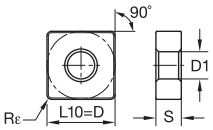
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG0903086P	9,53	9,53	3,18	0,8	3,81	4166802	4166803	-	-	-	-	-	-
SNMG1204046P	12,70	12,70	4,76	0,4	5,16	4166804	4166805	-	4166806	4166807	-	-	-
SNMG1204086P	12,70	12,70	4,76	0,8	5,16	4166808	4166809	4166810	4166811	4166812	-	-	-
SNMG1204126P	12,70	12,70	4,76	1,2	5,16	4166813	4166814	4166815	4166816	4166817	-	-	-
SNMG1906166P	19,05	19,05	6,35	1,6	7,92	-	-	5308173	-	-	-	-	-
SNMG1906126P	19,05	19,05	6,35	1,2	7,93	-	4166818	4166819	4166820	4166821	-	-	-





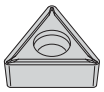
● first choice
○ alternate choice

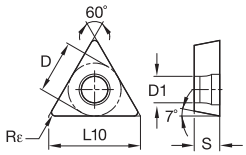
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

SNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
SNMG1204087N	12,70	12,70	4,76	0,8	5,16	4166498	4166499	-	-	-	4166500	-	-
SNMG1204127N	12,70	12,70	4,76	1,2	5,16	4166501	4166502	4166503	-	-	4166504	-	-
SNMG1204167N	12,70	12,70	4,76	1,6	5,16	4166505	4166506	4166507	-	-	4166508	-	-
SNMG1506127N	15,88	15,88	6,35	1,2	6,35	-	4166509	4166510	-	-	4166511	-	-
SNMG1506167N	15,88	15,88	6,35	1,6	6,35	-	4166512	4166513	-	-	4166514	-	-
SNMG1906127N	19,05	19,05	6,35	1,2	7,93	-	4166515	4166516	-	-	4166517	-	-
SNMG1906167N	19,05	19,05	6,35	1,6	7,93	-	4166518	4166519	-	-	4166520	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



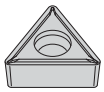


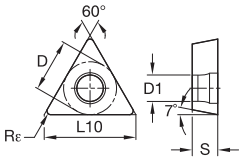
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TCGT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TCGT1102011P	6,35	11,00	2,38	0,1	2,80	ı	ı	ı	ı	ı	ı	4164526	4164527
TCGT1102041P	6,35	11,00	2,38	0,4	2,80	ı	ı	ı	ı	ı	ı	4164528	4164529
TCGT16T3021P	9,53	16,50	3,97	0,2	4,40	ı	ı	ı	ı	ı	ı	4164530	ı
TCGT16T3041P	9,53	16,50	3,97	0,4	4,40	ı	ı	ı	ı	ı	ı	4164531	4164532
TCGT16T3081P	9,53	16,50	3,97	0,8	4,40	ı	ı	ı	ı	ı	ı	4164543	ı





● first choice
○ alternate choice

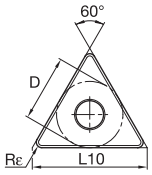
		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TCMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TCMT1102041P	6,35	11,00	2,38	0,4	2,80	4166414	4166415	-	4166417	4166418	4166416	4166419	-
TCMT1102081P	6,35	11,00	2,38	0,8	2,80	4166420	4166421	-	-	-	4166422	4166423	-
TCMT1102021P	6,35	11,00	2,38	0,2	2,90	4166411	-	-	-	-	4166412	4166413	-
TCMT16T3021P	9,53	16,50	3,97	0,2	4,40	-	-	-	-	-	-	4166424	-
TCMT16T3041P	9,53	16,50	3,97	0,4	4,40	4166425	4166426	-	4166428	4166429	4166427	4166430	-
TCMT16T3081P	9,53	16,50	3,97	0,8	4,40	4166469	4166471	-	4166563	4166564	4166472	4166565	-
TCMT16T3121P	9,53	16,50	3,97	1,2	4,40	-	-	-	-	-	-	4166566	-
TCMT2204081P	12,70	22,00	4,76	0,8	5,50	4166567	4166568	-	4166570	4166571	4166569	4166572	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



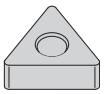


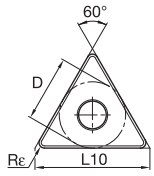
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TNGP

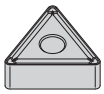
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNGP160402	9,53	16,50	4,76	0,2	3,81	■	■	■	■	■	■	4164789	4164790
TNGP160404	9,53	16,50	4,76	0,4	3,81	■	■	■	■	■	■	4164791	4164792
TNGP160408	9,53	16,50	4,76	0,8	3,81	■	■	■	■	■	■	4164793	■

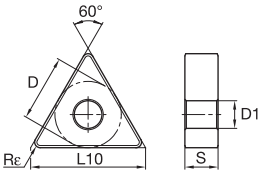




TNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMA160408	9,53	16,50	4,76	0,8	3,81	■	■	■	■	■	4165846	■	■
TNMA160412	9,53	16,50	4,76	1,2	3,81	■	■	■	■	■	4165847	■	■
TNMA220408	12,70	22,00	4,76	0,8	5,16	■	■	■	■	■	4165848	■	■





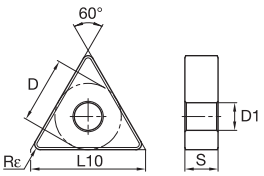
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604042P	9,53	16,50	4,76	0,4	3,81	4166863	4166864	-	4166866	4166867	4166865	4166868	4166869
TNMG1604082P	9,53	16,50	4,76	0,8	3,81	4166870	4166871	-	4166873	-	4166872	4166874	4166875
TNMG1604122P	9,53	16,50	4,76	1,2	3,81	4166876	4166877	-	4166879	4166880	4166878	4166881	-
TNMG2204082P	12,70	22,00	4,76	0,8	5,16	4166882	4166883	-	4166885	-	4166884	4166886	4166887





TNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604044P	9,53	16,50	4,76	0,4	3,81	-	5359246	-	4165874	4165875	-	-	-
TNMG1604084P	9,53	16,50	4,76	0,8	3,81	-	5359247	-	4165876	4165877	-	-	-
TNMG1604124P	9,53	16,50	4,76	1,2	3,81	-	-	-	4165878	4165879	-	-	-
TNMG2204044P	12,70	22,00	4,76	0,4	5,16	-	5359248	-	4165880	4165881	-	-	-
TNMG2204084P	12,70	22,00	4,76	0,8	5,16	-	5359249	-	4165882	4165883	-	-	-
TNMG2204124P	12,70	22,00	4,76	1,2	5,16	-	5359250	-	-	-	-	-	-


C2–C49

C50–C81

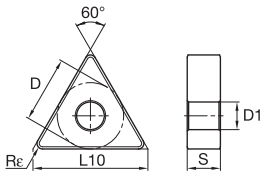
C86–C129

B8–B25

B26–B28

B30–B105



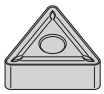


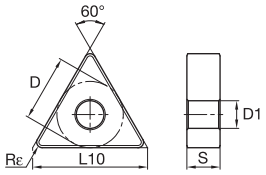
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

TNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
TNMG1604046P	9,53	16,50	4,76	0,4	3,81	4166822	4166823	-	4166824	4167086	-	-	-
TNMG1604086P	9,53	16,50	4,76	0,8	3,81	4167087	4167088	4167089	4167090	4167091	-	-	-
TNMG1604126P	9,53	16,50	4,76	1,2	3,81	4167092	4167113	-	4167114	4167115	-	-	-
TNMG2204046P	12,70	22,00	4,76	0,4	5,16	4167116	4167117	-	4167118	4167119	-	-	-
TNMG2204086P	12,70	22,00	4,76	0,8	5,16	4167120	4167121	4167122	4167123	4167124	-	-	-





● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

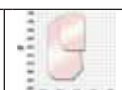
TNMG-7N

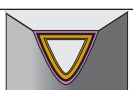
ISO catalogue number	D	L10	S	Rε	D1								
TNMG1604047N	9,53	16,50	4,76	0,4	3,81	-	4166521	-	-	-	-	-	-
TNMG1604087N	9,53	16,50	4,76	0,8	3,81	4166522	4166523	4166524	-	-	4166525	-	-
TNMG1604127N	9,53	16,50	4,76	1,2	3,81	4166526	4166527	4166528	-	-	4166529	-	-
TNMG2204047N	12,70	22,00	4,76	0,4	5,16	4166530	4166531	-	-	-	-	-	-
TNMG2204087N	12,70	22,00	4,76	0,8	5,16	4166532	4166533	4166534	-	-	4166535	-	-
TNMG2204127N	12,70	22,00	4,76	1,2	5,16	-	4166536	4166537	-	-	4166538	-	-
TNMG2706127N	15,88	27,50	6,35	1,2	6,35	4166539	4166540	4166541	-	-	4166542	-	-
TNMG3309247N	19,05	33,00	9,53	2,4	7,93	4166543	4166544	4166545	-	-	4166546	-	-


C2–C49

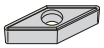

C50–C81

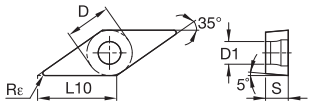

C86–C129


B8–B25


B26–B28


B30–B105



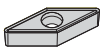


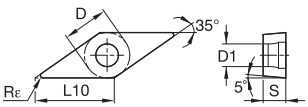
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

VBGT-1P

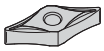
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VBGT1103011P	6,35	11,07	3,18	0,1	2,80	-	-	-	-	-	-	4164546	4164547
VBGT1103021P	6,35	11,07	3,18	0,2	2,80	-	-	-	-	-	-	4164544	4164545
VBGT1103041P	6,35	11,07	3,18	0,4	2,80	-	-	-	-	-	-	4164548	-
VBGT1604011P	9,53	16,61	4,76	0,1	4,40	-	-	-	-	-	-	4164551	-
VBGT1604021P	9,53	16,61	4,76	0,2	4,40	-	-	-	-	-	-	4164549	4164550
VBGT1604041P	9,53	16,61	4,76	0,4	4,40	-	-	-	-	-	-	4164552	4164563

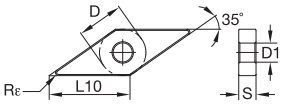




VBMT-1P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VBMT1103021P	6,35	11,07	3,18	0,2	2,80	-	-	-	-	-	-	4166573	4166574
VBMT1103041P	6,35	11,07	3,18	0,4	2,80	4166575	4166576	-	4166578	4166579	4166577	4166580	4166581
VBMT1103081P	6,35	11,07	3,18	0,8	2,80	4166582	4166583	-	4166585	-	4166584	4166586	-
VBMT1604021P	9,53	16,61	4,76	0,2	4,40	4166587	-	-	-	4166589	4166588	4166590	4166591
VBMT1604041P	9,53	16,61	4,76	0,4	4,40	4166592	4166593	-	4166595	4166596	4166594	4166597	4166598
VBMT1604081P	9,53	16,61	4,76	0,8	4,40	4166599	4166600	-	4166602	4166603	4166601	4166604	4166605



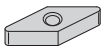


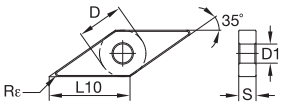
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ VNGP

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNGP160401	9,53	16,61	4,76	0,1	3,81	-	-	-	-	-	-	4164795	4164796
VNGP160402	9,53	16,61	4,76	0,2	3,81	-	-	-	-	-	-	4164794	-
VNGP220404	12,70	22,14	4,76	0,4	5,16	-	-	-	-	-	-	4164797	4164798
VNGP220408	12,70	22,14	4,76	0,8	5,16	-	-	-	-	-	-	4164799	4164800





■ VNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMA160408	9,53	16,61	4,76	0,8	3,81	-	-	-	-	-	4165849	-	-


C2–C49

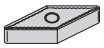
C50–C81

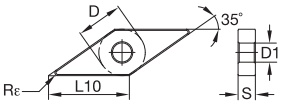
C86–C129

B8–B25

B26–B28

B30–B105



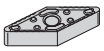


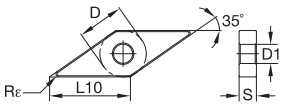
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

VNMG-2P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604042P	9,53	16,61	4,76	0,4	3,81	4166281	4166282	-	4166284	4166285	4166283	4166286	4166287
VNMG1604082P	9,53	16,61	4,76	0,8	3,81	4166288	4166289	-	4166291	-	4166290	4166292	4166293

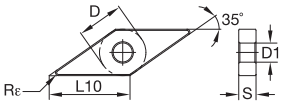




VNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604044P	9,53	16,61	4,76	0,4	3,81	-	5359251	-	4165884	4165885	-	5359252	-
VNMG1604084P	9,53	16,61	4,76	0,8	3,81	-	5359253	-	4165886	4165887	-	5359254	-



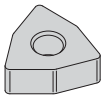


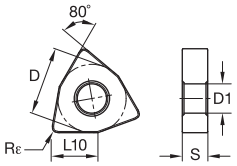
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

■ VNMG-6P

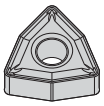
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
VNMG1604086P	9,53	16,61	4,76	0,8	3,81	4167125	4167126	-	4167127	4167128	-	-	-

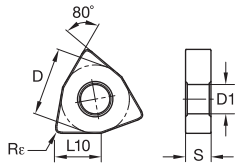




■ WNMA

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMA060408	9,53	6,52	4,76	0,8	3,81	-	-	-	-	-	4165850	-	-
WNMA080408	12,70	8,69	4,76	0,8	5,16	-	-	-	-	-	4165851	-	-
WNMA080412	12,70	8,69	4,76	1,2	5,16	-	-	-	-	-	4165852	-	-



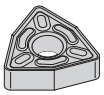


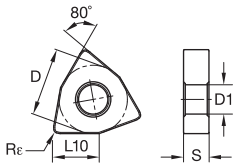
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

WNMG-2P

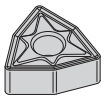
ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804042P	12,70	8,69	4,76	0,4	5,16	4166294	4166295	-	4166297	4166298	4166296	4166299	4166300
WNMG0804082P	12,70	8,69	4,76	0,8	5,16	4166301	4166302	-	4166304	-	4166303	4166305	4166306

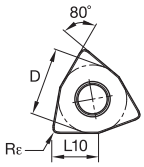




WNMG-4P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804044P	12,70	8,69	4,76	0,4	5,16	-	-	-	4165888	4165889	-	-	-
WNMG0804084P	12,70	8,69	4,76	0,8	5,16	-	5359255	-	4165890	4165891	-	5359256	-
WNMG0804124P	12,70	8,69	4,76	1,2	5,16	-	-	-	-	4165892	-	-	-



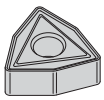


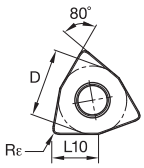
● first choice
○ alternate choice

		TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
P		●	●	●	○	○	○	○	○
M					●	●		●	●
K		○	○				●	○	○
N								○	○
S					○	○		●	●
H									

WNMG-6P

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0604086P	9,53	6,52	4,76	0,8	3,81	4167129	4167130	-	4167131	4167132	-	-	-
WNMG0804086P	12,70	8,69	4,76	0,8	5,16	4167133	4167134	4167135	4167136	4167137	-	-	-
WNMG0804126P	12,70	8,69	4,76	1,2	5,16	4167138	4167139	4167140	4167141	4167142	-	-	-





WNMG-7N

ISO catalogue number	D	L10	S	Rε	D1	TN10P	TN20P	TN30P	TN15M	TN30M	TN20K	TN10U	TN15U
WNMG0804087N	12,70	8,69	4,76	0,8	5,16	4166547	4166548	4166549	-	-	4166550	-	-
WNMG0804127N	12,70	8,69	4,76	1,2	5,16	4166551	4166552	4166553	-	-	4166554	-	-
WNMG0804167N	12,70	8,69	4,76	1,6	5,16	-	4166555	4166556	-	-	4166557	-	-

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105

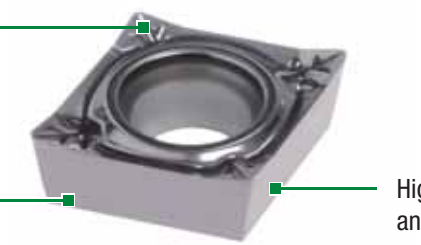
WIDIA™ Inserts for Machining Aluminium

WIDIA offers a series of inserts specifically designed for machining aluminium materials. These inserts are available in both an uncoated and a PVD grade for better performance and better tool life.

Inserts for Aluminium



- Easy to choose platform — one geometry and two grades.
- Longer tool life.



High positive rake for smooth chip flow.

G tolerance inserts for better precision.

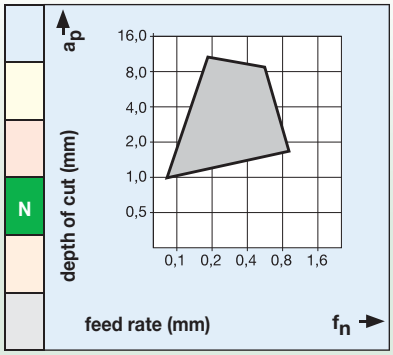
High polish inserts to prevent built-up edge and for longer tool life.

Negative Inserts

AL1



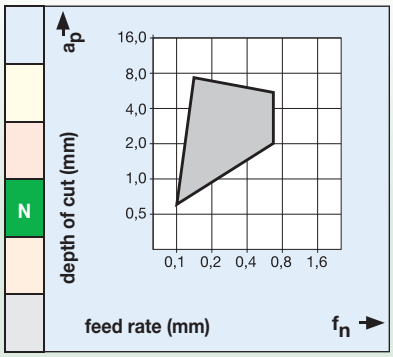
For turning cast aluminium, light alloys, non-ferrous metals, high-melting metals, plastics, glass fibre, reinforced plastics, laminated board, carbon, and fine ceramics.



AL3



For cost-effective machining of aluminium, non-ferrous metals, and plastics. Extremely sharp cutting edges result in optimum part finishes with low cutting forces and short chips. Finishing of steel, stainless steel, and grey iron is possible with the coated grade HCK10™.



Step 1 • Select the insert geometry

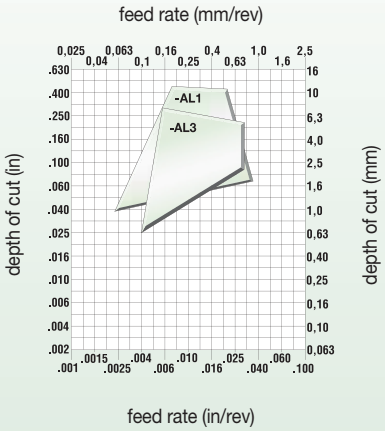
Positive Inserts



AL1



AL3



Step 2 • Select the grade

		Positive Insert Geometry	
cutting condition		**-AL1**	**-AL3**
heavily interrupted cut		**HCK10/HWK10**	**HCK10/HWK15**
lightly interrupted cut		**HCK10/HWK10**	**HCK10/HWK15**
varying depth of cut, casting, or forging skin		**HCK10/HWK10**	**HCK10/HWK15**
smooth cut, pre-turned surface		**HCK10/HWK10**	**HCK10/HWK15**

Step 3 • Selecting the cutting speed

Low-Silicon Aluminium Alloys (hypoeutectic <12,2% Si) and Magnesium Alloys

		speed — m/min										Starting Conditions ◁▷
Material Group	**grade**	**250**	**500**	**750**	**1000**	**1250**	**1500**	**1750**	**2000**	**2250**	**2500**	**m/min**
N2	**HCK10**		◁▷									550

High-Silicon Aluminium Alloys (hypereutectic >12,2% Si) and Magnesium Alloys

		speed — m/min										Starting Conditions ◁▷
Material Group	**grade**	**250**	**500**	**750**	**1000**	**1250**	**1500**	**1750**	**2000**	**2250**	**2500**	**m/min**
N3	**HCK10**		◁▷									550

Additional cutting speed recommendations for miscellaneous workpiece materials

Copper-, Brass-, Zinc-Based on a Machinability Index Range of 70–100

Material Group	grade	speed — m/min 250	500	750	1000	Starting Conditions m/min
N4	HCK10	◁▷				275
	HWK10/HWK15	◁▷				260

Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass, and Glass

Material Group	grade	speed — m/min 250	500	750	1000	Starting Conditions m/min
N5	HCK10	◁▷				275

Carbon and Graphite Composites: Brush Alloys, Kevlar, and Graphite (280–400 HB) (30–43 HRC)

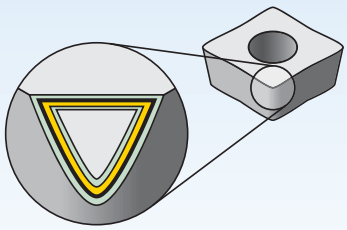
Material Group	grade	speed — m/min 250	500	750	1000	Starting Conditions m/min
N6	HCK10	◁▷				200

MMCs (Aluminium-Based Metal Matrix Composites)

Material Group	grade	speed — m/min 250	500	750	1000	Starting Conditions m/min
N7	HCK10		◁▷			170

Tin Alloys, Cast: ASTM 823, Alloys 1, 2, 3, 11

Material Group	grade	speed — m/min 250	500	750	1000	Starting Conditions m/min
N8	HCK10	◁▷				215
	HWK10/HWK15	◁▷				180

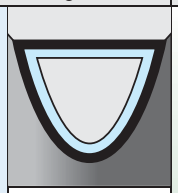
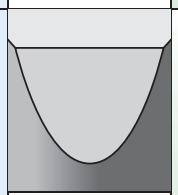
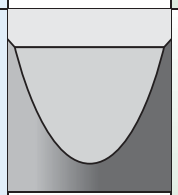


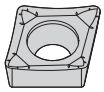
Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

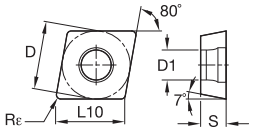
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
HCK10	 HC-N10	Coated carbide. PVD — TIALN-Al_2O_3 on micro-grain carbide. Light and medium machining. For aluminium alloys.	N	■	■	■						
HWK10	 HF-N10	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light machining. For non-ferrous metals and non-metals.	N	■	■	■	■					
HWK15	 HF-N15	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light and medium machining. For non-ferrous metals and non-metals.	N		■	■	■					





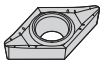
● first choice
○ alternate choice

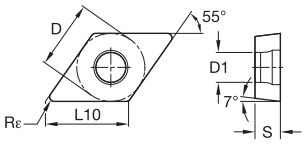
P			
M			
K			
N	●	●	●
S			
H			

■ CCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CCGT060202AL3	6,35	6,45	2,38	0,2	2,80	2022257	-	2022258
CCGT060204AL3	6,35	6,45	2,38	0,4	2,80	2022259	-	2022260
CCGT09T302AL3	9,53	9,67	3,97	0,2	4,40	-	-	2022854
CCGT09T304AL3	9,53	9,67	3,97	0,4	4,40	2022261	-	2022262
CCGT09T308AL3	9,53	9,67	3,97	0,8	4,40	-	-	2022858
CCGT120402AL3	12,70	12,90	4,76	0,2	5,50	-	-	2022859
CCGT120404AL3	12,70	12,90	4,76	0,4	5,50	2022323	-	2022324
CCGT120408AL3	12,70	12,90	4,76	0,8	5,50	2022325	-	2022326

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



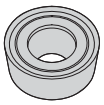


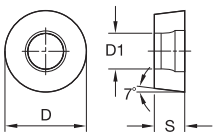
● first choice
○ alternate choice

P			
M			
K			
N	●	●	●
S			
H			

DCGT-AL3

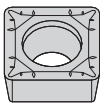
ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
DCGT070202AL3	6,35	7,75	2,38	0,2	2,80	2022327	-	2022328
DCGT070204AL3	6,35	7,75	2,38	0,4	2,80	2022329	-	2022330
DCGT11T302AL3	9,53	11,63	3,97	0,2	4,40	-	-	2022861
DCGT11T304AL3	9,53	11,63	3,97	0,4	4,40	2014890	-	2022331
DCGT11T308AL3	9,53	11,63	3,97	0,8	4,40	2022332	-	2022483

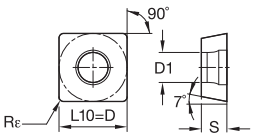




RCGT-AL1

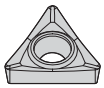
ISO catalogue number	D	S	D1	HCK10	HWK10	HWK15
RCGT0803M0AL1	8,00	3,18	3,40	2002473	2002474	-

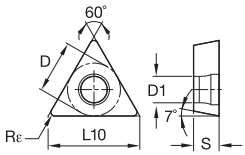




SCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
SCGT120408AL3	12,70	12,70	4,76	0,8	5,50	-	-	2023638



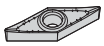


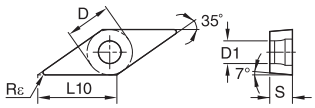
● first choice
○ alternate choice

P				
M				
K				
N	●	●	●	
S				
H				

TCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
TCGT110204AL1	6,35	11,00	2,38	0,4	2,80	-	2006991	-
TCGT16T308AL1	9,53	16,50	3,97	0,8	4,40	-	2007004	-





VCGT-AL3

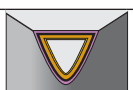
ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
VCGT110302AL3	6,35	11,07	3,18	0,2	2,80	-	-	2024559
VCGT110304AL3	6,35	11,07	3,18	0,4	2,80	-	-	2024561
VCGT160404AL3	9,53	16,61	4,76	0,4	4,40	2022484	-	2022485
VCGT160408AL3	9,53	16,61	4,76	0,8	4,40	2022487	-	2022488
VCGT160412AL3	9,53	16,61	4,76	1,2	4,40	2002503	-	2022489
VCGT220530AL3	12,70	22,14	5,56	3,0	5,50	2002505	-	2002506


C2–C49


C50–C81


C86–C129


B8–B25


B26–B28


B30–B105

Ceramic, PcBN, and PCD Inserts

Advanced Material Inserts









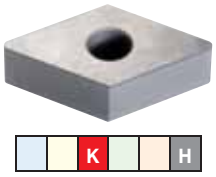
Hard part turning, along with the machining of cast irons, high-temp alloys, and non-ferrous materials, can be accomplished through the use of inserts made from advanced materials. These advanced materials include ceramics, PcBN (polycrystalline cubic boron nitride), and PCD (polycrystalline diamond). WIDIA™ offers:

- Improved performance.
- Greater wear resistance.
- Longer tool life.

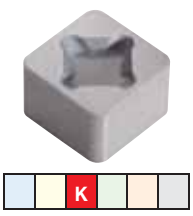
Ceramic Inserts

- Silicon-nitride based ceramic for cast iron machining.
- Mixed ceramic for hard machining and finishing of cast iron.
- Whisker ceramic for high-temp alloy and hard machining.

CW2015 — Mixed Ceramic



CW5025 — Silicon-Nitride Ceramic



PcBN

Solid Inserts

- Inserts are made only from PcBN.
- No material joint.
- Best heat-absorption capacity.
- Can work at highest temperatures.

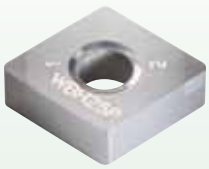
WBH25P

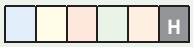


Tipped Inserts

- Require a carrier and a PcBN tip.
- The tips are brazed to a carrier.
- The substrate has to have a pocket that will accommodate and support the tip.

WBH25P





PCD

- Targeted machining of non-ferrous materials.
- Significant advantage in hardness over carbide tools.
- Increased productivity through higher speeds and longer tool life.
- Best used in processing materials that are un-machinable with conventional tooling.

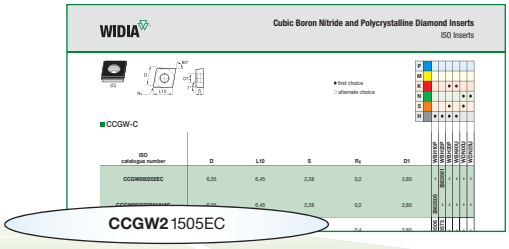
WDN25U





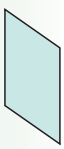
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

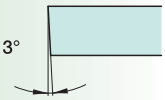
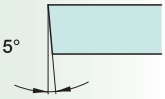
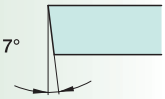
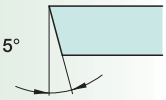
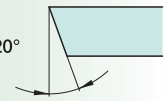
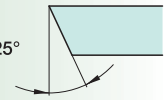
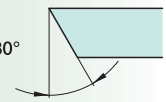
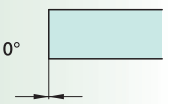
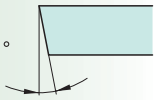


C	C	G	W	2
Insert Shape	Insert Clearance Angle	Tolerance Class	Insert Features	Size

Insert Shape

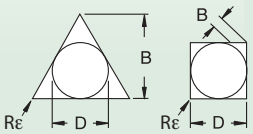
H	Hexagon 120°	
O	Octagon 135°	
P	Pentagon 108°	
R	Round –	
S	Square 90°	
T	Triangular 60°	
C D E M V	Rhomboid 80° 55° 75° 86° 35°	
W	Trigon 80° with enlarged corner angles	
L	Rectangular 90°	
A B N/K	Parallelogram 85° 82° 55°	

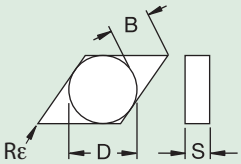
Insert Clearance Angle

A	3°	
B	5°	
C	7°	
D	15°	
E	20°	
F	25°	
G	30°	
N	0°	
P	11°	
O	For other clearance angles requiring descriptions.	

Tolerance Class

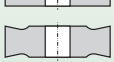
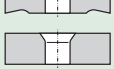
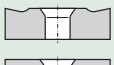
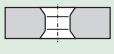
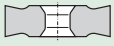
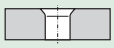
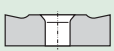
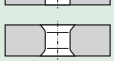
Tolerances apply prior to edge prep and coating





D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

Insert Features

N	
R	
F	
A	
M	
G	
W	
T	
Q	
U	
B	
H	
C	
J	
X V	Special Design

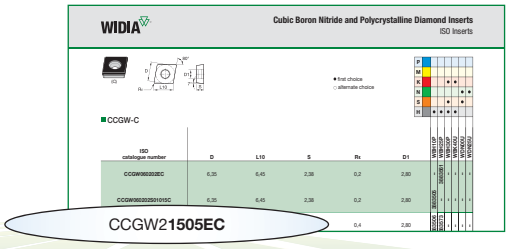
Size

"D" mm	Code for metric cutting edge length "L10" C	D	R	S	T	V	W
3,97	S4	04	03	03	06	–	–
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,00	–	–	06	–	–	–	–
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
8,00	–	–	08	–	–	–	–
9,52	09	11	09	09	16	16	06
10,00	–	–	10	–	–	–	–
11,11	11	13	11	11	19	19	07
12,00	–	–	12	–	–	–	–
12,70	12	15	12	12	22	22	08
14,29	14	17	14	14	24	24	09
15,88	16	19	15	15	27	27	10
16,00	–	–	16	–	–	–	–
17,46	17	21	17	17	30	30	11
19,05	19	23	19	19	33	33	13
20,00	–	–	20	–	–	–	–
22,22	22	27	22	22	38	38	15
25,00	–	–	25	–	–	–	–
25,40	25	31	25	25	44	44	17
31,75	32	38	31	31	54	54	21
32,00	–	–	32	–	–	–	–

tolerance class*	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

**Tolerances apply prior to edge prep and coating.*

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



15	05		E			C	
Thickness "S"	Corner Radius "Rε"	Hand of Insert (optional)	Cutting Edge (optional)	T-Land Width (optional)	T-Land Angle (optional)	Tip Style (optional)	Chipbreaker (optional)

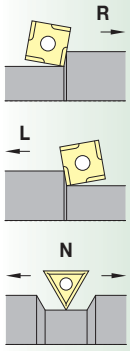
symbol	thick-ness
mm	mm
—	0,79
T0	1,00
01	11,59
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94
09	9,52
11	11,11
12	12,70

symbol	corner radius
mm	mm
X0	.04
01	0,1
02	0,2
04	0,4
08	0,8
12	1,2
16	1,6
20	2,0
24	2,4
28	2,8
32	3,2
00	round insert
M0	

R = Right hand

L = Left hand

N = Neutral



F* Sharp

E Rounded

T* Chamfered

S* Chamfered and Rounded

K Double-Chamfered

P Double-Chamfered and Rounded

**Also available in wiper style.*

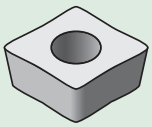
symbol	mm
ISO	size
010	0,01
020	0,02

symbol	size
10	10°
15	15°
20	20°
25	25°
30	30°

FW = Finishing Wiper

MW = Medium Wiper

symbol	usage
C	full top
M	mini tip
MT	multi-tip
ST	single tip



	± Tolerance on "D"				± Tolerance on "B"			
	Class M Tolerance			Class U Tolerance	Class M Tolerance			Class U Tolerance
"D"	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
mm	mm	mm	mm	mm	mm	mm	mm	mm
3,97	0,05	–	–	–	3,97	0,08	–	–	–
4,76	0,05	–	–	0,08	4,76	0,08	–	–	0,13
5,56	0,05	0,05	0,05	0,08	5,56	0,08	0,11	–	0,13
6,35	0,05	0,05	0,05	0,08	6,35	0,08	0,11	–	0,13
7,94	0,05	0,05	0,05	0,08	7,94	0,08	0,11	–	0,13
9,52	0,05	0,05	0,05	0,08	9,52	0,08	0,11	0,18	0,13
11,11	0,08	0,08	0,08	0,13	11,11	0,13	0,15	–	–
12,70	0,08	0,08	0,08	0,13	12,70	0,13	0,15	0,25	0,20
14,29	0,08	0,08	0,08	0,13	14,29	0,13	0,15	–	–
15,88	0,10	0,10	0,10	0,18	15,88	0,15	0,18	–	0,27
17,46	0,10	0,10	0,10	0,18	17,46	0,15	0,18	–	0,27
19,05	0,10	0,10	0,10	0,18	19,05	0,15	0,18	–	0,27
22,22	0,13	–	–	0,25	22,22	0,15	–	–	0,38
25,40	0,13	–	–	0,25	25,40	0,18	–	–	0,38
31,75	0,15	–	–	0,25	31,75	0,20	–	–	0,38

WBH25P for Enhanced Performance — Five Unique Features

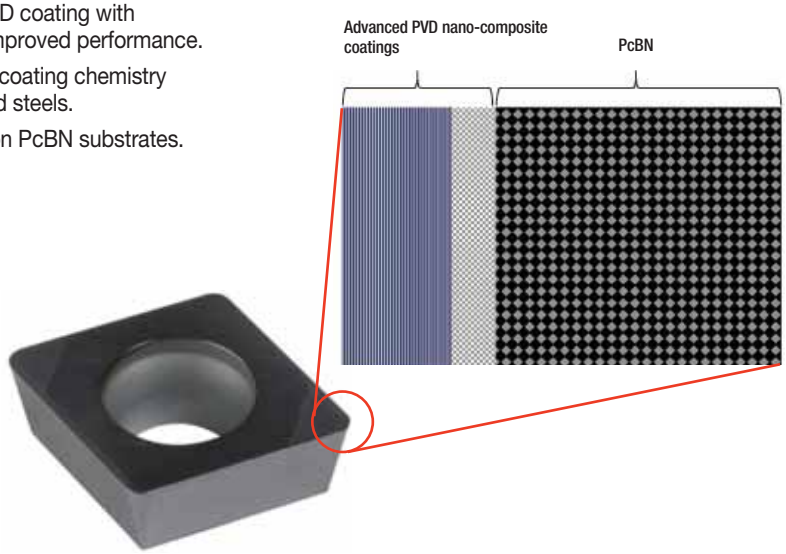
1 Newly developed substrate enables application in a wide variety of demanding situations.

The substrate contains superhard grains with a uniquely formulated size distribution and nano-structured binder phase. This unique combination provides an unparalleled balance of wear resistance and toughness. The net result is a robust hard turning tooling solution for a wide range of applications, including continuous to interrupted cutting.



2 Nano-composite coating that enhances speed capabilities and tool life.

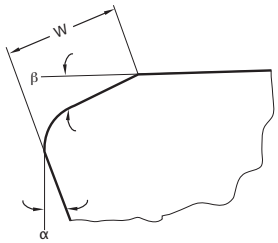
- Specially developed, advanced PVD coating with nano-composite architecture for improved performance.
- Improved wear resistance by PVD coating chemistry technology for machining hardened steels.
- Enhanced PVD coating adhesion on PcBN substrates.



3 Improved edge preparation technology for longer tool life, reliable performance, better surface finish, and tighter workpiece tolerances.

A critical performance factor is the edge preparation itself. The grind direction, surface roughness, hone sizes, and tolerances have great impact on performance and process reliability. WIDIA™ has performed significant research work and optimised edge preparation to improve your overall machining effectiveness.

4 Large standard portfolio.



β —T-Land Angle

Standard edge preparation — the optimum combination of T-land angle, T-land width, and hone size — is paramount in achieving maximum performance. WIDIA™ has developed three standard edge configurations, including wiper inserts.

• Light machining edge prep E.	E: Honed cutting edge
• Medium machining edge prep S01015.	S01015: W x ß = 0,10mm x 15°
• Heavy machining edge prep S01025.	S01025: W x ß = 0,10mm x 25°

These edge preps are available in common styles, sizes, and nose radii in both positive and negative geometries.

5 CB1 chipbreaker in positive and negative geometries, solving chipbreaking and chip control issues.

Chipbreaker — when machining case-hardened steel with a hard outer skin and a tough and softer core, a chipbreaker provides a great advantage. The CB1 chipbreaker is a proven solution to effectively breaking chips. Long chips can form bird nests, causing machine malfunctions, increasing scrap-rates, and reducing the overall equipment effectiveness.

Available as a custom solution product.





Insert without Chipbreaker



- Long chips.
- Bird-nest formation.

Insert with Chipbreaker



- Chips are broken.

Grade Numbering System — Ceramics

CW	2	0	15
Brand	Cutting Material Group		Application Range
CW = WIDIA™	**2** = CM Mixed (black) ceramic **3** = CR Whisker reinforced ceramic **5** = CN Silicon nitride ceramic	**0** = Stationary cutting edges (turning, parting, threading) **1** = First successor **2** = Semi-standard rotating cutting edges **3** = Semi-standard general applications **5** = Rotating cutting edges (milling, drilling, reaming)	**05** = fine finishing **10** = finishing **15** = medium to roughing **20** = medium to roughing **25** = roughing **30** = roughing **35** = roughing **40** = heaviest roughing **45** = heaviest roughing **50** = heaviest roughing



Grade Numbering System — PcBN and PCD

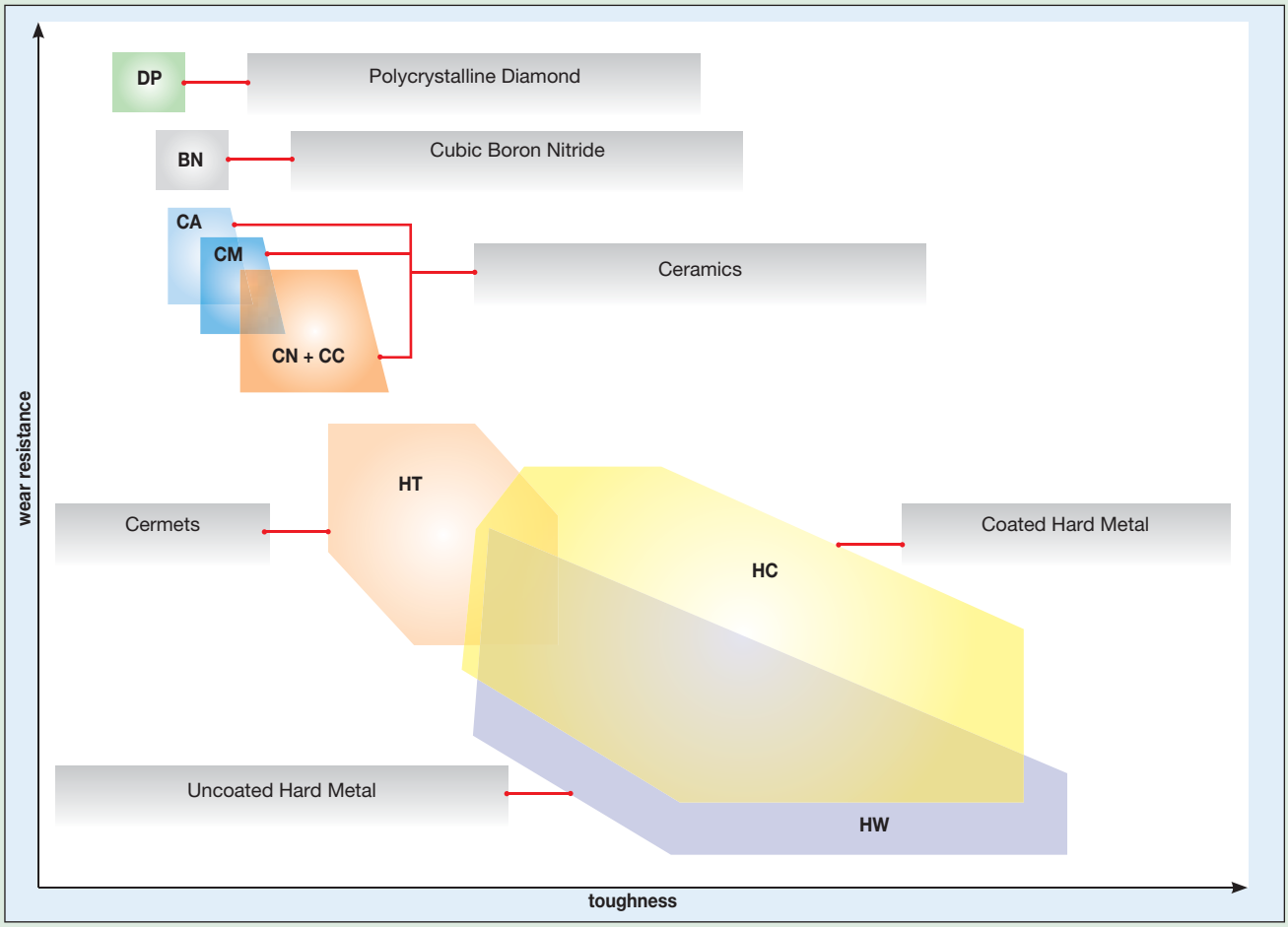
W	B	H	30	P
Brand	Cutting Material Group	Material Range	Application Range	Coating
WIDIA™	**B** = CBN **D** = PCD		**05** = fine finishing **10** = finishing **15** = medium to roughing **20** = medium to roughing **25** = medium to roughing **30** = roughing **35** = roughing **40** = heaviest roughing **45** = heaviest roughing **50** = heaviest roughing	**U** = Uncoated **C** = CVD Coated **P** = PVD Coated

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials
U	Universal Machining



The cutting tool materials are classified by the combination of their hardness and wear resistance characteristics.

The extended standard DIN ISO 513 also includes ceramic cutting materials and the superhard polycrystalline materials, boron nitride and diamond, resulting in additional identification symbols for these cutting material groups.



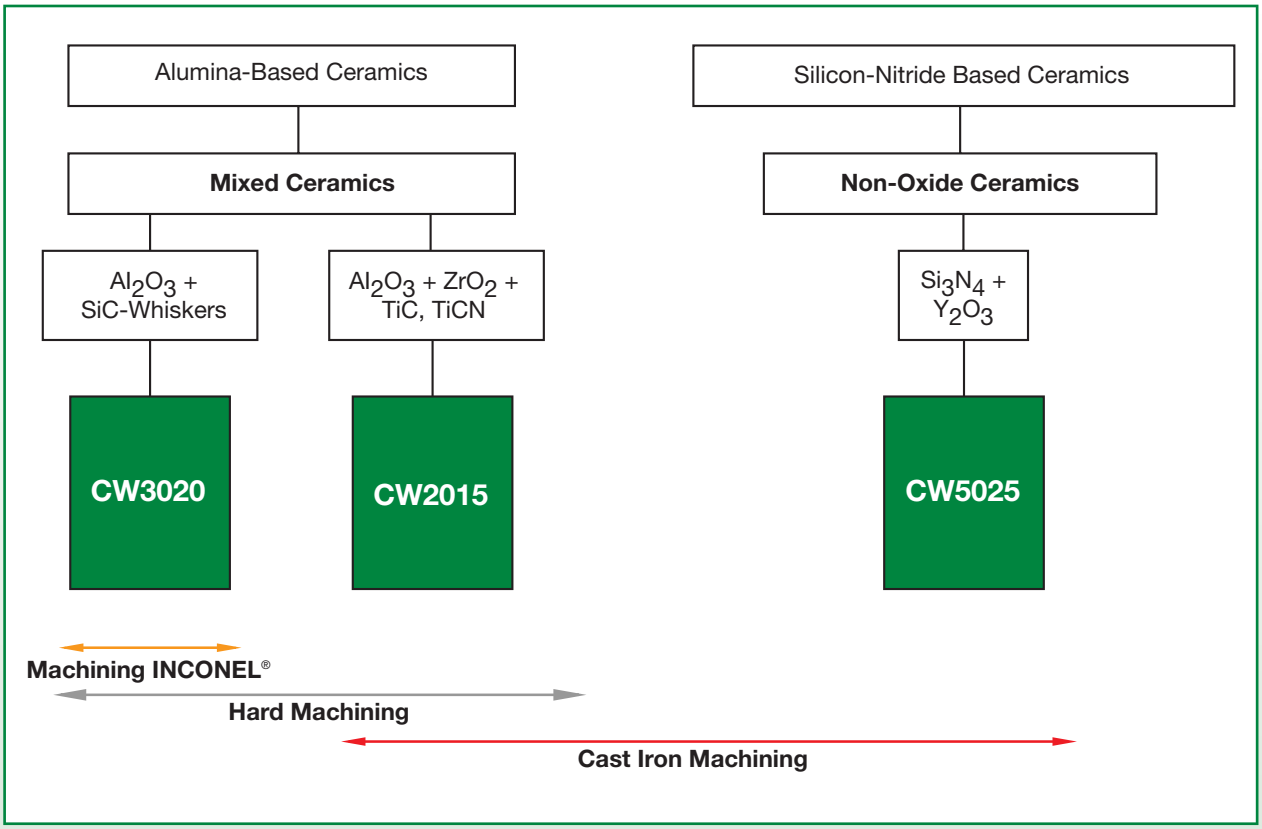
main group	sub-group (symbol)	feature
hard metal	HW	Uncoated WC-base hard metal
	HT	Uncoated TiC/TiN-base hard metal (cermets)
	HC	Coated hard metal
ceramics	CA	Al_2O_3-base oxide ceramics
	CM	Composite ceramics Al_2O_3 + metal carbide
	CN	Si_3N_4-base nitride ceramics
	CC	Coated ceramics
cubic boron nitride	BL	Cubic boron nitride (CBN) with low CBN content
	BH	Cubic boron nitride (CBN) with high CBN content
diamond	DP	Polycrystalline diamond (PCD)

Ceramic Inserts for Hard Turning, Turning in Cast Iron Materials, and Turning in High-Temp Alloys



- Ceramics offer greater wear resistance and toughness.
- Ceramics can be used in high-speed, continuous, and lightly interrupted turning applications in cast iron materials.
- Ceramics can be used for high-speed applications in high-temp alloys.

Ceramic Turning Grades



CW2015™

- Aluminia and titanium carbo-nitride.
- High hardness and wear resistance.
- TiCN increases strength and hardness.
- Black in colour.

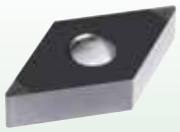
CW3020™

- Aluminia + SiC whisker.
- High hardness and wear resistance.
- Whisker ceramic with elongated crystals and very high strength.
- Grey-green colour.

CW5025™

- Pure silicon-nitride composition.
- Used in high-speed turning applications.
- Designed for use in grey cast iron and lower tensile ductile irons.

PcBN Grades for Hard Turning, Powder Metal, and Grey Cast Iron Machining



- PVD-coated grades available.
- Complete range of CBN grades for continuous to heavily interrupted turning.
- Industry-leading grades for grey cast iron machining.
- Full line of grades for hard turning.
- For best performance: solid, full-top, and tipped inserts are available.

Hard Turning Grades

Low-Content CBN Grades for Fine Finishing in Continuous Cutting

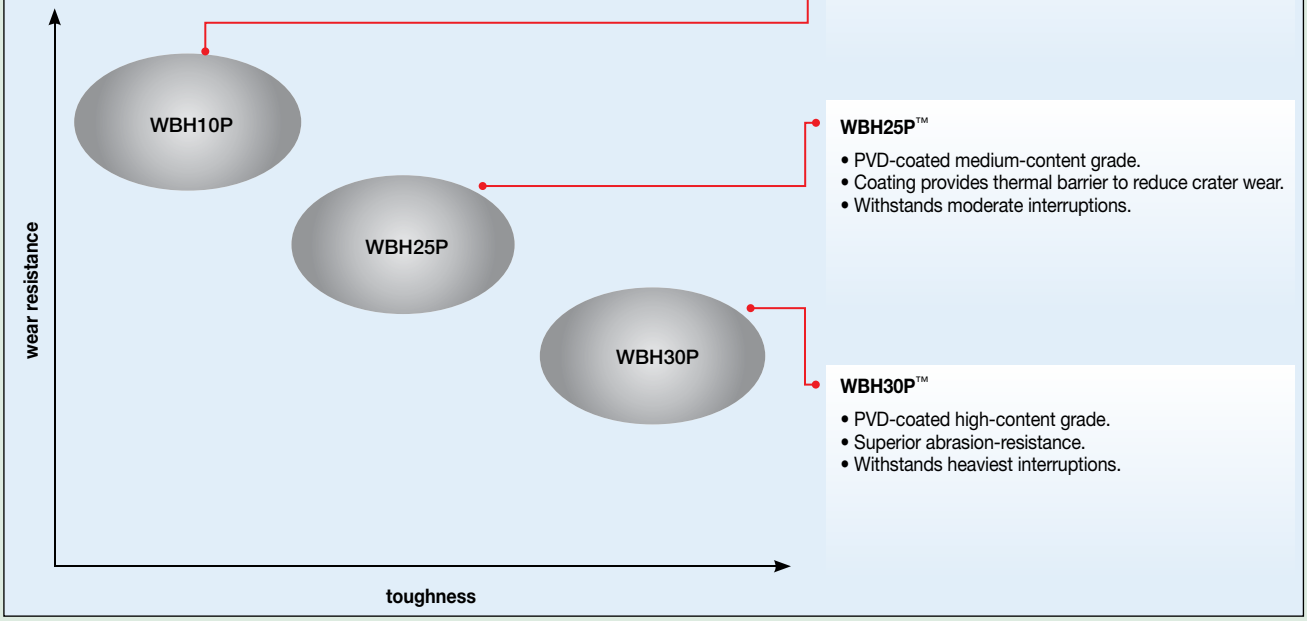


Medium-Content CBN Grades for Continuous to Interrupted Cutting



High-Content CBN Grades for Heavily Interrupted Cuts



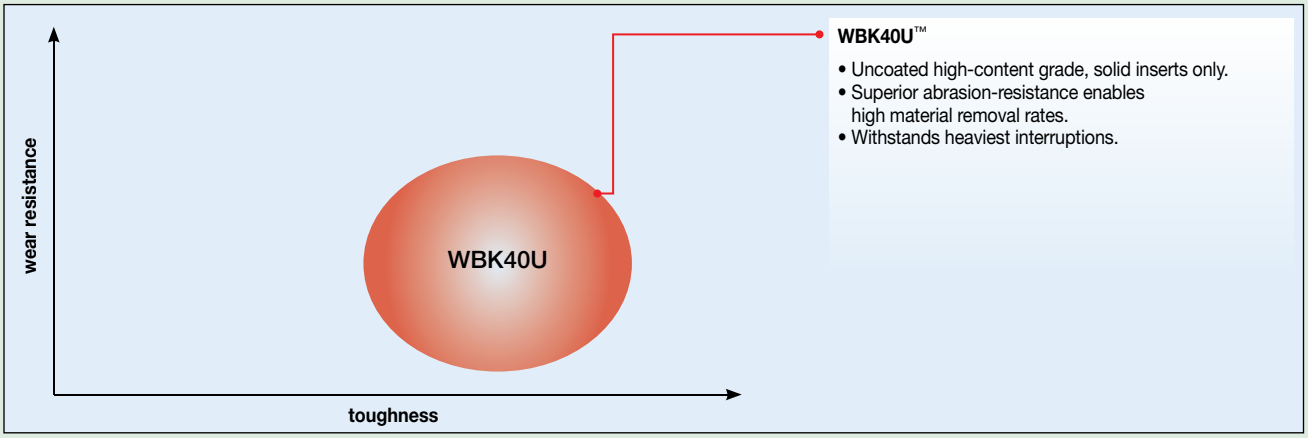


WBH10P™
- PVD-coated low-content grade.
- Coating provides thermal barrier to reduce crater wear.
- High temperature resistant ceramic binder improves high-speed capability.

WBH25P™
- PVD-coated medium-content grade.
- Coating provides thermal barrier to reduce crater wear.
- Withstands moderate interruptions.

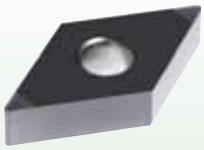
WBH30P™
- PVD-coated high-content grade.
- Superior abrasion-resistance.
- Withstands heaviest interruptions.

Grey Cast Iron Grades

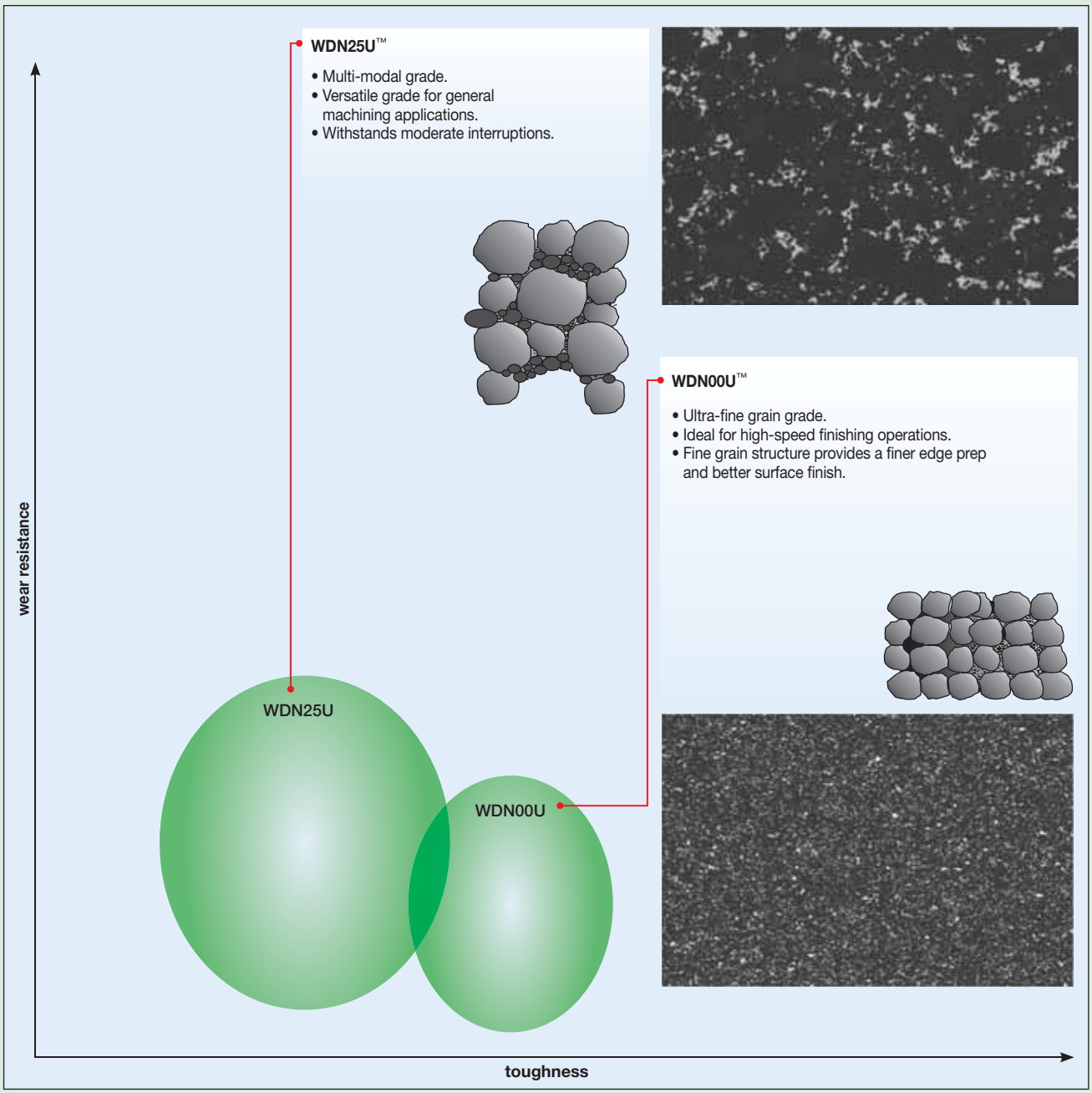


WBK40U™
- Uncoated high-content grade, solid inserts only.
- Superior abrasion-resistance enables high material removal rates.
- Withstands heaviest interruptions.

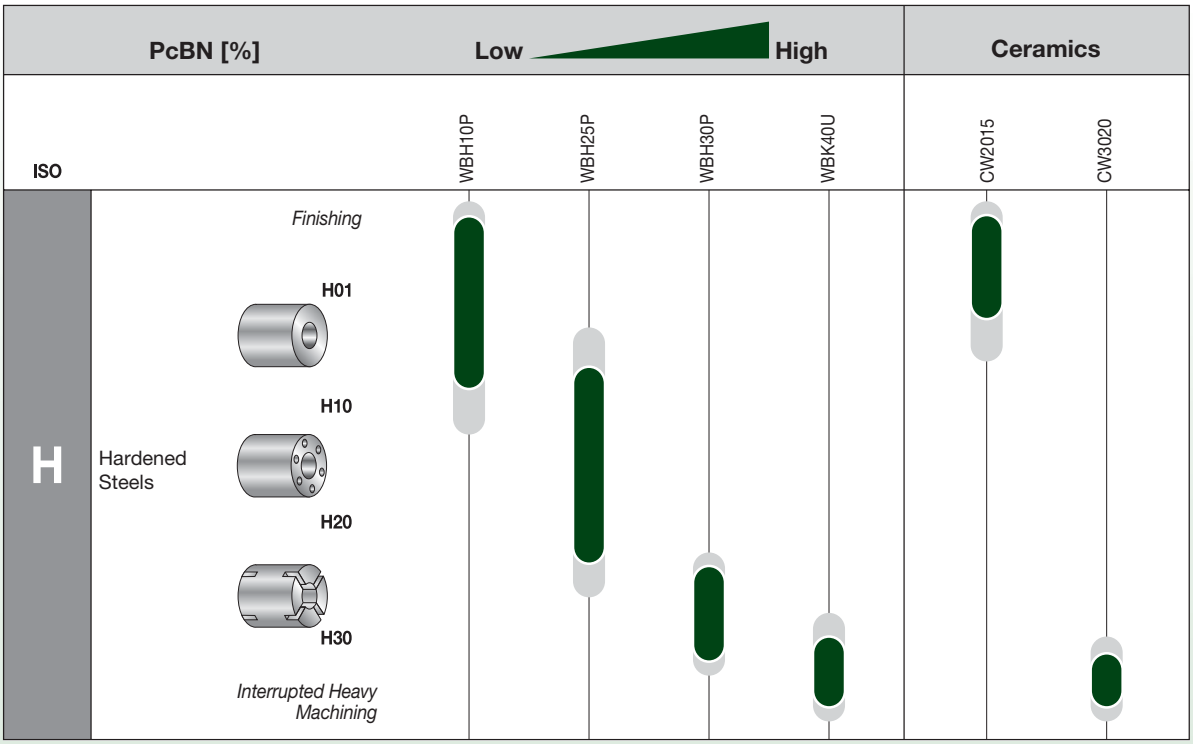
PCD Grades for Turning Non-Ferrous Materials



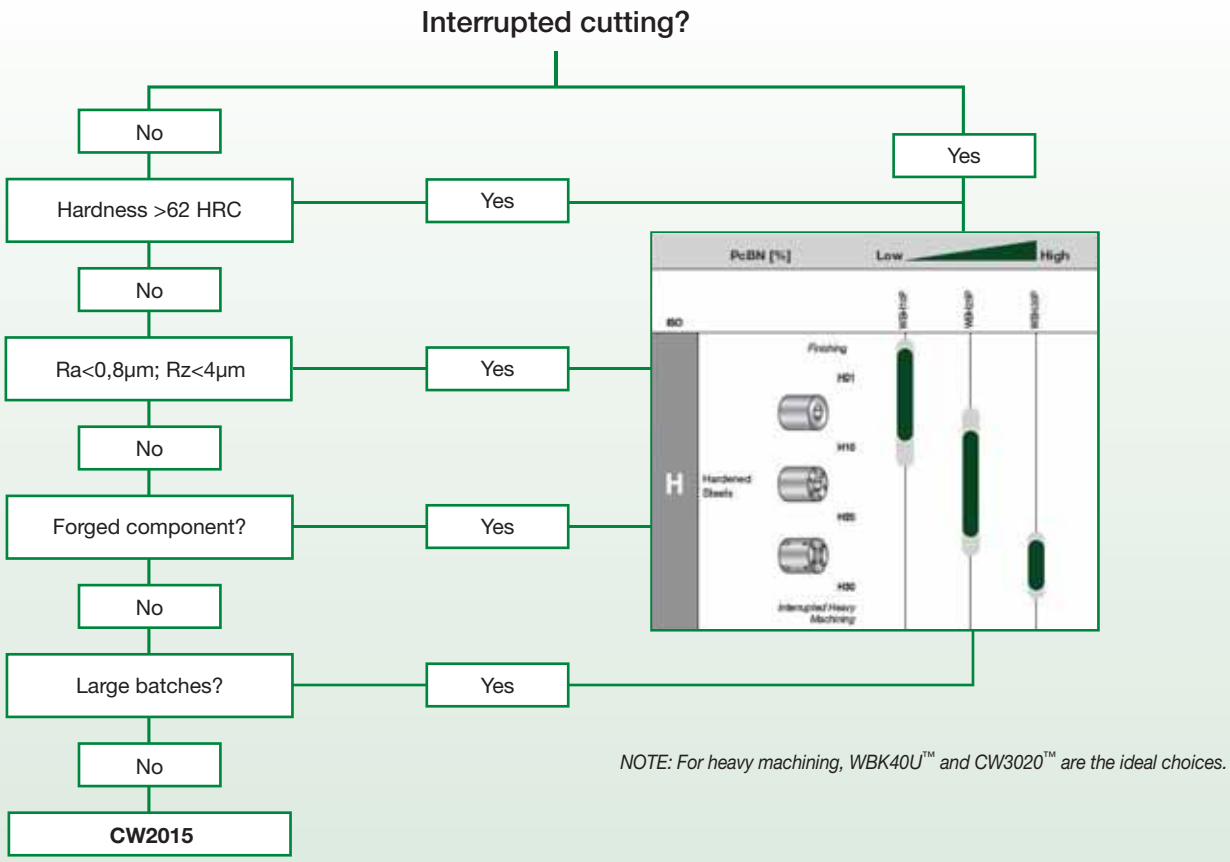
- Two PCD grades — WDN25U and WDN00U — cover a wide range of applications.
- New grades provide outstanding performance to increase productivity and cut manufacturing costs.
- High abrasion and chipping resistance.
- Used in machining aluminium alloys with low- and high-silicon content, copper alloys, ceramics, and plastics.
- Suitable for machining highly abrasive materials such as titanium and Metal Matrix Composites (MMC).



Advanced Materials for Hard Turning

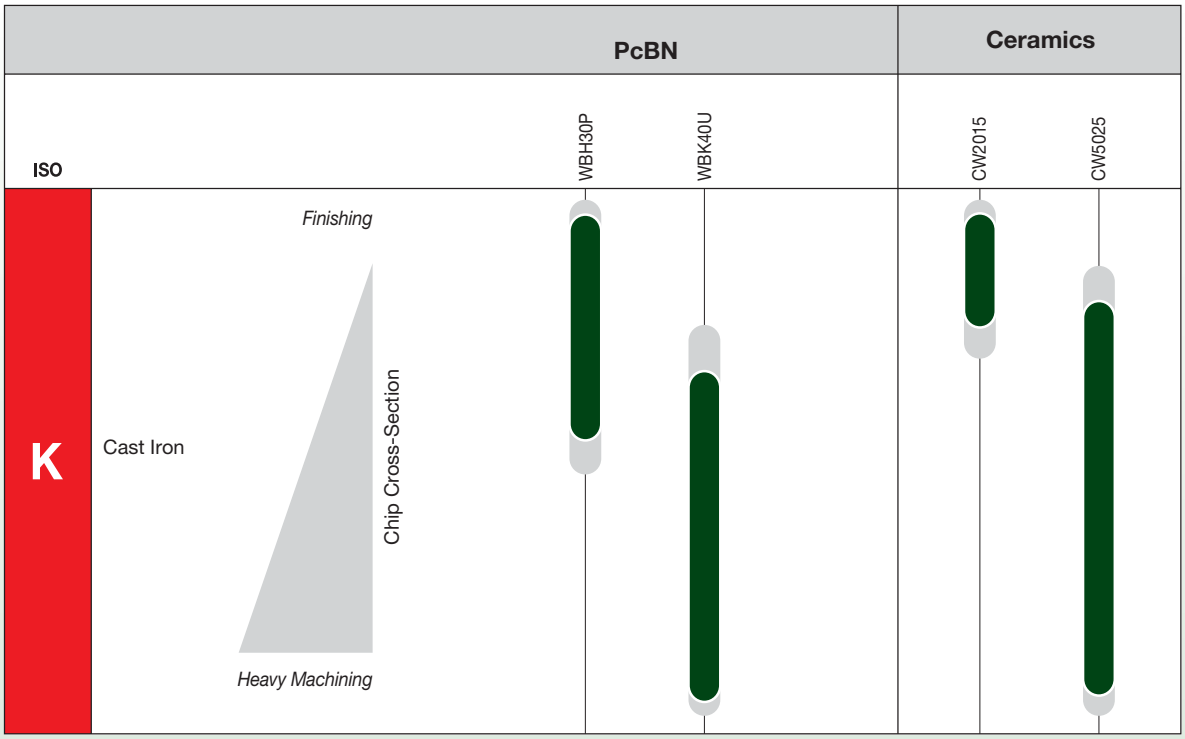


Hard Turning Grade Selection

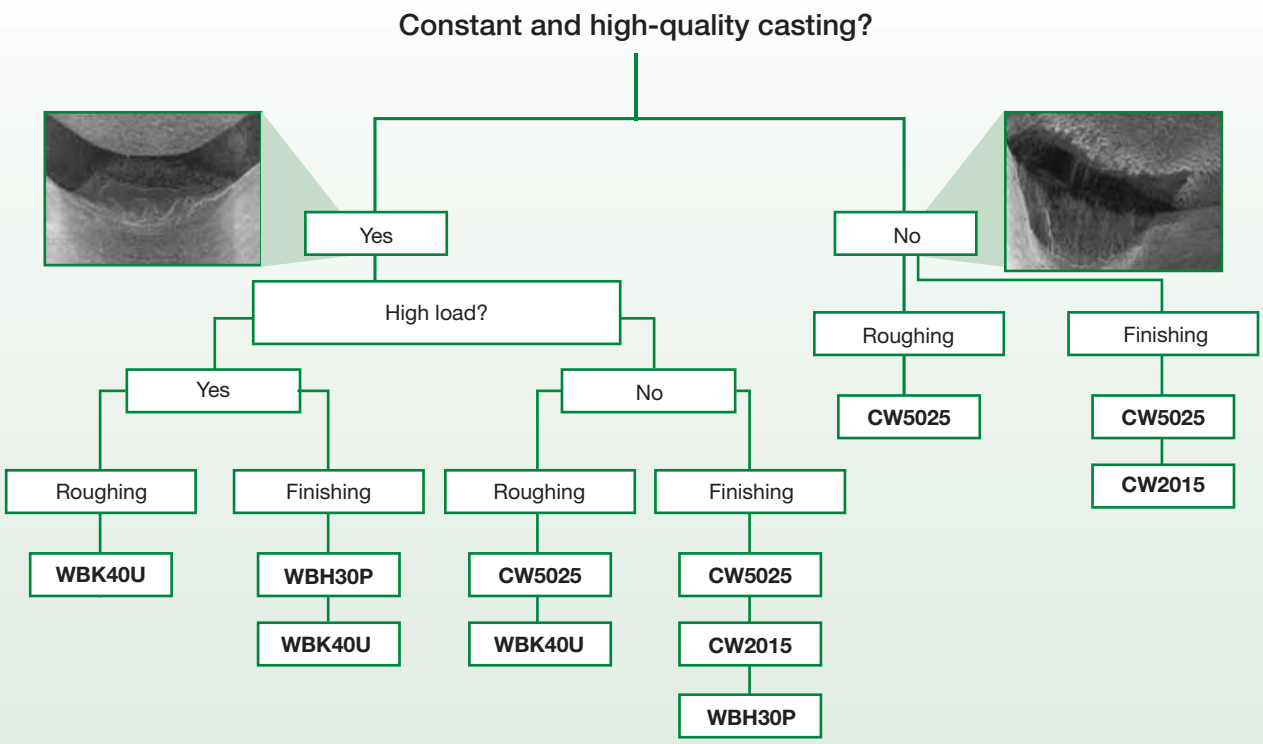


NOTE: For heavy machining, WBK40U™ and CW3020™ are the ideal choices.

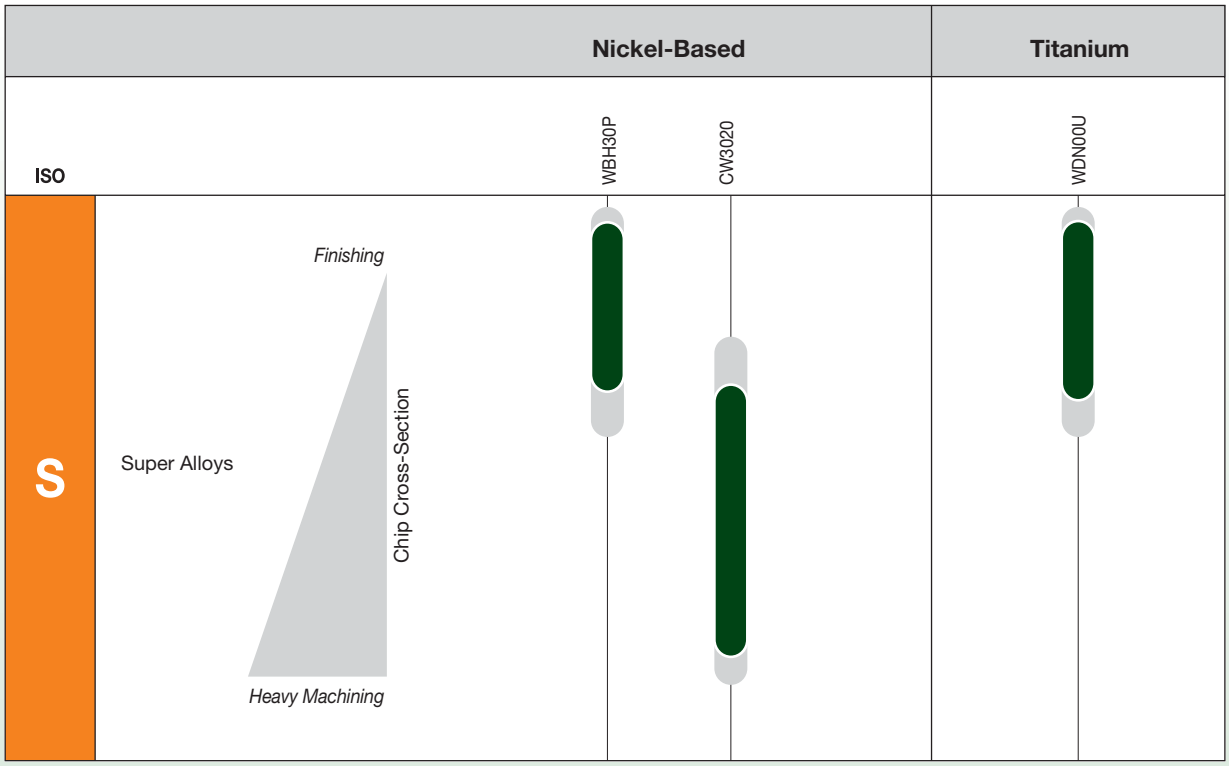
Advanced Materials for Cast Iron Machining



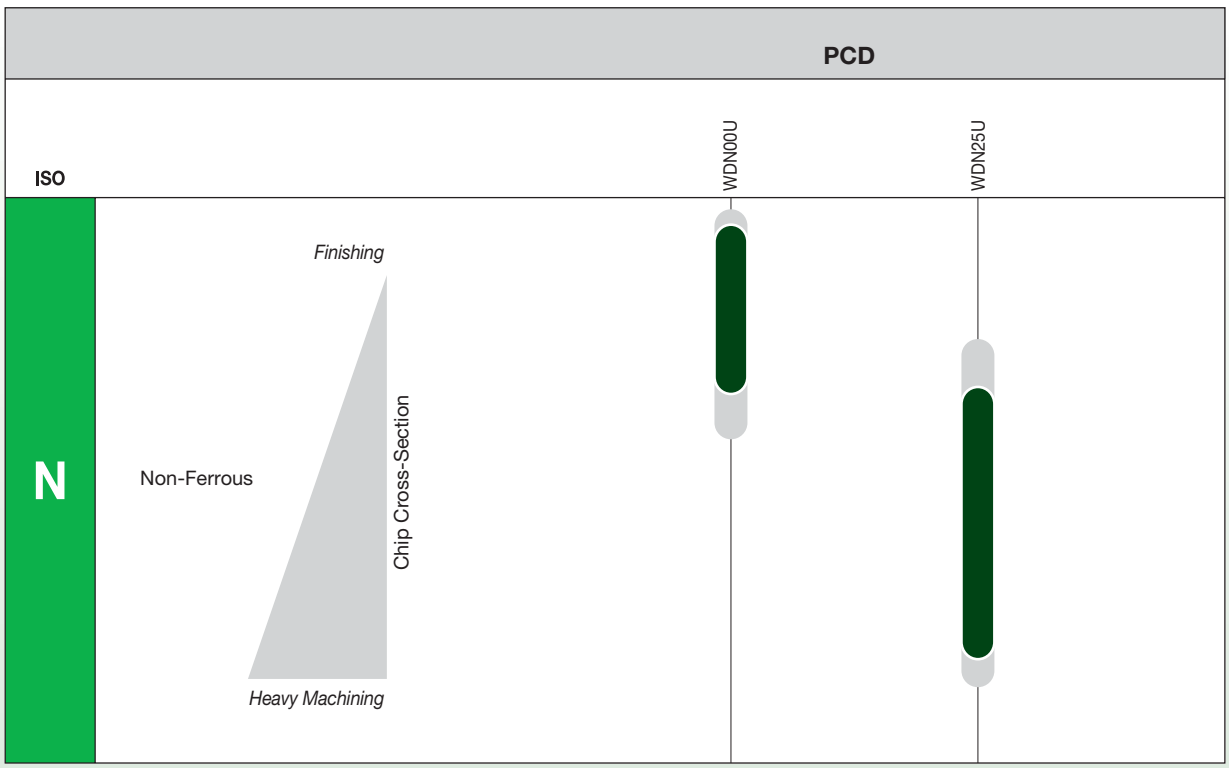
Cast Iron Machining Grade Selection

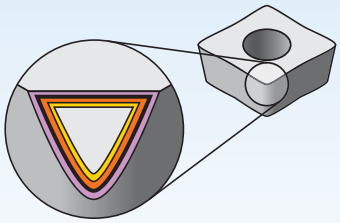


Advanced Materials for High-Temperature Machining



Advanced Materials for Non-Ferrous Machining





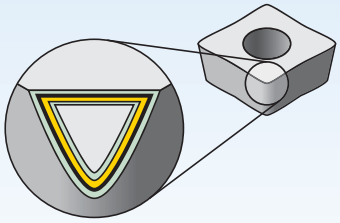
Reduce cycle times. High speed and feed capability. Long tool life. New multi-layer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
CW2015	CM-H10	Mixed (black) ceramic. Matrix Al_2O_3 and TiCN. Good toughness properties combined with good wear resistance. Semi-finishing and finishing. For hardened iron base materials and grey cast iron (finishing).	K									
			H									
CW5025	CN-K15	Silicon-nitride ceramic. Extraordinary toughness properties. Roughing, also in heavily interrupted cuts. Capable of high-performance turning. To be used with or without coolant. For grey cast iron.	K									
CW3020	C4	Whisker ceramic with a matrix of Al_2O_3 + SiCw. The SiC whiskers embedded in the micro-structure give this ceramic excellent toughness for cutting high-temp alloys and cast materials with high Brinell hardness.	S									
			H									
WBK40U	BN-K40	A high CBN content, solid CBN insert with multiple cutting edges. Applied in roughing to finishing of fully pearlitic grey cast iron, chilled irons, high-chrome alloyed steels, sintered powdered metals, and heavy cuts in hardened steels (>45 HRC). Use for finishing chilled and fully pearlitic cast iron. Solid inserts offer better security and shock-resistance than tipped inserts, while also enabling deeper depth-of-cut capability.	K									
			H									
WBH10P	BN-H10	A low content CBN grade with a PVD-TiAlN coating for added wear resistance. Designed for precision machining of hardened steels (>45 HRC); the harder the steel the better. PVD coating offers improved wear resistance and excellent surface finish capability. Effectively applied on bearing steels, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings.	H									

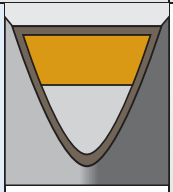
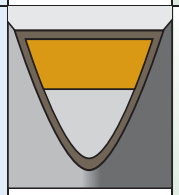
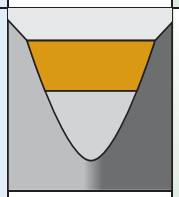
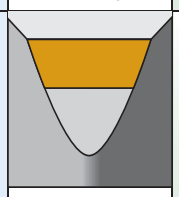


Reduce cycle times. High speed and feed capability. Long tool life. New multi-layer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

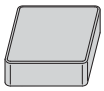
Grade

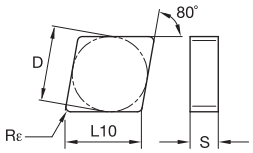
Coating	Grade Description		05	10	15	20	25	30	35	40	45
WBH25P  BN-H25	A PVD-TiAlN coating over a low content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing of hardened steels (>45 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings.	H									
WBH30P  BN-H30	A PVD-TiAlN coating over a low content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing in interrupted cuts on hardened steels (>45 HRC). Applied on grey cast iron, chilled irons, high-chrome alloyed steels, high-temp alloys, and sintered powdered metals.	K S H									
WDN00U*  DP-N10	An ultra-fine grained polycrystalline diamond (PCD) tip brazed onto a carbide substrate. Designed for general purpose turning of primarily non-ferrous materials. Applied over a wide range of continuous to interrupted cuts where superior surface finish is needed. Use on low- to medium-silicon content aluminium alloys, non-metallics, copper, brass, and zinc-based alloys. The ultra-fine grained diamond particle size enables superior surface finishes while ensuring the best mechanical shock resistance of any PCD cutting tool.	N S									
WDN25U  DP-N25	A multi-modal PCD grade with a range of grain sizes brazed onto a carbide substrate. Engineered for extreme abrasion resistance and good edge strength for demanding applications. An ideal choice for high-silicon aluminium alloys, bi-metallic (AL/GCI) materials, MMC, carbon-fibre reinforced plastics, and other abrasive non-metallic materials.	N									

**Grade available as Custom Solution only.*

Material Group		Cutting Speed — vc m/min								
		CW2015			CW3020			CW5025		
		min	Start	max	min	Start	max	min	Start	max
ap [mm]		0,5		4,0	0,5		4,0	1,0		8,0
f [mm/rev]		0,2		0,4	0,1		5,0	0,2		0,6
P	0	–	–	–	–	–	–	–	–	–
	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
	5	–	–	–	–	–	–	–	–	–
	6	–	–	–	–	–	–	–	–	–
M	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
K	1	250	**475**	725	–	–	–	250	**760**	1000
	2	300	**550**	800	–	–	–	275	**365**	490
	3	250	**400**	600	–	–	–	275	**335**	440
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
	5	–	–	–	–	–	–	–	–	–
	6	–	–	–	–	–	–	–	–	–
	7	–	–	–	–	–	–	–	–	–
	8	–	–	–	–	–	–	–	–	–
S	1	–	–	–	170	**200**	375	–	–	–
	2	–	–	–	170	**200**	375	–	–	–
	3	–	–	–	190	**250**	375	–	–	–
	4	–	–	–	–	–	–	–	–	–
H	1	60	**100**	140	45	**85**	125	–	–	–
	2	60	**100**	140	45	**85**	125	–	–	–
	3	60	**100**	140	45	**85**	125	–	–	–
	4	60	**100**	140	45	**85**	125	–	–	–

Material Group		Cutting Speed — vc m/min																	
		WBH10P			WBH25P			WBH30P			WBK40U			WDN00U			WDN25U		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
	ap [mm]	0,10		0,50	0,10		0,50	0,08		0,40	0,10		1,50	0,20		2,00	0,20		2,00
	f [mm/rev]	0,06		0,25	0,05		0,20	0,05		0,20	0,08		0,20	0,10		0,30	0,10		0,25
P	0/1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
M	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
K	1	–	–	–	–	–	–	400	**600**	800	650	**800**	1200	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	500	**765**	2500	500	**765**	2500
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	350	**580**	1000
	3	–	–	–	–	–	–	–	–	–	–	–	–	250	**520**	1000	250	**520**	1000
	4	–	–	–	–	–	–	–	–	–	–	–	–	250	**400**	750	250	**400**	750
	5	–	–	–	–	–	–	–	–	–	–	–	–	550	**760**	1000	550	**760**	1000
	6	–	–	–	–	–	–	–	–	–	–	–	–	400	**460**	850	400	**365**	750
	7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	120	**160**	200	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	100	**180**	320	–	–	–
H	1	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	2	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	3	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–
	4	80	**170**	260	80	**160**	230	60	**120**	220	60	**120**	220	–	–	–	–	–	–



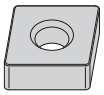


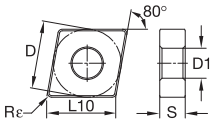
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ CNGN/CNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGN120404T02020	12,70	12,90	4,76	0,4	–	2952551	-	-
CNGN120408T01020	12,70	12,90	4,76	0,8	–	-	3869578	-
CNGN120408T02020	12,70	12,90	4,76	0,8	–	2952552	-	2952082
CNGN120412T01020	12,70	12,90	4,76	1,2	–	-	3869579	-
CNGN120412T02020	12,70	12,90	4,76	1,2	–	2952603	-	2952113
CNGN120416T01020	12,70	12,90	4,76	1,6	–	-	3869580	-
CNGN120416T02020	12,70	12,90	4,76	1,6	–	2952604	-	2952114
CNGN120712T01020	12,70	12,90	7,94	1,2	–	-	3869581	-
CNGN120712T02020	12,70	12,90	7,94	1,2	–	2952605	-	2952115
CNGN120716T01020	12,70	12,90	7,94	1,6	–	-	3869582	-



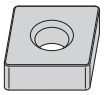


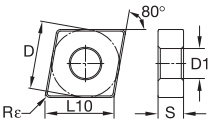
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

CNGA

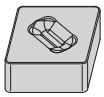
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGA120404T02020	12,70	12,90	4,76	0,4	5,16	2952526	-	-
CNGA120408T02020	12,70	12,90	4,76	0,8	5,16	2952527	-	2952159
CNGA120412T02020	12,70	12,90	4,76	1,2	5,16	2952528	-	2952161
CNGA120416T02020	12,70	12,90	4,76	1,6	5,16	-	-	2952173
CNGA160612T02020	15,88	16,12	6,35	1,2	6,35	2952529	-	2952174
CNGA160616T02020	15,88	16,12	6,35	1,6	6,35	-	-	2952175
CNGA190612T02020	19,05	19,34	6,35	1,2	7,93	2952530	-	2952176
CNGA190616T02020	19,05	19,34	6,35	1,6	7,93	2952531	-	-

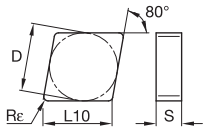




CNGA-FW

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGA120408T01020FW	12,70	12,90	4,76	0,8	5,16	-	-	2952158
CNGA120412T01020FW	12,70	12,90	4,76	1,2	5,16	-	-	2952160
CNGA120416T01020FW	12,70	12,90	4,76	1,6	5,16	-	-	2952162



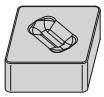


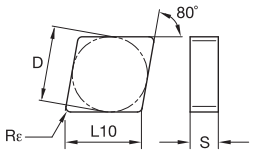
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

CNGX

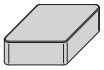
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGX120708T02020	12,70	12,90	7,94	0,8	–	■	■	2952117
CNGX120712T02020	12,70	12,90	7,94	1,2	–	■	■	2952119
CNGX160716T02020	15,88	16,12	7,94	1,6	–	■	■	2952121

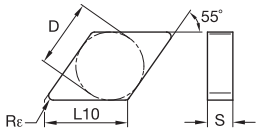




CNGX-FW

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGX120712T01020FW	12,70	12,90	7,94	1,2	–	■	■	2952118



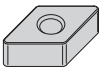


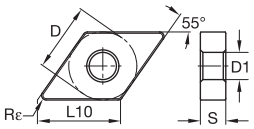
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ DNGN/DNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGN150704T02020	12,70	15,50	7,94	0,4	–	2952607	-	-
DNGN150708T01020	12,70	15,50	7,94	0,8	–	-	3869743	-
DNGN150708T02020	12,70	15,50	7,94	0,8	–	2952608	-	-
DNGN150712T02020	12,70	15,50	7,94	1,2	–	2952609	-	-
DNGN150716T01020	12,70	15,50	7,94	1,6	–	-	3869745	-



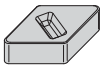


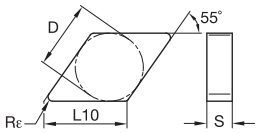
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

DNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGA150404T02020	12,70	15,50	4,76	0,4	5,16	2952532	○	○
DNGA150408T02020	12,70	15,50	4,76	0,8	5,16	2952533	○	○
DNGA150412T02020	12,70	15,50	4,76	1,2	5,16	2952534	○	2952184
DNGA150604T02020	12,70	15,50	6,35	0,4	5,16	2952535	○	○
DNGA150608T02020	12,70	15,50	6,35	0,8	5,16	2952536	○	○
DNGA150612T02020	12,70	15,50	6,35	1,2	5,16	2952537	○	2952185



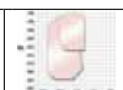
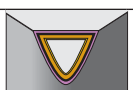


DNGX

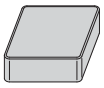
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGX120712T02020	10,00	12,21	7,94	1,2	–	○	○	2952124
DNGX120716T02020	10,00	12,21	7,94	1,6	–	○	○	2952125
DNGX150708T02020	12,70	15,50	7,94	0,8	–	○	○	2952126
DNGX150712T02020	12,70	15,50	7,94	1,2	–	○	○	2952127
DNGX150716T02020	12,70	15,50	7,94	1,6	–	○	○	2952128

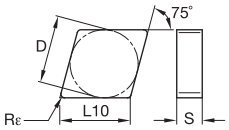

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



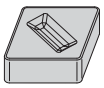


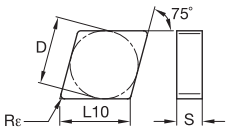
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ ENGN/ENG

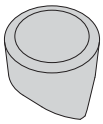
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
ENGN130704T02020	12,70	13,15	7,94	0,4	–	2952611	○	○
ENGN130708T02020	12,70	13,15	7,94	0,8	–	2952612	○	○
ENGN130712T02020	12,70	13,15	7,94	1,2	–	2952613	○	○
ENGN130716T02020	12,70	13,15	7,94	1,6	–	2952614	○	○

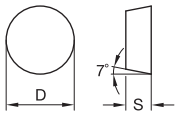




■ ENGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
ENGX130716T02020	12,70	13,15	7,94	1,6	–	○	○	2952130





● first choice
○ alternate choice

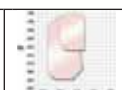
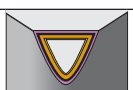
P			
M			
K	●		●
N			
S		●	
H	●		

RCGX/RCGV

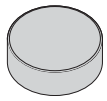
ISO catalogue number	D	S	CW2015	CW3020	CW5025
RCGX060400T01020	6,35	4,76	-	3869746	-
RCGX090700T02020	9,53	7,92	2952694	-	-
RCGX090700T07015	9,53	7,92	2952695	-	-
RCGX090700T01020	9,53	7,94	2952693	3869747	-
RCGX120700T01020	12,70	7,92	-	3869748	-
RCGX120700T02020	12,70	7,92	2952697	-	-
RCGX120700T20015	12,70	7,92	2952698	-	-

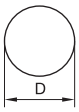

C2–C49

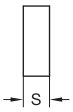
C50–C81

C86–C129

B8–B25

B26–B28

B30–B105





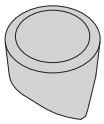


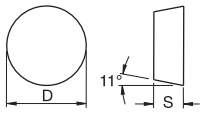
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ RNGN/RNG

ISO catalogue number	D	S	CW2015	CW3020	CW5025
RNGN090300T01020	9,53	3,18	-	3869749	-
RNGN090400T02020	9,53	4,76	2952615	-	-
RNGN120400T01020	12,70	4,76	-	3869750	-
RNGN120400T02020	12,70	4,76	2952616	-	2952131
RNGN120700T01020	12,70	7,94	-	3869751	-
RNGN120700T02020	12,70	7,94	2952617	-	-
RNGN120700T10015	12,70	7,94	2952618	-	-
RNGN120700T20015	12,70	7,94	2952619	-	-
RNGN150700T02020	15,88	7,94	2952620	-	2952133



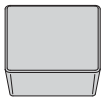


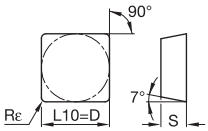
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

RPGV

ISO catalogue number	D	S	CW2015	CW3020	CW5025
RPGX060400T01020	6,35	4,78	-	3869753	-
RPGX090700T01020	9,53	7,92	-	3869754	-
RPGX120700T01020	12,70	7,94	-	3869755	-



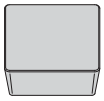


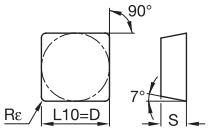
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ SCGN/SCG

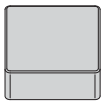
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SCGN090412T00520	9,53	9,53	4,76	1,2	–	'	'	2952147

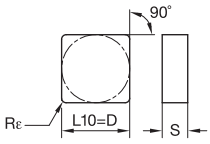




■ SCUN/SCU

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SCUN120412T00520	12,70	12,70	4,76	1,2	–	2952699	'	'





● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ SNGN/SNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGN090308T02020	9,53	9,53	3,18	0,8	–	2952748	–	–
SNGN090412T00515	9,53	9,53	4,76	1,2	–	2952749	–	–
SNGN120408T00520	12,70	12,70	4,76	0,8	–	2952750	–	–
SNGN120408T02020	12,70	12,70	4,76	0,8	–	2952751	–	2952135
SNGN120412T01020	12,70	12,70	4,76	1,2	–	–	3869756	–
SNGN120412T02020	12,70	12,70	4,76	1,2	–	2952752	–	2952136
SNGN120416T01020	12,70	12,70	4,76	1,6	–	–	3869757	–
SNGN120416T02020	12,70	12,70	4,76	1,6	–	–	–	2952137
SNGN120704T02020	12,70	12,70	7,94	0,4	–	2952824	–	–
SNGN120708T02020	12,70	12,70	7,94	0,8	–	2952825	–	–
SNGN120712T00520	12,70	12,70	7,94	1,2	–	2953339	–	–
SNGN120712T01020	12,70	12,70	7,94	1,2	–	–	3869758	–

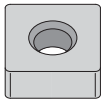
(continued)

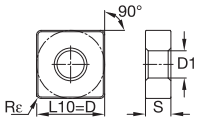
(SNGN/SNG — continued)

● first choice
○ alternate choice

P	M	K	N	S	H
		●		●	●

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGN120712T02020	12,70	12,70	7,94	1,2	–	2952826	–	2952138
SNGN120716T00520	12,70	12,70	7,94	1,6	–	2953340	–	–
SNGN120716T01020	12,70	12,70	7,94	1,6	–	–	3869759	–
SNGN120716T02020	12,70	12,70	7,94	1,6	–	–	–	2952139
SNGN120720T02020	12,70	12,70	7,94	2,0	–	2952828	–	–
SNGN120720T10015	12,70	12,70	7,94	2,0	–	2952829	–	–
SNGN150712T02020	15,88	15,88	7,94	1,2	–	2952830	–	–
SNGN150716T02020	15,88	15,88	7,94	1,6	–	2952831	–	–
SNGN190720K20015	19,05	19,05	7,94	2,0	–	2952832	–	–
SNGN190720T20015	19,05	19,05	7,94	2,0	–	2952833	–	–





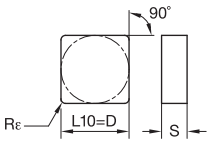
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

SNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGA120408T02020	12,70	12,70	4,76	0,8	5,16	2952538	●	2952187
SNGA120412T02020	12,70	12,70	4,76	1,2	5,16	2952539	●	2952188
SNGA120416T02020	12,70	12,70	4,76	1,6	5,16	2952540	●	2952189
SNGA150612T02020	15,88	15,88	6,35	1,2	6,35	●	●	2952190
SNGA150616T02020	15,88	15,88	6,35	1,6	6,35	●	●	2952191





SNGX

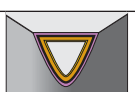
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120708T02020	12,70	12,70	7,94	0,8	–	●	●	2952140
SNGX150716T02020	15,88	15,88	7,94	1,6	–	●	●	2952144


C2–C49

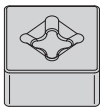

C50–C81

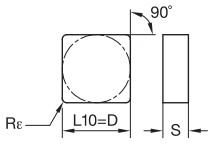

C86–C129


B8–B25


B26–B28


B30–B105



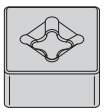


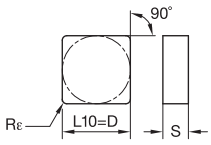
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ SNGX-FW

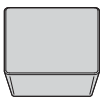
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120712T01020FW	12,70	12,70	7,94	1,2	–	■	■	2952141





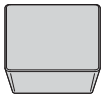
■ SNMX

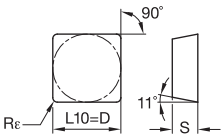
ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNMX120712T02020	12,70	12,70	7,94	1,2	–	■	■	2952069
SNMX120716T02020	12,70	12,70	7,94	1,6	–	■	■	2952070
SNMX150716T02020	15,88	15,88	7,94	1,6	–	■	■	2952071



■ SPGN-T/SPG-T

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SPGN090308T01020	9,53	9,53	3,18	0,8	–	2952700	■	■
SPGN120304T01020	12,70	12,70	3,18	0,4	–	2952701	■	■
SPGN120308T01020	12,70	12,70	3,18	0,8	–	2952702	■	■



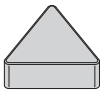


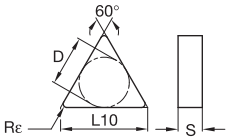
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

SPUN-T

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SPUN120304T00520	12,70	12,70	3,18	0,4	–	2952703	'	'
SPUN120308T00520	12,70	12,70	3,18	0,8	–	2952704	'	'
SPUN120312T00520	12,70	12,70	3,18	1,2	–	2952705	'	'



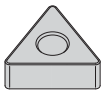


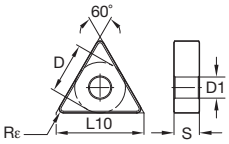
● first choice
○ alternate choice

P			
M			
K		●	●
N			
S		●	
H		●	

■ TNGN/TNG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGN160404T02020	9,53	16,50	4,76	0,4	–	2952835	-	-
TNGN160408T01020	9,53	16,50	4,76	0,8	–	-	3869761	-
TNGN160408T02020	9,53	16,50	4,76	0,8	–	2952836	-	2952072
TNGN160412T02020	9,53	16,50	4,76	1,2	–	2952837	-	2952153
TNGN160416T02020	9,53	16,50	4,76	1,6	–	2952838	-	-
TNGN160708T02020	9,53	16,50	7,94	0,8	–	2952839	-	-
TNGN160712T02020	9,53	16,50	7,94	1,2	–	2952840	-	-
TNGN220408T02020	12,70	22,00	4,76	0,8	–	2952841	-	-
TNGN220416T02020	12,70	22,00	4,76	1,6	–	-	-	2952154



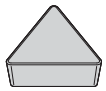


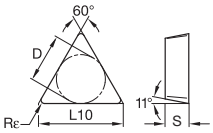
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

TNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGA160408T02020	9,53	16,50	4,76	0,8	3,81	2952541	-	2952195
TNGA160412T02020	9,53	16,50	4,76	1,2	3,81	2952542	-	2952196
TNGA160416T02020	9,53	16,50	4,76	1,6	3,81	2952543	-	2952197
TNGA220408T02020	12,70	22,00	4,76	0,8	5,16	2952544	-	-



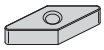


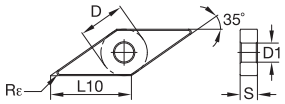
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ TPG

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TPGN110304T01020	6,35	11,00	3,18	0,4	–	2952706	●	●
TPGN110308T01020	6,35	11,00	3,18	0,8	–	2952707	●	●
TPGN110312T01020	6,35	11,00	3,18	1,2	–	2952708	●	●
TPGN160304T00520	9,53	16,50	3,18	0,4	–	2952709	●	●
TPGN160304T01020	9,53	16,50	3,18	0,4	–	2952710	●	●
TPGN160308T00520	9,53	16,50	3,18	0,8	–	2952711	●	●
TPGN160308T01020	9,53	16,50	3,18	0,8	–	2952712	●	●
TPGN160308T02020	9,53	16,50	3,18	0,8	–	○	●	2952155
TPGN160312T01020	9,53	16,50	3,18	1,2	–	2952713	●	●
TPGN160312T02020	9,53	16,50	3,18	1,2	–	○	●	2952156



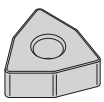


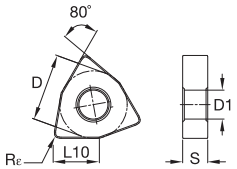
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

VNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
VNGA160404T02020	9,53	16,61	4,76	0,4	3,81	2952545	-	-
VNGA160408T02020	9,53	16,61	4,76	0,8	3,81	2952546	-	2952198
VNGA160412T02020	9,53	16,61	4,76	1,2	3,81	2952547	-	-
VNGA220408T02020	12,70	22,14	4,76	0,8	5,16	2952548	-	-

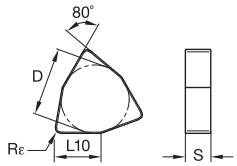




WNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
WNGA080408T02020	12,70	8,69	4,76	0,8	5,16	-	-	2952199
WNGA080412T02020	12,70	8,69	4,76	1,2	5,16	-	-	2952200
WNGA080416T02020	12,70	8,69	4,76	1,6	5,16	-	-	2952201



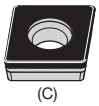


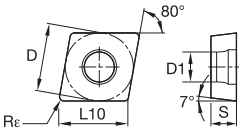
● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ WNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
WNGX080712T02020	12,70	8,69	7,94	1,2	–	'	'	2952157


(C)

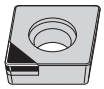


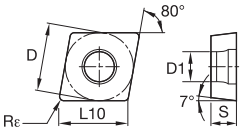
● first choice
○ alternate choice

P							
M							
K			●	●			
N						●	●
S				●		●	
H	●	●	●	●			

CCGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060202EC	6,35	6,45	2,38	0,2	2,80	-	3883561	-	-	-	-
CCGW060202S01015C	6,35	6,45	2,38	0,2	2,80	3883505	-	-	-	-	-
CCGW060204S01015C	6,35	6,45	2,38	0,4	2,80	3883506	3883573	-	-	-	-
CCGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	-	3883575	-	-	-	-
CCGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	-	3883577	-	-	-	-

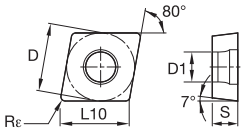

(FST)



CCGW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060204FST	6,35	6,45	2,38	0,4	2,80	-	-	-	-	5885722	3898746
CCGW09T304FST	9,53	9,67	3,97	0,4	4,40	-	-	-	-	5885723	3898749
CCGW09T308FST	9,53	9,67	3,97	0,8	4,40	-	-	-	-	5885724	3898750


(FWC)

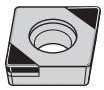


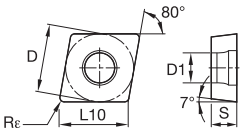
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ CCGW-FWC

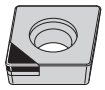
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW060202EFWC	6,35	6,45	2,38	0,2	2,80	-	3883560	-	-	-	-
CCGW060204EFWC	6,35	6,45	2,38	0,4	2,80	-	3883562	-	-	-	-
CCGW09T304EFWC	9,53	9,67	3,97	0,4	4,40	-	3883574	-	-	-	-
CCGW09T308EFWC	9,53	9,67	3,97	0,8	4,40	-	3883576	-	-	-	-

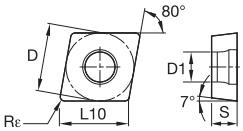

(MT)



■ CCGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCGW09T304S01015MT	9,52	9,67	3,99	0,4	4,40	3883507	-	-	-	-	-
CCGW09T308S01015MT	9,52	9,67	3,99	0,8	4,40	3883508	-	6018004	-	-	-


(FST)



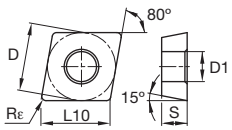
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

CCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CCMW060204FST	6,35	6,45	2,38	0,4	2,80	I	I	I	I	I	3883135
CCMW060208FST	6,35	6,45	2,38	0,8	2,80	I	I	I	I	I	3883133
CCMW09T304FST	9,53	9,67	3,97	0,4	4,40	I	I	I	I	I	3883134
CCMW09T308FST	9,53	9,67	3,97	0,8	4,40	I	I	I	I	I	3883136

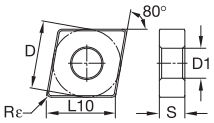

(FST)



CDHB-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CDHBS4T002FST	3,97	4,03	1,02	0,1	2,13	I	I	I	I	I	3898745
CDHBS4T004FST	3,97	4,03	1,02	0,2	2,13	I	I	I	I	I	3898744


(EMT)

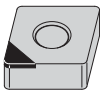


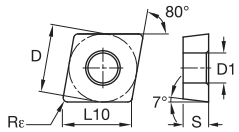
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ CNGA-EMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120408EMT	12,70	12,90	4,76	0,8	5,16	ı	3883363	ı	ı	ı	ı
CNGA120412EMT	12,70	12,90	4,76	1,2	5,16	ı	3883364	ı	ı	ı	ı

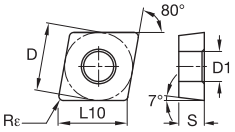

(FST)



■ CNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404FST	12,70	12,90	4,76	0,4	5,16	ı	ı	ı	ı	5885725	3898726
CNGA120408FST	12,70	12,90	4,76	0,8	5,16	ı	ı	ı	ı	5885726	3898727


(MT)



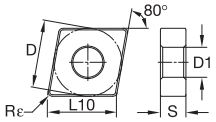
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H	●	●	●	●			

CNGA-FW/MW MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404EFWMT	12,70	12,90	4,76	0,4	5,15	-	3883356	-	-	-	-
CNGA120408EFWMT	12,70	12,90	4,76	0,8	5,16	-	3883912	-	-	-	-
CNGA120408S01025FWMT	12,70	12,90	4,78	0,8	5,16	3883523	-	-	-	-	-


(MT)

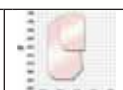
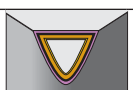


CNGA-MT

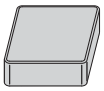
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNGA120404S01025MT	12,70	12,90	4,78	0,4	5,16	3883509	3883885	6018006	-	-	-
CNGA120408S01025MT	12,70	12,90	4,78	0,8	5,16	3883510	3883886	6018008	-	-	-
CNGA120412S01020MT	12,70	12,90	4,78	1,2	5,16	-	-	6018009	-	-	-
CNGA120412S01025MT	12,70	12,90	4,78	1,2	5,16	3883511	3883887	6018010	-	-	-

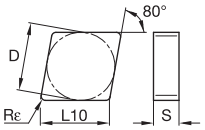

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



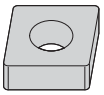


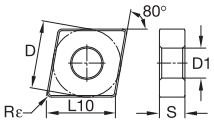
● first choice
○ alternate choice

P							
M							
K			●	●			
N					●	●	
S			●		●		
H	●	●	●	●			

■ CNMN

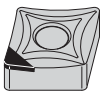
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMN090312S02020	9,53	9,67	3,18	1,2	–	■	■	■	3883278	■	■
CNMN120408S02020	12,70	12,90	4,76	0,8	–	■	■	■	3883279	■	■
CNMN120412S02020	12,70	12,90	4,76	1,2	–	■	■	■	3883280	■	■

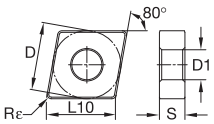




■ CNMA

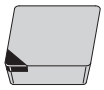
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMA120408S02020	12,70	12,90	4,76	0,8	5,16	■	■	■	3883281	■	■
CNMA120412S02020	12,70	12,90	4,76	1,2	5,16	■	■	■	3883282	■	■

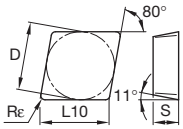

(FST)



■ CNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CNMS120408FST	12,70	12,90	4,76	0,8	5,16	■	■	■	■	■	3898729





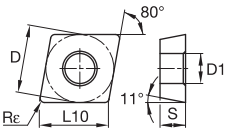
● first choice
○ alternate choice

P							
M							
K			●	●			
N					●	●	
S			●		●		
H	●	●	●	●			

CPGN

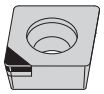
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGN120304F	12,70	12,90	3,18	0,4	–	-	-	-	-	-	3898717
CPGN120308F	12,70	12,90	3,18	0,8	–	-	-	-	-	-	3898718

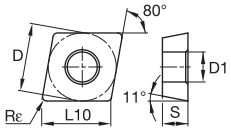

(C)



CPGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060202EC	6,35	6,45	2,38	0,2	2,80	-	3883578	-	-	-	-
CPGW060202S01015C	6,35	6,45	2,38	0,2	2,80	3883524	-	6018081	-	-	-
CPGW060204S01015C	6,35	6,45	2,38	0,4	2,80	3883525	3883579	6018082	-	-	-
CPGW060208S01015C	6,35	6,45	2,38	0,8	2,80	-	3883580	-	-	-	-
CPGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	-	3883581	-	-	-	-
CPGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	-	3883584	-	-	-	-


(FST)

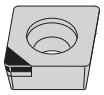


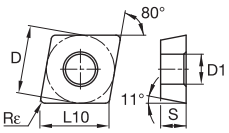
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

CPGW-FST

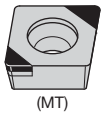
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060202FST	6,35	6,45	2,38	0,2	2,80	■	■	■	■	■	3898751
CPGW060204FST	6,35	6,45	2,38	0,4	2,80	■	■	■	■	■	3898752
CPGW060208FST	6,35	6,45	2,38	0,8	2,80	■	■	■	■	■	3898753
CPGW09T304FST	9,53	9,67	3,97	0,4	4,40	■	■	■	■	■	3898754
CPGW09T308FST	9,53	9,67	3,97	0,8	4,40	■	■	■	■	■	3898755
CPGW120404FST	12,70	12,90	4,76	0,4	5,50	■	■	■	■	■	3898756
CPGW120408FST	12,70	12,90	4,76	0,8	5,50	■	■	■	■	■	3898757

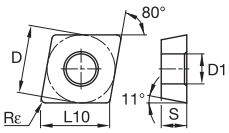

(FWST)



CPGW-FWST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW060204FWST	6,35	6,45	2,38	0,4	2,80	■	■	■	■	5885758	3898758
CPGW09T308FWST	9,53	9,67	3,97	0,8	4,40	■	■	■	■	5885759	3898759
CPGW120408FWST	12,70	12,90	4,76	0,8	5,50	■	■	■	■	5885760	3898760


(MT)

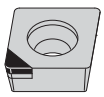


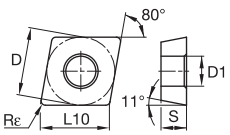
● first choice
○ alternate choice

P							
M							
K			●	●			
N						●	●
S			●		●		
H	●	●	●	●			

CPGW-MT

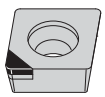
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPGW09T304S01015MT	9,53	9,67	3,99	0,4	4,40	3883526	-	6018084	-	-	-
CPGW09T308S01015MT	9,53	9,67	3,99	0,8	4,40	3883527	-	6018085	-	-	-

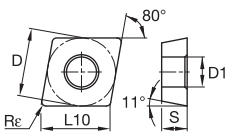

(FST)



CPMW-FST

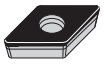
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPMW050204FST	5,56	5,65	2,38	0,4	2,50	-	-	-	-	-	3883139
CPMW060204FST	6,35	6,45	2,38	0,4	2,80	-	-	-	-	-	3883137

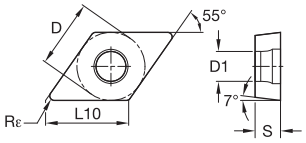

(FWST)



CPMW-FWST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
CPMW09T304FWST	9,53	9,67	3,97	0,4	4,40	-	-	-	-	-	3883138


(C)

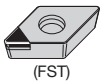


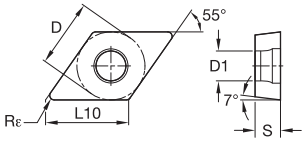
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ DCGW-C

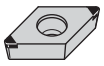
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW070202EC	6,35	7,75	2,38	0,2	2,80	■	3883585	■	■	■	■
DCGW070202S01015C	6,35	7,75	2,38	0,2	2,80	3883528	■	■	■	■	■
DCGW070204S01015C	6,35	7,75	2,38	0,4	2,80	3883529	3883586	■	■	■	■


(FST)



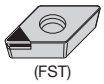
■ DCGW-FST

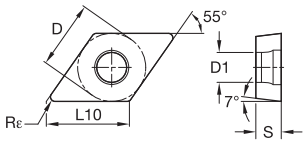
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW070204FST	6,35	7,75	2,38	0,4	2,80	■	■	■	■	■	3898761
DCGW11T304FST	9,53	11,63	3,97	0,4	4,40	■	■	■	■	■	3898762


(MT)

■ DCGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCGW11T304S01015MT	9,52	11,63	3,99	0,4	4,40	3883530	■	■	■	■	■
DCGW11T308S01015MT	9,52	11,63	3,99	0,8	4,40	3883531	■	■	■	■	■


(FST)

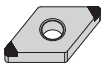


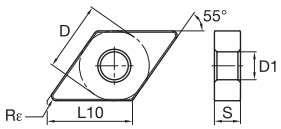
● first choice
○ alternate choice

P							
M							
K			●	●			
N						●	●
S			●			●	
H	●	●	●	●			

DCMW-FST

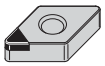
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DCMW070204FST	6,35	7,75	2,38	0,4	2,80	■	■	■	■	■	3883142
DCMW11T304FST	9,53	11,63	3,97	0,4	4,40	■	■	■	■	■	3883122
DCMW11T308FST	9,53	11,63	3,97	0,8	4,40	■	■	■	■	■	3883143

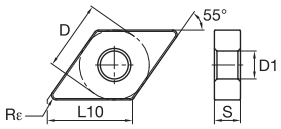

(EMT)



DNGA-EMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150408EMT	12,70	15,50	4,76	0,8	5,16	■	3883365	■	■	■	■
DNGA150412EMT	12,70	15,50	4,76	1,2	5,16	■	3883327	■	■	■	■


(FST)



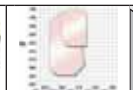
DNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404FST	12,70	15,50	4,76	0,4	5,16	■	■	■	■	5885774	3898730
DNGA150408FST	12,70	15,50	4,76	0,8	5,16	■	■	■	■	5885775	3898731


C2–C49

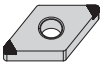

C50–C81

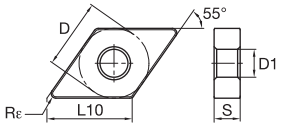

C86–C129


B8–B25


B26–B28


B30–B105


(FWMT)

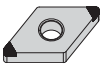


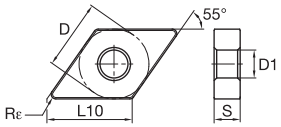
● first choice
○ alternate choice

P						
M						
K			●	●		
N					●	●
S			●		●	
H	●	●	●	●		

■ DNGA-FWMT

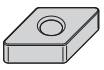
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404EFWMT	12,70	15,50	4,76	0,4	5,16	-	3883358	-	-	-	-
DNGA150408EFWMT	12,70	15,50	4,76	0,8	5,16	-	3883359	-	-	-	-
DNGA150412EFWMT	12,70	15,50	4,76	1,2	5,16	-	3883360	-	-	-	-

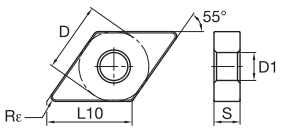

(MT)



■ DNGA-MT

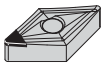
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNGA150404S01025MT	12,70	15,50	4,78	0,4	5,16	3883532	3883888	6018090	-	-	-
DNGA150408S01025MT	12,70	15,50	4,78	0,8	5,16	3883533	3883889	-	-	-	-

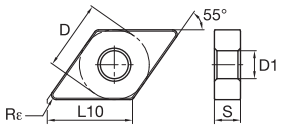




■ DNMA

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNMA110408S02020	9,53	11,63	4,76	0,8	3,81	-	-	-	3883313	-	-


(FST)



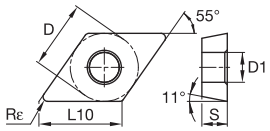
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H	●	●	●	●			

DNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DNMS150404FST	12,70	15,50	4,76	0,4	5,16	■	■	■	■	5885776	3898732
DNMS150408FST	12,70	15,50	4,76	0,8	5,16	■	■	■	■	5885777	3898733


(C)

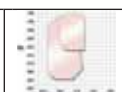
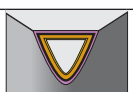


DPGW-C

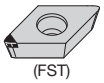
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070202EC	6,35	7,75	2,38	0,2	2,80	■	3883582	■	■	■	■
DPGW070204S01015C	6,35	7,75	2,38	0,4	2,80	■	3883583	■	■	■	■
DPGW070208S01015C	6,35	7,75	2,38	0,8	2,80	■	3883587	■	■	■	■

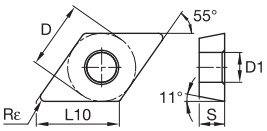

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105



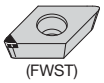


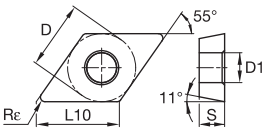
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

DPGW-FST

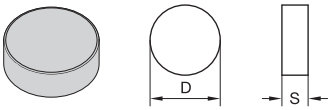
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070202FST	6,35	7,75	2,38	0,2	2,80	■	■	■	■	5885778	3898763
DPGW070204FST	6,35	7,75	2,38	0,4	2,80	■	■	■	■	5885779	3898764
DPGW11T304FST	9,53	11,63	3,97	0,4	4,40	■	■	■	■	5885780	3898765





DPGW-FWST

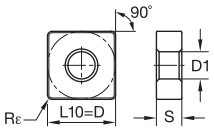
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
DPGW070204FWST	6,35	7,75	2,38	0,2	2,80	■	■	■	■	5885792	3898766
DPGW11T304FWST	9,53	11,63	3,97	0,2	4,40	■	■	■	■	5885791	3898767



RNM

ISO catalogue number	D	S	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
RNMN090300S02020	9,53	3,18	■	■	■	3883315	■	■
RNMN120300S02020	12,70	3,18	■	■	■	3883316	■	■
RNMN120400S02020	12,70	4,76	■	■	■	3883317	■	■


(MT)

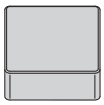


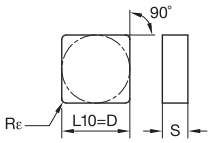
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ SNGA-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNGA120404S01025MT	12,70	12,70	4,78	0,4	5,16	■	3883915	■	■	■	■
SNGA120408S01025MT	12,70	12,70	4,78	0,8	5,16	■	3883328	■	■	■	■
SNGA120412S01025MT	12,70	12,70	4,78	1,2	5,16	■	3883891	■	■	■	■

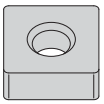


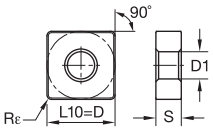


■ SNM

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMN090316S02020	9,53	9,53	3,18	1,6	–	■	■	■	3883320	■	■
SNMN120416T02020	12,70	12,70	4,76	1,6	–	■	■	■	3883324	■	■

C2–C49 | C50–C81 | C86–C129 | B8–B25 | B26–B28 | B30–B105



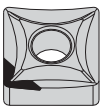


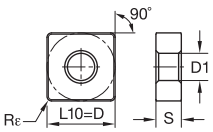
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H	●	●	●	●			

■ SNMA

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMA120408S02020	12,70	12,70	4,76	0,8	5,16	■	■	■	3883325	■	■
SNMA120412S02020	12,70	12,70	4,76	1,2	5,16	■	■	■	3883326	■	■

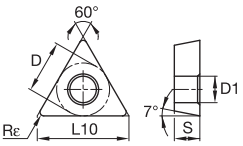

(FST)



■ SNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
SNMS120408FST	12,70	12,70	4,76	0,8	5,16	■	■	■	■	■	3898742
SNMS120412FST	12,70	12,70	4,76	1,2	5,16	■	■	■	■	■	3898743

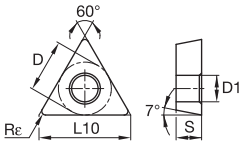

(C)



■ TCGW-C

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCGW110202EC	6,35	11,00	2,38	0,2	2,80	■	3883588	■	■	■	■
TCGW110204S01015C	6,35	11,00	2,38	0,4	2,80	■	3883589	■	■	■	■


(FST)



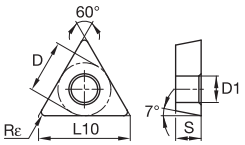
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

TCGW-FST

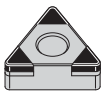
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCGW110204FST	6,35	11,00	2,38	0,4	2,80	■	■	■	■	■	3898768
TCGW16T304FST	9,53	16,50	3,97	0,4	4,40	■	■	■	■	■	3898769

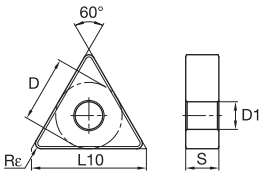

(FST)



TCMW-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TCMW110204FST	6,35	11,00	2,38	0,4	2,80	■	■	■	■	■	3883144

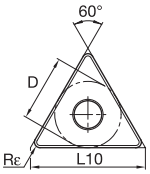

(FWMT)

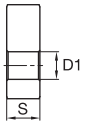


TNGA-FWMT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNGA160408EFWMT	9,53	16,50	4,76	0,8	3,81	■	3883361	■	■	■	■
TNGA160412EFWMT	9,53	16,50	4,76	1,2	3,81	■	3883362	■	■	■	■


(MT)





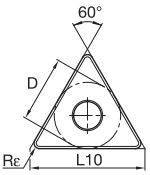
● first choice
○ alternate choice

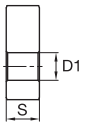
P							
M							
K			●	●			
N					●	●	
S				●		●	
H	●	●	●	●			

■ TNGA-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNGA160404S01025MT	9,53	16,50	4,78	0,4	3,81	○	3883329	○	○	○	○
TNGA160408S01025MT	9,53	16,50	4,78	0,8	3,81	○	3883892	○	○	○	○
TNGA160412S01025MT	9,53	16,50	4,78	1,2	3,81	○	3883893	○	○	○	○

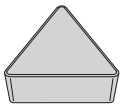

(FST)

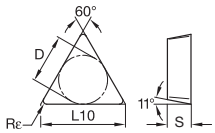




■ TNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TNMS160404FST	9,53	16,50	4,76	0,4	3,81	○	○	○	○	○	3898734
TNMS160408FST	9,53	16,50	4,76	0,8	3,81	○	○	○	○	○	3898735





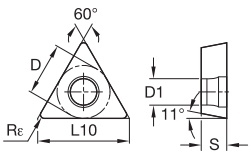
● first choice
○ alternate choice

P							
M							
K				●	●		
N						●	●
S				●		●	
H	●	●	●	●			

TPGN

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGN110304F	6,35	11,00	3,18	0,4	–	-	-	-	-	-	3898719
TPGN110308F	6,35	11,00	3,18	0,8	–	-	-	-	-	-	3898720
TPGN160304F	9,53	16,50	3,18	0,4	–	-	-	-	-	-	3898721
TPGN160308F	9,53	16,50	3,18	0,8	–	-	-	-	-	-	3898722
TPGN220408F	12,70	22,00	4,76	0,8	–	-	-	-	-	-	3898725


(C)

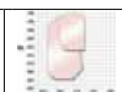
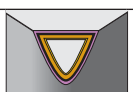


TPGW-C

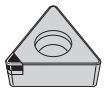
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGW110202EC	6,35	11,00	2,38	0,2	2,80	-	3883590	-	-	-	-
TPGW110204S01015C	6,35	11,00	2,38	0,4	2,80	3883534	3883591	6018092	-	-	-
TPGW110208S01015C	6,35	11,00	2,38	0,8	2,80	3883535	3883592	6018093	-	-	-

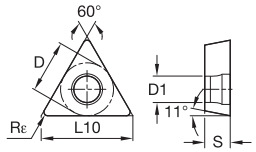

C2–C49

C50–C81

C86–C129

B8–B25

B26–B28

B30–B105


(FST)

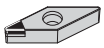


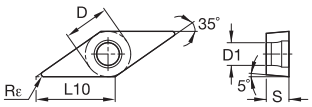
● first choice
○ alternate choice

P							
M							
K			●	●			
N					●	●	
S			●		●		
H	●	●	●	●			

TPGW-FST

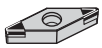
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
TPGW110204FST	6,35	11,00	2,38	0,4	2,80	'	'	'	'	'	3898770
TPGW110208FST	6,35	11,00	2,38	0,8	2,80	'	'	'	'	'	3898771
TPGW16T304FST	9,53	16,50	3,97	0,4	4,40	'	'	'	'	'	3898772
TPGW16T308FST	9,53	16,50	3,97	0,8	4,40	'	'	'	'	'	3898773

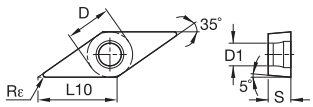

(FST)



VBGW-FST

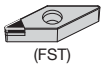
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VBGW110304FST	6,35	11,07	3,18	0,4	2,80	'	'	'	'	'	3898774
VBGW160404FST	9,53	16,61	4,76	0,4	4,40	'	'	'	'	'	3898775

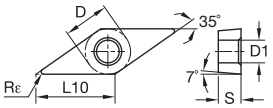

(MT)



VBGW-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VBGW160408S01015MT	9,52	16,61	4,78	0,8	4,40	3883537	'	6018095	'	'	'
VBGW160404S01015MT	9,53	16,61	4,78	0,4	4,40	3883536	'	6018094	'	'	'


(FST)

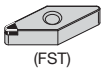


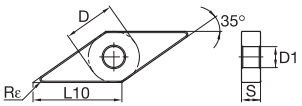
● first choice
○ alternate choice

P							
M							
K			●	●			
N						●	●
S			●		●		
H	●	●	●	●			

VCMW-FST

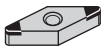
ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VCMW110304FST	6,35	11,07	3,18	0,4	2,80	ı	ı	ı	ı	ı	3883147

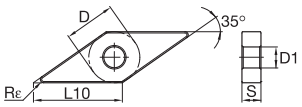

(FST)



VNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VNGA160404FST	9,53	16,61	4,76	0,4	3,81	ı	ı	ı	ı	ı	3898736
VNGA160408FST	9,53	16,61	4,76	0,8	3,81	ı	ı	ı	ı	ı	3898737


(MT)



VNGA-MT

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
VNGA160404S01025MT	9,53	16,61	4,78	0,4	3,81	3883538	3883894	6018096	ı	ı	ı
VNGA160408S01025MT	9,53	16,61	4,78	0,8	3,81	3883539	3883896	6018097	ı	ı	ı


C2–C49

C50–C81

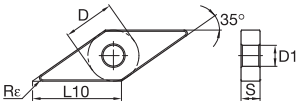
C86–C129

B8–B25

B26–B28

B30–B105


(FST)



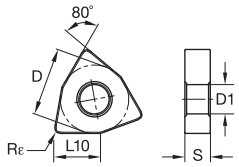
● first choice
○ alternate choice

		WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U
P							
M							
K				●	●		
N						●	●
S				●		●	
H		●	●	●	●		

■ VNMS-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U	
VNMS160404FST	9,53	16,61	4,76	0,4	3,81	■	■	■	■	■		3898738
VNMS160408FST	9,53	16,61	4,76	0,8	3,81	■	■	■	■	■		3898739


(FST)



■ WNGA-FST

ISO catalogue number	D	L10	S	Rε	D1	WBH10P	WBH25P	WBH30P	WBK40U	WDN00U	WDN25U	
WNGA080404FST	12,70	8,69	4,76	0,4	5,16	■	■	■	■	■		3898740
WNGA080408FST	12,70	8,69	4,76	0,8	5,16	■	■	■	■	■		3898741



Victory™ -UR Geometry

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

-UR geometry offers a roughing solution for high-temp materials.

Available in WS10PT™ and WS25PT™, the -UR geometry provides smooth chip forming and improved coolant flow for increased tool life. This positive geometry, with its unique chipbreaker without inflection points, reduces cutting forces and improves depth-of-cut (DOC) notching resistance, while still providing superior edge stability.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™ VICTORY



Turning • Tools for External Turning and Internal Boring

Tools for External Turning C2–C49

Tools for Internal Boring C50–C81

Tunable Boring Bars C82–C84

Cartridges C86–C129

Modern machining operations performed on CNC machine tools and flexible production facilities require high-performance tools that provide straightforward design and application versatility. WIDIA™ offers an extensive range of toolholders for external turning to meet even the most exacting production demands across a broad spectrum of workpiece shapes and sizes.

Tools for External Turning



Whatever your operation requirements — from light finishing cuts at very high cutting speeds to heavy roughing applications — there is a WIDIA solution to meet your needs. The complete programme includes toolholders for pin-, screw-, or clamp-type holding.

D-Style Clamping

- Used for negative style inserts.
- Clamp assembly contains clamp, screw, and retaining ring.
- Quick insert indexing.
- Ensures insert repeatability and seating.
- Reduced chatter and extended tool life.

P-Style Clamping

- Lever-type clamping system for negative indexable inserts.
- No interference to chip flow.
- Fast insert changes.

P-style available in metric sizes only.



S-Style Clamping

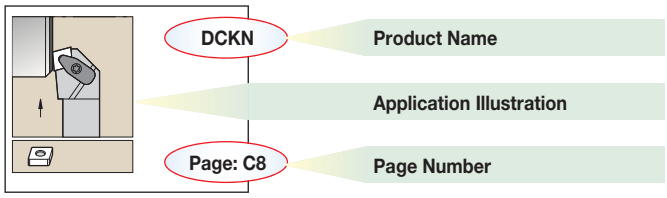
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

C-Style Clamping

- Height-adjustable clamp permits use of additional chipbreakers.
- Universal clamping system for positive and negative flat top inserts.
- Robust engineering makes it easy to handle.
- Carbide shim for extra tool protection.

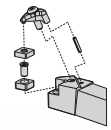


Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



D-Style Clamping

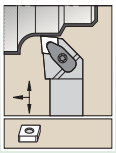
D



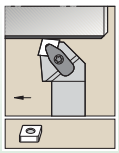
One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.



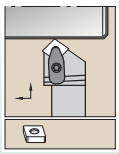
DCKN 75° **Page: C8**



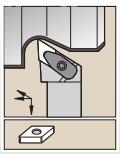
DCLN 95° **Page: C9**



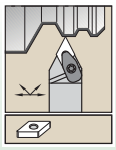
DCRN 75° **Page: C10**



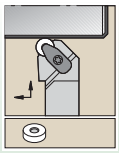
DCSN 45° **Page: C10**



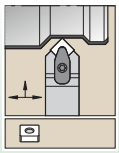
DDJN 93° **Page: C11**



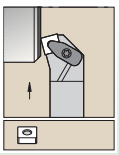
DDNN 63° **Page: C11**



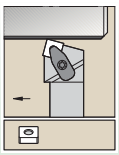
DRGN **Page: C12**



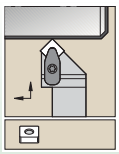
DSDN 45° **Page: C12**



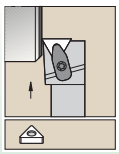
DSKN 75° **Page: C13**



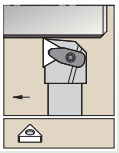
DSRN 75° **Page: C14**



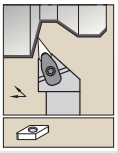
DSSN 45° **Page: C15**



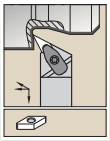
DTFN 90° **Page: C16**



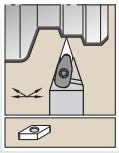
DTGN 90° **Page: C16**



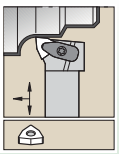
DVJN 93° **Page: C17**



DVON 117,5° **Page: C18**



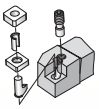
DVVN 72,5° **Page: C18**



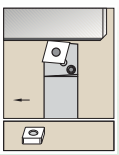
DWLN 95° **Page: C19**

P-Style Clamping

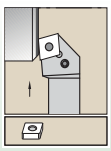
P



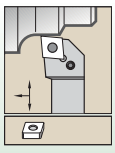
Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



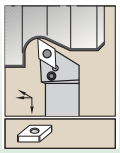
PCBN 75° **Page: C20**



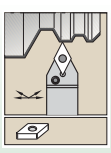
PCKN 75° **Page: C21**



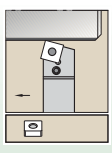
PCLN 95° **Page: C22**



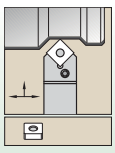
PDJN 93° **Page: C23**



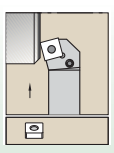
PDNN 62,5° **Page: C24**



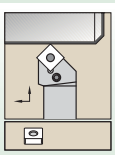
PSBN 75° **Page: C25**



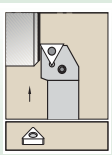
PSDN 45° **Page: C26**



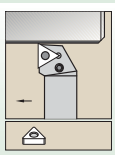
PSKN 75° **Page: C26**



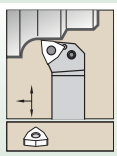
PSSN 45° **Page: C27**



PTFN 90° **Page: C28**



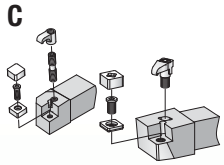
PTGN 90° **Page: C29**



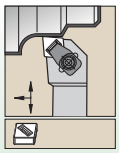
PWLN 95° **Page: C30**

C-Style Clamping

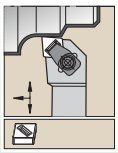
C



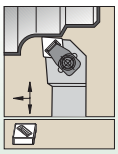
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs greater than 6,35mm.



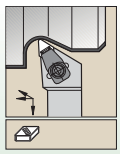
CCLN-MX
95°
Page: C31



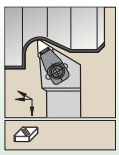
CCLN-MN
95°
Page: C31



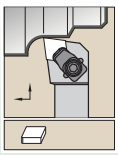
CCLN-MF
95°
Page: C32



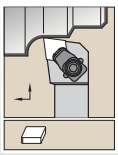
CDJN-MX
93°
Page: C32



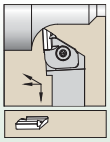
CDJN-MN
93°
Page: C33



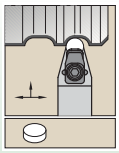
CELN-MF
97,5°
Page: C33



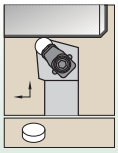
CELN-MN
97,5°
Page: C34



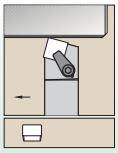
CKJN
Page: C34



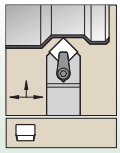
CRDN-MN
Page: C35



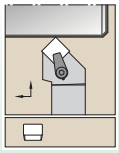
CRSN-MN
Page: C35



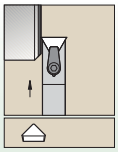
CSBP
75°
Page: C36



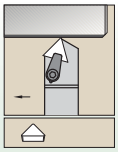
CSDP
45°
Page: C36



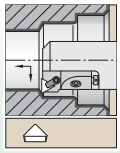
CSSP
45°
Page: C37



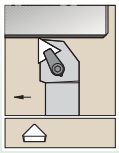
CTCP
90°
Page: C37



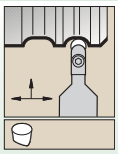
CTDP
45°
Page: C38



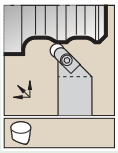
CTFP
90°
Page: C38



CTGP
90°
Page: C39



CRDP*
Page: C40

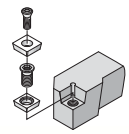


CRGP*
Page: C41

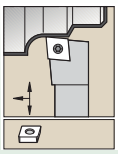
**Exact Clamping System not shown.*

S-Style Clamping

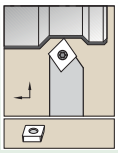
S



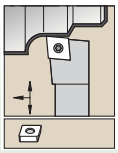
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs from 9,52mm are secured by means of a threaded bushing.



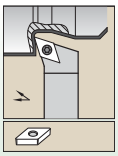
SCLC
95°
Page: C42



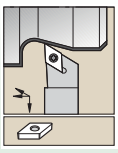
SCDP
45°
Page: C42



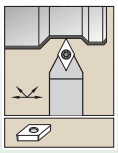
SCLP
95°
Page: C43



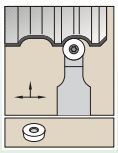
SDHC
107,5°
Page: C43



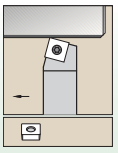
SDJC
93°
Page: C44



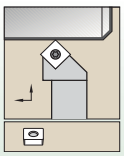
SDNC
62,5°
Page: C45



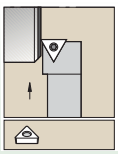
SRDC
Page: C45



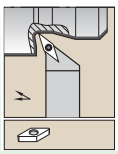
SSBC
75°
Page: C46



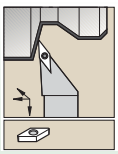
SSSC
45°
Page: C47



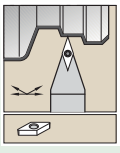
STFC
90°
Page: C48



SVHB
107,5°
Page: C48



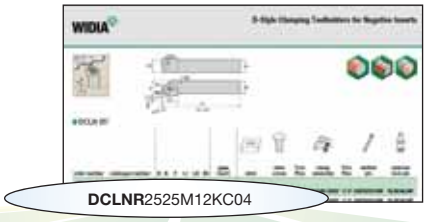
SVJB
93°
Page: C49



SVVB
72,5°
Page: C49

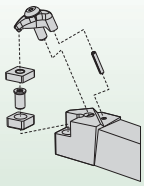
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

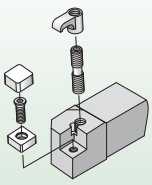


D — Insert Holding Method

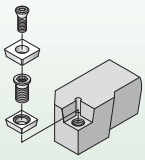
D



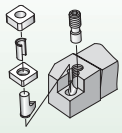
C



S



P



C — Insert Shape

A	85°
B	82°
C	80°
D	55°
E	75°
H	120°
K	55°
L	90°
M	86°
O	135°
P	108°
R	
S	90°
T	60°
V	35°
W	80°

L — Tool Style or Lead Angle

A	90°	L	95°
B	15°	P	107,5°
C	90°	Q	107,5°
D	45°	R	75°
E	60°	S	45°
F	90°	U	93°
G	90°	V	72,5°
		Y	85°

N — Insert Clearance Angle

N	0°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

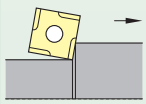
R — Hand of Tool

R =
Right hand

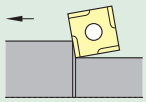
L =
Left hand

N =
Neutral

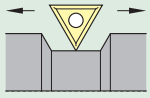
R



L



N



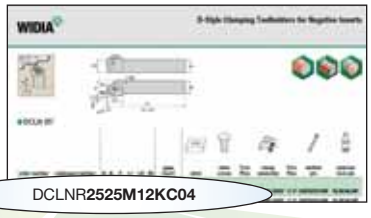
Additional Information

C =
Deep pocket for ceramic insert

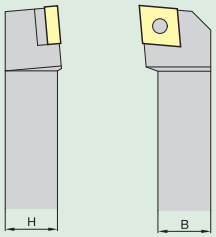
S =
Single pocket locating wall

F =
Straight shank, no offset

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



25	25	M	12	KC	04
Shank Dimensions		Tool Length	Insert Size	Additional Information	Insert Thickness (optional)



The seventh and eighth position shall be a significant two-digit number that indicates the holder cross section.

- If the dimension for the width "B" or the height "H" is represented by a one-digit number, a 0 (zero) will be used in front of it.

  Example: 8,0mm = 08

L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	J
125	K
140	L
150	M
160	N
170	P
180	Q
200	R
250	S
300	T
350	U
400	V
450	W
500	Y
Special Design	X

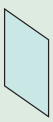
KC =
D-Style Clamping

04 = 4,76mm

06 = 6,35mm

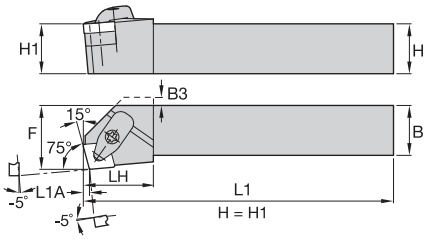
Cutting Edge Length L10

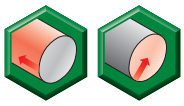
H	Hexagon 120°	
O	Octagon 135°	
P	Pentagon 108°	
S	Square 90°	
T	Triangular 60°	
R	Round —	

C	Rhomboid 80°	
D	55°	
E	75°	
M	86°	
V	35°	
W	Trigon 80° with enlarged corner angles	
L	Rectangular 90°	
A	Parallelogram 85°	
B	82°	
K	55°	



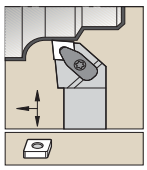
See pages B30–B46 for inserts.



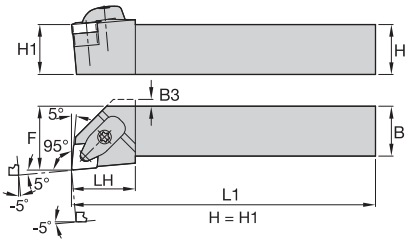


DCKN 75°

order number	catalogue number	H	B	F	L1	LH	L1A	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5697856	**DCKNR2020K12KC04**	20	20	25,0	125	32,0	3,1	6,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697857	**DCKNR2525M12KC04**	25	25	32,0	150	32,0	3,1	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697858	**DCKNR3225P12KC04**	32	25	32,0	170	32,0	3,1	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697859	**DCKNR3232P16KC06**	32	32	40,0	170	32,0	3,8	—	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697880	**DCKNR3232P19KC06**	32	32	40,0	170	38,0	4,6	—	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand																
5697853	**DCKNL2020K12KC04**	20	20	25,0	125	32,0	3,1	6,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697854	**DCKNL2525M12KC04**	25	25	32,0	150	32,0	3,1	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697855	**DCKNL3225P12KC04**	32	25	32,0	170	32,0	3,1	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**



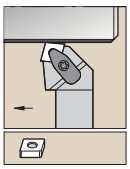
See pages B30–B46 for inserts.



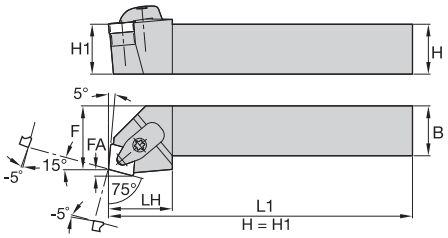


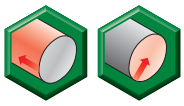
DCLN 95°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697890	**DCLNR1616H09KC03**	16	16	20,0	100	30,0	6,0	CN..090308	**ICSN332**	**KMSP39IP**	9 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697891	**DCLNR2020K09KC03**	20	20	25,0	125	30,0	2,0	CN..090308	**ICSN332**	**KMSP39IP**	9 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697892	**DCLNR2020K12KC04**	20	20	25,0	125	32,0	4,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697893	**DCLNR2525M12KC04**	25	25	32,0	150	32,0	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697894	**DCLNR2525M16KC06**	25	25	32,0	150	33,0	—	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697895	**DCLNR3232P16KC06**	32	32	40,0	170	33,0	—	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697896	**DCLNR3232P19KC06**	32	32	40,0	170	40,0	—	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697897	**DCLNR4040S19KC06**	40	40	50,0	250	40,0	—	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697898	**DCLNR4040S25KC09**	40	40	50,0	250	51,0	—	CN..250924	**ICSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**
left hand															
5697881	**DCLNL1616H09KC03**	16	16	20,0	100	30,0	6,0	CN..090308	**ICSN332**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697882	**DCLNL2020K09KC03**	20	20	25,0	125	30,0	2,0	CN..090308	**ICSN332**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5697883	**DCLNL2020K12KC04**	20	20	25,0	125	32,0	4,0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697884	**DCLNL2525M12KC04**	25	25	32,0	150	32,0	—	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697885	**DCLNL2525M16KC06**	25	25	32,0	150	33,0	—	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697886	**DCLNL3232P16KC06**	32	32	40,0	170	33,0	—	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697887	**DCLNL3232P19KC06**	32	32	40,0	170	40,0	—	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697888	**DCLNL4040S19KC06**	40	40	50,0	250	40,0	—	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697889	**DCLNL4040S25KC09**	40	40	50,0	250	51,0	—	CN..250924	**ICSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**



See pages B30–B46 for inserts.





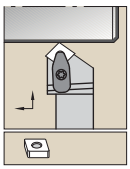
DCRN 75°



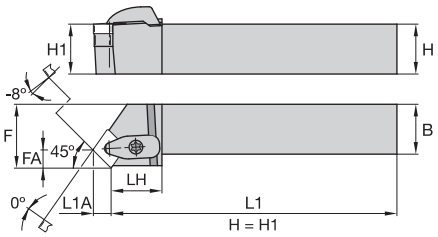




order number	catalogue number	H	B	F	L1	LH	FA	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697903	**DCRNR2020K12KC04**	20	20	25,0	125	32,0	3,3	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697904	**DCRNR2525M12KC04**	25	25	32,0	150	32,0	3,3	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697905	**DCRNR3225P12KC04**	32	25	32,0	170	32,0	3,3	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697906	**DCRNR3232P16KC06**	32	32	40,0	170	38,0	4,1	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697907	**DCRNR3232P19KC06**	32	32	40,0	170	38,0	4,9	CN..190612	**ICSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand															
5697899	**DCRNL2020K12KC04**	20	20	25,0	125	32,0	3,3	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697900	**DCRNL2525M12KC04**	25	25	32,0	150	32,0	3,3	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697901	**DCRNL3225P12KC04**	32	25	32,0	170	32,0	3,3	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697902	**DCRNL3232P16KC06**	32	32	40,0	170	38,0	4,1	CN..160612	**ICSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**



See pages B30–B46 for inserts.





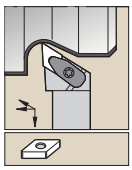
DCSN 45°



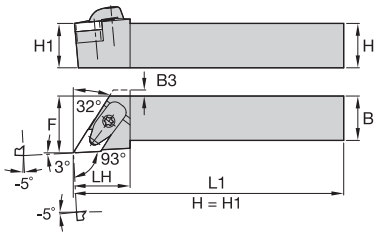


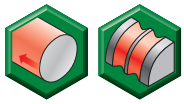


order number	catalogue number	H	B	F	L1	LH	FA	L1A	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5697911	**DCSNR2020K12KC04**	20	20	25,0	125	35,0	8,2	8,5	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697913	**DCSNR2525M12KC04**	25	25	32,0	150	35,0	8,2	8,5	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
left hand																
5697908	**DCSNL2020K12KC04**	20	20	25,0	125	35,0	8,2	8,5	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697909	**DCSNL2525M12KC04**	25	25	32,0	150	35,0	8,2	8,5	CN..120408	**ICSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**



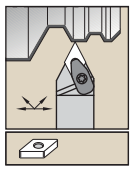
See pages B47–B64 for inserts.



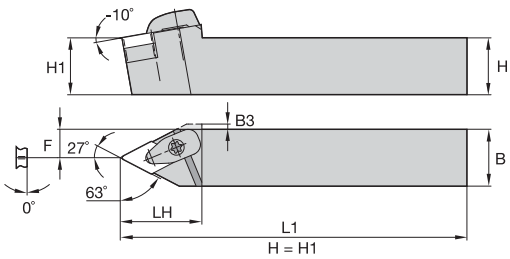


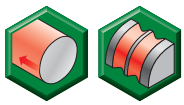
DDJN 93°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697924	DDJNR2020K11KC04	20	20	25,0	125	30,0	2,0	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697926	DDJNR2020K15KC06	20	20	25,0	125	32,0	4,0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697928	DDJNR2525M11KC04	25	25	32,0	150	30,0	—	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697930	DDJNR2525M15KC06	25	25	32,0	150	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697932	DDJNR3225P15KC06	32	25	32,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5564336	DDJNR3232P15KC06	32	32	40,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand															
5697915	DDJNL2020K11KC04	20	20	25,0	125	30,0	2,0	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697916	DDJNL2020K15KC06	20	20	25,0	125	32,0	4,0	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697918	DDJNL2525M11KC04	25	25	32,0	150	30,0	—	DN..110408	IDSN322	KMSP315IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM34L9IP
5697920	DDJNL2525M15KC06	25	25	32,0	150	32,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697922	DDJNL3225P15KC06	32	25	32,0	170	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5564335	DDJNL3232P15KC06	32	32	40,0	171	32,0	—	DN..150608	IDSN433	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP



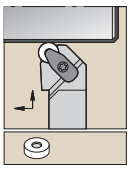
See pages B47–B64 for inserts.



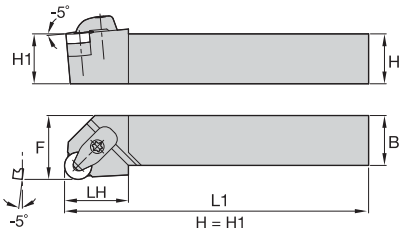


DDNN 63°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5697940	DDNNR2020K15KC06	20	20	10,0	125	40,0	2,5	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697942	DDNNR2525M15KC06	25	25	13,0	150	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
left hand															
5697934	DDNNL2020K15KC06	20	20	10,0	125	40,0	2,5	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697936	DDNNL2525M15KC06	25	25	13,0	150	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP
5697938	DDNNL3225P15KC06	32	25	13,0	170	40,0	—	DN..150608	IDSN443	KMSP415IP	15 IP	CM234R ASSY	15 IP	SSP025016M	KLM46L15IP

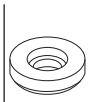


See pages B65–B67 for inserts.





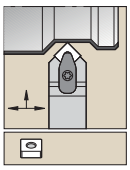
DRGN



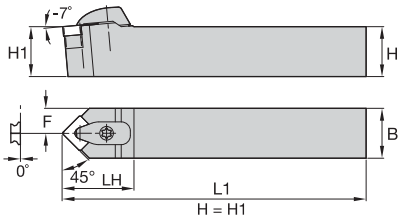




order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5697948	**DRGNR2525M12KC04**	25	25	32,0	150	32,0	RN..120400	**IRSN44**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697950	**DRGNR3225P12KC04**	32	25	32,0	170	32,0	RN..120400	**IRSN44**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697952	**DRGNR4040S25KC09**	40	40	50,0	250	48,0	RN..250900	**IRSN84**	**KMSP825IP**	25 IP	**–**	25 IP	**SSP025018M**	**KLM81025IP**
left hand														
5697944	**DRGNL3225P12KC04**	32	25	32,0	170	32,0	RN..120400	**IRSN44**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697946	**DRGNL4040S25KC09**	40	40	50,0	250	48,0	RN..250900	**IRSN84**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**



See pages B68–B80 for inserts.





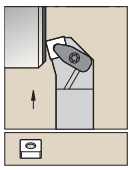
DSDN 45°



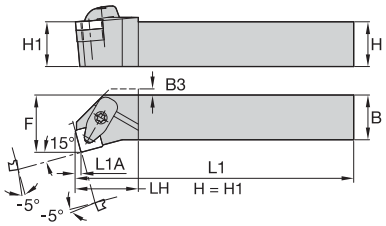


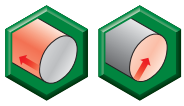


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
5697954	**DSDNN2020K12KC04**	20	20	10,0	125	36,0	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5697955	**DSDNN2525M12KC04**	25	25	12,0	150	36,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697957	**DSDNN2525M15KC06**	25	25	12,0	150	42,0	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5697959	**DSDNN3225P12KC04**	32	25	12,0	170	36,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5697961	**DSDNN3232P19KC06**	32	32	15,5	170	44,0	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5697963	**DSDNN4040S25KC09**	40	40	19,5	250	59,0	SN..250924	**ISSN846**	**KMSP825IP**	40 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**



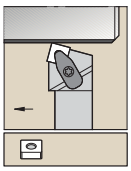
See pages B68–B80 for inserts.



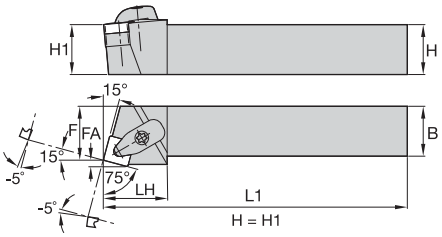


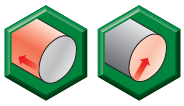
DSKN 75°

order number	catalogue number	H	B	F	L1	LH	L1A	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5696685	**DSKNR2020K12KC04**	20	20	25,0	125	32,0	3,1	8,0	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696686	**DSKNR2525M12KC04**	25	25	32,0	150	32,0	3,1	4,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696687	**DSKNR3225P12KC04**	32	25	32,0	170	32,0	3,1	–	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696688	**DSKNR3232P15KC06**	32	32	40,0	170	32,0	3,8	–	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696689	**DSKNR3232P19KC06**	32	32	40,0	170	38,0	4,6	–	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand																
5696682	**DSKNL2525M12KC04**	25	25	32,0	150	32,0	3,1	4,0	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696683	**DSKNL3225P12KC04**	32	25	32,0	170	32,0	3,1	–	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696684	**DSKNL3232P15KC06**	32	32	40,0	170	32,0	3,8	–	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**



See pages B68–B80 for inserts.





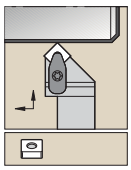
DSRN 75°



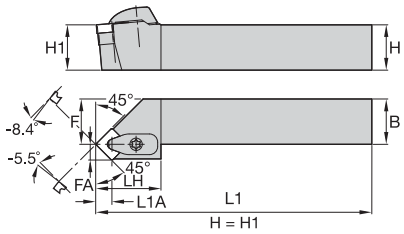




order number	catalogue number	H	B	F	L1	LH	FA	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696703	**DSRNR2020K12KC04**	20	20	22,0	125	32,0	3,3	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696704	**DSRNR2525M12KC04**	25	25	27,0	150	32,0	3,3	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696705	**DSRNR3232P15KC06**	32	32	35,0	170	38,0	4,0	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696706	**DSRNR3232P19KC06**	32	32	35,0	170	42,0	4,8	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
5696707	**DSRNR4040S25KC09**	40	40	43,0	250	52,0	6,1	SN..250924	**ISSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**
left hand															
5696700	**DSRNL2525M12KC04**	25	25	27,0	150	32,0	3,3	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696701	**DSRNL3232P15KC06**	32	32	35,0	170	38,0	4,0	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696702	**DSRNL4040S25KC09**	40	40	43,0	250	52,0	6,1	SN..250924	**ISSN846**	**KMSP825IP**	25 IP	**CM236R ASSY**	25 IP	**SSP025018M**	**KLM81025IP**



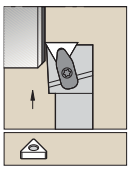
See pages B68–B80 for inserts.



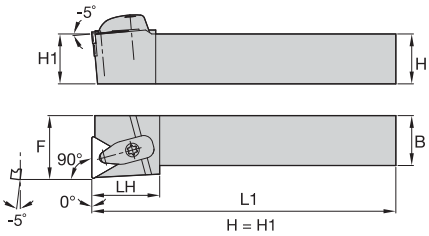


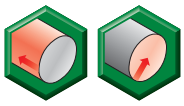
DSSN 45°

order number	catalogue number	H	B	F	L1	LH	FA	L1A	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand																
5696713	**DSSNR2020K12KC04**	20	20	25,0	125	36,0	8,4	8,7	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696714	**DSSNR2525M12KC04**	25	25	32,0	150	36,0	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696715	**DSSNR2525M15KC06**	25	25	32,0	150	42,0	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696716	**DSSNR3225P12KC04**	32	25	32,0	170	35,4	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696717	**DSSNR3232P15KC06**	32	32	40,0	170	40,3	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696718	**DSSNR3232P19KC06**	32	32	40,0	170	44,0	12,7	10,7	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**
left hand																
5696708	**DSSNL2020K12KC04**	20	20	25,0	125	36,0	8,4	8,7	SN..120408	**ISSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696709	**DSSNL2525M12KC04**	25	25	32,0	150	36,0	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696710	**DSSNL3225P12KC04**	32	25	32,0	170	35,4	8,4	8,7	SN..120408	**ISSN443**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696711	**DSSNL3232P15KC06**	32	32	40,0	170	40,3	10,5	10,7	SN..150612	**ISSN543**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM58L15IP**
5696712	**DSSNL3232P19KC06**	32	32	40,0	170	44,0	12,7	10,7	SN..190612	**ISSN643**	**KMSP625IP**	25 IP	**CM210R ASSY**	25 IP	**SSP025016M**	**KLM68L25IP**



See pages B81–B93 for inserts.





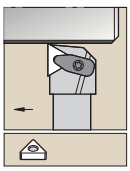
DTFN 90°



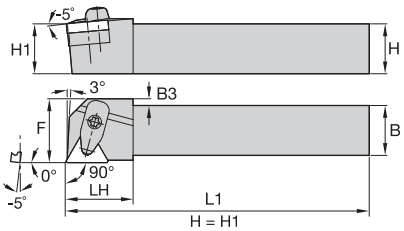


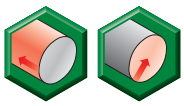


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5696724	**DTFNR2020K16KC04**	20	20	25,0	125	32,0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696725	**DTFNR2525M16KC04**	25	25	32,0	150	32,0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696726	**DTFNR3232P27KC06**	32	32	40,0	170	38,0	TN..270612	**ITSN534**	**KMSP515IP**	15 IP	**CM209R ASSY**	15 IP	**SSP025016M**	**KLM5815IP**
left hand														
5696719	**DTFNL2020K16KC04**	20	20	25,0	125	32,0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696720	**DTFNL2525M16KC04**	25	25	32,0	150	32,0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696721	**DTFNL2525M22KC04**	25	25	32,0	150	34,0	TN..220408	**ITSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
5696722	**DTFNL3225P16KC04**	32	25	32,0	170	32,0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696723	**DTFNL3225P22KC04**	32	25	32,0	170	34,0	TN..220408	**ITSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**

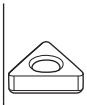


See pages B81–B93 for inserts.





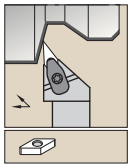
DTGN 90°



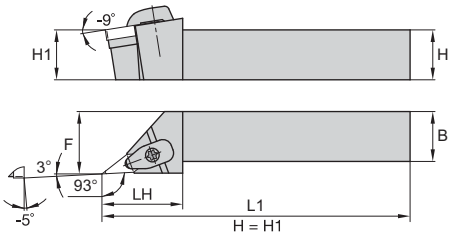


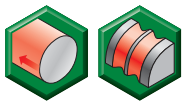


order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696729	**DTGNR2020K16KC04**	20	20	25,0	125	25,0	6,5	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696730	**DTGNR2525M16KC04**	25	25	32,0	150	25,0	—	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696731	**DTGNR2525M22KC04**	25	25	32,0	150	32,0	3,0	TN..220408	**ITSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM46L15IP**
left hand															
5696727	**DTGNL2020K16KC04**	20	20	25,0	125	25,0	6,5	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696728	**DTGNL2525M16KC04**	25	25	32,0	150	25,0	—	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**



See pages B94–B99 for inserts.





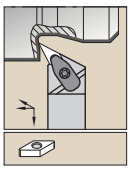
DVJN 93°



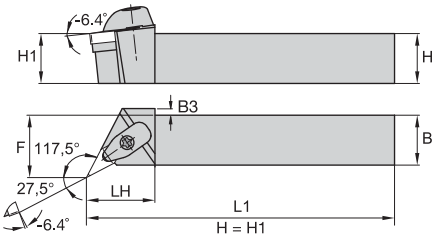


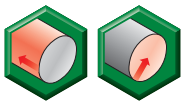


order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand														
5696737	**DVJNR2020K16KC04**	20	20	25,0	125	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696738	**DVJNR2525M16KC04**	25	25	32,0	150	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696739	**DVJNR2525M22KC04**	25	25	32,0	150	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696740	**DVJNR3225P16KC04**	32	25	32,0	170	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696741	**DVJNR3225P22KC04**	32	25	32,0	170	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
left hand														
5696732	**DVJNL2020K16KC04**	20	20	25,0	125	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696733	**DVJNL2525M16KC04**	25	25	32,0	150	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696734	**DVJNL2525M22KC04**	25	25	32,0	150	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696735	**DVJNL3225P16KC04**	32	25	32,0	170	46,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696736	**DVJNL3225P22KC04**	32	25	32,0	170	55,0	VN..220408	**IVSN432**	**KMSP415IP**	15 IP	**CM235R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**



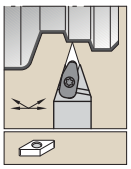
See pages B94–B99 for inserts.



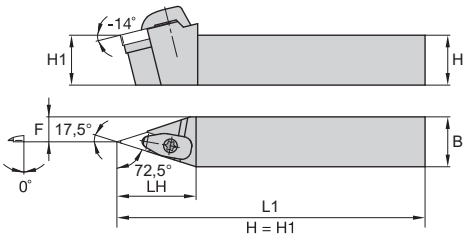


DVON 117,5°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696745	**DVONR2020K16KC04**	20	20	27,0	125	38,0	5,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696746	**DVONR2525M16KC04**	25	25	32,0	150	38,0	—	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696747	**DVONR3225P16KC04**	32	25	32,0	170	38,0	—	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
left hand															
5696742	**DVONL2020K16KC04**	20	20	27,0	125	38,0	5,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696743	**DVONL2525M16KC04**	25	25	32,0	150	38,0	—	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696744	**DVONL3225P16KC04**	32	25	32,0	170	38,0	—	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**



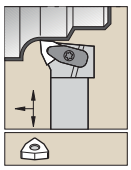
See pages B94–B99 for inserts.



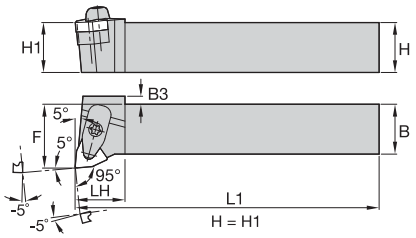


DVVN 72,5°

order number	catalogue number	H	B	F	L1	LH	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
5696748	**DVVNN2020K16KC04**	20	20	9,5	125	48,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696749	**DVVNN2525M16KC04**	25	25	12,0	150	48,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696750	**DVVNN3225P16KC04**	32	25	12,0	170	48,0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**



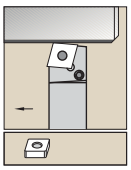
See pages B99–B105 for inserts.



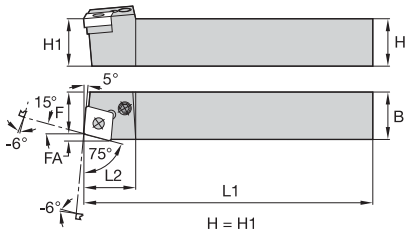


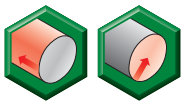
DWLN 95°

order number	catalogue number	H	B	F	L1	LH	B3	gage insert	shim	shim screw	Torx Plus	clamp assembly	Torx Plus	slotted pin	optional lock pin
right hand															
5696757	**DWLNR2020K06KC04**	20	20	25,0	125	31,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696758	**DWLNR2020K08KC04**	20	20	25,0	125	33,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696759	**DWLNR2525M06KC04**	25	25	32,0	150	25,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696760	**DWLNR2525M08KC04**	25	25	32,0	150	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696761	**DWLNR3225P08KC04**	32	25	32,0	170	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696762	**DWLNR3232P08KC04**	32	32	40,0	170	25,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
left hand															
5696751	**DWLNL2020K06KC04**	20	20	25,0	125	31,0	—	WN..060408	**IWSN322**	**KMSP39IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696752	**DWLNL2020K08KC04**	20	20	25,0	125	33,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696753	**DWLNL2525M06KC04**	25	25	32,0	150	25,0	—	WN..060408	**IWSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM34L9IP**
5696754	**DWLNL2525M08KC04**	25	25	32,0	150	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696755	**DWLNL3225P08KC04**	32	25	32,0	170	25,0	4,0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**
5696756	**DWLNL3232P08KC04**	32	32	40,0	170	25,0	—	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	15 IP	**SSP025016M**	**KLM4615IP**



See pages B30–B46 for inserts.

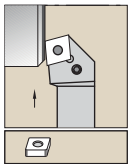




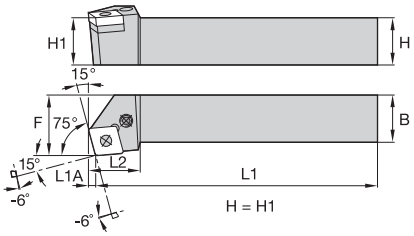
PCBN 75°

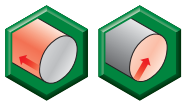


order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878361	**PCBNR2020K12**	20	20	17,0	125	26,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878356	**PCBNR2525M12**	25	25	22,0	150	26,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878366	**PCBNR2525M16**	25	25	22,0	150	26,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878367	**PCBNR3225P16**	32	25	22,0	170	28,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878363	**PCBNR3232P16**	32	32	27,0	170	38,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878358	**PCBNR3232P19**	32	32	27,0	170	40,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878364	**PCBNR4040S19**	40	40	35,0	250	38,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
left hand														
3878360	**PCBNL2020K12**	20	20	17,0	125	26,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878354	**PCBNL2525M12**	25	25	22,0	150	26,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878365	**PCBNL2525M16**	25	25	22,0	150	26,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878359	**PCBNL3225P16**	32	25	22,0	170	28,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878355	**PCBNL3232P16**	32	32	27,0	170	38,0	4,2	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878357	**PCBNL3232P19**	32	32	27,0	170	40,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878362	**PCBNL4040S19**	40	40	35,0	250	38,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP



See pages B30–B46 for inserts.





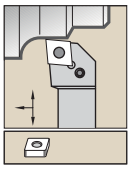
PCKN 75°



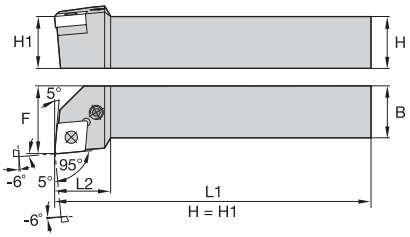




order number	catalogue number	H	B	F	L1	L2	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878372	**PCKNR2020K12**	20	20	25,0	125	23,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878370	**PCKNR2525M12**	25	25	32,0	150	23,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878374	**PCKNR2525M16**	25	25	32,0	150	30,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878375	**PCKNR3225P16**	32	25	32,0	170	30,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3899889	**PCKNR3232P16**	32	32	40,0	170	38,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	–
3878371	**PCKNR3232P19**	32	32	40,0	170	40,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879707	**PCKNR4040S19**	40	40	50,0	250	36,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
left hand														
3878373	**PCKNL2020K12**	20	20	25,0	125	23,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878369	**PCKNL2525M12**	25	25	32,0	150	23,0	3,1	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878377	**PCKNL2525M16**	25	25	32,0	150	30,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878376	**PCKNL3225P16**	32	25	32,0	170	30,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3899888	**PCKNL3232P16**	32	32	40,0	170	38,0	3,8	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	–
3878368	**PCKNL3232P19**	32	32	40,0	170	40,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878378	**PCKNL4040S19**	40	40	50,0	250	36,0	4,6	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP



See pages B30–B46 for inserts.





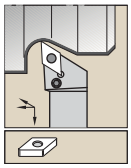
PCLN 95°



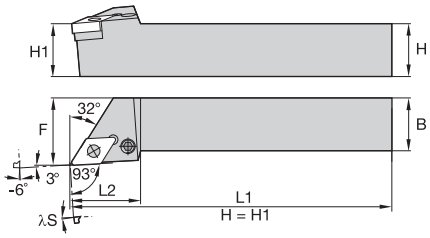


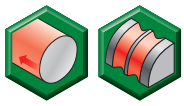


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	lever screw wrench size
right hand													
3900154	**PCLNR1616H09**	16	16	20,0	100	23,0	CN..090308	**512.111**	**513.019**	**515.018**	**511.018**	**514.018**	2.5 mm
3878400	**PCLNR1616H12**	16	16	20,0	100	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878422	**PCLNR2020K12**	20	20	25,0	125	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878419	**PCLNR2525M12**	25	25	32,0	150	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878401	**PCLNR2525M16**	25	25	32,0	150	28,0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878402	**PCLNR3225P12**	32	25	32,0	170	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878421	**PCLNR3225P16**	32	25	32,0	170	38,0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878413	**PCLNR3225P19**	32	25	32,0	170	38,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878396	**PCLNR3232P16**	32	32	40,0	170	36,0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878414	**PCLNR3232P19**	32	32	40,0	170	36,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878417	**PCLNR4040S19**	40	40	50,0	250	36,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
left hand													
3900153	**PCLNL1616H09**	16	16	20,0	100	23,0	CN..090308	**512.111**	**513.019**	**515.018**	**511.018**	**514.018**	2.5 mm
3878379	**PCLNL1616H12**	16	16	20,0	100	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878418	**PCLNL2020K12**	20	20	25,0	125	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878398	**PCLNL2525M12**	25	25	32,0	150	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878380	**PCLNL2525M16**	25	25	32,0	150	28,0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878397	**PCLNL3225P12**	32	25	32,0	170	26,0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878381	**PCLNL3225P19**	32	25	32,0	170	38,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878415	**PCLNL3232P16**	32	32	40,0	170	36,0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878393	**PCLNL3232P19**	32	32	40,0	170	36,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878416	**PCLNL4040S19**	40	40	50,0	250	36,0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP



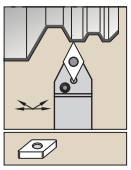
See pages B47–B64 for inserts.



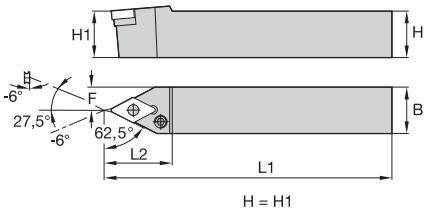


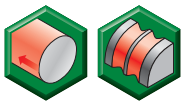
PDJN 93°

order number	catalogue number	H	B	F	L1	L2	λS°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3878424	**PDJNR1616H11**	16	16	20,0	100	22,0	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878429	**PDJNR2020K11**	20	20	25,0	125	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879318	**PDJNR2020K15**	20	20	25,0	125	36,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879151	**PDJNR2525M11**	25	25	32,0	150	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878425	**PDJNR3225P15**	32	25	32,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879152	**PDJNR3232P15**	32	32	40,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878426	**PDJNR4025R15**	40	25	32,0	200	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
left hand														
3879313	**PDJNL1616H11**	16	16	20,0	100	22,0	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878427	**PDJNL2020K11**	20	20	25,0	125	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879317	**PDJNL2020K15**	20	20	25,0	125	36,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878428	**PDJNL2525M11**	25	25	32,0	150	30,0	-7.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879314	**PDJNL2525M15**	25	25	32,0	150	—	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15IP
3878423	**PDJNL3225P15**	32	25	32,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879315	**PDJNL3232P15**	32	32	40,0	170	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879316	**PDJNL4025R15**	40	25	32,0	200	38,0	-7.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP



See pages B47–B64 for inserts.

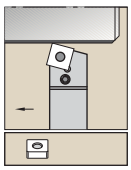




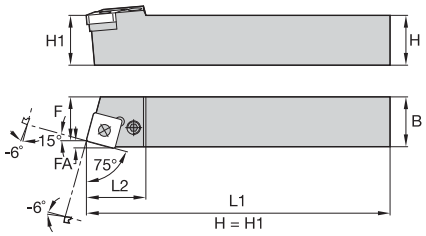
PDNN 62,5°

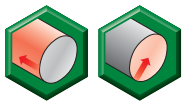


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879319	**PDNNR2525M15**	25	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900156	**PDNNR3225P15**	32	25	12,5	170	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879322	**PDNNR4025M15**	40	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
left hand													
3879320	**PDNNL2525M15**	25	25	12,5	150	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900155	**PDNNL3225P15**	32	25	12,5	170	36,0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP



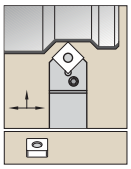
See pages B68–B80 for inserts.



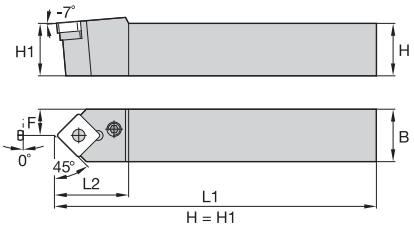


PSBN 75°

order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3879324	**PSBNR2020K12**	20	20	17,0	125	26,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900158	**PSBNR2525M12**	25	25	22,0	150	26,0	–	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879333	**PSBNR2525M15**	25	25	22,0	150	36,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879330	**PSBNR3232P15**	32	32	27,0	170	33,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879327	**PSBNR3232P19**	32	32	27,0	170	40,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879334	**PSBNR4040S19**	40	40	35,0	250	38,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879331	**PSBNR4040S25**	40	40	35,0	250	47,0	5,9	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP
left hand														
3879325	**PSBNL2020K12**	20	20	17,0	125	26,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900157	**PSBNL2525M12**	25	25	22,0	150	26,0	–	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879329	**PSBNL2525M15**	25	25	22,0	150	36,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879332	**PSBNL3232P15**	32	32	27,0	170	33,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879328	**PSBNL3232P19**	32	32	27,0	170	40,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879323	**PSBNL4040S19**	40	40	35,0	250	38,0	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879326	**PSBNL4040S25**	40	40	35,0	250	47,0	5,9	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP
3900159	**PSBNL5050T25**	50	50	43,0	300	50,0	–	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP



See pages B68–B80 for inserts.

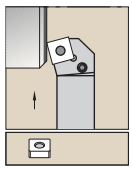




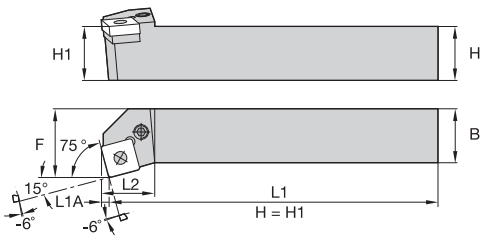
PSDN 45°

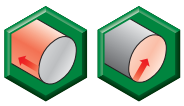


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
3879336	**PSDNN1616H09**	16	16	8,0	100	20,0	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879335	**PSDNN2020K12**	20	20	10,0	125	26,0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879337	**PSDNN2525M12**	25	25	12,5	150	26,0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900160	**PSDNN3225P15**	32	25	12,5	170	33,0	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3900161	**PSDNN3232P15**	32	32	16,0	170	33,0	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879338	**PSDNN4040S25**	40	40	20,0	250	47,0	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP



See pages B68–B80 for inserts.

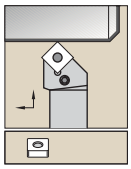




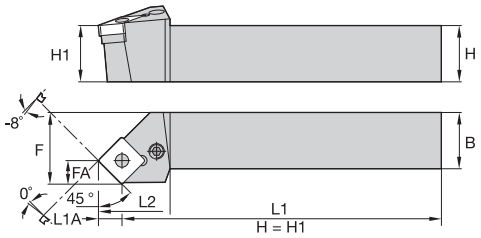
PSKN 75°



order number	catalogue number	H	B	F	L1	L2	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand														
3879340	**PSKNR2020K12**	20	20	25,0	125	23,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879341	**PSKNR2525M12**	25	25	32,0	150	23,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879708	**PSKNR2525M15**	25	25	32,0	150	32,0	3,8	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879342	**PSKNR3232P19**	32	32	40,0	170	37,5	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879710	**PSKNR4040S19**	40	40	50,0	250	37,5	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
left hand														
3879709	**PSKNL1616H09**	16	16	20,0	100	20,0	2,2	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879343	**PSKNL2020K12**	20	20	25,0	125	23,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879339	**PSKNL2525M12**	25	25	32,0	150	23,0	3,1	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879344	**PSKNL3232P19**	32	32	40,0	170	37,5	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879345	**PSKNL4040S19**	40	40	50,0	250	37,5	4,6	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP



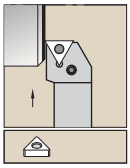
See pages B68–B80 for inserts.



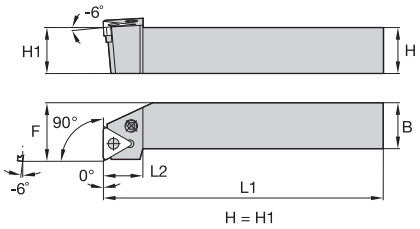


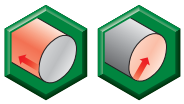
PSSN 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand															
3879351	**PSSNR1616H09**	16	16	20,0	100	23,0	6,1	6,1	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879359	**PSSNR2020K09**	20	20	25,0	125	26,0	6,1	6,1	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879348	**PSSNR2020K12**	20	20	25,0	125	28,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879352	**PSSNR2525M12**	25	25	32,0	150	28,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879349	**PSSNR2525M15**	25	25	32,0	150	32,0	10,2	10,2	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879360	**PSSNR3225P12**	32	25	32,0	170	29,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879362	**PSSNR3225P15**	32	25	32,0	170	32,0	10,2	10,2	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879354	**PSSNR3232P15**	32	32	40,0	170	32,0	10,0	11,5	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879350	**PSSNR3232P19**	32	32	40,0	170	37,5	12,5	12,5	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879361	**PSSNR4040S19**	40	40	50,0	250	37,5	12,5	12,5	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
left hand															
3879363	**PSSNL1616H09**	16	16	20,0	100	23,0	6,1	6,1	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879844	**PSSNL2020K09**	20	20	25,0	125	26,0	6,1	6,1	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879347	**PSSNL2020K12**	20	20	25,0	125	28,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879353	**PSSNL2525M12**	25	25	32,0	150	28,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879355	**PSSNL2525M15**	25	25	32,0	150	32,0	10,2	10,2	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879358	**PSSNL3225P12**	32	25	32,0	170	29,0	8,3	8,3	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**–**	15 IP
3879843	**PSSNL3225P15**	32	25	32,0	170	32,0	10,2	10,2	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879712	**PSSNL3232P15**	32	32	40,0	170	32,0	10,2	10,2	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879356	**PSSNL3232P19**	32	32	40,0	170	37,5	12,5	12,5	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879357	**PSSNL4040S19**	40	40	50,0	250	37,5	12,5	12,5	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879711	**PSSNL4040S25**	40	40	50,0	250	50,0	16,0	16,0	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP



See pages B81–B93 for inserts.





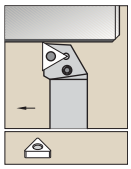
PTFN 90°



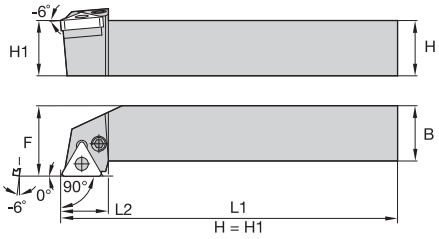


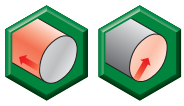


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879369	**PTFNR1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879367	**PTFNR2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879364	**PTFNR2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879372	**PTFNR2525M22**	25	25	32,0	150	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879370	**PTFNR3225P22**	32	25	32,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879845	**PTFNR3232P22**	32	32	40,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand													
3879365	**PTFNL1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879366	**PTFNL2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879368	**PTFNL2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP



See pages B81–B93 for inserts.

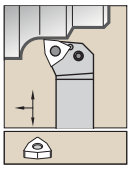




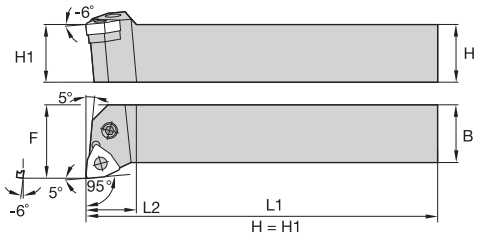
PTGN 90°



order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879385	**PTGNR1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879389	**PTGNR2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879390	**PTGNR2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879387	**PTGNR2525M22**	25	25	32,0	150	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879846	**PTGNR3225P22**	32	25	32,0	170	28,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879391	**PTGNR3232P22**	32	32	40,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900163	**PTGNR4040T27**	40	40	50,0	300	31,0	TN..270612	**512.031**	**513.025**	**515.022**	**511.028**	**514.128**	15 IP
left hand													
3879383	**PTGNL1616H16**	16	16	20,0	100	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879384	**PTGNL2020K16**	20	20	25,0	125	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879388	**PTGNL2525M16**	25	25	32,0	150	20,0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879386	**PTGNL2525M22**	25	25	32,0	150	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879392	**PTGNL3232P22**	32	32	40,0	170	26,0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900162	**PTGNL4040T27**	40	40	50,0	300	31,0	TN..270612	**512.031**	**513.025**	**515.022**	**511.028**	**514.128**	15 IP



See pages B99–B105 for inserts.





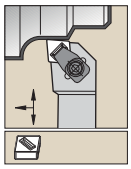
PWLN 95°



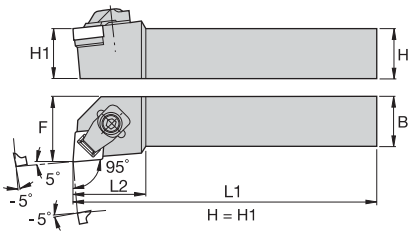




order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
right hand													
3879405	**PWLNR1616H06**	16	16	20,0	100	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879407	**PWLNR2020K06**	20	20	25,0	125	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879408	**PWLNR2020K08**	20	20	25,0	125	20,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900167	**PWLNR2525M06**	25	25	32,0	150	20,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879409	**PWLNR2525M08**	25	25	32,0	150	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900164	**PWLNR3232P08**	32	32	40,0	170	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand													
3879410	**PWLNL1616H06**	16	16	20,0	100	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879406	**PWLNL2020K06**	20	20	25,0	125	14,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879403	**PWLNL2020K08**	20	20	25,0	125	20,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900166	**PWLNL2525M06**	25	25	32,0	150	20,0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879404	**PWLNL2525M08**	25	25	32,0	150	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900165	**PWLNL3232P08**	32	32	40,0	170	26,0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP



See pages B177–B179 and B197–B205 for inserts.



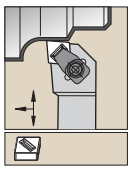


CCLN-MX 95°

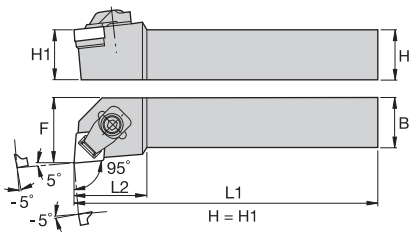


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3032691	**CCLNR2525M12MX7**	25	25	32,0	150	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
3032713	**CCLNR3225P12MX7**	32	25	32,0	170	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
left hand												
3032692	**CCLNL2525M12MX7**	25	25	32,0	150	32,0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.



See pages B177–B179 and B197–B205 for inserts.



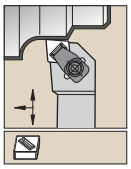


CCLN-MN 95°

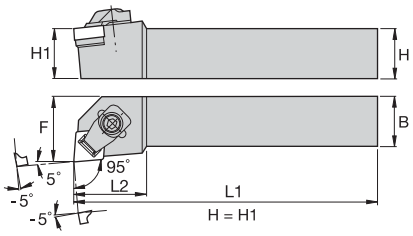


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032715	**CCLNR2525M12MN4**	25	25	32,0	150	32,0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032717	**CCLNR2525M12MN7**	25	25	32,0	150	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032719	**CCLNR3225P12MN7**	32	25	32,0	170	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	**—**	**551.317**	4 mm
left hand													
3032716	**CCLNL2525M12MN4**	25	25	32,0	150	32,0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MX — clamping version is shown.



See pages B177–B179 and B197–B205 for inserts.

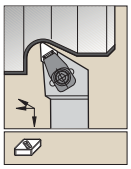




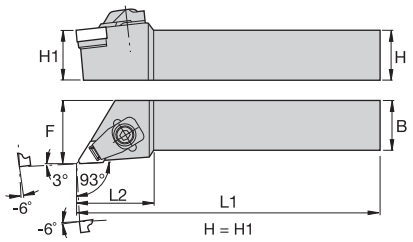
■ CCLN-MF 95°

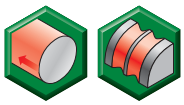
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	chipbreaker	clamp assembly	hex
right hand													
3032723	**CCLNR2525M12MF7**	25	25	32,0	150	32,0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm

NOTE: MX — clamping version is shown.



See pages B180–B181 and B206–B216 for inserts.

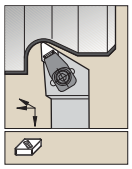




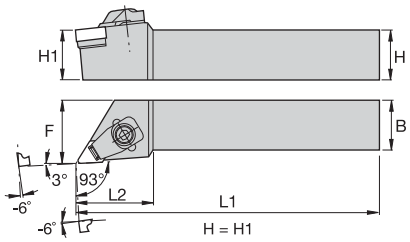
■ CDJN-MX 93°

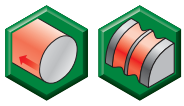
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3032726	**CDJNR2525M15MX7**	25	25	32,0	150	38,0	DN.X150708	**552.228**	**554.252**	2.5 mm	**551.332**	4 mm
left hand												
3032727	**CDJNL2525M15MX7**	25	25	32,0	150	38,0	DN.X150708	**552.228**	**554.252**	2.5 mm	**551.332**	4 mm

NOTE: MX — clamping version is shown.



See pages B180–B181 and B206–B216 for inserts.



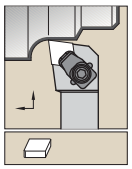


CDJN-MN 93°

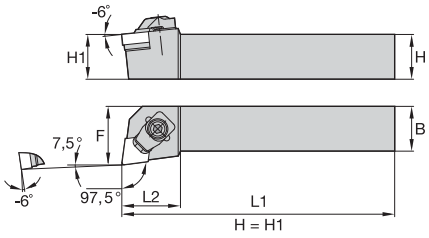


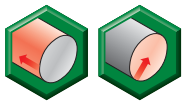
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032728	**CDJNR2525M15MN7**	25	25	32,0	150	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032545	**CDJNR3225P15MN7**	32	25	32,0	170	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
left hand													
3032544	**CDJNL2525M15MN7**	25	25	32,0	150	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3032546	**CDJNL3225P15MN7**	32	25	32,0	170	38,0	DN.N150708	**552.228**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MX — clamping version is shown.



See page B182 for inserts.



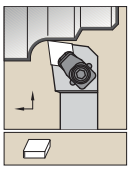


CELN-MF 97,5°

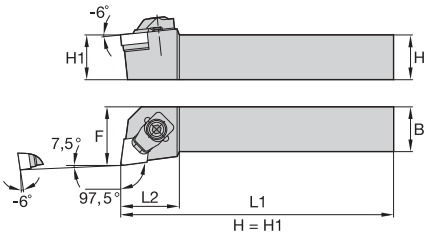


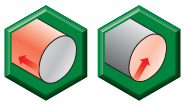
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	chipbreaker	clamp assembly	hex
right hand													
3879700	**CELNR2525M13MF7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm
left hand													
3879698	**CELNL2525M13MF7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.125**	**551.317**	4 mm

NOTE: MN — clamping version is shown.



See page B182 for inserts.



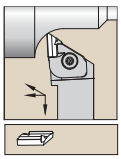


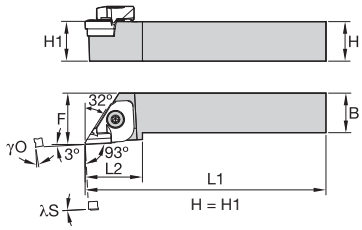
CELN-MN 97,5°

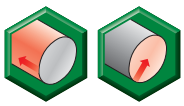


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3879701	**CELNR2525M13MN7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
left hand													
3879699	**CELNL2525M13MN7**	25	25	32,5	153	32,0	EN.N130708	**552.240**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

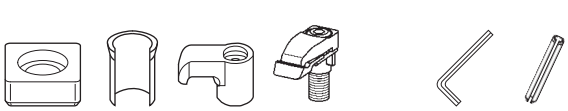
NOTE: MN — clamping version is shown.



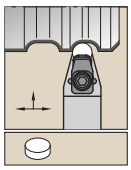




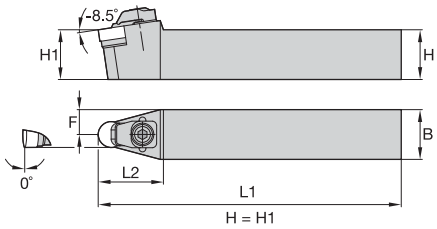
CKJN



order number	catalogue number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim pin	clamp	clamp assembly	hex	hex wrench	pin
right hand																
3870064	**CKJNR2525M16**	25	25	32,0	150	36,0	0.0	-6.0	KN..160410R	**512.100**	**513.020**	**551.129**	**–**	4 mm	**170.004**	**513.123**
3870065	**CKJNR3225P16**	32	25	32,0	170	33,0	0.0	-6.0	KN..160410R	**512.100**	**513.020**	**551.129**	**–**	4 mm	**170.004**	**513.123**
left hand																
3870042	**CKJNL2525M16**	25	25	32,0	150	36,0	0.0	-6.0	KN..160410L	**512.101**	**513.020**	**–**	**551.130**	4 mm	**170.004**	**513.123**
3870063	**CKJNL3225P16**	32	25	32,0	170	33,0	0.0	-6.0	KN..160410L	**512.101**	**513.020**	**–**	**551.130**	4 mm	**170.004**	**513.123**



See pages B183–B185 and B210 for inserts.



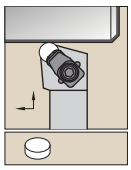


CRDN-MN

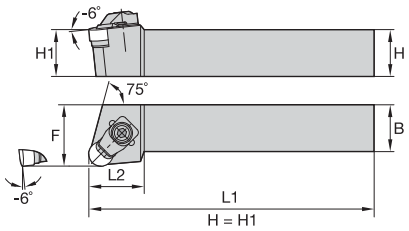


order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
3032549	**CRDNN2525M12MN4**	25	25	12,5	150	30,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032551	**CRDNN2525M12MN7**	25	25	12,5	150	30,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032550	**CRDNN3225P12MN4**	32	25	12,5	170	30,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032552	**CRDNN3225P12MN7**	32	25	12,5	170	30,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm

NOTE: MN — clamping version is shown.



See pages B183–B185 and B210 for inserts.



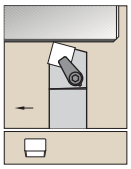


CRSN-MN

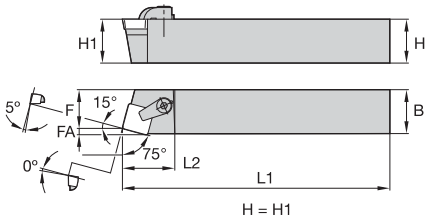


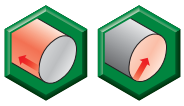
order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand													
3032677	**CRSNR2525M12MN7**	25	25	32,0	150	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032675	**CRSNR3225P12MN4**	32	25	32,0	170	26,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032679	**CRSNR3225P12MN7**	32	25	32,0	170	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
left hand													
3032678	**CRSNL2525M12MN7**	25	25	32,0	150	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032676	**CRSNL3225P12MN4**	32	25	32,0	170	26,0	RN.N120400	**552.229**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm
3032680	**CRSNL3225P12MN7**	32	25	32,0	170	26,0	RN.N120700	**552.230**	**554.252**	2.5 mm	**557.111**	**551.333**	4 mm

NOTE: MN — clamping version is shown.



See pages B186–B191 and B211–B212 for inserts.

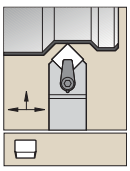




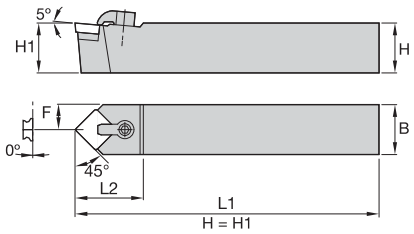
CSBP 75°



order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand														
3870068	**CSBPR2020K12**	20	20	17,0	125	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870069	**CSBPR2525M12**	25	25	22,0	150	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
left hand														
3870066	**CSBPL2020K12**	20	20	17,0	125	30,0	3,1	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm



See pages B186–B191 and B211–B212 for inserts.

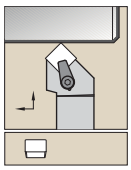




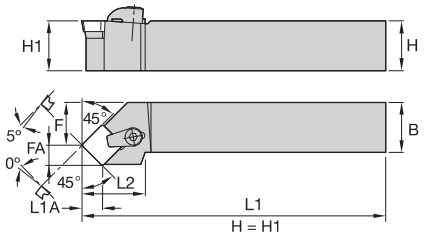
CSDP 45°



order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870070	**CSDPN1616H09**	16	16	8,0	100	25,0	SP..090308	**SM820**	**MS959**	–	**CKM7**	**STCM9**	2.5 mm
3870071	**CSDPN2020K12**	20	20	10,0	125	32,0	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870072	**CSDPN2525M12**	25	25	12,5	150	32,0	SP..120308	**SM840**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm



See pages B186–B191 and B211–B212 for inserts.

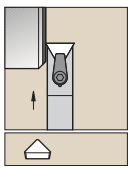




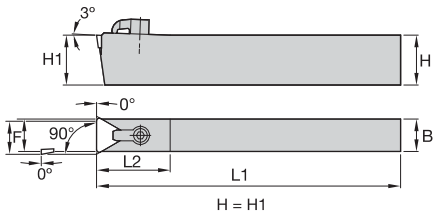
CSSP 45°

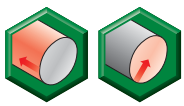


order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand															
3870074	**CSSPR2020K12**	20	20	25,0	125	32,0	8,7	8,3	SP..120308	**SM840**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870075	**CSSPR2525M12**	25	25	32,0	150	32,0	8,7	8,3	SP..120308	**SM840**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm
left hand															
3870073	**CSSPL2525M12**	25	25	32,0	150	32,0	8,7	8,3	SP..120308	**SM840**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm



See pages B192–B194 and B212–B216 for inserts.

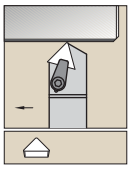




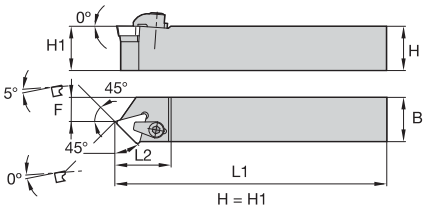
CTCP 90°



order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870080	**CTCPN4018R22**	40	18	19,2	200	41,0	TP..220408	**SM837**	**MS125**	2.5 mm	**CKM13**	**STCM4**	4 mm
3870076	**CTCPN2510M11**	25	10	10,0	150	26,0	TP..110304	**SM819**	**MS960**	–	**CKM7**	**STCM5**	2.5 mm
3870077	**CTCPN2514M16**	25	14	14,4	150	28,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM13**	**STCM4**	4 mm
3870078	**CTCPN2518M22**	25	18	19,2	150	41,0	TP..220408	**SM837**	**MS125**	2.5 mm	**CKM13**	**STCM4**	4 mm
3870079	**CTCPN2520M22**	25	20	20,2	150	41,0	TP..220408	**SM837**	**MS125**	2.5 mm	**CKM13**	**STCM4**	4 mm



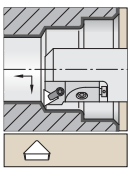
See pages B192–B194 and B212–B216 for inserts.



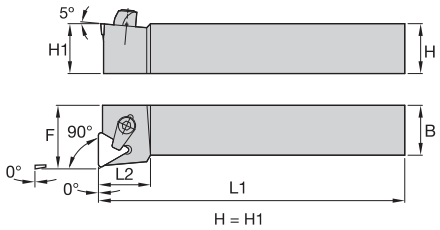


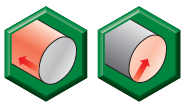
CTDP 45°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	clamp	clamp screw	hex
right hand												
3870083	**CTDPR1212F11**	12	12	6,0	80	22,0	TP..110304	**SM819**	**MS960**	**CKM19**	**STCM9**	2.5 mm
left hand												
3870082	**CTDPL1212F11**	12	12	6,0	80	22,0	TP..110304	**SM819**	**MS960**	**CKM19**	**STCM9**	2.5 mm



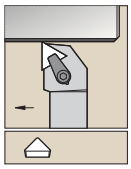
See pages B192–B194 and B212–B216 for inserts.



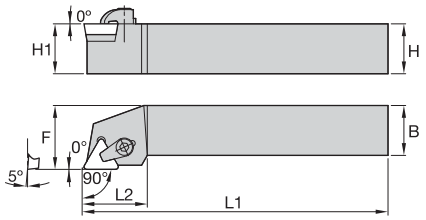


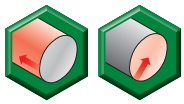
CTFP 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand													
3870087	**CTFPR2020K16**	20	20	25,0	125	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870088	**CTFPR2525M16**	25	25	32,0	150	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm
left hand													
3870086	**CTFPL2525M16**	25	25	32,0	150	29,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm



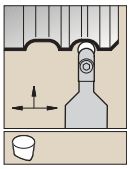
See pages B192–B194 and B212–B216 for inserts.



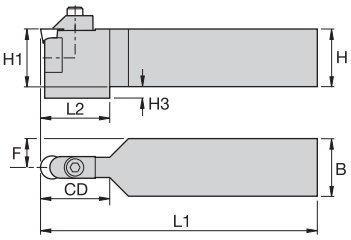


CTGP 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand													
3870092	**CTGPR1212F11**	12	12	16,0	80	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870103	**CTGPR1616H11**	16	16	20,0	100	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870104	**CTGPR2020K11**	20	20	25,0	125	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870105	**CTGPR2020K16**	20	20	25,0	125	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870106	**CTGPR2525M16**	25	25	32,0	150	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm
3870107	**CTGPR2525M22**	25	25	32,0	150	30,0	TP..220408	**SM837**	**MS125**	2.5 mm	**CKM9**	**STCM4**	4 mm
left hand													
3870089	**CTGPL1212F11**	12	12	16,0	80	20,0	TP..110304	**SM819**	**MS960**	–	**CKM19**	**STCM9**	2.5 mm
3870090	**CTGPL2020K16**	20	20	25,0	125	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM10**	**STCM8**	4 mm
3870091	**CTGPL2525M16**	25	25	32,0	150	26,0	TP..160308	**SM841**	**MS111**	2 mm	**CKM9**	**STCM4**	4 mm



See page B184 for inserts.



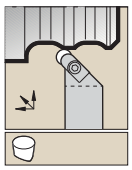


CRDP

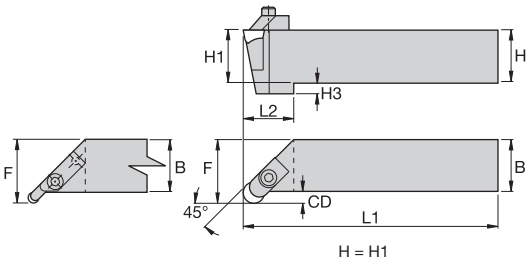


order number	catalogue number	H	B	F	L1	L2	H3	CD	gage insert	nest	clamp	clamp screw	hex
3871510	**CRDPN2525M06V**	25	25	12,5	151	—	—	19,0	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871512	**CRDPN3232P09V**	32	32	16,0	171	—	—	29,0	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871511	**CRDPN2525M09V**	25	25	12,5	151	—	—	29,0	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871514	**CRDPN3232P12V**	32	32	16,0	171	—	—	38,0	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871513	**CRDPN2525M12V**	25	25	12,5	151	38,1	6,4	38,0	R..X120700E	**NST3**	**CM216**	**CS412**	9/64

NOTE: CRDP toolholders are able to use RPGX and RCGX insert styles.



See page B184 for inserts.





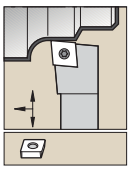
CRGP



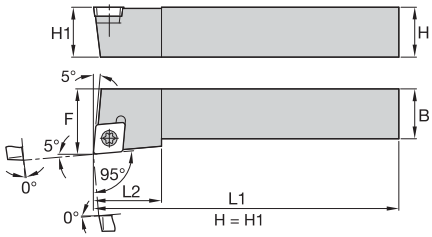


order number	catalogue number	H	B	F	L1	L2	H3	CD	gage insert	nest	clamp	clamp screw	hex
right hand													
3871515	**CRGPR2525M06V**	25	25	32,0	151	—	—	7,3	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871519	**CRGPR3232P09V**	32	32	40,0	171	—	—	8,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871517	**CRGPR2525M09V**	25	25	32,0	151	—	—	7,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871521	**CRGPR2525M12V**	25	25	32,0	151	27,1	6,4	7,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
left hand													
3871516	**CRGPL2525M06V**	25	25	32,0	151	—	—	7,3	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5 mm
3871520	**CRGPL3232P09V**	32	32	40,0	171	—	—	8,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871518	**CRGPL2525M09V**	25	25	32,0	151	—	—	7,3	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871524	**CRGPL3232P12V**	32	32	40,0	171	37,1	—	8,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871522	**CRGPL2525M12V**	25	25	32,0	151	27,1	6,4	7,3	R..X120700E	**NST3**	**CM216**	**CS412**	9/64

NOTE: CRGP toolholders are able to use RPGX and RCGX insert styles.



See pages B30–B46 for inserts.



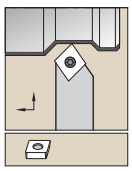


SCLC 95°

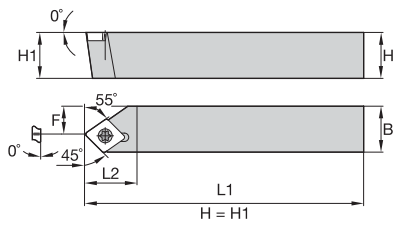




order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3900169	**SCLCR1010E06**	10	10	12,0	70	12,0	CC..060204	–	–	–	**MS1153**	T7
3900172	**SCLCR1212F06**	12	12	16,0	80	12,0	CC..060204	–	–	–	**MS1153**	T7
3900170	**SCLCR1212F09**	12	12	16,0	80	16,0	CC..09T308	–	–	–	**MS1155**	T15
3879416	**SCLCR1616H09**	16	16	20,0	100	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879417	**SCLCR2020K09**	20	20	25,0	125	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879414	**SCLCR2020K12**	20	20	25,0	125	20,0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
3879418	**SCLCR2525M12**	25	25	32,0	150	19,8	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3900171	**SCLCL1010E06**	10	10	12,0	70	12,0	CC..060204	–	–	–	**MS1153**	T7
3900173	**SCLCL1212F06**	12	12	16,0	80	12,0	CC..060204	–	–	–	**MS1153**	T7
3900168	**SCLCL1212F09**	12	12	16,0	80	16,0	CC..09T308	–	–	–	**MS1155**	T15
3879411	**SCLCL1616H09**	16	16	20,0	100	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879412	**SCLCL2020K09**	20	20	25,0	125	16,0	CC..09T308	**SKCP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879415	**SCLCL2020K12**	20	20	25,0	125	20,0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
3879413	**SCLCL2525M12**	25	25	32,0	150	19,8	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15



See pages B30–B46 for inserts.

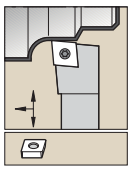




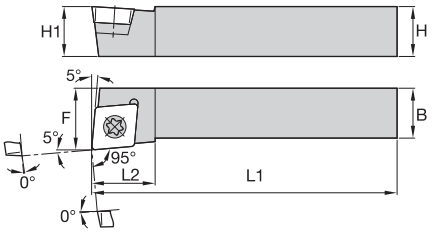
SCDP 45°



order number	catalogue number	H	B	F	L1	L2	gage insert	insert screw	Torx
right hand									
5094163	**SCDPR1212H06**	12	12	7,0	100	14,0	CP..060203	**MS1153**	T7
left hand									
5094162	**SCDPL1212H06**	12	12	7,0	100	14,0	CP..060203	**MS1153**	T7



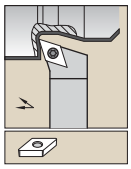
See pages B30–B46 for inserts.



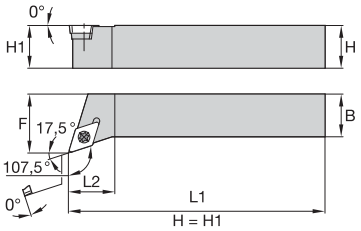


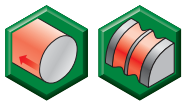
SCLP 95°

order number	catalogue number	H	B	F	L1	L2	gage insert	insert screw	Torx
right hand									
5094217	**SCLPR1010M06**	10	10	11,0	150	11,4	CP..060203	**MS1153**	T7
5094218	**SCLPR1212M06**	12	12	13,0	150	11,4	CP..060203	**MS1153**	T7
left hand									
5094212	**SCLPL1212M06**	12	12	13,0	150	11,4	CP..060203	**MS1153**	T7



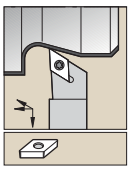
See pages B47–B64 for inserts.



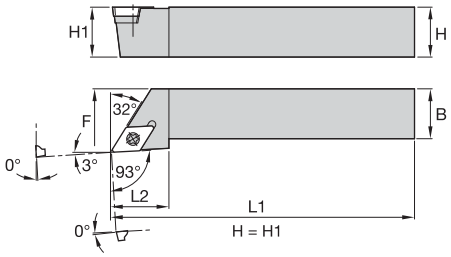


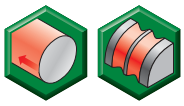
SDHC 107,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879435	**SDHCR1616H11**	16	16	20,0	100	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879437	**SDHCR2020K11**	20	20	25,0	125	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879440	**SDHCR2525M11**	25	25	32,0	150	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879436	**SDHCR2525M15**	25	25	32,0	150	25,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3879433	**SDHCL1616H11**	16	16	20,0	100	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879439	**SDHCL2020K11**	20	20	25,0	125	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879438	**SDHCL2525M11**	25	25	32,0	150	20,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879434	**SDHCL2525M15**	25	25	32,0	150	25,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15



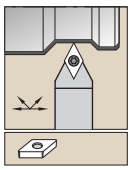
See pages B47–B64 for inserts.



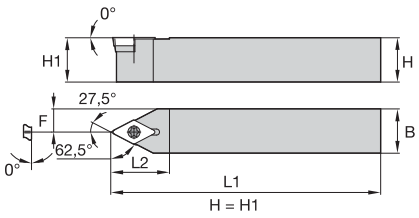


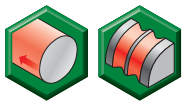
SDJC 93°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879464	**SDJCR1010M07**	10	10	12,0	150	16,0	DC..070204	–	–	–	**MS1153**	T7
3899890	**SDJCR1212F07**	12	12	16,0	80	16,0	DC..070204	–	–	–	**MS1153**	T7
3900177	**SDJCR1212F11**	12	12	16,0	80	22,0	DC..11T308	–	–	–	**MS1155**	T15
3879456	**SDJCR1616H07**	16	16	20,0	100	16,0	DC..070204	–	–	–	**MS1153**	T7
3879459	**SDJCR1616H11**	16	16	20,0	100	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879458	**SDJCR2020K07**	20	20	25,0	125	16,0	DC..070204	–	–	–	**MS1153**	T7
3879460	**SDJCR2020K11**	20	20	25,0	125	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879457	**SDJCR2020K15**	20	20	25,0	125	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3879461	**SDJCR2525M11**	25	25	32,0	150	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879463	**SDJCR2525M15**	25	25	32,0	150	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3900175	**SDJCR3225P15**	32	25	32,0	170	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand												
3899892	**SDJCL1010E07**	10	10	12,0	70	16,0	DC..070204	–	–	–	**MS1153**	T7
3899891	**SDJCL1212F07**	12	12	16,0	80	16,0	DC..070204	–	–	–	**MS1153**	T7
3900176	**SDJCL1212F11**	12	12	16,0	80	22,0	DC..11T308	–	–	–	**MS1155**	T15
3879441	**SDJCL1616H07**	16	16	20,0	100	16,0	DC..070204	–	–	–	**MS1153**	T7
2024450	**SDJCL1616H11**	16	16	20,0	100	21,0	DC..11T3..	–	–	–	**12148038800**	T15
3879454	**SDJCL1616H11**	16	16	20,0	100	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879442	**SDJCL2020K07**	20	20	25,0	125	16,0	DC..070204	–	–	–	**MS1153**	T7
3879462	**SDJCL2020K11**	20	20	25,0	125	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879848	**SDJCL2020K15**	20	20	25,0	125	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3879453	**SDJCL2525M11**	25	25	32,0	150	22,0	DC..11T308	**SKDP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879455	**SDJCL2525M15**	25	25	32,0	150	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
3900174	**SDJCL3225P15**	32	25	32,0	170	32,0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15



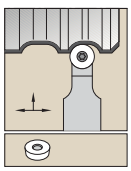
See pages B47–B64 for inserts.



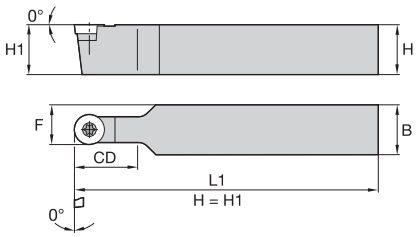


SDNC 62,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
left hand												
3879468	SDNCN0808L07	8	8	4,0	140	16,0	DC..070204	–	–	–	MS1153	T7
3879469	SDNCN1010M07	10	10	5,0	150	16,0	DC..070204	–	–	–	MS1153	T7
3900178	SDNCN1212F11	12	12	6,0	80	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879465	SDNCN1616H11	16	16	8,0	100	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879467	SDNCN2020K11	20	20	10,0	125	22,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879849	SDNCN2525M11	25	25	12,5	150	25,0	DC..11T308	SKDP343	SRS3	3.5 mm	MS1156	T15
3879466	SDNCN2525M15	25	25	12,5	150	28,0	DC..150408	SKDP453	SRS4	4 mm	MS1158	T15
3900179	SDNCN3225P15	32	25	12,5	170	32,5	DC..150408	SKDP453	SRS4	4 mm	MS1158	T15



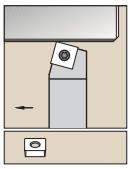
See pages B65–B67 for inserts.



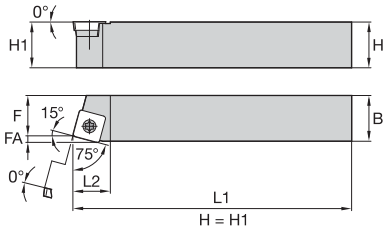


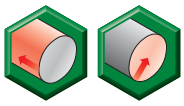
SRDC

order number	catalogue number	H	B	F	L1	CD	gage insert	shim	shim screw	hex	insert screw	Torx
3879735	SRDCN1616H06	16	16	11,0	100	16,0	RC..0602M0	–	–	–	MS1153	T7
3879702	SRDCN1616H08	16	16	12,0	100	16,0	RC..0803M0	–	–	–	MS1154	T9
3900182	SRDCN2020K06	20	20	12,5	125	19,7	RC..0602M0	–	–	–	MS1153	T7
3879733	SRDCN2020K08	20	20	14,0	125	20,0	RC..0803M0	–	–	–	MS1154	T9
3879736	SRDCN2020K10	20	20	15,0	125	20,0	RC..10T3M0	SKRN100300	SRS3	3.5 mm	MS1156	T15
3900183	SRDCN2525M06	25	25	15,0	150	19,7	RC..0602M0	–	–	–	MS1153	T7
3879737	SRDCN2525M08	25	25	16,5	150	25,0	RC..0803M0	–	–	–	MS1154	T9
3879734	SRDCN2525M10	25	25	17,5	150	25,0	RC..10T3M0	SKRN100300	SRS3	3.5 mm	MS1156	T15
3879738	SRDCN2525M12	25	25	18,5	150	25,0	RC..1204M0	SKRN1203M0	SRS3	3.5 mm	MS1156	T15
3900181	SRDCN3225P12	32	25	8,0	170	28,0	RC..1204M0	SKRN1203M0	SRS3	3.5 mm	MS1156	T15
3900180	SRDCN3225P16	32	25	20,0	170	35,0	RC..1605M0	SKRN160400	SRS5	5 mm	MS1160	T20



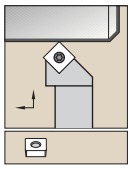
See pages B68–B80 for inserts.



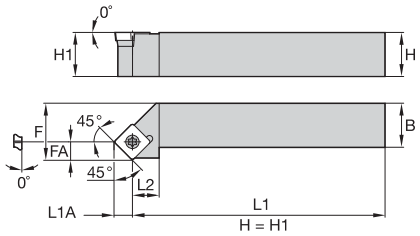


SSBC 75°

order number	catalogue number	H	B	F	L1	L2	FA	gage insert	shim	shim screw	hex	insert screw	Torx
right hand													
3879850	**SSBCR1616H09**	16	16	13,0	100	16,0	2,2	SC..096308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879741	**SSBCR2020K12**	20	20	17,0	125	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879740	**SSBCR2525M12**	25	25	22,0	150	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
left hand													
3879739	**SSBCL1616H09**	16	16	13,0	100	16,0	2,2	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879852	**SSBCL2020K12**	20	20	17,0	125	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879851	**SSBCL2525M12**	25	25	22,0	150	21,0	3,1	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15



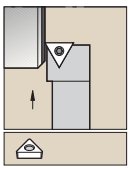
See pages B68–B80 for inserts.



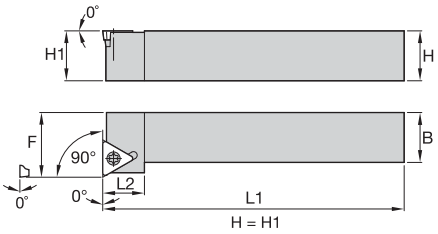


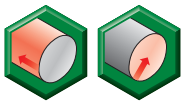
SSSC 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3879747	**SSSCR1616H09**	16	16	20,0	100	18,0	6,1	6,1	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879746	**SSSCR2020K12**	20	20	25,0	125	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879744	**SSSCR2525M12**	25	25	32,0	150	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3879745	**SSSCL1616H09**	16	16	20,0	100	18,0	6,1	6,1	SC..09T308	**SKSP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879743	**SSSCL2020K12**	20	20	25,0	125	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15
3879742	**SSSCL2525M12**	25	25	32,0	150	25,0	8,3	8,3	SC..120408	**SKSP453**	**SRS4**	4 mm	**MS1158**	T15



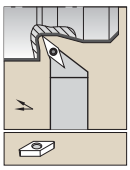
See pages B81–B93 for inserts.



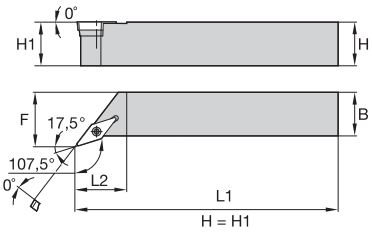


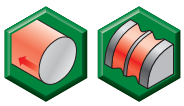
STFC 90°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3900184	**STFCR1212F11**	12	12	16,0	80	13,0	TC..110204	–	–	–	**MS1153**	T7
3879763	**STFCR2020K16**	20	20	25,0	125	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879750	**STFCR2525M16**	25	25	32,0	150	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879751	**STFCL1616H16**	16	16	20,0	100	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879748	**STFCL2020K16**	20	20	25,0	125	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15
3879752	**STFCL2525M16**	25	25	32,0	150	20,0	TC..16T308	**SKTP343**	**SRS3**	3.5 mm	**MS1156**	T15



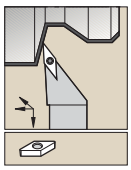
See pages B94–B99 for inserts.



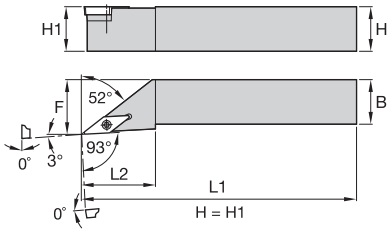


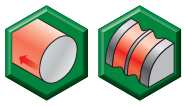
SVHB 107,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879767	**SVHBR2020K16**	20	20	25,0	125	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879765	**SVHBR2525M16**	25	25	32,0	150	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879853	**SVHBR3225P16**	32	25	32,0	170	25,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879764	**SVHBL2020K16**	20	20	25,0	125	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879766	**SVHBL2525M16**	25	25	32,0	150	28,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879768	**SVHBL3225P16**	32	25	32,0	170	25,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15



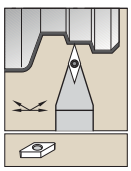
See pages B94–B99 for inserts.



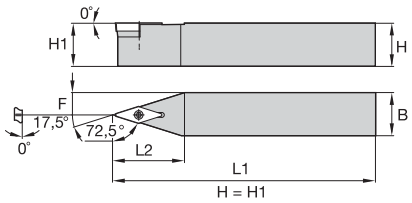


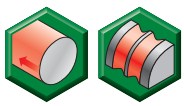
SVJB 93°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
right hand												
3879769	**SVJBR1616H16**	16	16	20,0	100	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879776	**SVJBR2020K16**	20	20	25,0	125	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879775	**SVJBR2525M16**	25	25	32,0	150	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879773	**SVJBR3225P16**	32	25	32,0	170	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
left hand												
3879772	**SVJBL1616H16**	16	16	20,0	100	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879770	**SVJBL2020K16**	20	20	25,0	125	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879774	**SVJBL2525M16**	25	25	32,0	150	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879771	**SVJBL3225P16**	32	25	32,0	170	35,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15



See pages B94–B99 for inserts.





SVVB 72,5°

order number	catalogue number	H	B	F	L1	L2	gage insert	shim	shim screw	hex	insert screw	Torx
3879777	**SVVBN2020K16**	20	20	10,0	125	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879778	**SVVBN2525M16**	25	25	12,5	150	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15
3879779	**SVVBN3225P16**	32	25	12,5	170	33,0	VB..160408	**SKVN343**	**SRS3**	3.5 mm	**MS1156**	T15

Today's modern boring operations require the most reliable, high-performance tools. WIDIA™ offers an extensive range of toolholders for internal boring to meet even the most precise production demands across a broad spectrum of workpiece shapes and sizes.

Tools for Internal Boring



WIDIA boring bars, available with both a conventional steel shank or a vibration-resistant carbide shank and coolant hole, guarantee consistent results and enhanced production reliability.

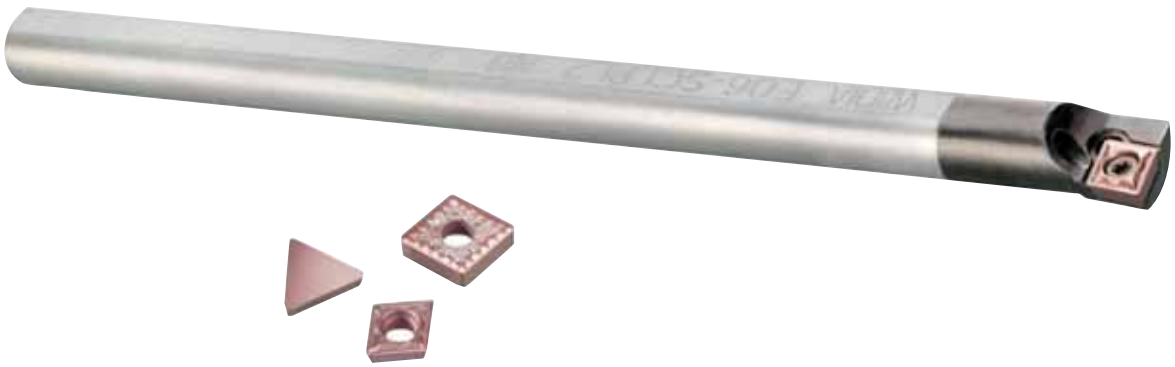
D-Style Clamping

- Used for negative style inserts.
- Clamp assembly contains clamp, screw, and retaining ring.
- Quick insert indexing.
- Ensures insert repeatability and seating.
- Reduced chatter and extended tool life.

P-Style Clamping

- Lever-type clamping system for negative indexable inserts.
- No interference to chip flow.
- Fast insert changes.

P-style available in metric sizes only.



S-Style Clamping

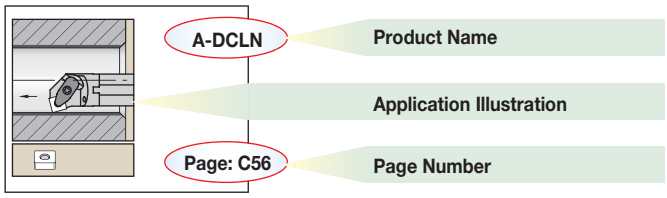
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

C-Style Clamping

- Height-adjustable clamp permits use of additional chipbreakers.
- Universal clamping system for positive and negative flat top inserts.
- Robust engineering makes it easy to handle.
- Carbide shim for extra tool protection.

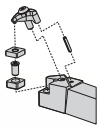


Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.

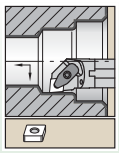


D-Style Clamping

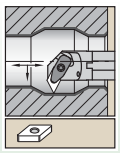
D



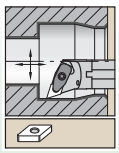
One-piece clamp assembly holder for use with negative style inserts. An extremely rigid clamping system. The tool is protected by a carbide shim.



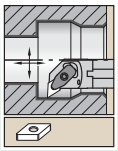
A-DCLN
95°
Page: C56



A-DDPN
117,5°
Page: C56



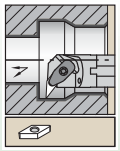
A-DDQN
107,5°
Page: C57



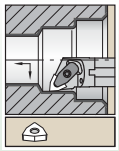
A-DDUN
93°
Page: C57



A-DTFN
90°
Page: C58



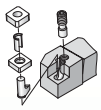
DVUN
93°
Page: C58



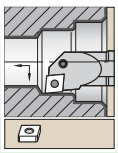
A-DWLN
95°
Page: C59

P-Style Clamping

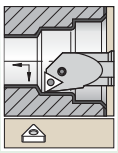
P



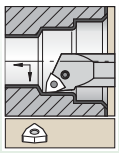
Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



A-PCLN
95°
Page: C60



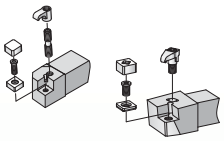
A-PTFN
90°
Page: C60



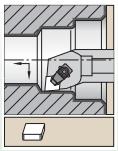
A-PWLN
95°
Page: C61

C-Style Clamping

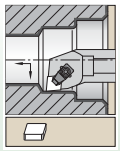
C



Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of 16mm and insert iCs greater than 6,35mm.



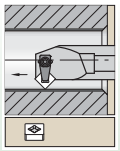
S-CCLN-MX
95°
Page: C62



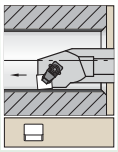
S-CCLN-MN
95°
Page: C62



S-CDQN-MX
Page: C63



S-CSSN-MX
45°
Page: C63



S-CSYN-MN
85°
Page: C64



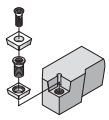
S-CWLN-MX
95°
Page: C64



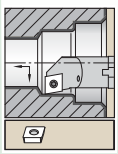
A-CTFP
90°
Page: C65

S-Style Clamping

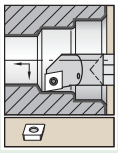
S



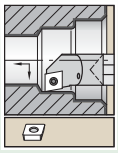
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert iCs from .375" are secured by means of a threaded bushing.



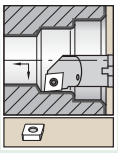
A-SCFP
90°
Page: C66



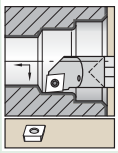
E-SCFC
90°
Page: C66



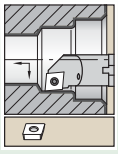
E-SCFP
90°
Page: C67



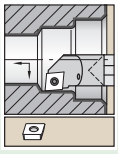
A-SCLC
95°
Page: C67



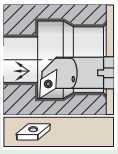
E-SCLC
95°
Page: C68



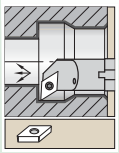
A-SCLP
95°
Page: C69



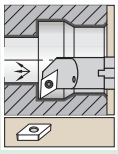
E-SCLP
95°
Page: C70



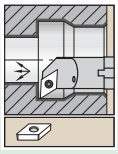
A-SDQC
107,5°
Page: C71



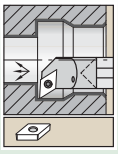
E-SDQC
107,5°
Page: C72



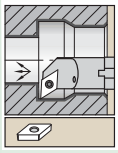
A-SDQP
Page: C72



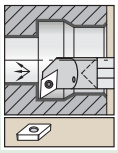
A-SDUC
93°
Page: C73



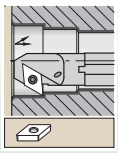
E-SDUC
93°
Page: C74



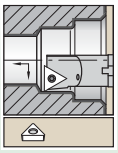
A-SDUP
93°
Page: C75



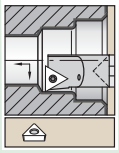
E-SDUP
93°
Page: C75



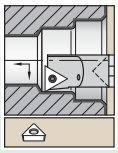
A-SDXP
95°
Page: C76



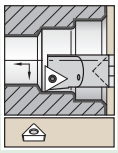
A-STFC
90°
Page: C76



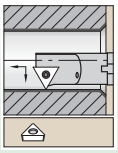
E-STFC
90°
Page: C77



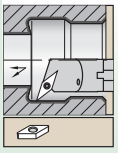
A-STFP
90°
Page: C78



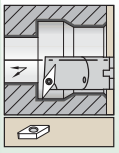
E-STFP
90°
Page: C79



A-STWP
60°
Page: C80



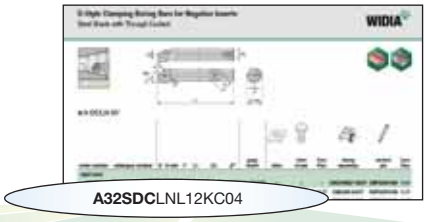
A-SVQB
107,5°
Page: C80



A-SVUB
93°
Page: C81

How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



A — Bar Type

A

Steel bar with coolant

S

Steel bar without coolant

C

Carbide bar

D

DeVibrator bar with coolant

D

Tunable bar with coolant

E

Carbide bar with coolant

B

DeVibrator

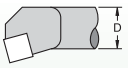
H

Interchangeable head

L

Heavy metal bar with coolant

32 — Bar Diameter



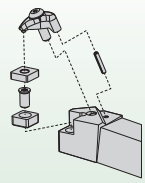
Metric:
A two-digit number indicates the bar diameter in mm.
If the diameter is represented by a one digit number, a 0 (zero) will be used in front of it.
Example:
8mm = 08

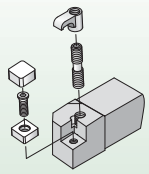
S — Bar Length**

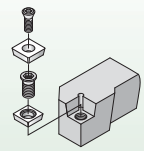
3	=	F
3.5	=	G
4	=	H
4.5	=	J
5	=	K
5.5	=	L
6	=	M
6.5	=	N
7	=	Q
8	=	R
10	=	S
12	=	T
14	=	U
16	=	V
18	=	W
20	=	Y

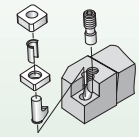
**Used only when more than one length is available or a special length is required.

D — Insert Holding Method

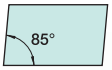
D


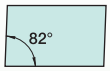
C


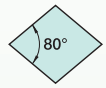
S


P


C — Insert Shape

A


B


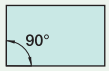
C


D


E


H


K


L


M


O


P


R

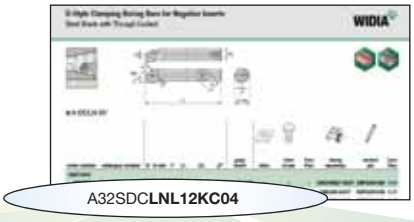

S


T


V


W

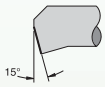

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.

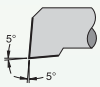


L
Bar Style or Lead Angle

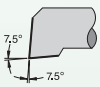
E


F


K


L


(E-style inserts)

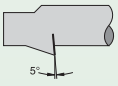
L


P

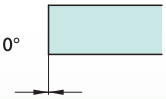

Q

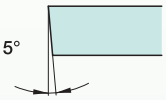

S

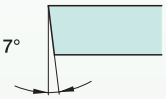

U

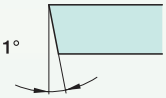

X


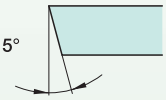
N
Insert Clearance Angle

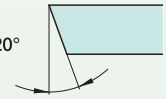
N 0°


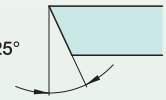
B 5°


C 7°


P 11°


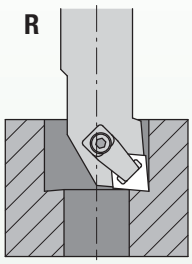
D 15°


E 20°


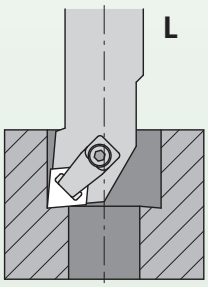
F 25°


L
Hand of Tool

R =
Right-hand boring bar



L =
Left-hand boring bar



12
Insert Size Cutting Edge Length L10

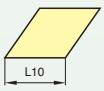
H


O

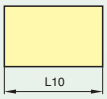

P

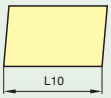

S


T


CDE
M
V


W


L


A
B
K


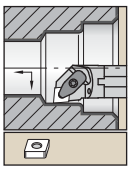
R


KC04
Additional Information

M... =
M.. MF, MN, MX, for ceramic and PcBN inserts

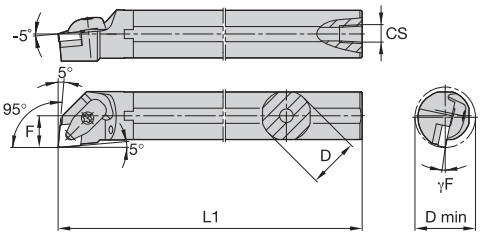
KC =
D-Style Clamping

+ =
Insert thickness



Steel shank with through coolant.

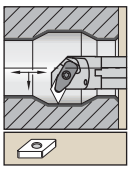
See pages B30–B46 for inserts.





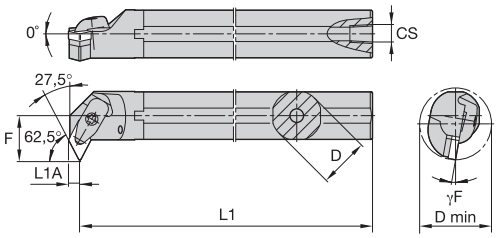
A-DCLN 95°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696071	**A25RDCLNR12KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	CN..120408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696073	**A32SDCLNR12KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696075	**A40TDCLNR12KC04**	40	50,0	27,0	300	1/4-18 NPT	-9.0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696077	**A40TDCLNR16KC06**	32	45,0	27,0	250	1/4-18 NPT	-12.0	CN..160612	**ICSN533**	**KMSP515IP**	15 IP	**CM209R ASSY**	**SSP025018M**	15 IP
left hand														
5696072	**A25RDCLNL12KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	CN..120408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696074	**A32SDCLNL12KC04**	40	50,0	27,0	300	1/4-18 NPT	-9.0	CN..120408	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696076	**A40TDCLNL12KC04**	32	45,0	27,0	250	1/4-18 NPT	-12.0	DN..150608	**ICSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696078	**A40TDCLNL16KC06**	32	45,0	27,0	250	1/4-18 NPT	-12.0	CN..160612	**ICSN533**	**KMSP515IP**	15 IP	**CM209R ASSY**	**SSP025018M**	15 IP



Steel shank with through coolant.

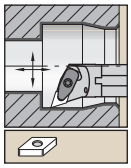
See pages B47–B64 for inserts.





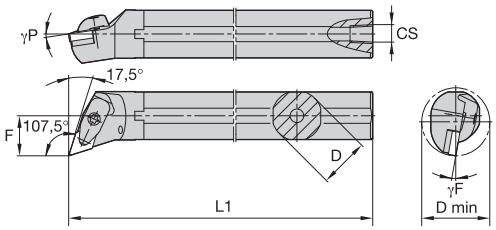
A-DDPN 117,5°

order number	catalogue number	D	D min	F	L1	L1A	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand															
5696079	**A25RDDPNR11KC04**	32	45,0	27,0	250	6,5	1/4-18 NPT	-12.0	DN..150608	**IDSN322**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696080	**A32SDDPNR15KC06**	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696082	**A40TDDPNR15KC06**	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand															
5696081	**A32SDDPNL15KC06**	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696083	**A40TDDPNL15KC06**	40	52,0	30,0	300	6,6	1/4-18 NPT	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

See pages B47–B64 for inserts.

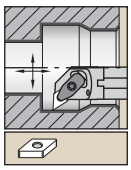




A-DDQN 107,5°

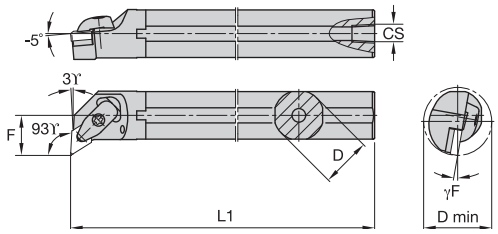


order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand															
5696085	**A32SDDQNR15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696087	**A40TDDQNR15KC06**	40	50,0	27,0	300	1/4-18 NPT	-10.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand															
5696086	**A32SDDQNL15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696088	**A40TDDQNL15KC06**	40	50,0	27,0	300	1/4-18 NPT	-10.0	-10.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

See pages B47–B64 for inserts.

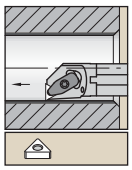




A-DDUN 93°

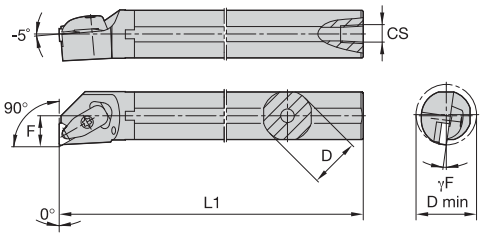


order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696089	**A25RDDUNR11KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	DN..110408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696211	**A32SDDUNR11KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..110408	**IDSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696213	**A32SDDUNR15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696215	**A40TDDUNR15KC06**	40	50,0	27,0	300	1/4-18 NPT	-9.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696217	**A50UDDUNR15KC06**	50	63,0	35,0	350	1/4-18 NPT	-7.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand														
5696210	**A25RDDUNL11KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	DN..110408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696212	**A32SDDUNL11KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..110408	**IDSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696214	**A32SDDUNL15KC06**	32	40,0	22,0	250	1/4-18 NPT	-12.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696216	**A40TDDUNL15KC06**	40	50,0	27,0	300	1/4-18 NPT	-9.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696218	**A50UDDUNL15KC06**	50	63,0	35,0	350	1/4-18 NPT	-7.0	DN..150608	**IDSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

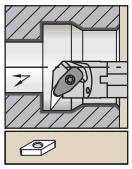
See pages B81–B93 for inserts.





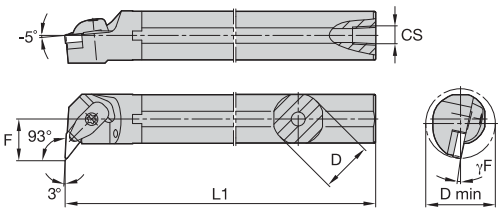
A-DTFN 90°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696219	**A25RDTFNR16KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696261	**A32SDTFNR16KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
left hand														
5696260	**A25RDTFNL16KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696262	**A32SDTFNL16KC04**	32	40,0	22,0	250	1/4-18 NPT	-12.0	TN..160408	**ITSN323**	**KMSP315IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

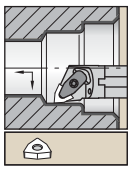
See pages B94–B99 for inserts.





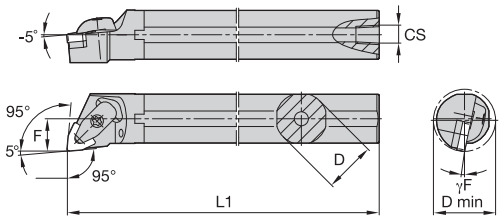
A-DVUN 93°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696263	**A32SDVUNR16KC04**	32	40,0	22,0	250	1/4-18 NPT	-9.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696265	**A40TDVUNR16KC04**	40	50,0	27,0	300	1/4-18 NPT	-8.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	**SSP025016M**	15 IP
left hand														
5696264	**A32SDVUNL16KC04**	32	40,0	22,0	250	1/4-18 NPT	-9.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
5696266	**A40TDVUNL16KC04**	40	50,0	27,0	300	1/4-18 NPT	-8.0	VN..160408	**IVSN322**	**KMSP315IP**	15 IP	**CM215R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

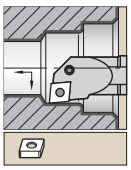
See pages B99–B105 for inserts.





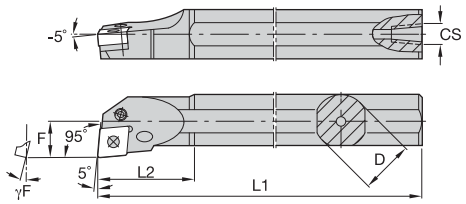
A-DWLN 95°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	Torx Plus	clamp assembly	slotted pin	Torx Plus
right hand														
5696267	**A25RDWLNR06KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696269	**A25RDWLNR08KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696281	**A32SDWLNR08KC04**	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696283	**A40TDWLNR08KC04**	40	50,0	27,0	300	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP
left hand														
5696268	**A25RDWLNL06KC04**	25	32,0	17,0	200	1/4-18 NPT	-14.0	WN..060408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696280	**A25RDWLNL08KC04**	25	32,0	17,0	200	1/4-18 NPT	-12.0	WN..080408	–	–	–	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696282	**A32SDWLNL08KC04**	32	40,0	22,0	250	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234RLP ASSY**	**SSP025016M**	15 IP
5696284	**A40TDWLNL08KC04**	40	50,0	27,0	300	1/4-18 NPT	-14.0	WN..080408	**IWSN433**	**KMSP415IP**	15 IP	**CM234R ASSY**	**SSP025016M**	15 IP



Steel shank with through coolant.

See pages B30–B46 for inserts.

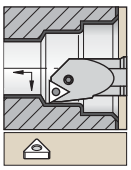




A-PCLN 95°

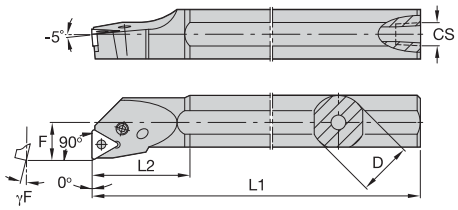


order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883468	**A25TPCLNR12**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	CN..120408	–	–	–	**511.022**	**514.122**	10 IP
3883466	**A32UPCLNR12**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883463	**A40VPCLNR12**	40	50,0	27,0	400	55	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883442	**A40VPCLNR16**	40	50,0	27,0	400	55	1/4-18 NPT	-11.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
left hand															
3883469	**A25TPCLNL12**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	CN..120408	–	–	–	**511.022**	**514.122**	10 IP
3883467	**A32UPCLNL12**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883465	**A40VPCLNL12**	40	50,0	27,0	400	55	1/4-18 NPT	-10.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883464	**A40VPCLNL16**	40	50,0	27,0	400	55	1/4-18 NPT	-11.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP



Steel shank with through coolant.

See pages B81–B93 for inserts.

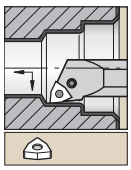




A-PTFN 90°

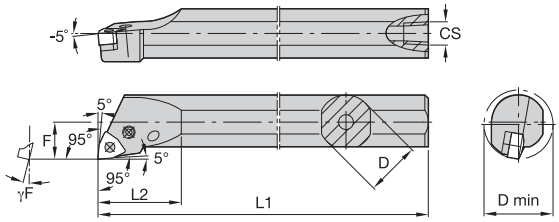


order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883263	**A25TPTFNR16**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883151	**A32UPTFNR16**	32	40,0	22,0	350	50	1/4-18 NPT	-10.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883149	**A40VPTFNR22**	40	48,0	27,0	400	55	1/4-18 NPT	-10.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
left hand															
3883264	**A25TPTFNL16**	25	32,0	17,0	300	40	1/4-18 NPT	-12.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883150	**A40VPTFNL22**	40	48,0	27,0	400	55	1/4-18 NPT	-10.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP



Steel shank with through coolant.

See pages B99–B105 for inserts.

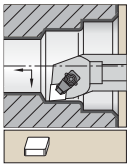




A-PWLN 95°

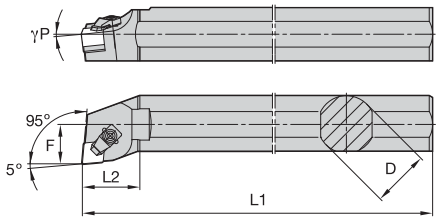


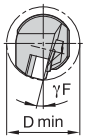
order number	catalogue number	D	D min	F	L1	L2	CS	γF°	gage insert	shim	shim pin	pin	toggle lever	lever screw	Torx Plus
right hand															
3883459	**A16RPWLNR06**	16	27,0	11,0	200	32	1/8-27 NPT	-12.0	WN..060408	–	–	–	**511.030**	**514.112**	–
3883455	**A20SPWLNR06**	20	25,0	13,0	250	–	1/8-27 NPT	-14.0	WN..060408	–	–	–	**511.030**	**514.112**	8 IP
3883458	**A25RPWLNR08**	25	32,0	17,0	200	–	1/4-18 NPT	-12.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883454	**A32SPWLNR08**	32	40,0	22,0	250	50	1/4-18 NPT	-10.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	–
left hand															
3883461	**A16RPWLNL06**	16	27,0	11,0	200	32	1/8-27 NPT	-12.0	WN..060408	–	–	–	**511.030**	**514.112**	–
3883457	**A20SPWLNL06**	20	25,0	13,0	250	–	1/8-27 NPT	-14.0	WN..060408	–	–	–	**511.030**	**514.112**	8 IP
3883456	**A32SPWLNL08**	32	40,0	22,0	250	50	1/4-18 NPT	-10.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	–



See pages B177–B179 and B197–B205 for inserts.

Steel shank with through coolant.



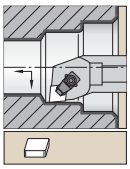




S-CCLN-MX 95°

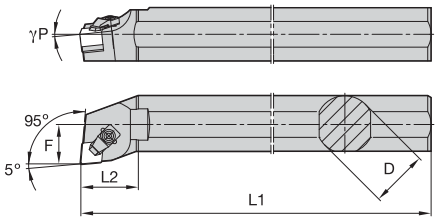
order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand														
3883565	**S32SCCLNR12MX7**	32	40,0	22,0	251	43	-14.0	-5.0	CN.X120708	**–**	**–**	–	**551.316**	4 mm
3029009	**S40TCCLNR12MX7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm
left hand														
3883564	**S32SCCLNL12MX7**	32	40,0	22,0	251	43	-14.0	-5.0	CN.X120708	**–**	**–**	–	**551.316**	4 mm
3029010	**S40TCCLNL12MX7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5 mm	**551.316**	4 mm

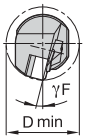
NOTE: MN — clamping version is shown.



See pages B177–B179 and B197–B205 for inserts.

Steel shank with through coolant.





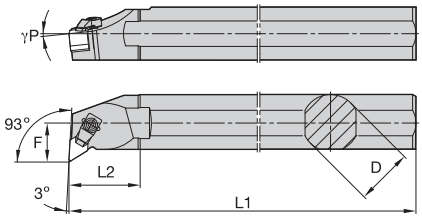


S-CCLN-MN 95°

order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand															
3029011	**S40TCCLNR12MN4**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3029143	**S40TCCLNR12MN7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120708	**552.221**	**554.253**	2.5 mm	**557.111**	**551.317**	4 mm
left hand															
3029012	**S40TCCLNL12MN4**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
3029144	**S40TCCLNL12MN7**	40	55,0	27,0	300	40	-14.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MN — clamping version is shown.





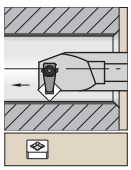
See pages B180–B181 and B206–B216 for inserts.

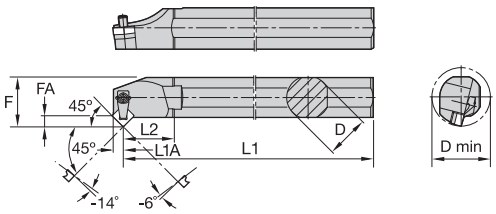
Steel shank with through coolant.

S-CDQN-MX

order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand														
3883567	**S40TCDQNR12MX7**	40	50,0	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5 mm	**551.316**	4 mm
left hand														
3883566	**S40TCDQNL12MX7**	40	50,0	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5 mm	**551.316**	4 mm

NOTE: MN — clamping version is shown.





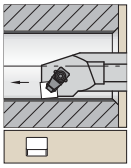
See pages B186–B191 and B211–B212 for inserts.

Steel shank with through coolant.

S-CSSN-MX 45°

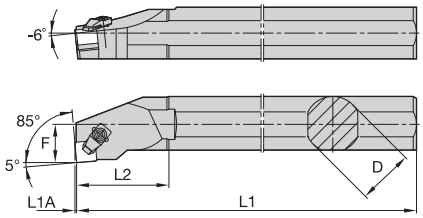
order number	catalogue number	D	D min	F	L1	L2	L1A	FA	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand														
3029151	**S40TCSSNR12MX7**	40	55,0	27,0	300	67,0	8,5	8,2	SN.X120708	**552.232**	**554.252**	2.5 mm	**551.316**	4 mm
left hand														
3029152	**S40TCSSNL12MX7**	40	55,0	27,0	300	67,0	8,5	8,2	SN.X120708	**552.232**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.



See pages B186–B191 and B211–B212 for inserts.

Steel shank with through coolant.





S-CSYN-MN 85°



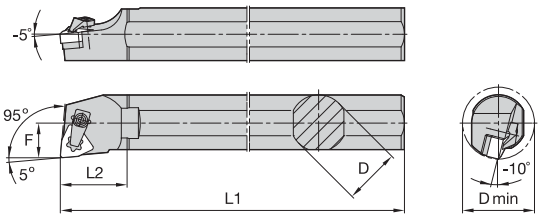
order number	catalogue number	D	D min	F	L1	L2	L1A	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
right hand														
3883569	**S40TCSYNR12MN7**	40	55,0	27,0	300	67,0	1,0	SN.N120708	**552.232**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm
left hand														
3883568	**S40TCSYNL12MN7**	40	55,0	27,0	300	67,0	1,0	SN.N120708	**552.232**	**554.252**	2.5 mm	**557.111**	**551.317**	4 mm

NOTE: MN — clamping version is shown.



See pages B195–B198 and B218 for inserts.

Steel shank with through coolant.



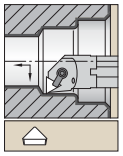


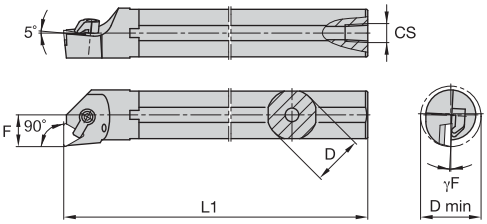
S-CWLN-MX 95°



order number	catalogue number	D	D min	F	L1	L2	gage insert	shim	shim screw	hex	clamp assembly	hex
right hand												
3029153	**S40TCWLNR08MX7**	40	80,0	27,0	300	55,0	WN.X080708	**552.210**	**554.252**	2.5 mm	**551.316**	4 mm
left hand												
3029154	**S40TCWLNL08MX7**	40	80,0	27,0	300	55,0	WN.X080708	**552.210**	**554.252**	2.5 mm	**551.316**	4 mm

NOTE: MX — clamping version is shown.







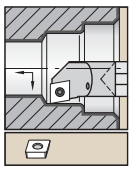
See pages B192–B194 and B212–B216 for inserts.

Steel shank with through coolant.

A-CTFP 90°

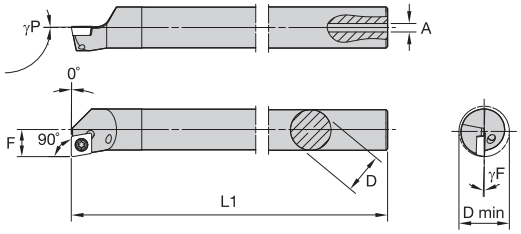


order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
right hand														
3883451	**A16RCTFPR11**	16	20,0	11,0	200	1/8-27 NPT	-4.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5 mm
3883450	**A25RCTFPR16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	TP..160308	**SM841**	**MS110**	2 mm	**CKM10**	**STCM8**	4 mm
left hand														
3883453	**A16RCTFPL11**	16	20,0	11,0	200	1/8-27 NPT	-4.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5 mm
3883452	**A25RCTFPL16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	TP..160308	**SM841**	**MS110**	2 mm	**CKM10**	**STCM8**	4 mm



Carbide shank with through coolant.

See pages B30–B46 for inserts.



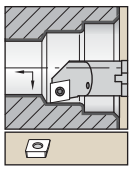


E-SCFC 90°



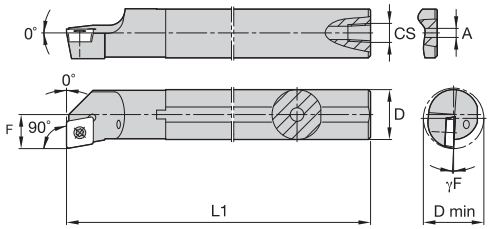
order number	catalogue number	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand											
2023600	**E08KSCFCR06**	8	11,0	6,0	125	3,0	-12.0	0.0	CC..060204	**12148036300**	T8
left hand											
2031019	**E08KSCFCL06**	8	11,0	6,0	125	3,0	-12.0	0.0	CC..060204	**12148036300**	T8

Steel Shank with Through Coolant



Steel shank with through coolant.

See pages B30–B46 for inserts.

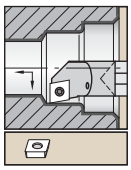




A-SCFP 90°

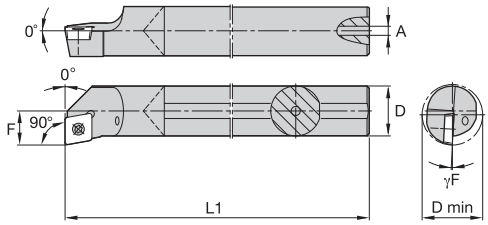


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077442	**A08JSCFPR06**	8	11,0	6,0	110	2,4	–	-8.0	CP..0602..	**MS1153**	T7
5077449	**A10KSCFPR06**	10	13,0	7,0	125	3,2	–	-6.0	CP..0602..	**MS1153**	T7
5077497	**A12MSCFPR06**	12	16,0	9,0	150	–	1/16 - 27 NPT	-4.0	CP..0602..	**MS1153**	T7
5077552	**A16RSCFPR06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077553	**A16RSCFPR09**	16	20,0	11,0	200	–	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077614	**A20SSCFPR06**	20	25,0	13,0	250	–	1/8 - 27 NPT	-3.0	CC..0602..	**MS1153**	T7
5077615	**A20SSCFPR09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15
left hand											
5077441	**A08JSCFPL06**	8	11,0	6,0	110	2,4	–	-8.0	CP..0602..	**MS1153**	T15
5077447	**A10KSCFPL06**	10	13,0	7,0	125	3,2	–	-6.0	CP..0602..	**MS1153**	T7
5077496	**A12MSCFPL06**	12	16,0	9,0	150	–	1/16 - 27 NPT	-4.0	CP..0602..	**MS1153**	T7
5077550	**A16RSCFPL06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077551	**A16RSCFPL09**	16	20,0	11,0	200	–	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077556	**A20SSCFPL06**	20	25,0	13,0	250	–	1/8 - 27 NPT	-3.0	CC..0602..	**MS1153**	T7
5077557	**A20SSCFPL09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T7



Carbide shank with through coolant.

See pages B30–B46 for inserts.



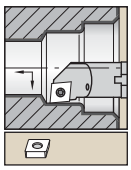


E-SCFP 90°



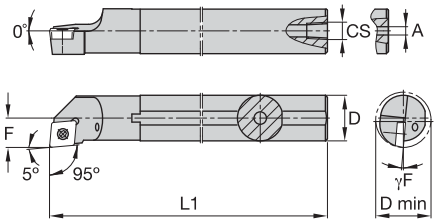
order number	catalogue number	D	D min	F	L1	A	A1	γF°	gage insert	insert screw	Torx
right hand											
2010047	**E06JSCFPR04**	6	8,0	4,5	110,0	2,0	1,4	-10.0	CP..04T104	**12148005800**	T6
5092759	**E08KSCFPR06A**	8	11,0	6,0	123,0	2,4	–	-8.0	CP..060204	**MS1939**	T7
5092921	**E10MSCFPR06A**	10	13,0	7,0	148,0	3,2	–	-4.0	CP..060204	**MS1939**	T7
5092923	**E12QSCFPR06**	12	16,0	9,0	177,5	4,8	–	-3.0	CP..060204	**MS1153**	T7
left hand											
2031018	**E06JSCFPL04**	6	8,0	4,5	110,0	2,0	1,4	-10.0	CP..04T104	**12148005800**	T6
5092757	**E08KSCFPL06A**	8	11,0	6,0	123,0	2,4	–	-8.0	CP..060204	**MS1939**	T7
5092920	**E10MSCFPL06A**	10	13,0	7,0	148,0	3,2	–	-4.0	CP..060204	**MS1939**	T7
5092922	**E12QSCFPL06**	12	16,0	9,0	177,5	4,8	–	-3.0	CP..060204	**MS1153**	T7

Steel Shank with Through Coolant



Steel shank with through coolant.

See pages B30–B46 for inserts.

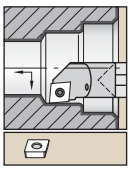




A-SCLC 95°

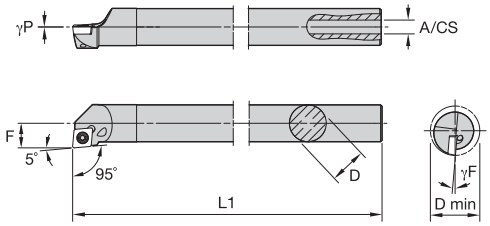


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3883285	**A08JSCLCR06**	8	11,0	6,0	110	2,4	–	-8.0	CC..060204	–	–	–	**MS1939**	T7
3883283	**A10KSCLCR06**	10	13,0	7,0	125	3,2	–	-7.0	CC..060204	–	–	–	**MS1153**	T7
3883271	**A16RSCLCR09**	16	20,0	11,0	200	–	1/8-27 NPT	-7.0	CC..09T308	–	–	–	**MS1155**	T15
3883269	**A20SSCLCR09**	20	25,0	13,0	250	4,0	1/8-27 NPT	-5.0	CC..09T308	–	–	–	**MS1155**	T15
3883265	**A25TSCLCR12**	25	32,0	17,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	–	–	–	**MS1157**	T15
3883266	**A32TSCLCR12**	32	40,0	22,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3883286	**A08JSCLCL06**	8	11,0	6,0	110	2,4	–	-8.0	CC..060204	–	–	–	**MS1939**	T7
3883284	**A10KSCLCL06**	10	13,0	7,0	125	3,2	–	-7.0	CC..060204	–	–	–	**MS1153**	T7
3883272	**A16RSCLCL09**	16	20,0	11,0	200	4,0	1/8-27 NPT	-7.0	CC..09T308	–	–	–	**MS1155**	T15
3883270	**A20SSCLCL09**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	CC..09T308	–	–	–	**MS1155**	T15
3883267	**A25TSCLCL12**	25	32,0	17,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	–	–	–	**MS1157**	T15
3883268	**A32TSCLCL12**	32	40,0	22,0	300	6,4	1/4-18 NPT	-7.0	CC..120408	**SKCP453**	**SRS4**	4 mm	**MS1158**	T15



Carbide shank with through coolant.

See pages B30–B46 for inserts.

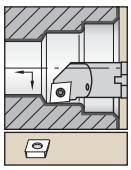




E-SCLC 95°

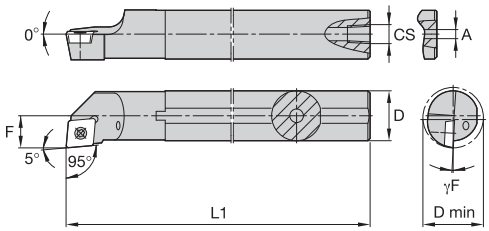


order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010068	**E08KSCLCR06**	8	11,0	6,0	125	3,0	–	-12.0	0.0	CC..060204	**12148036300**	T8
2023603	**E08KSCLCR065**	8	10,0	5,0	125	3,0	–	-15.0	0.0	CC..060204	**12148036300**	T8
2031021	**E10MSCLCR06**	10	13,0	7,0	150	3,5	–	-10.0	0.0	CC..060204	**12148068700**	T8
2023608	**E12QSCLCR06**	12	16,0	9,0	180	4,5	–	-8.0	0.0	CC..060204	**12148068700**	T8
2010139	**E16RSCLCR09**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..090308	**12148038800**	T15
2023614	**E16RSCLCR09T3**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..09T308	**12148038800**	T15
2023621	**E20SSCLCR09**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2010184	**E20SSCLCR09T3**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..09T308	**12148038800**	T15
2031029	**E25TSCLCR09**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2010224	**E25TSCLCR09T3**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..09T308	**12148038800**	T15
2023632	**E32USCLCR12**	32	40,0	22,0	350	–	G 1/4	-10.0	0.0	CC..120408	**MS2260**	T20
left hand												
2023601	**E08KSCLCL06**	8	11,0	6,0	125	3,0	–	-12.0	0.0	CC..060204	**12148036300**	T8
2031020	**E08KSCLCL065**	8	10,0	5,0	125	3,0	–	-15.0	0.0	CC..060204	**12148036300**	T8
2031022	**E10MSCLCL06**	10	13,0	7,0	150	3,5	–	-10.0	0.0	CC..060204	**12148036300**	T8
2023607	**E12QSCLCL06**	12	16,0	9,0	180	4,5	–	-8.0	0.0	CC..060204	**12148068700**	T8
2023613	**E16RSCLCL09**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..090308	**12148038800**	T15
2023615	**E16RSCLCL09T3**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..09T308	**12148038800**	T15
2031026	**E20SSCLCL09**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2031027	**E20SSCLCL09T3**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..09T308	**12148038800**	T15
2010215	**E25TSCLCL09**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2031028	**E25TSCLCL09T3**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..09T308	**12148038800**	T15



Steel shank with through coolant.

See pages B30–B46 for inserts.

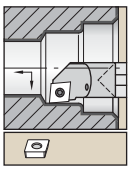




A-SCLP 95°

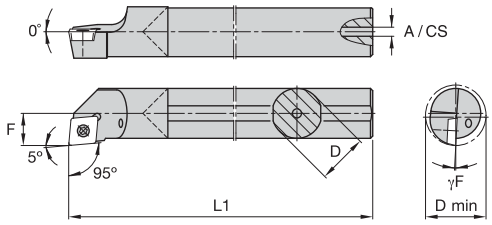


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5077640	**A08JSCLPR06**	8	11,0	6,0	110	2,4	–	-6.0	CP..0602..	**MS1939**	T7
5077645	**A10KSCLPR06**	10	13,0	7,0	125	3,2	–	-4.0	CP..0602..	**MS1939**	T7
5077681	**A12MSCLPR06**	12	16,0	9,0	150	4,0	–	-3.0	CP..0602..	**MS1153**	T7
5077694	**A16RSCLPR06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077695	**A16RSCLPR09**	16	20,0	11,0	200	4,0	1/8 - 27 NPT	-4.0	CP..09T308	**MS1155**	T15
5077722	**A20SSCLPR09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15
left hand											
5077619	**A08JSCLPL06**	8	11,0	6,0	110	2,4	–	-6.0	CP..0602..	**MS1939**	T7
5077644	**A10KSCLPL06**	10	13,0	7,0	125	3,2	–	-4.0	CP..0602..	**MS1939**	T7
5077680	**A12MSCLPL06**	12	16,0	9,0	150	4,0	–	-3.0	CP..0602..	**MS1153**	T7
5077688	**A16RSCLPL06**	16	20,0	11,0	200	–	1/8 - 27 NPT	-5.0	CC..0602..	**MS1153**	T7
5077692	**A16RSCLPL09**	16	20,0	11,0	200	–	1/8 - 27 NPT	-4.0	CP..09T3..	**MS1155**	T15
5077721	**A20SSCLPL09**	20	25,0	13,0	250	–	1/8 - 27 NPT	-2.0	CP..09T3..	**MS1155**	T15



Carbide shank with through coolant.

See pages B30–B46 for inserts.

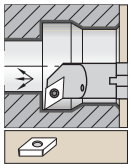




E-SCLP 95°

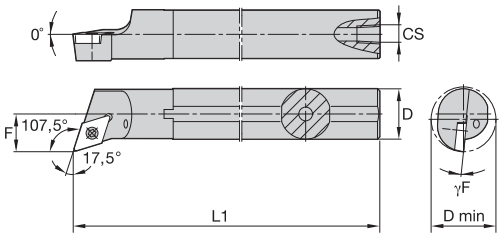


order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
2023598	**E06JSCLPR04**	6	8,0	4,5	110	2,0	-10.0	CP..04T104	**12148005800**	T6
5093094	**E08KSCLPR06A**	8	11,0	6,0	122	2,4	-6.0	CP..060204	**MS1939**	T7
5093098	**E10MSCLPR06A**	10	13,0	7,0	149	3,2	-4.0	CP..060204	**MS1939**	T7
5093144	**E12QSCLPR06**	12	16,0	9,0	178	4,8	-3.0	CP..060204	**MS1153**	T7
5093181	**E16RSCLPR09**	16	20,0	11,0	201	5,5	-4.0	CP..09T308	**MS1155**	T15
5093185	**E20SSCLPR09**	20	25,0	13,0	250	7,1	-2.0	CP..09T308	**MS1155**	T15
left hand										
2023597	**E06JSCLPL04**	6	8,0	4,5	110	2,0	-10.0	CP..04T104	**12148005800**	T6
5093093	**E08KSCLPL06A**	8	11,0	6,0	122	2,4	-6.0	CP..060204	**MS1939**	T7
5093097	**E10MSCLPL06A**	10	13,0	7,0	149	3,2	-4.0	CP..060204	**MS1939**	T7
5093143	**E12QSCLPL06**	12	16,0	9,0	178	4,8	-3.0	CP..060204	**MS1153**	T7
5093149	**E16RSCLPL09**	16	20,0	11,0	201	5,5	-4.0	CP..09T308	**MS1155**	T15
5093184	**E20SSCLPL09**	20	25,0	13,0	250	7,1	-2.0	CP..09T308	**MS1155**	T15



Steel shank with through coolant.

See pages B47–B64 for inserts.

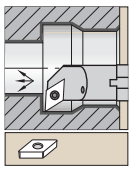




A-SDQC 107,5°

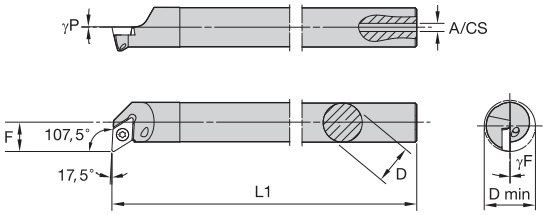


order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
3883476	**A16RSDQCR07**	16	20,0	11,0	200	1/8-27 NPT	-5.0	DC..070204	**MS1153**	T7
3883474	**A20SSDQCR11**	20	25,0	13,0	250	1/8-27 NPT	-5.0	DC..11T308	**MS1155**	T15
3883462	**A25TSDQCR11**	25	32,0	17,0	300	1/4-18 NPT	-4.0	DC..11T308	**MS1155**	T15
left hand										
3883477	**A16RSDQCL07**	16	20,0	11,0	200	1/8-27 NPT	-5.0	DC..070204	**MS1153**	T7
3883475	**A20SSDQCL11**	20	25,0	13,0	250	1/8-27 NPT	-5.0	DC..11T308	**MS1155**	T15
3883473	**A25TSDQCL11**	25	32,0	17,0	300	1/4-18 NPT	-4.0	DC..11T308	**MS1155**	T15



Carbide shank with through coolant.

See pages B47–B64 for inserts.



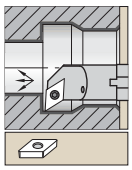


E-SDQC 107,5°



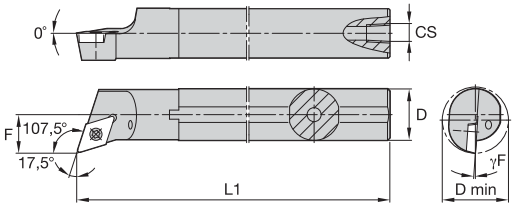
order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2010111	**E12QSDQCR07**	12	16,0	9,0	180	4,5	–	-7.0	0.0	DC..070204	**12148080000**	T8
2031025	**E16RSDQCR07**	16	20,0	11,0	200	5,5	–	-5.0	0.0	DC..070204	**12148080000**	T8
2023623	**E20SSDQCR11**	20	25,0	13,0	250	–	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
left hand												
2031023	**E12QSDQCL07**	12	16,0	9,0	180	4,5	–	-7.0	0.0	DC..070204	**12148080000**	T8
2010148	**E16RSDQCL07**	16	20,0	11,0	200	5,5	–	-5.0	0.0	DC..070204	**12148080000**	T8
2023622	**E20SSDQCL11**	20	25,0	13,0	250	–	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15

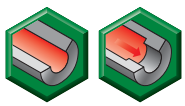
Steel Shank with Through Coolant



Steel shank with through coolant.

See pages B47–B64 for inserts.

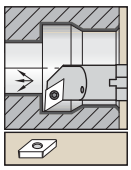




A-SDQP

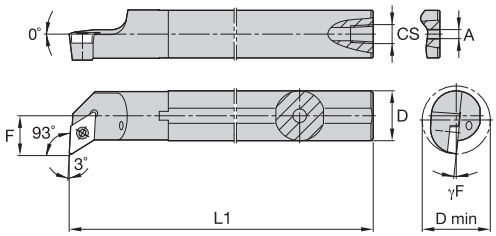


order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
5078292	**A12MSDQPR07**	12	16,0	9,0	150	1/16-27 NPT	2.0	DP..0702..	**MS1153**	T7
5078295	**A16RSDQPR07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..0702..	**MS1153**	T7
5078298	**A20SSDQPR11**	20	25,0	13,0	250	1/8-27 NPT	2.0	DP..11T3..	**MS1155**	T15
5078320	**A25TSDQPR11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T3..	**MS1155**	T15
left hand										
5078291	**A12MSDQPL07**	12	16,0	9,0	150	1/16-27 NPT	2.0	DP..0702..	**MS1153**	T7
5078293	**A16RSDQPL07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..0702..	**MS1153**	T7
5078296	**A20SSDQPL11**	20	25,0	13,0	250	1/8-27 NPT	2.0	DP..11T3..	**MS1155**	T15
5078299	**A25TSDQPL11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T3..	**MS1155**	T15



Steel shank with through coolant.

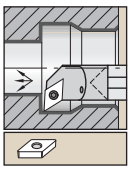
See pages B47–B64 for inserts.





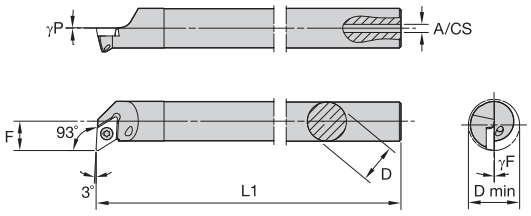
A-SDUC 93°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	shim	shim screw	hex	insert screw	Torx
right hand														
3883297	**A10KSDUCR07**	10	13,0	7,0	125	3,2	–	-7.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883294	**A16RSDUCR07**	16	20,0	11,0	200	–	1/8-27 NPT	-4.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883293	**A16RSDUCR11**	16	20,0	11,0	200	–	1/8-27 NPT	-6.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883291	**A20SSDUCR11**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883288	**A25TSDUCR11**	25	32,0	17,0	300	–	1/8-27 NPT	-4.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883287	**A32TSDUCR15**	32	40,0	22,0	300	–	1/8-27 NPT	-7.0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15
left hand														
3883298	**A10KSDUCL07**	10	13,0	7,0	125	3,2	–	-7.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883296	**A16RSDUCL07**	16	20,0	11,0	200	–	1/8-27 NPT	-4.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3883295	**A16RSDUCL11**	16	20,0	11,0	200	–	1/8-27 NPT	-6.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883292	**A20SSDUCL11**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883290	**A25TSDUCL11**	25	32,0	17,0	300	–	1/8-27 NPT	-4.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3883289	**A32TSDUCL15**	32	40,0	22,0	300	–	1/8-27 NPT	-7.0	DC..150408	**SKDP453**	**SRS4**	4 mm	**MS1158**	T15



Carbide shank with through coolant.

See pages B47–B64 for inserts.

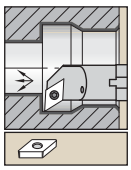




E-SDUC 93°

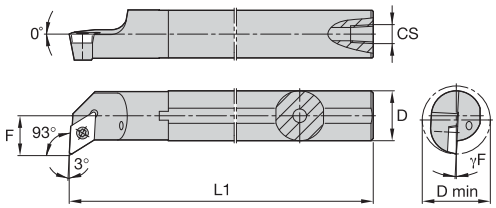


order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
right hand												
2023611	**E12QSDUCR07**	12	16,0	9,0	180	4,5	–	-7.0	0.0	DC..070204	**12148068700**	T8
2010157	**E16RSDUCR07**	16	20,0	11,0	200	4,5	–	-5.0	0.0	DC..070204	**12148080000**	T8
2023624	**E20SSDUCR11**	20	25,0	13,0	250	–	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
2023630	**E25TSDUCR11**	25	32,0	17,0	300	–	G 1/4	-5.0	0.0	DC..11T308	**12148038800**	T15
left hand												
2023610	**E12QSDUCL07**	12	16,0	9,0	180	4,5	–	-7.0	0.0	DC..070204	**12148068700**	T8
2023617	**E16RSDUCL07**	16	20,0	11,0	200	4,5	–	-5.0	0.0	DC..070204	**12148080000**	T8
2010193	**E20SSDUCL11**	20	25,0	13,0	250	–	G 1/8	-7.0	0.0	DC..11T308	**12148038800**	T15
2023629	**E25TSDUCL11**	25	32,0	17,0	300	–	G 1/4	-5.0	0.0	DC..11T308	**12148038800**	T15



Steel shank with through coolant.

See pages B47–B64 for inserts.



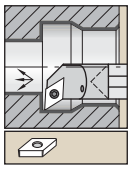


A-SDUP 93°



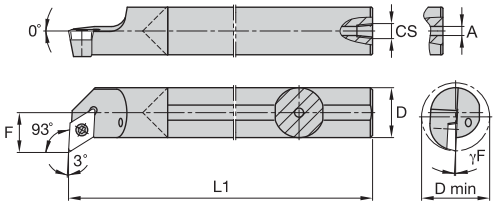
order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
5078360	**A12MSDUPR07**	12	16,0	9,0	150	1/16-27 NPT	-2.0	DP..070204	**MS1153**	T7
5078364	**A16RSDUPR07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..070204	**MS1153**	T7
5078368	**A20SSDUPR11**	20	25,0	13,0	250	1/8-27 NPT	-2.0	DP..11T308	**MS1155**	T15
5078376	**A25TSDUPR11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T308	**MS1155**	T15
left hand										
5078329	**A12MSDUPL07**	12	16,0	9,0	150	1/16-27 NPT	-2.0	DP..070204	**MS1153**	T7
5078363	**A16RSDUPL07**	16	20,0	11,0	200	1/8-27 NPT	0.0	DP..070204	**MS1153**	T7
5078367	**A20SSDUPL11**	20	25,0	13,0	250	1/8-27 NPT	-2.0	DP..11T308	**MS1155**	T15
5078375	**A25TSDUPL11**	25	32,0	17,0	300	1/4-18 NPT	0.0	DP..11T308	**MS1155**	T15

Carbide Shank with Through Coolant



Carbide shank with through coolant.

See pages B47–B64 for inserts.

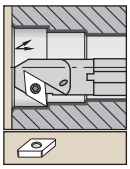




E-SDUP 93°

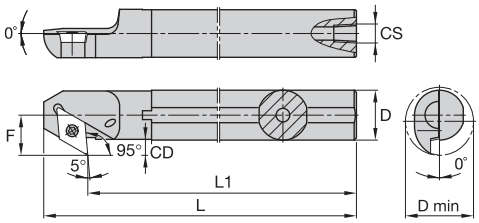


order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
5093591	**E12QSDUPR07**	12	16,0	9,0	179	4,8	-2.0	DP..070204	**MS1153**	T7
5093634	**E16RSDUPR07**	16	20,0	11,0	199	5,5	0.0	DP..070204	**MS1153**	T7
5093639	**E20SSDUPR11**	20	25,0	13,0	253	7,1	-2.0	DP..11T308	**MS1155**	T15
left hand										
5093429	**E12QSDUPL07**	12	16,0	9,0	179	4,8	-2.0	DP..070204	**MS1153**	T7
5093633	**E16RSDUPL07**	16	20,0	11,0	199	5,5	0.0	DP..070204	**MS1153**	T7
5093638	**E20SSDUPL11**	20	25,0	13,0	253	7,1	-2.0	DP..11T308	**MS1155**	T15



Steel shank with through coolant.

See pages B47–B64 for inserts.

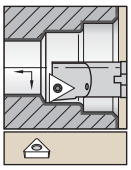




A-SDXP 95°

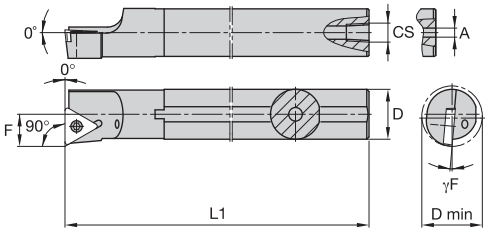


order number	catalogue number	D	D min	F	L1	L	CD	CS	gage insert	insert screw	Torx
right hand											
5078401	**A12MSDXPR07**	12	16,0	9,0	150	162,0	3,09	1/16-27 NPT	DP..070204	**MS1153**	T7
5078405	**A16RSDXPR07**	16	20,0	11,0	200	212,0	3,20	1/8-27 NPT	DP..070204	**MS1153**	T7
5078430	**A20SSDXPR11**	20	25,0	13,0	250	270,0	4,31	1/8-27 NPT	DP..11T308	**MS1155**	T15
left hand											
5078400	**A12MSDXPL07**	12	16,0	9,0	150	162,0	3,09	1/16-27 NPT	DP..070204	**MS1153**	T7
5078404	**A16RSDXPL07**	16	20,0	11,0	200	212,0	3,20	1/8-27 NPT	DP..070204	**MS1153**	T7
5078409	**A20SSDXPL11**	20	25,0	13,0	250	270,0	4,31	1/8-27 NPT	DP..11T308	**MS1155**	T15



Steel shank with through coolant.

See pages B81–B93 for inserts.

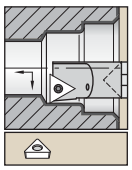




A-STFC 90°

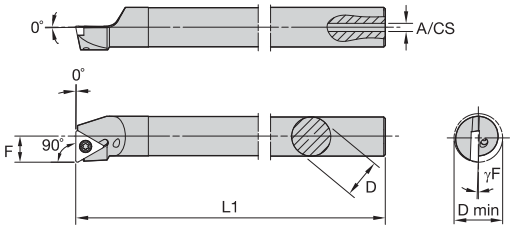


order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
3883382	**A10KSTFCR11**	10	13,0	7,0	125	3,2	-7.0	TC..110204	**MS1153**	T7
left hand										
3883443	**A10KSTFCL11**	10	13,0	7,0	125	3,2	-7.0	TC..110204	**MS1153**	T7



Carbide shank with through coolant.

See pages B81–B93 for inserts.

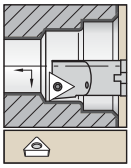




E-STFC 90°

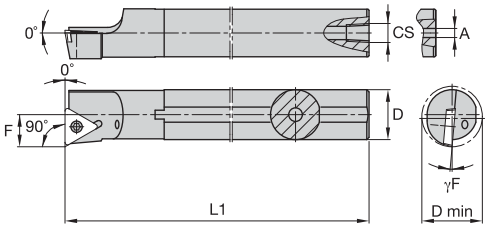


order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
2031888	**E10MSTFCR11**	10	13,0	7,0	150	3,5	–	-10.0	TC..110204	**12148068700**	T8
2031024	**E12QSTFCR11**	12	16,0	9,0	180	4,5	–	-8.0	TC..110204	**12148068700**	T8
2010174	**E16RSTFCR16**	16	20,0	11,0	200	4,5	–	-9.0	TC..16T308	**12148038800**	T15
2023626	**E20SSTFCR16**	20	25,0	13,0	250	–	G 1/8	-7.0	TC..16T308	**12148038800**	T15
2023631	**E25TSTFCR16**	25	32,0	17,0	300	–	G 1/4	-5.0	TC..16T308	**12148038800**	T15
left hand											
2010090	**E10MSTFCL11**	10	13,0	7,0	150	3,5	–	-10.0	TC..110204	**12148068700**	T8
2010120	**E12QSTFCL11**	12	16,0	9,0	180	4,5	–	-8.0	TC..110204	**12148068700**	T8
2023618	**E16RSTFCL16**	16	20,0	11,0	200	4,5	–	-9.0	TC..16T308	**12148038800**	T15
2023625	**E20SSTFCL16**	20	25,0	13,0	250	–	G 1/8	-7.0	TC..16T308	**12148038800**	T15
2010233	**E25TSTFCL16**	25	32,0	17,0	300	–	G 1/4	-5.0	TC..16T308	**12148038800**	T15



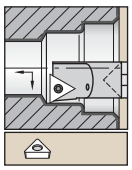
Steel shank with through coolant.

See pages B81–B93 for inserts.



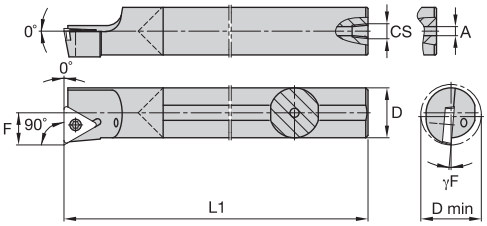
A-STFP 90°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	gage insert	insert screw	Torx
right hand											
5086726	**A08JSTFPR09**	8	11,0	6,0	110	–	–	-8.0	TP..090204	**MS1933**	T7
3883446	**A10KSTFPR11**	10	13,0	7,0	125	3,2	–	-4.0	TP..110204	**MS1153**	T7
5086802	**A12MSTFPR11**	12	16,0	9,0	150	4,0	–	-2.0	TP..110204	**MS1153**	T7
3883444	**A16RSTFPR11**	16	20,0	11,0	200	–	1/16-27 NPT	0.0	TP..110204	**MS1153**	T7
5086807	**A20SSTFPR16**	20	25,0	13,0	250	–	–	-2.0	TP..16T308	**MS1155**	T15
5086809	**A25TSTFPR16**	25	32,0	17,0	300	6,4	1/4-18 NPT	0.0	TP..16T308	**MS1155**	T15
left hand											
5086724	**A08JSTFPL09**	8	11,0	6,0	110	–	–	-8.0	TP..090204	**MS1933**	T7
3883447	**A10KSTFPL11**	10	13,0	7,0	125	3,2	–	-4.0	TP..110204	**MS1153**	T7
5086800	**A12MSTFPL11**	12	16,0	9,0	150	4,0	–	-2.0	TP..110204	**MS1153**	T7
3883445	**A16RSTFPL11**	16	20,0	11,0	200	–	1/16-27 NPT	0.0	TP..110204	**MS1153**	T7
5086806	**A20SSTFPL16**	20	25,0	13,0	250	–	–	-2.0	TP..16T308	**MS1155**	T15
5086808	**A25TSTFPL16**	25	32,0	17,0	300	6,4	1/4-18 NPT	0.0	TP..16T308	**MS1155**	T15



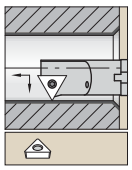
Carbide shank with through coolant.

See pages B81–B93 for inserts.



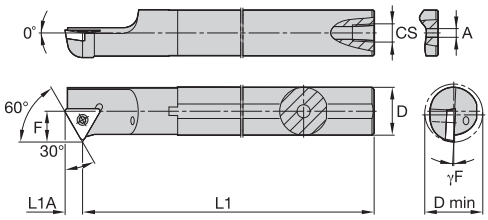
E-STFP 90°

order number	catalogue number	D	D min	F	L1	A	γF°	gage insert	insert screw	Torx
right hand										
5093696	**E08KSTFPR09A**	8	11,0	6,0	124	2,4	-6.0	TP..090204	**MS1933**	T7
5093750	**E10MSTFPR11A**	10	13,0	7,0	152	3,2	-4.0	TP..110204	**MS1153**	T7
5093755	**E12QSTFPR11**	12	16,0	9,0	181	4,8	-2.0	TP..110204	**MS1153**	T7
5093759	**E16RSTFPR11**	16	20,0	11,0	201	5,5	0.0	TP..110204	**MS1153**	T7
5093773	**E20SSTFPR16**	20	25,0	13,0	251	7,1	-2.0	TP..16T308	**MS1155**	T15
left hand										
5093694	**E08KSTFPL09A**	8	11,0	6,0	124	2,4	-6.0	TP..090204	**MS1933**	T7
5093699	**E10MSTFPL11A**	10	13,0	7,0	152	3,2	-4.0	TP..110204	**MS1153**	T7
5093754	**E12QSTFPL11**	12	16,0	9,0	181	4,8	-2.0	TP..110204	**MS1153**	T7
5093758	**E16RSTFPL11**	16	20,0	11,0	201	5,5	0.0	TP..110204	**MS1153**	T7
5093772	**E20SSTFPL16**	20	25,0	13,0	251	7,1	-2.0	TP..16T308	**MS1155**	T15



Steel shank with through coolant.

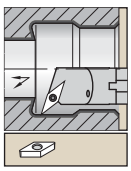
See pages B81–B93 for inserts.





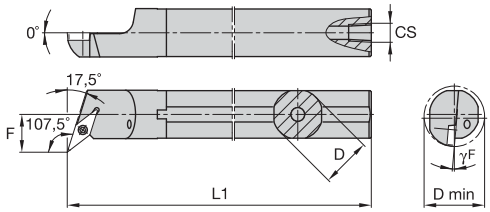
A-STWP 60°

order number	catalogue number	D	D min	F	L1	L1A	A	γF°	gage insert	insert screw	Torx
right hand											
5086811	**A12MSTWPR11**	12	16,0	9,0	150	–	–	-2.0	TP..110204	**MS1153**	T7
5086813	**A16RSTWPR11**	16	20,0	11,0	200	–	–	-2.0	TP..110204	**MS1153**	T7
left hand											
3883449	**A10KSTWPL11**	10	13,0	7,0	125	5,0	3,2	-4.0	TP..110204	**MS1153**	T7
5086810	**A12MSTWPL11**	12	16,0	9,0	150	–	–	-2.0	TP..110204	**MS1153**	T7
5086812	**A16RSTWPL11**	16	20,0	11,0	200	–	–	-2.0	TP..110204	**MS1153**	T7



Steel shank with through coolant.

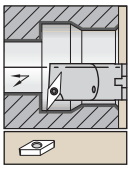
See pages B94–B99 for inserts.





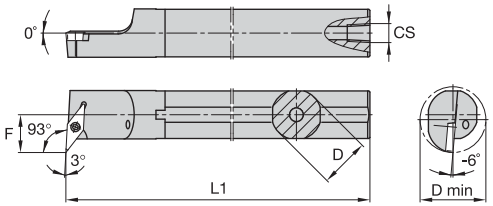
A-SVQB 107,5°

order number	catalogue number	D	D min	F	L1	CS	γF°	gage insert	insert screw	Torx
right hand										
3883436	**A16RSVQBR11**	16	20,0	11,0	200	1/8-27 NPT	-7.0	VB..110304	**MS1153**	T7
3883434	**A25TSVQBR16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	VB..160408	**MS1155**	T15
left hand										
3883435	**A25TSVQBL16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	VB..160408	**MS1155**	T15



Steel shank with through coolant.

See pages B94–B99 for inserts.





A-SVUB 93°

order number	catalogue number	D	D min	F	L1	CS	gage insert	insert screw	Torx
right hand									
3883440	**A20SSVUBR11**	20	25,0	13,0	250	1/8-27 NPT	VB..110304	**MS1153**	T7
3883438	**A25TSVUBR16**	25	32,0	17,0	300	1/4-18 NPT	VB..160408	**MS1155**	T15
left hand									
3883439	**A25TSVUBL16**	25	32,0	17,0	300	1/4-18 NPT	VB..160408	**MS1155**	T15

Tunable Boring Bars with Front End KM™ Quick Change Adaptor

Reduce vibrations and enhance productivity in deep boring applications with KM Quick Change heads and tunable boring bars.

Tunable Boring Bars





Adjustment screw to allow for on-machine tuning. Allows each bar to be setup for the specific operation.

Available in either steel or carbide shanks:

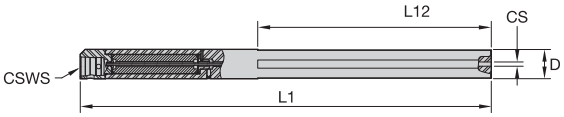
- Steel
  — 40–100mm
- Carbide
  — 50–100mm

Comprehensive offering of KM Quick Change cutting units. See WIDIA™ Tooling Systems Catalogue (A-09-02122) for KM adaptors.

Features	Function	Benefit
Robust internal clamping package	• Eliminates chatter and vibration. • Higher metal removal rate. • Larger depths of cut.	• High surface quality. • Low scrap rate. • Increased productivity. • Reduced noise exposure.
Tunable clamping mechanism	Bar can be tuned on the machine with just turning a screw.	Optimised damping characteristics for all kinds of machining conditions.
KM™ Quick Change front end adaptor	• Ridged clamping system. • Wide selection of KM Quick Change cutting units.	Flexible system reduces tooling inventory and setup times.

Tuning Procedure

1. Loosen the two locking screws on the bar.
2. Turn the adjusting screw in the positive direction until it becomes snug. The adjusting screw becomes snug when it locks the tuner mass.
3. Turn the screw one complete turn in the negative direction and take a test cut.
4. Repeat Step 3 until chatter is eliminated.
5. Once chatter is eliminated, note that chatter starts between the current screw setting and one turn in the positive direction. Make 1/4 turn adjustments within this range, taking test cuts for each setting, until you can identify the adjusting screw setting that causes chatter to start.
6. Once the adjusting screw setting that causes chatter is determined, back the adjusting screw off a 1/2 turn in the negative direction.
7. Tighten both clamping screws and take a test cut to confirm desired results.



Tunable steel shank with through coolant and front end KM™ clamping unit.

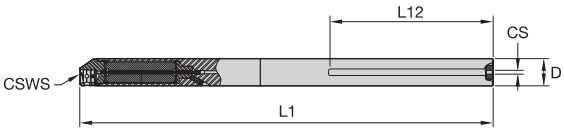


KM QUICK CHANGE

D...TTB-KM • Metric

order number	catalogue number	D	L1	CS	L12	L1 min	CSWS system size
3637636	**D40MTTB560KM40**	40	520	RP 3/8-19	305	330	KM40
3637637	**D50MTTB737KM40**	50	697	RP 3/8-19	470	337	KM40
3637638	**D60MTTB1000KM40**	60	976	RP 3/8-19	686	396	KM40
3642134	**D80MTTB1120KM63**	80	1060	RP 3/8-19	610	560	KM63
3642135	**D100MTTB1330KM63**	100	1384	RP 3/8-19	622	695	KM63

NOTE: KM adaptors can be found in the WIDIA™ Tooling Systems Catalogue (A-09-02122EN).



Carbide tunable boring bar with KM™ Quick Change connection.



KM QUICK CHANGE

G-KM-TTB • Metric

order number	catalogue number	D	L1	CS	L12	CSWS system size
3954298	**G50MTTB1026KM40**	50	986	RP 3/8-19	300	KM40
3954299	**G60MTTB1226KM40**	60	1186	RP 3/8-19	381	KM40
3954300	**G80MTTB1564KM63**	80	1504	RP 3/8-19	480	KM63
3954301	**G100MTTB2066KM63**	100	1975	RP 3/8-19	600	KM63

NOTE: KM adaptors can be found in the WIDIA™ Tooling Systems Catalogue (A-09-02122EN).

Separator™ Toolholders and Inserts





EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

- Insert widths 2–4mm.
- Toolholder shank sizes 10–31,75mm.
- Cut-off up to 76mm bar capacity.
- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.

To learn more, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™

Modern machining operations demand high-quality, high-performance toolholders that provide straightforward design and application versatility.

Standard WIDIA™ cartridges are ideal for turning tools with one, or several, cutting edges. A wide range of cartridge sizes and styles provide numerous combinations and application possibilities.

Cartridges



Clamping System M

- Combined pin/wedge clamp for negative inserts.
- An extremely sturdy clamping system, specially designed for interrupted cuts.
- The tool is protected by a carbide shim.

Clamping System P

- Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter.
- Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°.
- Advantages of this system are fast insert changes and no interference with chip flow.

P-style available in metric sizes only.



Simple and secure mounting to the tool by a single cartridge clamping screw.

High accuracy on “F” dimension ensures proper application to minimum bore dimensions.

Same clamping systems as standard turning toolholders.

Overall sizes to DIN and ISO are ideal for single- and multi-tooth turning, boring, and spotting tools.

Precise axial and radial positioning by adjustment screws.





Clamping System C

- Top clamping system for negative and positive indexable inserts to DIN 4968.
- This universal clamping system is robust and easy to handle.
- Some height-adjustable clamps enable the use of additional chipbreakers.
- A carbide shim provides additional tool protection.

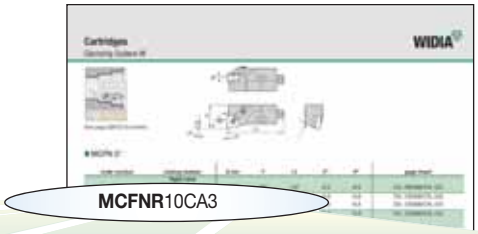


Clamping System S

- Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967.
- Compact design using a minimum of spare parts for high reliability and cost efficiency.
- A carbide shim provides additional tool protection.
- Toolholders with cutting edge heights upwards of 16mm (.625") and insert iCs from 9,52mm (.375") are secured by means of a threaded bushing.

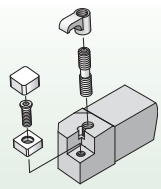
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



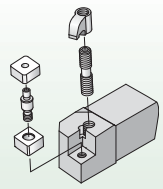
M — Insert Clamping System

C



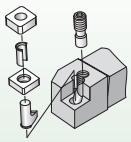
Top clamping by clamping finger for inserts without hole.

M



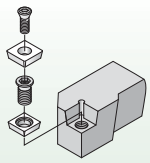
Top and hole clamping for inserts with hole.

P



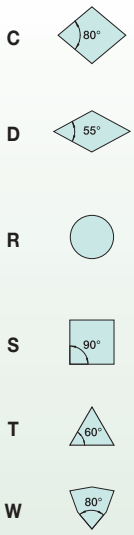
Insert clamping by toggle lever for insert hole.

S

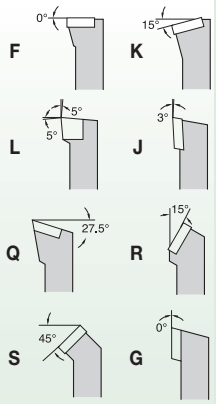


Centre clamping by screw for inserts with hole.

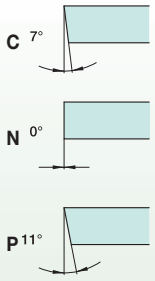
C — Insert Shape



F — Cartridge Style

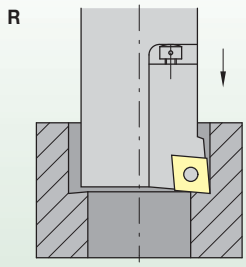


N — Insert Clearance Angle

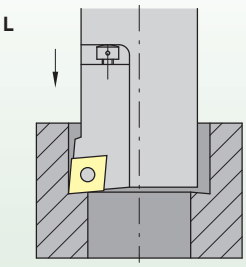


R — Hand of Tool

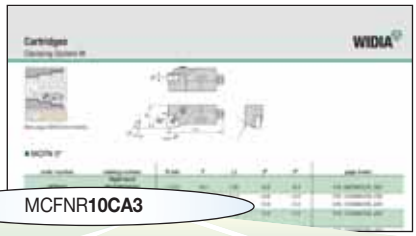
Right-hand cartridge



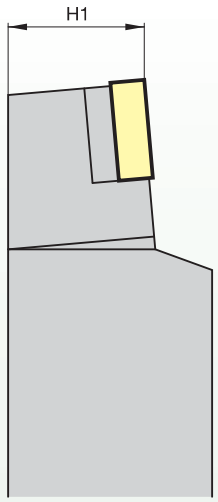
Left-hand cartridge



By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



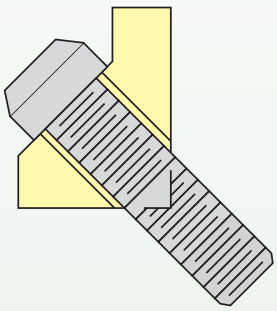
10	**C**	**A**	**3**	
Cartridge Size	Identifying Code of Cartridge	Mounting Design of Cartridge	Insert Size	Additional Information

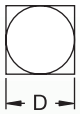


H1 = Cutting edge height of cartridge, in inches

C = Cartridge

A-design conforming to ISO 5611

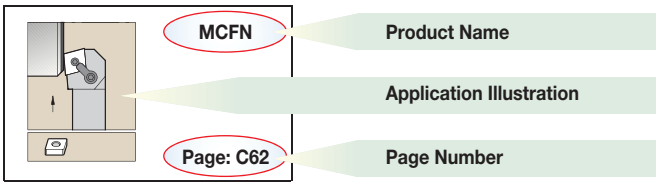




Insert iC

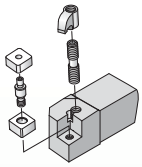
Number of 1/8ths of "D"

Each unique clamping system offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.

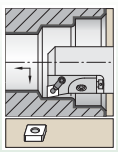


Clamping System M

M



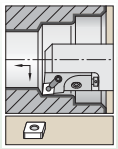
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.



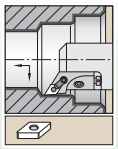
MCFN
90°
Page:
C92



MCKN
75°
Page:
C93



MCLN
95°
Page:
C94



MDJN
93°
Page:
C95



MDQN
107,5°
Page:
C96



MSKN
75°
Page:
C97



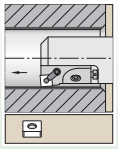
MSRN
75°
Page:
C98



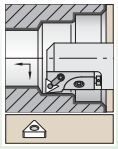
MSSN
45°
Page:
C99



MSTN
60°
Page:
C100



MSYN
85°
Page:
C101



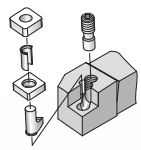
MTFN
90°
Page:
C102



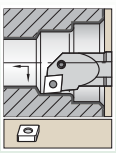
MTGN
90°
Page:
C103

P-Style Clamping

P



Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20mm in diameter. Inserts with one- and two-side chip control geometries have positive rakes from 6° to 18°. Advantages of this system are fast insert changes and no interference with chip flow.



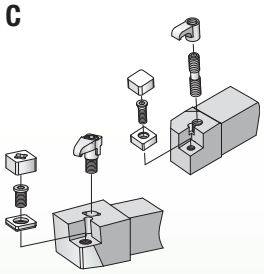
PCLN
95°
Page:
C104



PSKN
75°
Page:
C105

Clamping System C

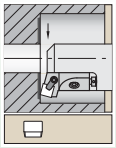
C



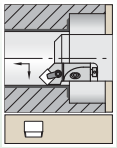
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection.



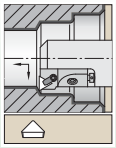
CSKP
75°
Page:
C106



CSRP
75°
Page:
C107



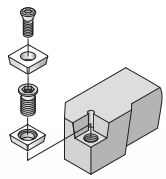
CSSP
45°
Page:
C108



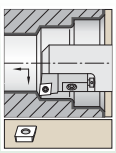
CTFP
90°
Page:
C109

Clamping System S

S



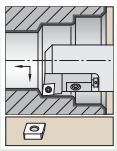
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.



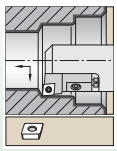
SCFP
90°
Page:
C110



SCGP
90°
Page:
C111



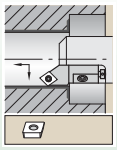
SCLC
95°
Page:
C112



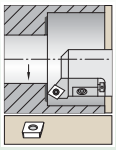
SCLP
95°
Page:
C113



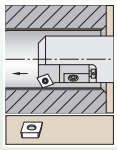
SCRP
75°
Page:
C114



SCSP
45°
Page:
C115



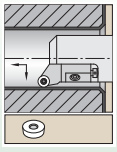
SCTP
60°
Page:
C116



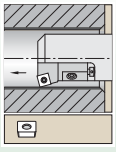
SCWP
60°
Page:
C117



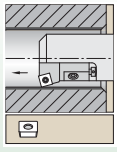
SDJP
93°
Page:
C118



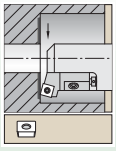
SRGC
Page:
C119



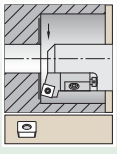
SSKC
75°
Page:
C120



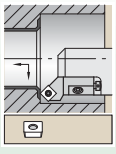
SSKP
75°
Page:
C121



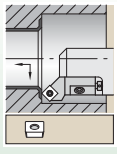
SSRC
75°
Page:
C122



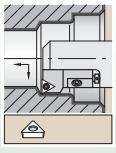
SSRP
75°
Page:
C123



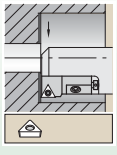
SSSC
45°
Page:
C124



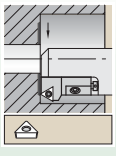
SSSP
45°
Page:
C125



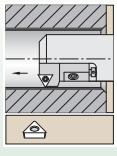
STFP
90°
Page:
C126



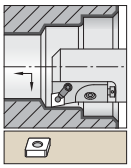
STGP
90°
Page:
C127



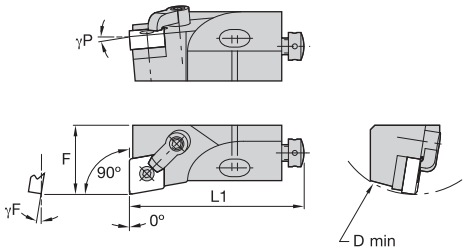
STTP
60°
Page:
C128



STWP
60°
Page:
C129



See pages B30–B46 for inserts.



MCFN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870421	**MCFNR10CA09**	40	14,0	50	-9.0	-9.0	CN..090308/CN..322
3870420	**MCFNR12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870419	**MCFNR16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870418	**MCFNR20CA12**	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
left hand							
3870423	**MCFNL12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870422	**MCFNL16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432

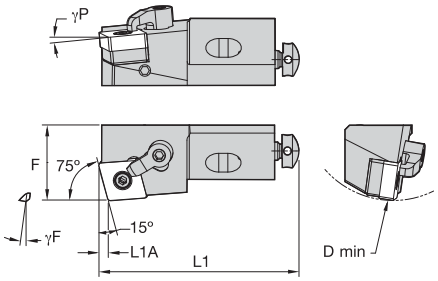
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	–	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ICSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**ICSN432**	**KLM46**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B30–B46 for inserts.



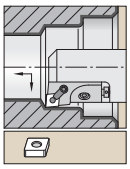
MCKN 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870416	**MCKNR12CA12**	50	20,0	55	3	-9.0	-5.0	CN..120408/CN..432
3870415	**MCKNR16CA12**	60	25,0	63	3	-9.0	-5.0	CN..120408/CN..432
left hand								
3870417	**MCKNL12CA12**	50	20,0	55	3	-9.0	-5.0	CN..120408/CN..432

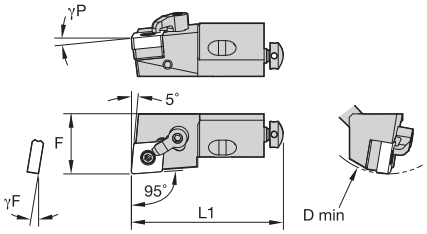
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ICSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B30–B46 for inserts.



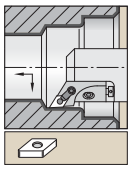
MCLN 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870410	**MCLNR12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870409	**MCLNR16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870408	**MCLNR20CA12**	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
3870407	**MCLNR25CA19**	100	32,0	100	-9.0	-5.0	CN..190612/CN..643
left hand							
3870414	**MCLNL12CA12**	50	20,0	55	-9.0	-5.0	CN..120408/CN..432
3870413	**MCLNL16CA12**	60	25,0	63	-9.0	-5.0	CN..120408/CN..432
3870412	**MCLNL20CA12**	70	25,0	70	-9.0	-5.0	CN..120408/CN..432
3870411	**MCLNL25CA19**	100	32,0	100	-9.0	-5.0	CN..190612/CN..643

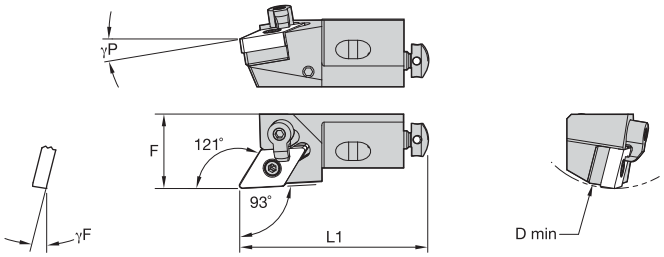
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**
60	**ICSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
70	**ICSN432**	**KLM46**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
100	**ICSN633**	**KLM68**	4 mm	**CKM35**	**STCM8**	4 mm	**KUAM27**	4 mm	**KUAM32**	–	**MS364**	8 mm	**CSWM 100 080**



See pages B47–B64 for inserts.



MDJN 93°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870405	**MDJNR16CA15**	60	25,0	63	-9.0	-9.0	DN..150408/DN..3.532
3870404	**MDJNR20CA15**	70	25,0	70	-8.5	-8.5	DN..150408/DN..3.532
left hand							
3870406	**MDJNL16CA15**	60	25,0	63	-9.0	-9.0	DN..150408/DN..3.532

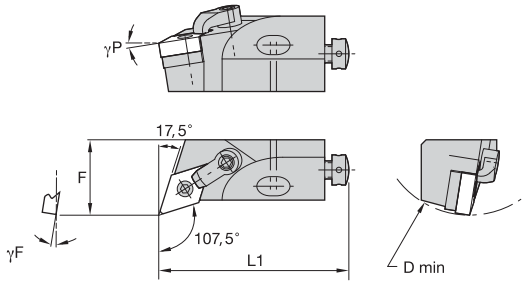
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
60	**IDSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**IDSN432**	**KLM46**	2.5 mm	**CKM41**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



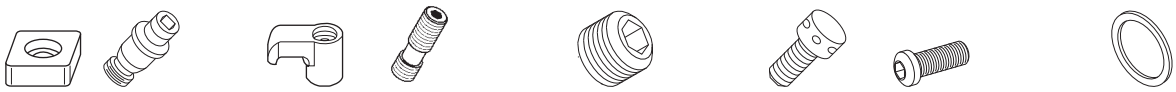
See pages B47–B64 for inserts.



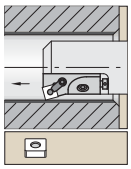
MDQN 107,5°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870361	**MDQNR16CA15**	60	25,0	63	-9.0	-6.0	DN..150408/DN..3.532
3870360	**MDQNR20CA15**	70	25,0	70	-9.0	-8.0	DN..150408/DN..3.532
left hand							
3870403	**MDQNL16CA15**	60	25,0	63	-9.0	-6.0	DN..150408/DN..3.532
3870362	**MDQNL20CA15**	70	25,0	70	-9.0	-8.0	DN..150408/DN..3.532

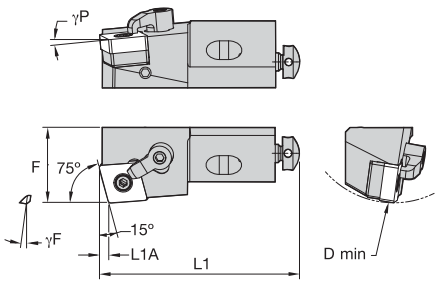
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
60	**IDSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**IDSN432**	**KLM46**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B68–B80 for inserts.



MSKN 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870352	**MSKNR10CA09**	40,0	14,0	50	2,2	-9.0	-5.0	SN..090308/SN..322
3870351	**MSKNR12CA12**	50,0	20,0	55	3,0	-9.0	-5.0	SN..120408/SN..432
3870350	**MSKNR16CA12**	60,0	25,0	63	3,0	-9.0	-5.0	SN..120408/SN..432
3870349	**MSKNR20CA15**	70,0	25,0	70	3,7	-9.0	-5.0	SN..150612/SN..543
3870348	**MSKNR25CA19**	100,0	32,0	100	4,6	-9.0	-5.0	SN..190612/SN..543
left hand								
3870356	**MSKNL10CA09**	40,0	14,0	50	2,2	-9.0	-5.0	SN..090308/SN..322
3870354	**MSKNL16CA12**	60,0	25,0	63	3,0	-9.0	-5.0	SN..120408/SN..432
3870353	**MSKNL20CA15**	70,0	25,0	70	3,7	-9.0	-5.0	SN..150612/SN..543

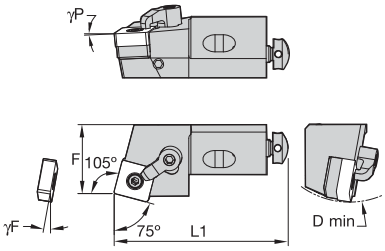
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
70	**SKSN566K**	**KLM54**	2.5 mm	**CKM37**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
100	**ISSN633**	**KLM68**	4 mm	**CKM35**	**STCM8**	4 mm	**KUAM27**	4 mm	**KUAM32**	–	**MS364**	8 mm	**CSWM 100 080**



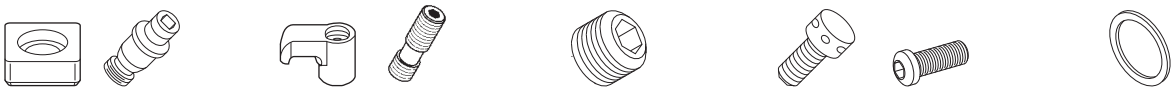
See pages B68–B80 for inserts.



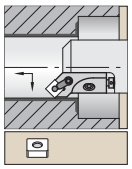
MSRN 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870344	**MSRNR10CA09**	40,0	14,0	50	-9.0	-5.0	SN..090308/SN..322
3870343	**MSRNR12CA12**	50,0	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870341	**MSRNR20CA15**	70,0	25,0	70	-9.0	-5.0	SN..150612/SN..543
left hand							
3870347	**MSRNL12CA12**	50,0	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870346	**MSRNL16CA12**	60,0	25,0	63	-9.0	-5.0	SN..120408/SN..432
3870345	**MSRNL20CA15**	70,0	25,0	70	-9.0	-5.0	SN..150612/SN..543

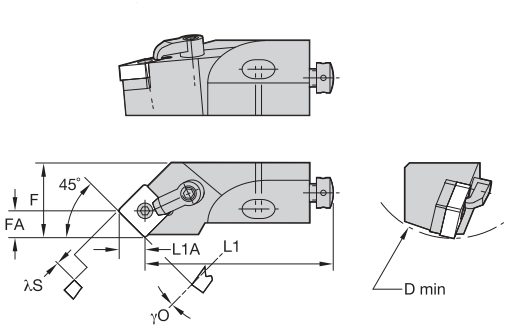
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**SKSN566K**	**KLM54**	2.5 mm	**CKM37**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



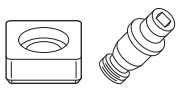
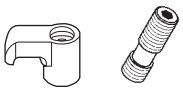
See pages B68–B80 for inserts.



MSSN 45°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3870336	**MSSNR10CA09**	40,0	14,0	44	6,1	-13.0	0.0	SN..090308/SN..322
3870335	**MSSNR12CA12**	50,0	20,0	47	8,3	-13.0	0.0	SN..120408/SN..432
3870334	**MSSNR16CA12**	60,0	25,0	53	8,3	-13.0	0.0	SN..120408/SN..432
3870333	**MSSNR20CA15**	70,0	25,0	60	10,3	-13.0	0.0	SN..150612/SN..543
left hand								
3870340	**MSSNL10CA09**	40,0	14,0	44	6,1	-13.0	0.0	SN..090308/SN..322
3870339	**MSSNL12CA12**	50,0	20,0	47	8,3	-13.0	0.0	SN..120408/SN..432
3870338	**MSSNL16CA12**	60,0	25,0	53	8,3	-13.0	0.0	SN..120408/SN..432

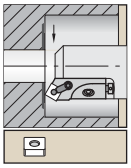
Spare Parts

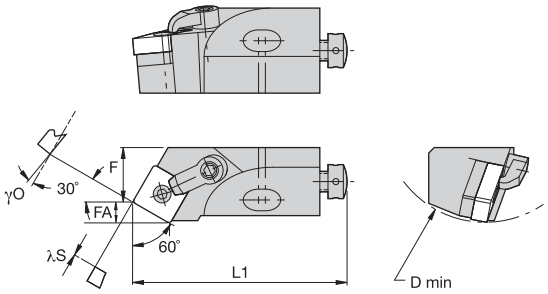




D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM36**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**SKSN566K**	**KLM54**	2.5 mm	**CKM37**	**STCM40**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



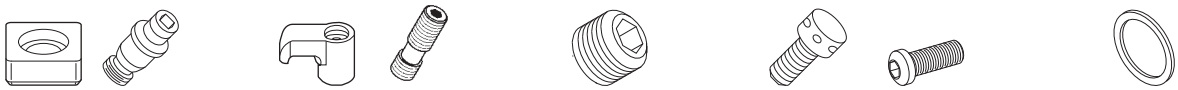
See pages B68–B80 for inserts.



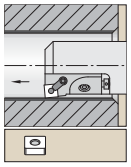
MSTN 60°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
right hand								
3870312	**MSTNR10CA09**	40,0	9,0	50	13,3	-11.0	0.0	SN..090308/SN..322
3870311	**MSTNR12CA12**	50,0	13,0	55	5,9	-11.0	0.0	SN..120408/SN..432
3870310	**MSTNR16CA12**	60,0	15,0	63	5,9	0.0	-11.0	SN..120408/SN..432

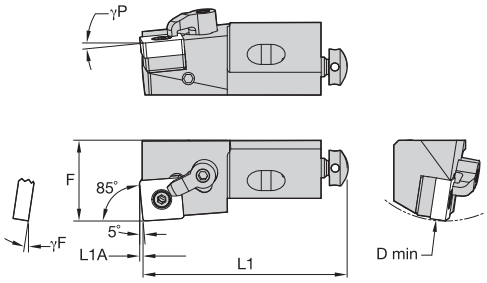
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B68–B80 for inserts.



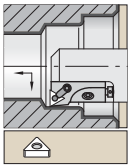
MSYN 85°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870308	**MSYNR10CA09**	40,0	14,0	50	0,8	-9.0	-5.0	SN..090308/SN..322
3870307	**MSYNR12CA12**	50,0	20,0	55	1,0	-9.0	-5.0	SN..120408 / SN..432
3870306	**MSYNR16CA12**	60,0	25,0	63	1,0	-9.0	-5.0	SN..120408 / SN..432
3870305	**MSYNR25CA19**	100,0	32,0	100	1,5	-9.0	-5.0	SN..190612/SN..643
left hand								
3870309	**MSYNL10CA09**	40,0	14,0	50	0,8	-9.0	-5.0	SN..090308/SN..322

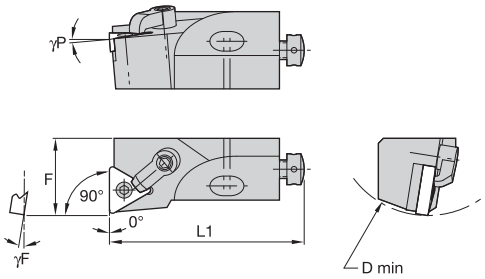
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
40	–	**KLM33**	2 mm	**CKM36**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	–	4 mm	**CSWM 060 050**
50	–	**KLM43**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**
60	**ISSN432**	**KLM46S**	2.5 mm	**CKM34**	**STCM9**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
100	**ISSN633**	**KLM68**	4 mm	**CKM35**	**STCM8**	4 mm	**KUAM27**	4 mm	**KUAM33**	–	**MS364**	8 mm	**CSWM 100 080**



See pages B81–B93 for inserts.



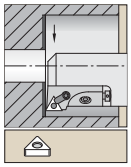
MTFN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871303	**MTFNR12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871302	**MTFNR16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871301	**MTFNR20CA22**	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432
3871300	**MTFNR25CA27**	100,0	32,0	100	-9.0	-5.0	TN..270612/TN..443
left hand							
3871306	**MTFNL12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871305	**MTFNL16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332

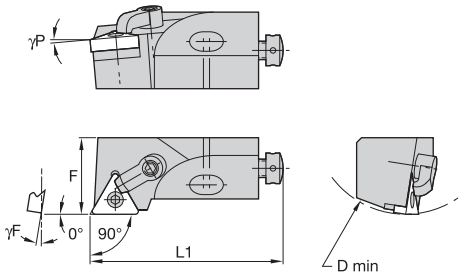
Spare Parts



D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
50	–	**KLM33L**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	–	4 mm	**CSWM 060 050**
60	**ITSN322**	**KLM34L**	2 mm	**CKM34**	**STCM9**	2 mm	**KUAM25**	2 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
70	**ITSN433**	**KLM46**	2.5 mm	**CKM35**	**STCM37**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	–	5 mm	**CSWM 080 050**
100	**ITSN534**	**KLM58**	3 mm	**CKM38**	**STCM39**	3 mm	**KUAM26**	3 mm	**KUAM32**	–	**MS364**	8 mm	**CSWM 100 080**



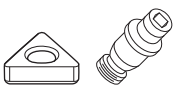
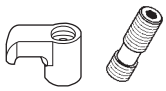
See pages B81–B93 for inserts.



MTGN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871296	**MTGNR12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871295	**MTGNR16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871294	**MTGNR20CA22**	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432
left hand							
3871299	**MTGNL12CA16**	50,0	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871298	**MTGNL16CA16**	60,0	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871297	**MTGNL20CA22**	70,0	25,0	70	-9.0	-5.0	TN..220408/TN..432

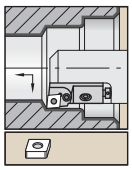
Spare Parts

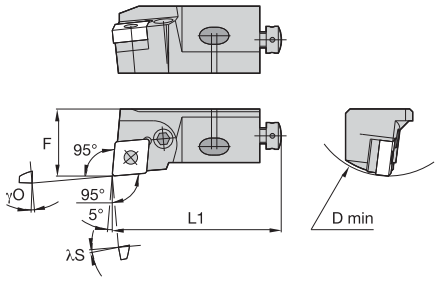




D min	shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**–**	**KLM33L**	2 mm	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**ITSN322**	**KLM34L**	2 mm	**CKM34**	**STCM9**	2 mm	**KUAM25**	2 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**ITSN433**	**KLM46**	2.5 mm	**CKM35**	**STCM37**	2.5 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



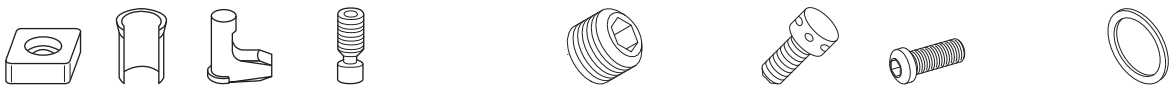
See pages B30–B46 for inserts.



PCLN 95°

order number	catalogue number	D min	F	L1	λS°	γO°	gage insert
right hand							
3871291	**PCLNR12CA12**	50	20,0	55	-6.0	-9.0	CN..120408/CN..432
3871290	**PCLNR16CA12**	60	25,0	63	-6.0	-7.0	CN..120408/CN..432
left hand							
3871293	**PCLNL16CA12**	60	25,0	63	-6.0	-7.0	CN..120408/CN..432
3871292	**PCLNL20CA16**	70	25,0	70	–	–	CN..160612/CN..543

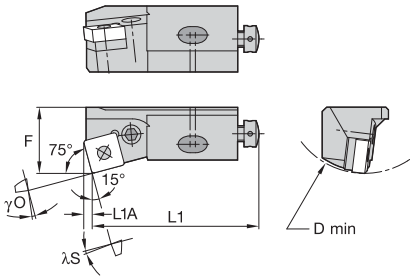
Spare Parts



D min	shim	shim pin	toggle lever	lever screw	wrench size lever screw	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	–	–	**511.022**	**514.122**	10 IP	**KUAM28**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**512.112**	**513.023**	**511.023**	**514.123**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**512.117**	**513.025**	**511.025**	**514.125**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



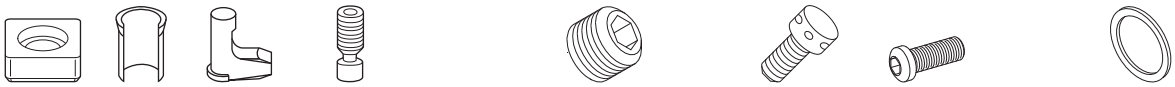
See pages B68–B80 for inserts.



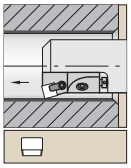
PSKN 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3871287	**PSKNR12CA12**	50,0	20,0	55	3,1	-8.0	-6.0	SN..120408/SN..432
3871286	**PSKNR16CA12**	60,0	25,0	63	3,1	-6.0	-6.0	SN..120408/SN..432
3871289	**PSKNR20CA15**	70,0	25,0	70	3,8	–	–	SN..150612/SN..543
left hand								
3871288	**PSKNL16CA12**	60,0	25,0	63	3,1	-6.0	-6.0	SN..120408/SN..432

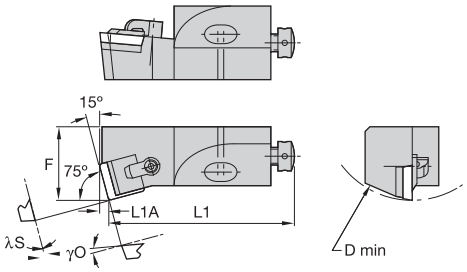
Spare Parts



D min	shim	shim pin	toggle lever	lever screw	wrench size lever screw	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	–	–	**511.022**	**514.122**	10 IP	**KUAM28**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**512.063**	**513.023**	**511.023**	**514.123**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**
70	**512.025**	**513.025**	**511.025**	**514.125**	15 IP	**KUAM23**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B186–B191 and B211–B212 for inserts.



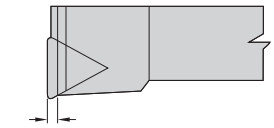
CSKP 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
right hand								
3870437	**CSKPR10CA09**	40,0	14,0	50	2,2	0.0	5.0	SP..090308/SP..322
3870436	**CSKPR12CA12**	50,0	20,0	55	3,1	0.0	5.0	SP..120308/SP..422

Spare Parts



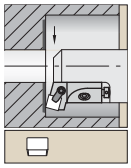
D min	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**



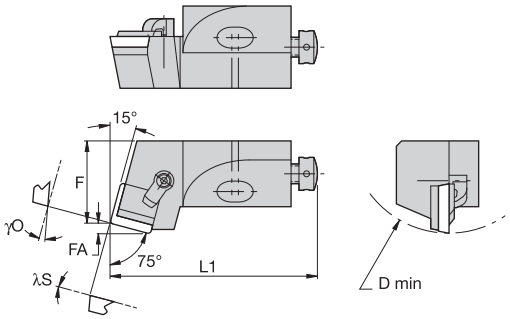
Effective Width

Chipbreakers for C-Style Cartridges

insert	Chipbreakers chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



See pages B186–B191 and B211–B212 for inserts.



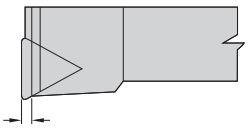
CSRP 75°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
right hand								
3870435	**CSRPR10CA09**	40,0	14,0	50	2,2	0.0	0.0	SP..090308/SP..322
3870434	**CSRPR12CA12**	50,0	20,0	55	3,0	3.0	0.0	SP..120308/SP..422

Spare Parts



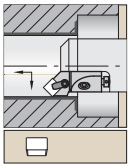
D min	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**



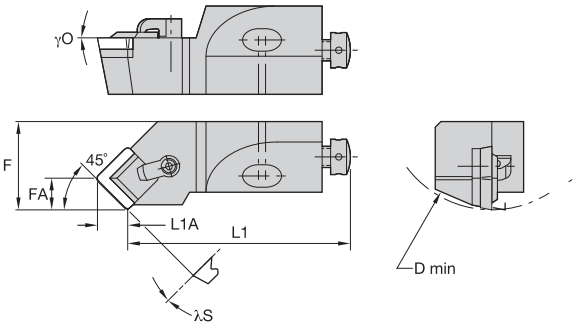
Effective Width

Chipbreakers for C-Style Cartridges

insert	Chipbreakers chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



See pages B186–B191 and B211–B212 for inserts.



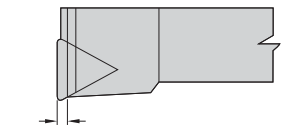
CSSP 45°

order number	catalogue number	D min	F	L1	FA	L1A	λS°	γO°	gage insert
right hand									
3870430	**CSSPR10CA09**	40,0	14,0	44	6,5	6,1	0.0	0.0	SP..090308/SP..322
3870429	**CSSPR12CA12**	50,0	20,0	47	8,7	8,3	0.0	0.0	SP..120308/SP..422
left hand									
3870433	**CSSPL10CA09**	40,0	14,0	44	6,5	6,1	0.0	0.0	SP..090308/SP..322
3870432	**CSSPL12CA12**	50,0	20,0	47	8,7	8,3	0.0	0.0	SP..120308/SP..422
3870431	**CSSPL20CA12**	70,0	25,0	60	–	8,3	0.0	0.0	SP..120308/SP..422

Spare Parts



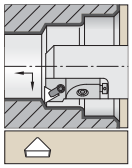
D min	shim	shim screw	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	–	–	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	–	–	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
70	**SM840**	**MS111**	2 mm	**CKM20**	**STCM11**	3 mm	**KUAM26**	3 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



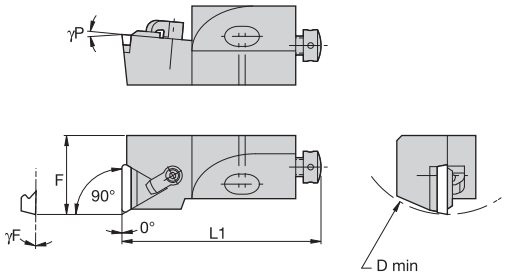
Effective Width

Chipbreakers for C-Style Cartridges

	Chipbreakers		
insert	chipbreaker	effective width	note
SP..090308/SP..322	CBS-12	2.1	
	CBS-12D**	2.1	**For chipbreaking on both primary and secondary cutting edges
SP..120308/SP..422	CBS16	4.4	
	CBS-16D**	2.8	**For chipbreaking on both primary and secondary cutting edges
	CBS-16N	3.0	
	CBS16F	2.1	



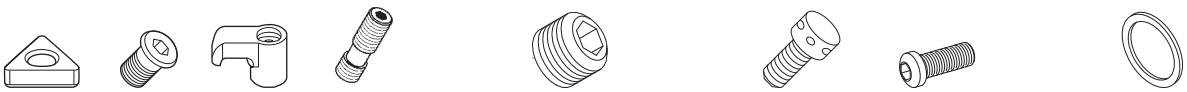
See pages B192–B194 and B212–B216 for inserts.



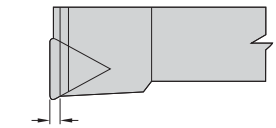
CTFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870427	**CTFPR10CA11**	40,0	14,0	50	0.0	5.0	TP..110304/TP..421
3870426	**CTFPR12CA16**	50,0	20,0	55	0.0	5.0	TP..160308/TP..322
3870424	**CTFPR20CA22**	70,0	25,0	70	0.0	5.0	TP..220408/TP..432
left hand							
3870428	**CTFPL12CA16**	50,0	20,0	55	0.0	5.0	TP..160308/TP..322

Spare Parts

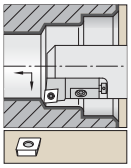


D min	shim	shim screw	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	–	–	**CKM34**	**STCM38**	2 mm	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	–	–	**CKM34**	**STCM38**	2 mm	**KUAM22**	2 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
70	**SM837**	**MS125**	**CKM35**	**STCM8**	4 mm	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**

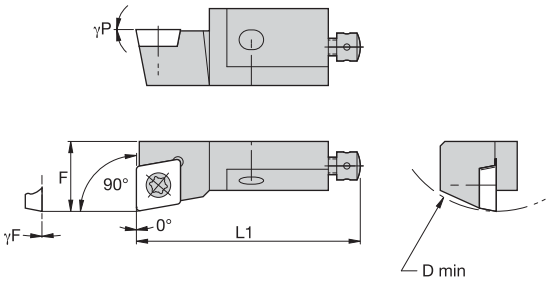


Chipbreakers for C-Style Cartridges

	Chipbreakers		
insert	chipbreaker	effective width	note
TP..110304/TP..421	CBT-8	2.2	
TP..160308/TP..322	CBT-12*	4.0	*Use with CTC-style holder only
	CBT-12*	2.7	*Use with CTC-style holder only
	CBT-12*	2.2	*Use with CTC-style holder only
TP..220408/TP..432	CBT-16	5.5	
	CBT-16N	3.2	
	CBT-16F	2.1	



See pages B30–B46 for inserts.



SCFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871284	**SCFPR06CA05**	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871283	**SCFPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871272	**SCFPR10CA09**	40	14,0	50	0.0	0.0	CP..09T308/CP..3252
left hand							
3871285	**SCFPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151

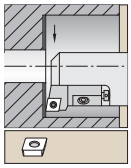
Spare Parts



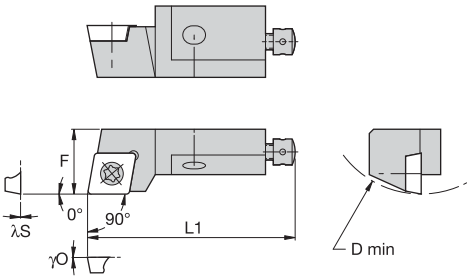





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
20	**MS1933**	T7	**KUAM34**	1.5 mm	**KUAM35**	**–**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**



See pages B30–B46 for inserts.



SCGP 90°

order number	catalogue number	D min	F	L1	λS°	γO°	gage insert
right hand							
3871270	**SCGPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
left hand							
3871271	**SCGPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151

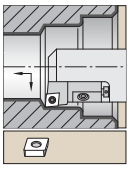
Spare Parts



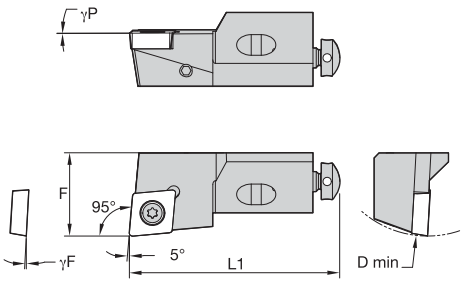




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



See pages B30–B46 for inserts.



SCLC 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871268	**SCLCR10CA09**	40	14,0	50	-3.0	0.0	CC..09T308/CC..3252
3871265	**SCLCR12CA12**	50	20,0	55	-3.0	0.0	CC..120408/CC..432
left hand							
3871267	**SCLCL12CA12**	50	20,0	55	-3.0	0.0	CC..120408/CC..432
3871266	**SCLCL16CA12**	60	25,0	63	-3.0	0.0	CC..120408/CC..432

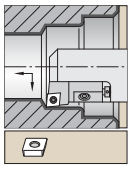
Spare Parts



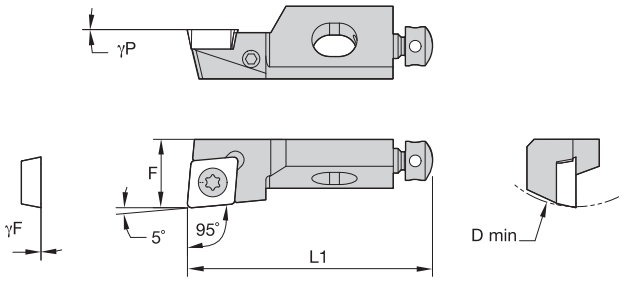




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**MS1157**	T15	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B30–B46 for inserts.



SCLP 95°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871261	**SCLPR06CA05**	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871260	**SCLPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871259	**SCLPR10CA09**	40	14,0	50	0.0	0.0	CP..09T308/CP..3252
left hand							
3871264	**SCLPL06CA05**	20	8,0	25	0.0	0.0	CP..050204/CP..18151
3871263	**SCLPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
3871262	**SCLPL10CA09**	40	14,0	50	0.0	0.0	CP..09T308/CP..3252

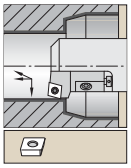
Spare Parts



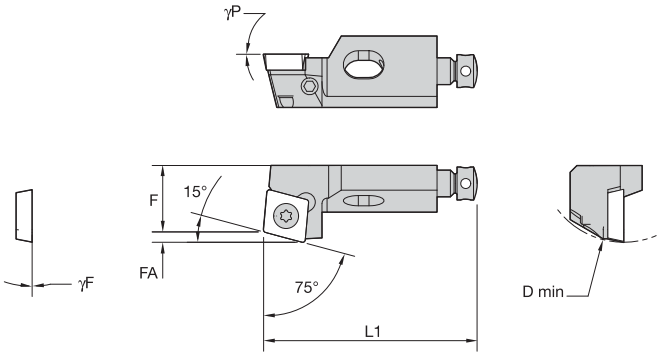





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
20	**MS1933**	T7	**KUAM34**	1.5 mm	**KUAM35**	**–**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**



See pages B30–B46 for inserts.



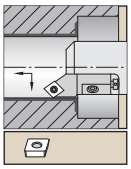
SCRP 75°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3871257	**SCRPR08CA06**	25	10,0	1,5	32	0.0	0.0	CP..060204/CP..2151
left hand								
3871258	**SCRPL08CA06**	25	10,0	1,5	32	0.0	0.0	CP..060204/CP..2151

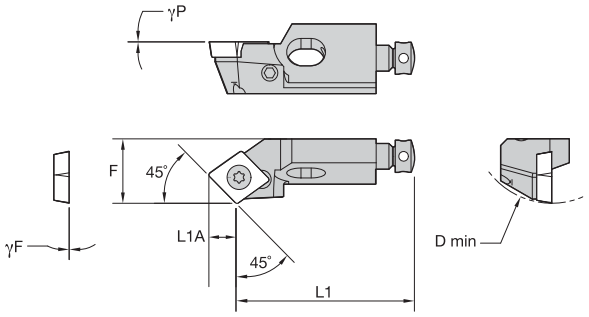
Spare Parts



D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



See pages B30–B46 for inserts.



SCSP 45°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3871255	**SCSPR06CA05**	20	8,0	21	4	0.0	0.0	CP..050204/CP..18151
3871254	**SCSPR08CA06**	25	10,0	28	4	0.0	0.0	CP..060204/CP..2151

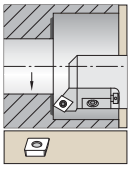
Spare Parts



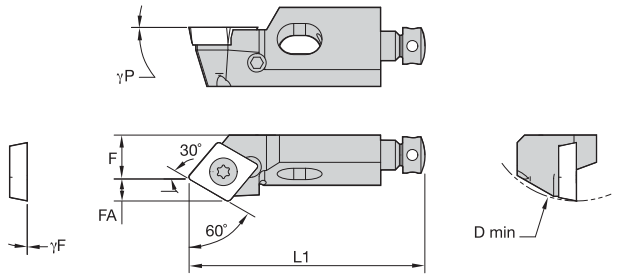




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
20	**MS1933**	T7	**–**	–	**KUAM35**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



See pages B30–B46 for inserts.



SCTP 60°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3871252	**SCTPR06CA05**	20	5,5	2,6	25	0.0	0.0	CP..050204/CP..18151
3871251	**SCTPR08CA06**	25	6,0	3,0	32	0.0	0.0	CP..060204/CP..2151
left hand								
3871253	**SCTPL08CA06**	25	6,0	3,0	32	0.0	0.0	CP..060204/CP..2151

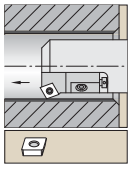
Spare Parts



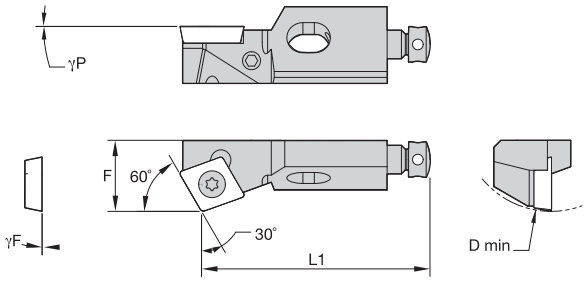




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
20	**MS1933**	T7	**–**	–	**KUAM35**	**MS2173**	2 mm	**CSWM 035 040**
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



See pages B30–B46 for inserts.



SCWP 60°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871249	**SCWPR08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151
left hand							
3871250	**SCWPL08CA06**	25	10,0	32	0.0	0.0	CP..060204/CP..2151

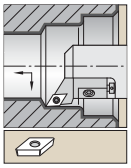
Spare Parts



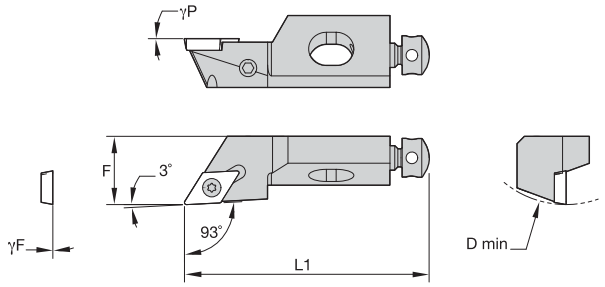




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**MS2175**	2.5 mm	**CSWM 040 050**



See pages B47–B64 for inserts.



SDJP 93°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871247	**SDJPR10CA07**	40	14,0	50	0.0	0.0	DP..070204/DP..2151
left hand							
3871248	**SDJPL10CA07**	40	14,0	50	0.0	0.0	DP..070204/DP..2151

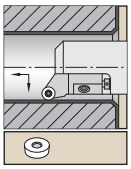
Spare Parts



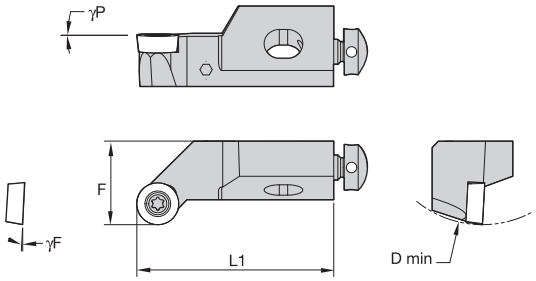




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**



See pages B65–B67 for inserts.



SRGC

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871245	**SRGCR08CA06**	25	10,0	32	-4.0	0.0	RC..0602M0/RC..215
3871244	**SRGCR10CA08**	40	14,0	50	-3.0	0.0	RC..0803M0/RC..0803M0
left hand							
3871246	**SRGCL12CA10**	50	20,0	55	-3.0	0.0	RC..10T3M0/RC..10T3M0

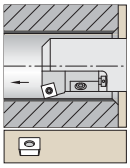
Spare Parts



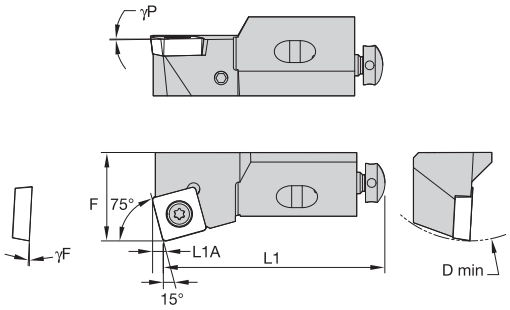





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1153**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1154**	T9	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



See pages B68–B80 for inserts.



SSKC 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3871192	**SSKCR10CA09**	40	14,0	50	-4.3	-2.5	SC..09T308/SC..3252
3871191	**SSKCR12CA12**	50	20,0	55	-3.0	0.0	SC..120408/SC..432
3871190	**SSKCR16CA12**	60	25,0	63	-3.0	0.0	SC..120408/SC..432
left hand							
3871243	**SSKCL12CA12**	50	20,0	55	-3.0	0.0	SC..120408/SC..432

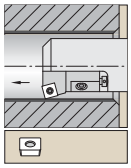
Spare Parts



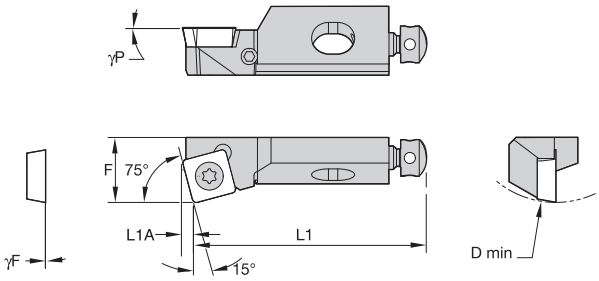




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**MS1157**	T15	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B68–B80 for inserts.



SSKP 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870393	SSKPR10CA09	40	14,0	50	0.0	0.0	SP..09T308/SP..3252
3870392	SSKPR12CA09	50	20,0	55	0.0	0.0	SP..09T308/SP..3252
left hand							
3870394	SSKPL10CA09	40	14,0	50	0.0	0.0	SP..09T308/SP..3252

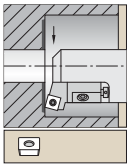
Spare Parts



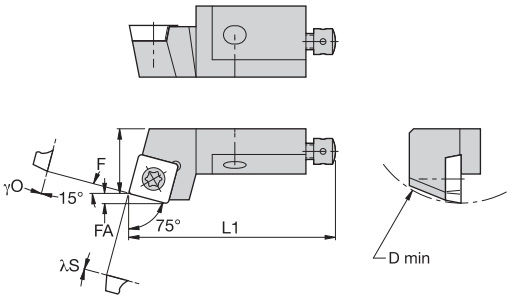




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	MS1155	T15	KUAM28	2 mm	KUAM30	191.405	4 mm	CSWM 060 050
50	MS1155	T15	KUAM23	2.5 mm	KUAM31	191.406	4 mm	CSWM 060 050



See pages B68–B80 for inserts.



SSRC 75°

order number	catalogue number	D min	F	FA	L1	λS°	γO°	gage insert
right hand								
3870390	**SSRCR12CA12**	50	20,0	3,1	55	-3.0	0.0	SC..120408/SC..432
left hand								
3870391	**SSRCL12CA12**	50	20,0	3,1	55	-3.0	0.0	SC..120408/SC..432

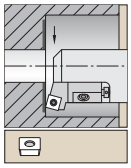
Spare Parts



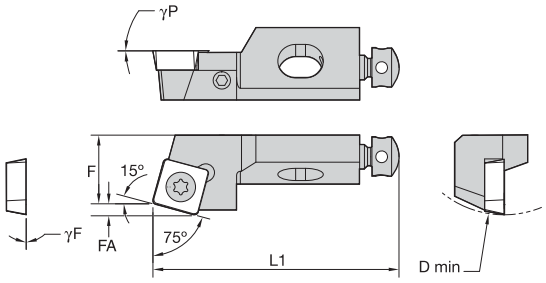




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**



See pages B68–B80 for inserts.



SSRP 75°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3870388	**SSRPR10CA09**	40	14,0	2,2	50	0.0	0.0	SP..09T308/SP..3252
left hand								
3870389	**SSRPL10CA09**	40	14,0	2,2	50	0.0	0.0	SP..09T308/SP..3252

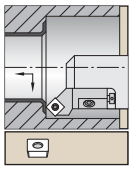
Spare Parts



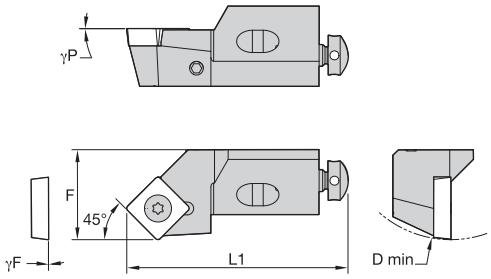




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**



See pages B68–B80 for inserts.



SSSC 45°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870386	**SSSCR10CA09**	40	14,0	44	-3.0	0.0	SC..09T308/SC..3252
3870385	**SSSCR12CA12**	50	20,0	47	-3.0	0.0	SC..120408/SC..432
3870384	**SSSCR16CA12**	60	25,0	53	0.0	0.0	SC..120408/SC..432
left hand							
3870387	**SSSCL12CA12**	50	20,0	47	-3.0	0.0	SC..120408/SC..432

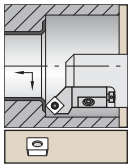
Spare Parts



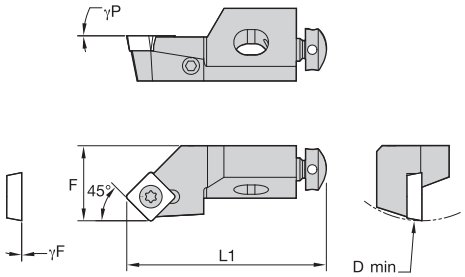




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**
50	**MS1157**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	4 mm	**CSWM 060 050**
60	**MS1157**	T15	**KUAM25**	2.5 mm	**KUAM32**	**191.407**	5 mm	**CSWM 080 050**



See pages B68–B80 for inserts.



SSSP 45°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870382	**SSSPR10CA09**	40	14,0	44	0.0	0.0	SP..09T308/SP..3252
left hand							
3870383	**SSSPL10CA09**	40	14,0	44	0.0	0.0	SP..09T308/SP..3252

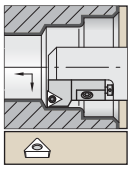
Spare Parts



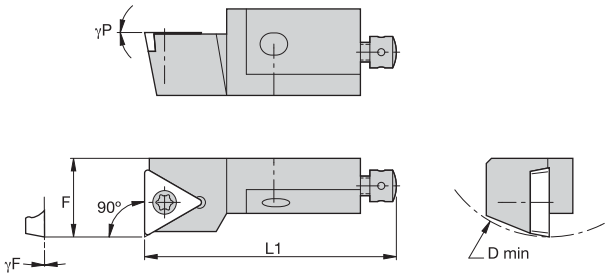




D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
40	**MS1155**	T15	**KUAM28**	2 mm	**KUAM30**	**191.405**	4 mm	**CSWM 060 050**



See pages B81–B93 for inserts.



STFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870378	**STFPR08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870377	**STFPR10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870376	**STFPR12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252
left hand							
3870381	**STFPL08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870380	**STFPL10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870379	**STFPL12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252

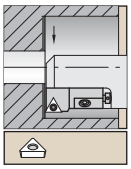
Spare Parts



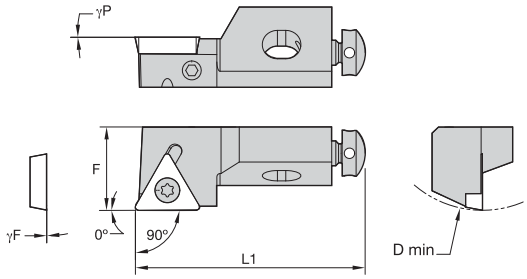





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



See pages B81–B93 for inserts.



STGP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
right hand							
3870372	**STGPR08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870371	**STGPR10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151
3870370	**STGPR12CA16**	50	20,0	55	0.0	0.0	TP..16T308/TP..3252
left hand							
3870374	**STGPL08CA09**	25	10,0	32	0.0	0.0	TP..090204/TP..18151
3870373	**STGPL10CA11**	40	14,0	50	0.0	0.0	TP..110204/TP..2151

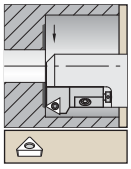
Spare Parts



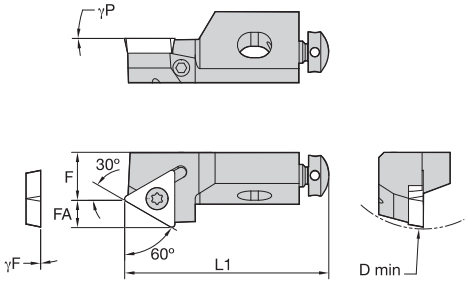





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



See pages B81–B93 for inserts.



STTP 60°

order number	catalogue number	D min	F	FA	L1	γF°	γP°	gage insert
right hand								
3870369	**STTPR08CA09**	25	6,0	4,3	32	0.0	0.0	TP..090204/TP..18151
3870368	**STTPR10CA11**	40	9,0	4,9	50	0.0	0.0	TP..110204/TP..2151
3870367	**STTPR12CA16**	50	13,0	7,2	55	0.0	0.0	TP..16T308/TP..3252

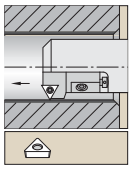
Spare Parts



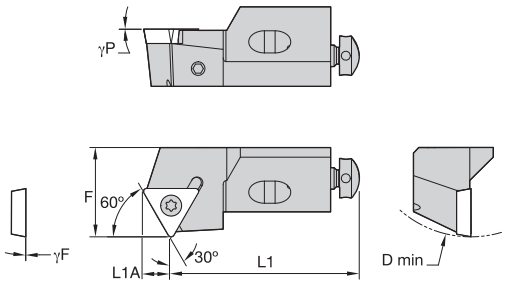





D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



See pages B99–B105 for inserts.



STWP 60°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
right hand								
3870364	**STWPR08CA09**	25	10,0	28	4,3	0.0	0.0	TP..090204/TP..18151
3870363	**STWPR10CA11**	40	14,0	44	5,0	0.0	0.0	TP..110204/TP..2151
3870252	**STWPR12CA16**	50	20,0	47	7,2	0.0	0.0	TP..16T308/TP..3252
left hand								
3870366	**STWPL10CA11**	40	14,0	44	5,0	0.0	0.0	TP..110204/TP..2151
3870365	**STWPL12CA16**	50	20,0	47	7,2	0.0	0.0	TP..16T308/TP..3252

Spare Parts








D min	insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	holding screw	hex	washer
25	**MS1152**	T7	**KUAM34**	1.5 mm	**KUAM20**	**–**	**MS2175**	2.5 mm	**CSWM 040 050**
40	**MS1153**	T7	**KUAM28**	2 mm	**KUAM30**	**191.405**	**–**	4 mm	**CSWM 060 050**
50	**MS1155**	T15	**KUAM23**	2.5 mm	**KUAM31**	**191.406**	**–**	4 mm	**CSWM 060 050**



Turning • Tools for Small Hole Boring

Small Hole Boring I.D. Indexable Insert Tooling D2–D59

A/B Series D60–D71

Quadralock D72–D84

Technical Information D86–D89

Custom Solution Worksheet D90–D91

The WIDIA™ line of micro boring bars provide accurate holemaking tooling in diameters as small as 1,57mm. These economical, indexable inserts are available in both steel and carbide shanks and are stocked in both metric and inch sizes. Ideal for a wide range of applications, including precision micro boring.



Small Hole Boring •
I.D. Indexable Insert Tooling

80° Diamond Insert Boring Bars

- Available in shanks as small as 4mm to bore >4,57mm diameter.
- Positive rake geometry for free cutting action and better surface finishes.
- Superior, unobstructed chip evacuation.
- Stocked in multiple grades to bore a wide range of materials.

Threading and Grooving Boring Bars

- Easy insert changes for threading and grooving.
- Thread down to a 48 TPI, 1,3mm TP (pitch).
- Thread and groove capabilities to an inside bore diameter of 6,91mm.





Multi-application tooling — groove and thread with the same bar.

Inserts available in multiple styles and grades, including polycrystalline diamond tipped, for all machining applications.

0,05mm insert nose radii available; insert repeatability within 0,005mm.

Choose from high-quality steel or carbide shanks with through tool coolant capabilities.



Triangle Insert Boring Bars

- Designed for less obstruction and greater chip evacuation.
- Positive rake geometry to bore holes >6,98mm diameter.
- Stocked in all grades, including diamond-tipped and borazon-tipped styles.
- Stocked in shanks as small as 6mm for 7,06mm minimum bore diameter.



The World's Most Comprehensive Boring Solutions

Trust the WIDIA™ full line of boring tools to meet all of your demanding job requirements. Whatever the work at hand, you are sure to find the most appropriate solution in this comprehensive, easy-to-use guide.

We engineer only the BEST boring tools, guaranteed to reduce your machining time, provide superior results, and outperform the competition.



Select the Correct Small Hole Boring Product Platform for Your Application

1 Determine tooling system to be used based on hole size to be bored (D min).

NOTE: Proper bar selection will have largest minimum bore dimension under hole size to be bored.

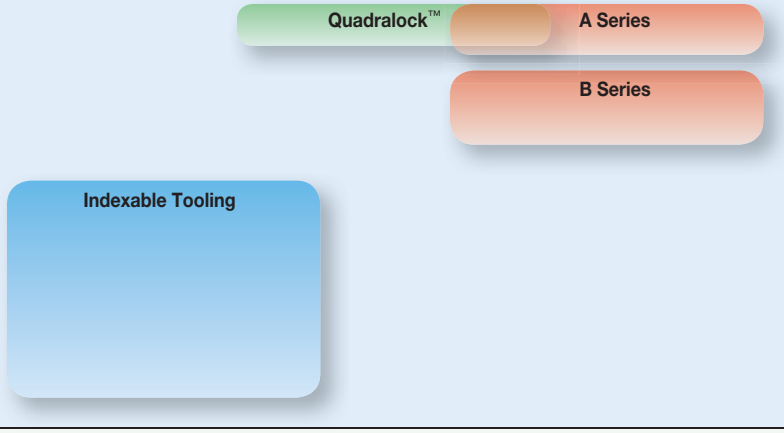
- Indexable Tooling
- A/B Series
- Quadralock

Boring

minimum bore diameter (D min)	high performance ◀ ▶ general performance
1	Quadralock™
2	A Series
3	
4	B Series
5	
6	Indexable Tooling
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	

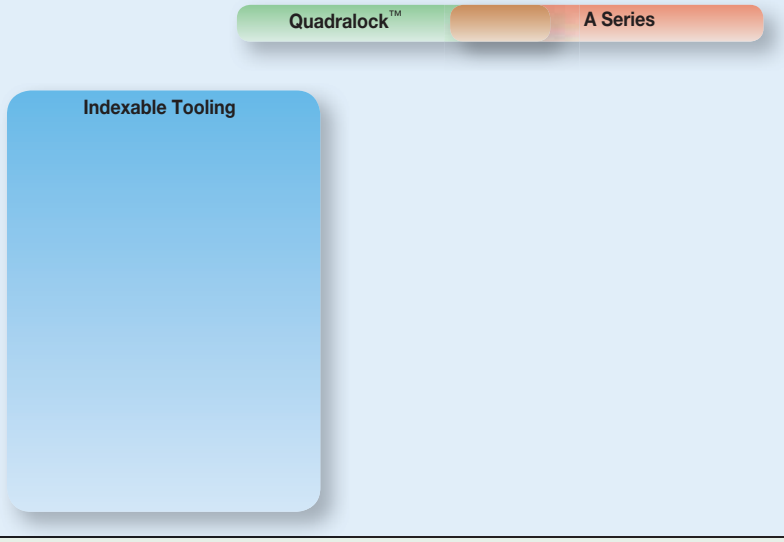
Profiling

minimum bore diameter (D min)	high performance ◀ ▶ general performance
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	



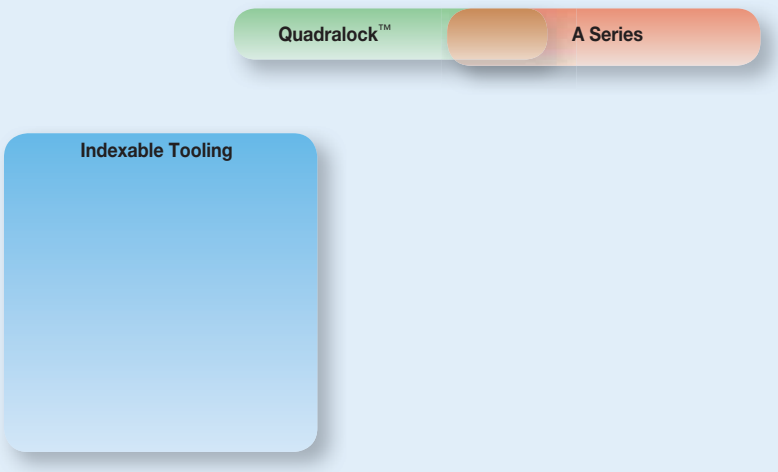
Threading

minimum bore diameter (D min)	high performance ◀ ▶ general performance
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	



Grooving

minimum bore diameter (D min)	high performance ◀ ▶ general performance
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	



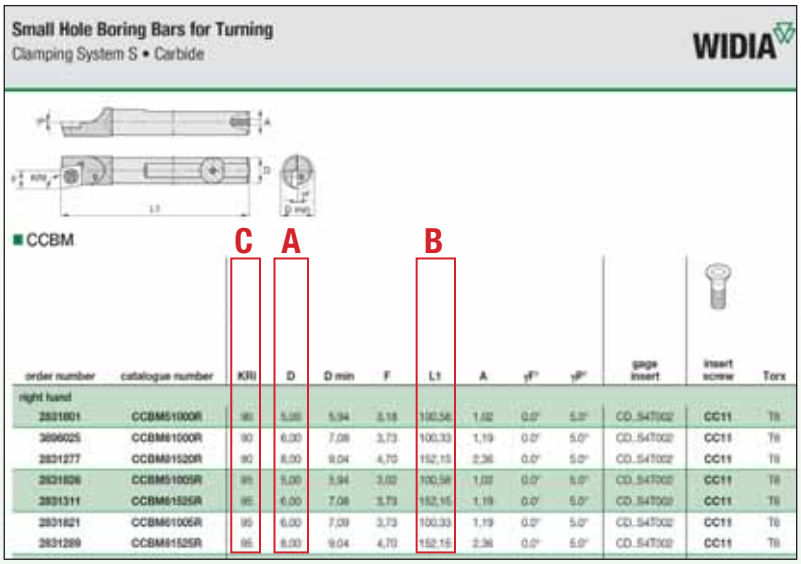
NOTE: Proper bar selection will have largest minimum bore dimension under hole size to be bored.

2 Determine boring bar (D).

A Select shank size (D) based on your machine's requirements.

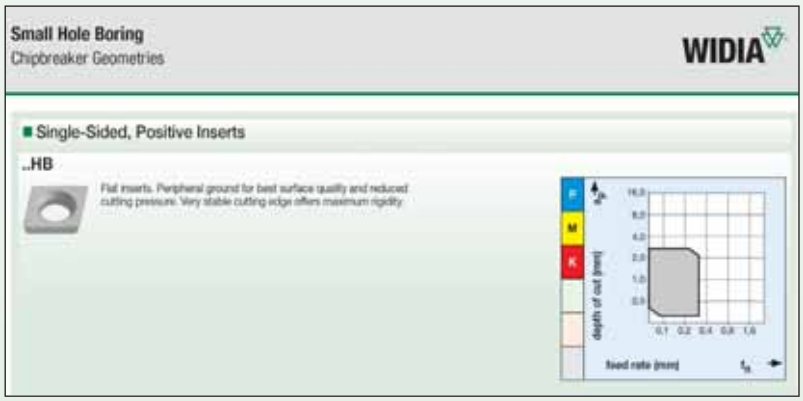
B Determine bore depth (how far the boring bar extends from the holder). Multiply bar diameter by 4. If bore depth is less, use a steel bar. If bore depth exceeds 4:1 ratio, use a carbide bar. Use L1 or L4 depending on bar selected. *(See recommended maximum overhang chart on **page D86**.)* For indexable tooling, go to **step 3**. For all other tooling systems, go directly to **step 4**.

C Determine lead angle (KRA). Zero degree lead angle is used when maximum stability is required. Lead angle may vary based on changing conditions, such as boring in a blind hole.



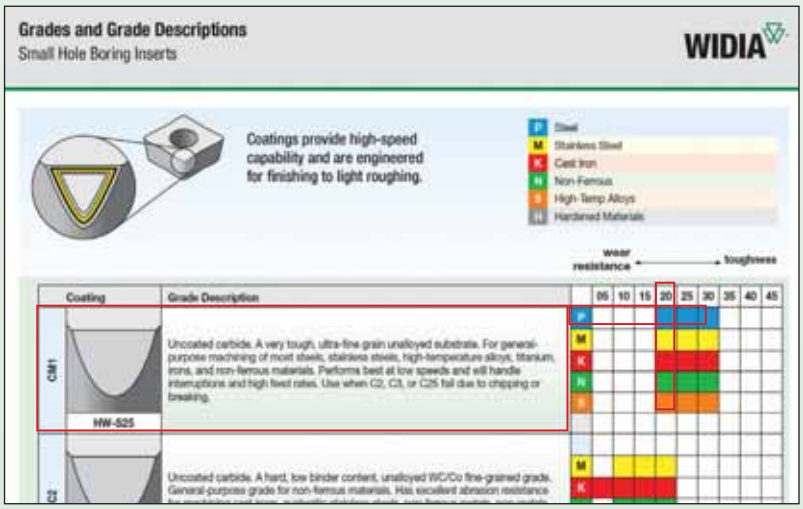
3 Determine which chipbreaker is best for the material to be machined.

Consult the Small Hole Boring Chipbreaker Geometry charts on **pages D34–D37.**



4 Determine which grade is best for the material to be machined.

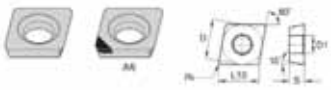
Consult the Grades and Grade Descriptions charts on **pages D38–D39.**



5 Select the appropriate insert based on style, grade, and geometry.

Small Hole Boring Positive Inserts

WIDIA



● first choice
□ alternate choice

■ CDHB

ISO catalogue number	D	L10	S	Re	D1	max	C2	C25	C3	CG5	CG55	CM1	AL0	TN7	CBN6	CP21
CDHBS4T0X0	3,97	4,03	1,02	0,05	2,13	–	+	2830987	+	3884731	+	2830988	2830981	+	+	+
CDHBS4T0X0M	3,97	4,03	1,02	0,05	2,13	1,80	+	+	+	+	+	+	+	+	2830148	+
CDHBS4T002	3,97	4,03	1,02	0,18	2,13	–	+	2830964	+	3884732	+	2830953	2830948	2830670	+	+
CDHBS4T002M	3,97	4,03	1,02	0,18	2,13	0,96	+	+	+	+	+	+	+	+	2830141	2830714
CDHBS4T004M	3,97	4,03	1,02	0,38	2,13	0,96	+	+	+	+	+	+	+	+	+	2830169
CDHBS4T004	3,97	4,03	1,02	0,38	2,13	–	+	2830930	+	2830786	+	2830817	2830813	+	2830693	+

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.

6 Determine the Speed and Feed Chart with the appropriate cutting data.

A Based on grade and edge geometry, identify starting speed (vc) and feed (fz). The first choice starting feed is in bold.

B Use the corresponding speed located in the same column below the feed information.

Speed and Feed Chart

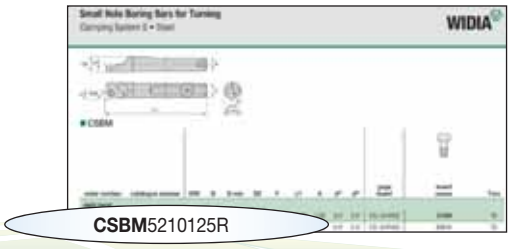
Positive Inserts • Metric

Cutting Speed – vc m/min

Material Group		C2 min	C2 Start	C2 max	C25 min	C25 Start	C25 max	C3 min	C3 Start	C3 max	CG5 min	CG5 Start	CG5 max	CG55 min	CG55 Start
P	ap [mm]	–	–	–	–	–	–	–	–	–	0,051	–	0,300	0,051	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,300	0,025	–
	0/1	–	–	–	–	–	–	–	–	–	95	**115**	140	105	**130**
	2	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**
	3 A	–	–	–	–	–	–	–	–	–	60 B	**75**	90	65	**85**
	4	–	–	–	–	–	–	–	–	–	45	**60**	70	50	**65**
	5	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**
	6	–	–	–	–	–	–	–	–	–	40	**50**	60	45	**55**
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	55	**70**	80	60	**80**	95	60	**80**	95	75	**90**	110	80	**100**
	2	50	**60**	75	55	**70**	85	55	**70**	85	65	**80**	100	75	**90**
	3	35	**45**	55	45	**50**	65	45	**50**	65	50	**60**	75	55	**65**
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	50	**65**	80	60	**70**	85	60	**70**	85	60	**75**	90	65	**80**
	2	65	**80**	100	75	**90**	110	75	**90**	110	75	**95**	115	85	**105**
	3	50	**60**	75	55	**65**	80	55	**65**	80	55	**70**	80	60	**75**
N	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–
	1	400	**505**	605	400	**505**	605	400	**505**	605	400	**505**	605	445	**555**
	2	295	**370**	440	295	**370**	445	295	**370**	445	295	**370**	445	325	**405**
	3	70	**85**	105	70	**85**	105	70	**85**	105	85	**105**	125	90	**115**
	4	310	**380**	465	310	**385**	465	310	**385**	465	140	**175**	210	155	**190**

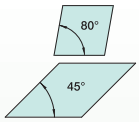
How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



C	S	B	M	
Series Type	Bar Type	Bar Style Designation	Units	Insert Shape (optional)

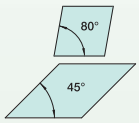
C



F



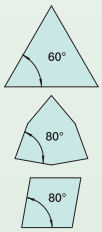
G



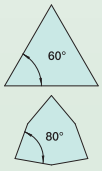
L

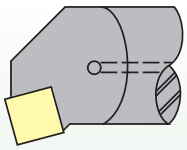


Q

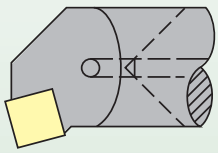


S





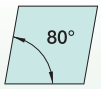
S = Steel
(with coolant)



C = Carbide
(with coolant)

M = Metric

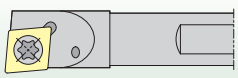
C



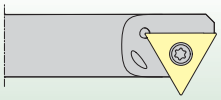
W



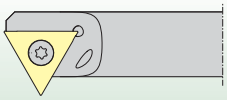
B
Boring Bar



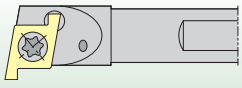
C
External
Chamfering Bar



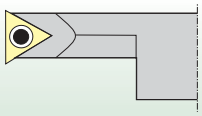
I
Internal
Threading Bar



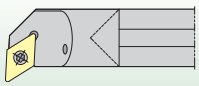
M
Offset Internal
Grooving Bar



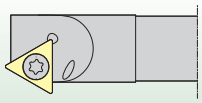
O
Offset Boring Bar



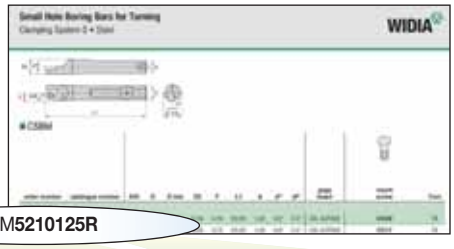
P
Profiling Bar



R
Reverse Chamfer
or Back Chamfer Bar



By referencing this easy-to-use guide, you can identify the correct product to meet your needs.

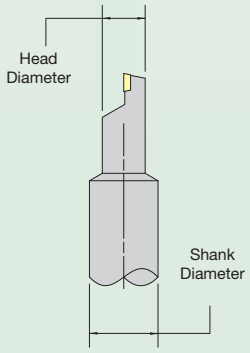


CSBM**5210125R**

52	**10**	**12**	**5**	**R**
Head Diameter shown as "D2"	Shank Diameter shown as "D"	Length/Depth shown as "L1/L4"	Lead Angle*	Hand of Tool

Metric

7 = 6,60mm
8 = 8,18mm/8,20mm
10 = 9,78mm
13 = 12,70mm/ 12,95mm
45 = 4,57mm
48 = 4,80mm
52 = 5,16mm
53 = 5,30mm
64 = 6,60mm
66 = 6,55mm/6,60mm
82 = 8,15mm
95 = 9,50mm
99 = 9,91mm
159 = 15,88mm



NOTE: Only shown on stepped-style bars.

Metric

4 = 4,00mm
5 = 5,00mm
6 = 6,00mm
8 = 8,00mm
10 = 10,00mm
12 = 12,00mm
16 = 16,00mm

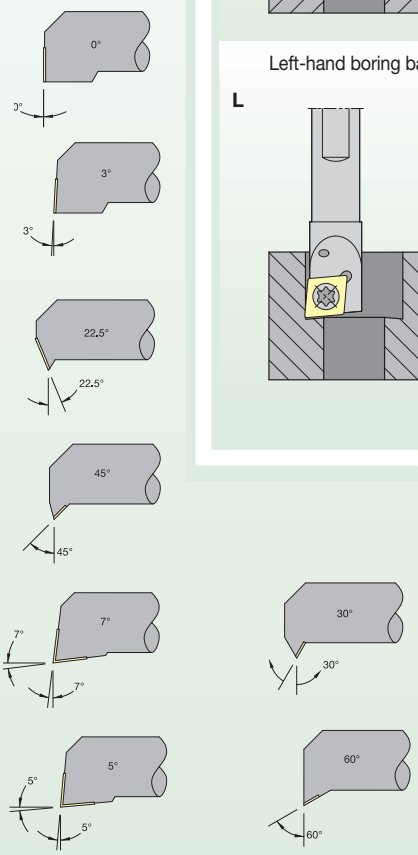
Bore Length for Step Bars
Thread Depth for Threading Bars
Overall Length for Straight Shank Bars

Metric

12 = 12,70mm
19 = 19,05mm
22 = 22,23mm
25 = 25,40mm
32 = 31,75mm
38 = 38,10mm
48 = 47,63mm
51 = 50,80mm
63 = 63,50mm
64 = 64,00mm
76 = 76,00mm
79 = 79,38mm
100 = 100,58mm/ 101,50mm/ 101,60mm
102 = 101,60mm
127 = 127,00mm
152 = 152,00mm 152,40mm
178 = 177,80mm 179,90mm
203 = 203,20mm
254 = 254,00mm

0 = 90°
Used for Threading/ Grooving Bars

3 = 3°
5 = 5°
7 = 7°
225 = 22.5°
30 = 30°
45 = 45°
60 = 60°

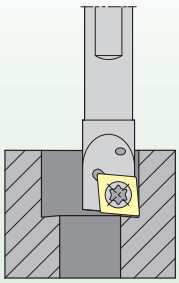


*NOTE: Shown as "KRI" for metric bars.

R = Right hand
L = Left hand

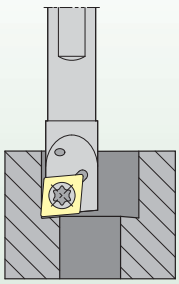
Right-hand boring bar

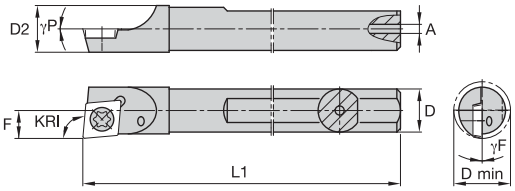
R



Left-hand boring bar

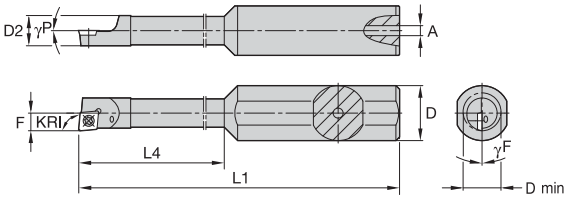
L





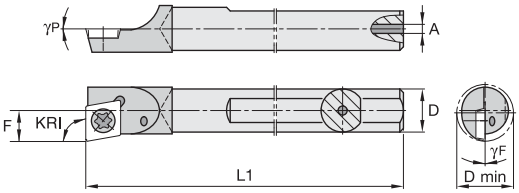
CSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3896205	**CSBM5650R**	90	5,00	5,94	5,16	3,10	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831676	**CSBM6650R**	90	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831441	**CSBM5655R**	95	5,00	5,79	5,16	2,95	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831687	**CSBM6655R**	95	6,00	7,09	6,21	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831666	**CSBM8765R**	95	8,00	9,04	8,18	4,70	76,20	1,52	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831701	**CSBM4657R**	97	4,00	4,57	4,22	2,41	63,50	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
left hand													
3896204	**CSBM5650L**	90	5,00	5,94	5,16	3,10	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
3896207	**CSBM6650L**	90	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896209	**CSBM8760L**	90	8,00	9,05	8,18	4,70	76,00	2,40	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896206	**CSBM5655L**	95	5,00	5,78	5,16	2,95	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
3896208	**CSBM6655L**	95	6,00	7,09	6,20	3,73	63,50	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3517652	**CSBM8765L**	95	8,00	9,04	8,18	9,04	76,20	1,52	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831695	**CSBM4657L**	97	4,00	4,57	4,22	2,41	63,50	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6



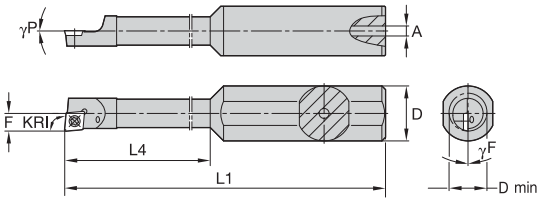
CSBM • STEPPED

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2831606	**CSBM5210250R**	90	10,00	5,94	5,16	3,10	70,00	25,72	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831499	**CSBM5212250R**	90	12,00	5,94	5,16	3,10	70,00	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831477	**CSBM6412190R**	90	12,00	7,42	6,60	3,86	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831462	**CSBM6412320R**	90	12,00	7,42	6,60	3,86	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831661	**CSBM4510125R**	95	10,00	5,18	4,57	5,18	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831639	**CSBM5210125R**	95	10,00	5,78	5,16	2,95	70,00	12,30	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831615	**CSBM5210255R**	95	10,00	5,78	5,16	5,78	69,85	24,96	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831595	**CSBM6410195R**	95	10,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831548	**CSBM4512125R**	95	12,00	5,18	4,57	2,64	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831512	**CSBM5212255R**	95	12,00	5,78	5,16	2,95	70,00	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831490	**CSBM6412195R**	95	12,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831468	**CSBM6412325R**	95	12,00	7,24	6,60	3,68	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
left hand														
2831656	**CSBM4510125L**	95	10,00	5,18	4,57	2,64	70,00	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831588	**CSBM6410195L**	95	10,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3890853	**CSBM4512125L**	95	12,00	5,18	4,57	2,64	69,85	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
3890854	**CSBM4512255L**	95	12,00	5,18	4,57	2,64	69,85	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831528	**CSBM5212125L**	95	12,00	5,78	5,16	2,95	70,00	12,70	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831483	**CSBM6412195L**	95	12,00	7,24	6,60	3,68	70,00	19,05	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3890855	**CSBM6412325L**	95	12,00	7,24	6,60	3,68	70,00	31,75	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6



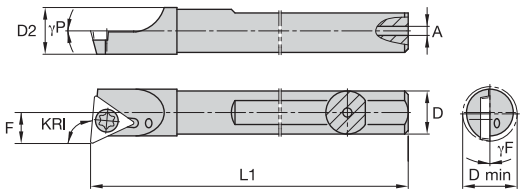
CCBM

order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
2831801	**CCBM51000R**	90	5,00	5,94	3,18	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896025	**CCBM61000R**	90	6,00	7,08	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831277	**CCBM81520R**	90	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831826	**CCBM51005R**	95	5,00	5,94	3,02	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831311	**CCBM61525R**	95	6,00	7,08	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831821	**CCBM61005R**	95	6,00	7,09	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831289	**CCBM81525R**	95	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831832	**CCBM41007R**	97	3,96	4,57	2,41	100,33	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
2831324	**CCBM41527R**	97	4,00	4,57	2,41	152,40	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
left hand												
3896023	**CCBM51000L**	90	5,00	5,94	3,18	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896024	**CCBM61000L**	90	6,00	7,08	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896026	**CCBM61520L**	90	6,00	7,09	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896028	**CCBM81520L**	90	8,00	9,04	4,70	152,15	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831807	**CCBM51005L**	95	5,00	5,94	3,02	100,58	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831025	**CCBM51525L**	95	5,00	5,94	3,02	152,40	1,02	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831307	**CCBM61525L**	95	6,00	7,08	3,73	152,15	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831791	**CCBM61005L**	95	6,00	7,09	3,73	100,33	1,19	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896027	**CCBM81005L**	95	8,00	9,04	4,70	101,60	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831283	**CCBM81525L**	95	8,00	9,04	4,70	152,40	2,36	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831813	**CCBM41007L**	97	3,96	4,57	2,41	100,33	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6
3896002	**CCBM41527L**	97	4,00	4,57	2,41	152,40	1,02	0.0°	0.0°	CD..S4T002	**CC09**	T6



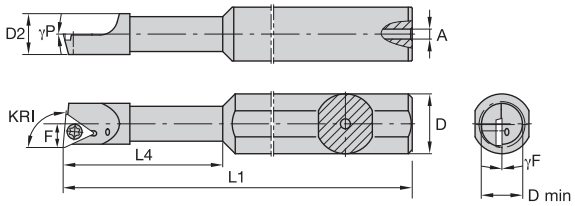
■ CCBM • STEPPED

order number	catalogue number	KRI	D	D min	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2831211	**CCBM5312510R**	90	12,00	5,94	3,18	88,90	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831188	**CCBM6612320R**	90	12,00	7,42	3,85	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831175	**CCBM6612630R**	90	12,00	7,42	3,86	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831127	**CCBM5316510R**	90	16,00	6,10	3,18	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831110	**CCBM6516320R**	90	16,00	7,42	3,86	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831265	**CCBM4812225R**	95	12,00	5,28	2,64	60,32	22,22	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831255	**CCBM4812485R**	95	12,00	5,28	2,64	85,73	47,63	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831244	**CCBM5312255R**	95	12,00	5,94	3,02	63,50	25,40	1,02	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831201	**CCBM6612325R**	95	12,00	7,24	3,68	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896019	**CCBM6612635R**	95	12,00	7,24	3,68	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896015	**CCBM4816225R**	95	16,00	5,28	2,64	85,72	22,23	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
3896017	**CCBM4816485R**	95	16,00	5,28	2,64	111,12	47,62	3,18	0.0°	5.0°	CD..S4T002	**CC09**	T6
2831162	**CCBM5316255R**	95	16,00	5,94	3,02	88,90	25,40	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831139	**CCBM5316515R**	95	16,00	5,94	3,02	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896018	**CCBM6516325R**	95	16,00	7,24	3,68	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
left hand													
2831194	**CCBM6612325L**	95	12,00	7,24	3,68	69,85	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
3896093	**CCBM6612635L**	95	12,00	7,24	3,68	101,60	63,50	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831157	**CCBM5316255L**	95	16,00	5,94	3,02	88,90	25,40	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831132	**CCBM5316515L**	95	16,00	5,94	3,02	114,30	50,80	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6
2831117	**CCBM6516325L**	95	16,00	7,24	3,68	95,25	31,75	3,18	0.0°	5.0°	CD..S4T002	**CC11**	T6



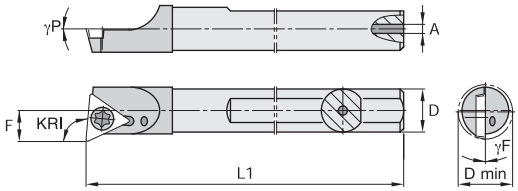
FSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2829554	**FSBM61000R**	90	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829566	**FSBM61005R**	95	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
left hand													
3896211	**FSBM61000L**	90	6,00	7,06	6,20	3,71	101,60	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896213	**FSBM81000L**	90	8,00	9,14	8,20	4,80	101,60	1,52	0.0°	5.0°	TD..07S102	**FC11**	T7
2829545	**FSBM81005L**	95	8,00	9,14	8,20	4,80	101,60	1,52	0.0°	5.0°	TD..07S102	**FC11**	T7



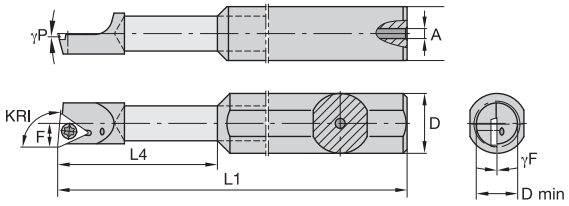
FSBM • STEPPED

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
3890858	**FSBM6612320R**	90	12,00	7,52	6,58	3,96	76,20	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829472	**FSBM8212250R**	90	12,00	9,09	8,15	4,75	76,00	25,40	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
2829448	**FSBM8212380R**	90	12,00	9,09	8,15	4,75	76,20	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3890860	**FSBM6616190R**	90	16,00	7,52	6,58	3,96	101,60	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829533	**FSBM5212125R**	95	12,00	6,99	5,16	3,20	76,20	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3890857	**FSBM5212255R**	95	12,00	6,99	5,16	3,20	76,20	25,40	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829508	**FSBM6612195R**	95	12,00	7,52	6,58	3,96	76,00	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829459	**FSBM8212385R**	95	12,00	9,09	8,15	4,75	76,00	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3897011	**FSBM5216125R**	95	16,00	6,99	5,16	3,20	101,60	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3890862	**FSBM6616325R**	95	16,00	7,52	6,58	3,96	101,60	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
2829429	**FSBM6616195R**	95	16,00	7,52	6,60	3,96	102,00	19,05	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
left hand														
2829442	**FSBM8212380L**	90	12,00	9,09	8,15	4,75	76,00	38,10	1,52	0.0°	5.0°	TD..07S102	**FC14**	T7
3890861	**FSBM6616320L**	90	16,00	7,52	6,58	3,96	101,60	31,75	1,02	0.0°	5.0°	TD..07S102	**FC14**	T7
3890856	**FSBM5212125L**	95	12,00	6,99	5,16	3,20	76,20	12,70	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7



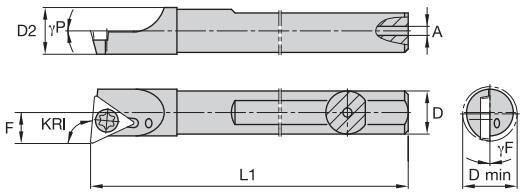
FCBM

order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3896036	**FCBM51000R**	90	5,00	6,98	3,40	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896031	**FCBM61520R**	90	6,00	7,06	3,70	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7
2829356	**FCBM81520R**	90	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..07S102	**FC14**	T7
2829390	**FCBM61525R**	95	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7
2829368	**FCBM81525R**	95	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..07S102	**FC14**	T7
left hand												
3896035	**FCBM51000L**	90	5,00	6,98	3,40	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
3896030	**FCBM61520L**	90	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..130805	**FC11**	T7
3896032	**FCBM81520L**	90	8,00	9,16	4,80	152,40	2,36	0.0°	5.0°	TD..130805	**FC11**	T7
3896037	**FCBM51005L**	95	5,00	6,98	3,20	100,58	1,02	0.0°	5.0°	TD..07S102	**FC11**	T7
2829385	**FCBM61525L**	95	6,00	7,06	3,71	152,40	1,19	0.0°	5.0°	TD..07S102	**FC11**	T7



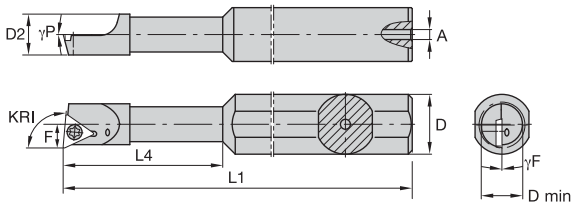
FCBM • STEPPED

order number	catalogue number	KRI	D	D min	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3896072	**FCBM6612630R**	90	12,00	7,52	3,96	101,60	63,50	1,19	0.0°	5.0°	TD..07S102	**FC14**	T7
2829268	**FCBM8212790R**	90	12,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3896069	**FCBM5316250R**	90	16,00	6,98	3,40	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3896084	**FCBM6616320R**	90	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3896086	**FCBM8216380R**	90	16,00	9,09	4,75	101,60	38,10	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3896095	**FCBM8216790R**	90	16,00	9,09	4,75	142,87	79,37	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
2829350	**FCBM5312255R**	95	12,00	6,98	3,20	63,50	25,40	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
2829323	**FCBM6612325R**	95	12,00	7,52	3,96	69,85	31,75	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3896083	**FCBM6612635R**	95	12,00	7,52	3,96	101,60	63,50	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
2829301	**FCBM8212385R**	95	12,00	9,09	4,75	76,20	38,10	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
2829279	**FCBM8212795R**	95	12,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3897085	**FCBM5316255R**	95	16,00	6,98	3,20	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3790247	**FCBM6616325R**	95	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3786518	**FCBM6616635R**	95	16,00	7,52	3,96	127,00	63,50	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3786519	**FCBM8216795R**	95	16,00	9,09	4,75	117,48	79,38	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
left hand													
3896067	**FCBM5312510L**	90	12,00	6,98	3,40	88,90	50,80	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
2829344	**FCBM5312255L**	95	12,00	6,98	3,20	63,50	25,40	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3896068	**FCBM5312515L**	95	12,00	6,98	3,20	88,90	50,80	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
2829319	**FCBM6612325L**	95	12,00	7,52	3,96	69,85	31,75	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
2829295	**FCBM8212385L**	95	12,00	9,09	4,75	76,20	38,10	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7
3896070	**FCBM5316255L**	95	16,00	6,98	3,20	88,90	25,40	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3896085	**FCBM6616325L**	95	16,00	7,52	3,96	95,25	31,75	3,18	0.0°	5.0°	TD..07S102	**FC11**	T7
3896087	**FCBM8216385L**	95	16,00	9,09	4,75	101,60	38,10	3,18	0.0°	5.0°	TD..07S102	**FC14**	T7



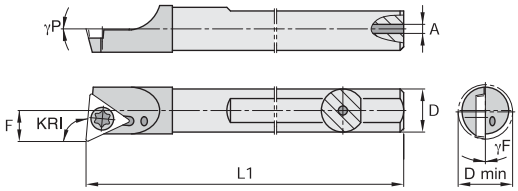
QSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3886552	**QSBM101275R**	95	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
left hand													
3886550	**QSBM101270L**	90	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
3886943	**QSBM121520L**	90	12,00	13,16	12,19	6,81	152,40	4,00	0.0°	5.0°	TP..110202	**QC26**	T9
3886551	**QSBM101275L**	95	10,00	11,15	10,21	5,79	127,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9



■ QSBM • STEPPED

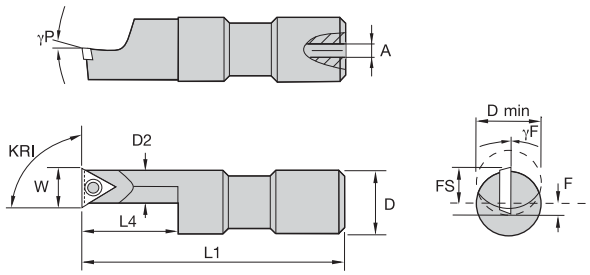
order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2825013	**QSBM9912480R**	90	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3890865	**QSBM9916480R**	90	16,00	11,12	9,91	5,61	107,95	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886949	**QSBM15920630R**	90	20,00	17,47	15,88	8,97	114,30	63,50	2,49	0.0°	5.0°	TP..110202	**QC26**	T9
2825052	**QSBM9912295R**	95	12,00	11,12	9,91	5,61	95,25	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
2825024	**QSBM9912485R**	95	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3890864	**QSBM9916295R**	95	16,00	11,12	9,91	5,61	107,95	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
2824993	**QSBM9916485R**	95	16,00	11,12	9,91	5,61	107,95	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886945	**QSBM1316385R**	95	16,00	14,30	12,95	7,52	107,95	38,10	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
3886948	**QSBM1316635R**	95	16,00	14,30	12,95	7,52	107,95	63,50	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
2824950	**QSBM9920385R**	95	20,00	11,12	9,91	5,61	101,60	38,10	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886950	**QSBM15920635R**	95	20,00	17,47	15,88	8,97	114,30	63,50	2,49	0.0°	5.0°	TP..110202	**QC26**	T9
left hand														
2825019	**QSBM9912485L**	95	12,00	11,12	9,91	5,61	95,25	47,63	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3896089	**QSBM9916295L**	95	16,00	11,12	9,91	5,61	107,95	28,58	2,03	0.0°	5.0°	TP..110202	**QC21**	T9
3886944	**QSBM1316385L**	95	16,00	14,30	12,95	7,52	107,95	38,10	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
3886947	**QSBM1316635L**	95	16,00	14,30	12,95	7,52	107,95	63,50	2,03	0.0°	5.0°	TP..110202	**QC26**	T9
2824945	**QSBM9920385L**	95	20,00	11,12	9,91	5,61	101,60	38,10	2,03	0.0°	5.0°	TP..110202	**QC21**	T9



QCBM

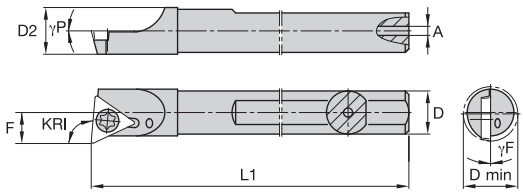
order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3854445	**QCBM102540R**	90	10,00	11,15	5,79	254,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
2824776	**QCBM102545R**	95	10,00	11,15	5,79	254,00	3,20	0.0°	5.0°	TP..110202	**QC21**	T9
2824747	**QCBM122545R**	95	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC21**	T9
left hand												
3896043	**QCBM122540L**	90	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC26**	T9
3896044	**QCBM122545L**	95	12,00	13,16	6,81	254,00	4,70	0.0°	5.0°	TP..110202	**QC26**	T9

Clamping System S • Steel



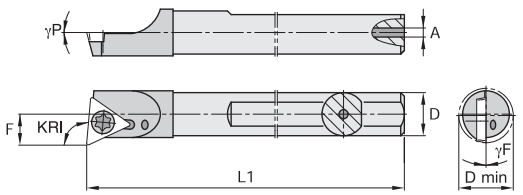
QSOM

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
2824819	**QSOM9516385R**	95	16,00	16,51	9,50	0,64	95,25	38,10	10,63	10,70	2,03	0.0°	5.0°	TP..110202	**QC26**	T9



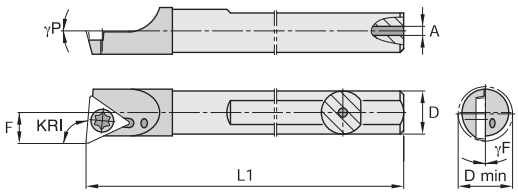
SSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3886968	**SSBM202030R**	90	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10
left hand													
3886967	**SSBM202030L**	90	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10
3886969	**SSBM202035L**	95	20,00	21,23	20,19	10,90	203,20	4,00	0.0°	5.0°	TP..160302	**SC30**	T10



SCBM

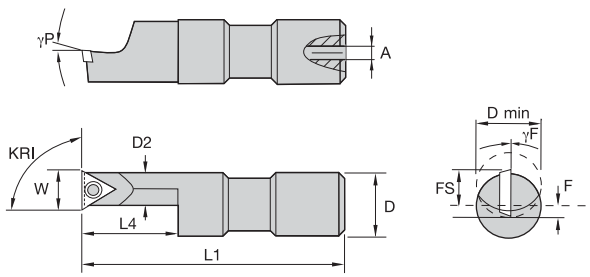
order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3895892	**SCBM162540R**	90	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896004	**SCBM162545R**	95	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896006	**SCBM202545R**	95	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
left hand												
3895891	**SCBM162540L**	90	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896005	**SCBM202540L**	90	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
3896003	**SCBM162545L**	95	16,00	17,25	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896091	**SCBM202545L**	95	20,00	21,25	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10



SDBM

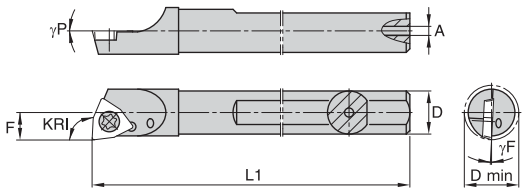
order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3896011	**SDBM162540R**	90	16,00	17,25	–	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896014	**SDBM202540R**	90	20,00	21,25	–	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
2822085	**SDBM162545R**	95	16,00	17,25	16,13	8,89	254,00	5,54	0.0°	5.0°	TP..160302	**SC30**	T10
3896092	**SDBM202545R**	95	20,00	21,25	–	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
left hand													
3896010	**SDBM162540L**	90	16,00	17,25	–	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3896013	**SDBM202540L**	90	20,00	21,25	–	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10
3896012	**SDBM162545L**	95	16,00	17,25	–	8,89	254,00	5,51	0.0°	5.0°	TP..160302	**SC30**	T10
3897084	**SDBM202545L**	95	20,00	21,25	–	10,90	254,00	7,11	0.0°	5.0°	TP..160302	**SC30**	T10

Clamping System S • Steel



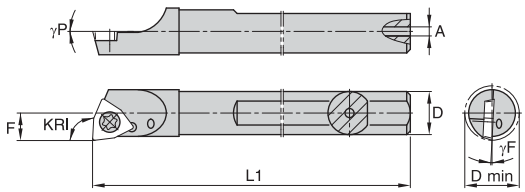
SSOM

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
3896090	**SSOM1325380R**	90	24,99	24,61	12,70	1,78	95,25	38,10	14,46	16,24	3,00	0.0°	5.0°	TPHB160302	**SC30**	T10
3890867	**SSOM1325630R**	90	24,99	24,61	12,70	1,78	120,65	63,50	14,46	16,24	3,00	0.0°	5.0°	TPHB160302	**SC30**	T10
3890866	**SSOM1325385R**	95	24,99	24,61	12,70	1,78	95,25	38,10	14,40	16,18	3,00	0.0°	5.0°	TPHB160302	**SC30**	T10
3890868	**SSOM1325635R**	95	24,99	24,61	12,70	1,78	120,65	63,50	14,40	16,18	3,00	0.0°	5.0°	TPHB160302	**SC30**	T10



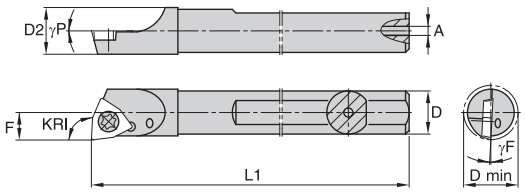
GSBMW

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
2828122	**GSBMW61003R**	93	6,00	6,78	6,21	3,43	101,60	1,02	-3.0°	0.0°	WP..S30104	**CT11**	T6
3886549	**GSBMW81003R**	93	8,00	8,10	8,18	4,42	101,60	2,40	-3.0°	0.0°	WP..S30104	**CT11**	T6
left hand													
2828116	**GSBMW61003L**	93	6,00	6,78	6,21	3,43	101,60	1,02	-3.0°	0.0°	WP..S30104	**CT11**	T6
3886548	**GSBMW81003L**	93	8,00	8,10	8,18	4,42	101,60	2,40	-3.0°	0.0°	WP..S30104	**CT11**	T6



GCBMW

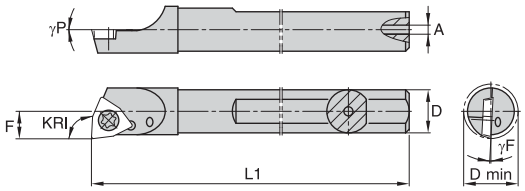
order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3896040	**GCBMW51523R**	93	5,00	6,60	3,20	152,40	1,02	-3.0°	0.0°	WP..S30104	**CT11**	T6
2827711	**GCBMW61523R**	93	6,00	6,78	3,43	152,40	1,19	-3.0°	0.0°	WP..S30104	**CT11**	T6
left hand												
3896039	**GCBMW51523L**	93	5,00	6,60	3,20	152,40	1,02	-3.0°	0.0°	WP..S30104	**CT11**	T6
2827705	**GCBMW61523L**	93	6,00	6,78	3,43	152,40	1,19	-3.0°	0.0°	WP..S30104	**CT11**	T6
3897012	**GCBMW81523L**	93	8,00	8,80	4,42	152,40	2,36	-3.0°	0.0°	WP..S30104	**CT11**	T6



QSBMW

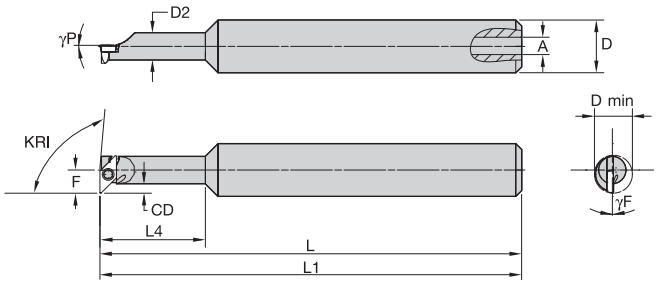
order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand													
3393828	**QSBMW121523R**	93	12,00	12,90	12,19	6,55	152,40	4,00	-3.0°	0.0°	WP..040204	**QTM20**	T7
left hand													
3886952	**QSBMW101273L**	93	10,00	10,94	10,70	5,59	127,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7

Clamping System S • Carbide

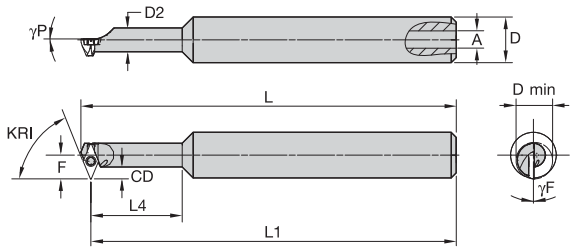


QCBMW

order number	catalogue number	KRI	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
3782378	**QCBMW102543R**	93	10,00	10,95	5,59	254,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7
left hand												
3896045	**QCBMW102543L**	93	10,00	10,95	5,59	254,00	3,20	-3.0°	0.0°	WP..040204	**QTM20**	T7
3896046	**QCBMW122543L**	93	12,00	12,90	6,55	254,00	4,70	-3.0°	0.0°	WP..040204	**QTM20**	T7



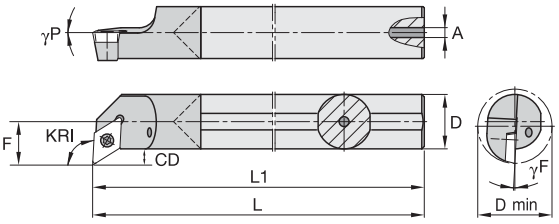
NOTE: KRI shown as 95°.



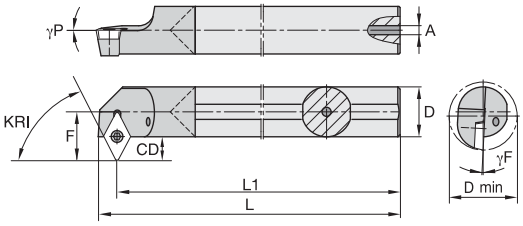
NOTE: KRI shown as 67,5°.

CSPM

order number	catalogue number	KRI	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
2831399	**CSPM71225225R**	67.5	12,00	10,16	6,60	6,60	3,30	104,00	101,60	25,40	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
3758942	**CSPM81232225R**	67.5	12,00	11,37	8,18	7,01	2,92	105,16	101,60	31,75	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
2831411	**CSPM712255R**	95.0	12,00	9,14	6,60	5,59	2,29	101,60	101,60	25,40	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
left hand																
2831394	**CSPM71225225L**	67.5	12,00	10,16	6,60	6,60	3,30	104,00	101,60	25,40	1,02	0.0°	0.0°	GPHW050102	**CT15**	T6
2831378	**CSPM81232225L**	67.5	12,00	11,38	8,18	7,01	2,92	104,10	101,60	31,75	1,02	0.0°	0.0°	GC..050102	**CT15**	T6
2831405	**CSPM712255L**	95.0	12,00	9,14	6,60	5,59	2,29	101,60	101,60	25,40	1,02	0.0°	0.0°	GP..050102	**CT15**	T6
2831383	**CSPM812325L**	95.0	12,00	10,74	8,20	6,38	2,27	101,60	101,60	31,75	1,02	0.0°	0.0°	GP..050102	**CT15**	T6



NOTE: KRI shown as 95°.

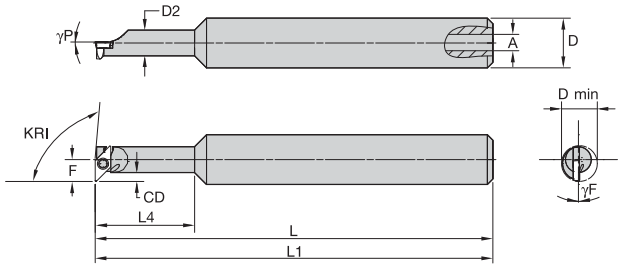


NOTE: KRI shown as 67,5°.

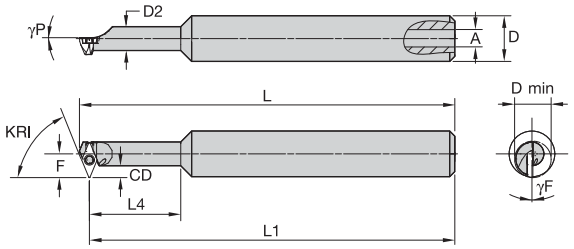
CCPM

order number	catalogue number	KRI	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2831010	**CCPM6152225R**	67.5	6,00	10,16	6,60	3,51	154,61	152,40	1,19	0.0°	0.0°	GP..050102	**CT15**	T6
2831020	**CCPM61525R**	95.0	6,00	9,14	5,59	2,49	152,40	152,40	1,19	0.0°	0.0°	GP..050102	**CT15**	T6
left hand														
2831004	**CCPM6152225L**	67.5	6,00	10,15	6,60	3,51	152,61	152,40	1,19	0.0°	0.0°	GP..050102	**CT15**	T6
2830980	**CCPM8152225L**	67.5	8,00	11,38	7,01	2,92	155,96	152,40	2,36	0.0°	0.0°	GP..050102	**CT15**	T6
3897899	**CCPM61525L**	95.0	6,00	9,14	5,59	2,49	152,40	152,40	1,19	0.0°	0.0°	GP..050102	**CT15**	T6
3896022	**CCPM81525L**	95.0	8,00	10,74	6,38	2,28	152,40	152,40	2,23	0.0°	0.0°	GP..050102	**CT15**	T6

Clamping System S • Steel



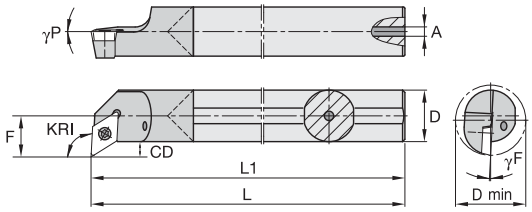
NOTE: KRI shown as 95°.



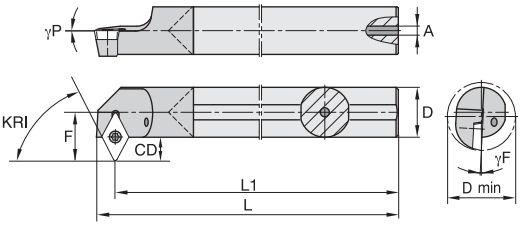
NOTE: KRI shown as 67,5°.

GSPM

order number	catalogue number	KRI	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
right hand																
3518694	**GSPM1316515R**	95.0	16,00	16,00	12,95	9,50	3,02	127,00	127,00	50,80	2,49	0.0°	0.0°	GC..060202	**GT21**	T7
left hand																
3897894	**GSPM101638225L**	67.5	16,00	13,72	9,78	8,59	3,70	105,01	101,60	38,10	2,49	0.0°	0.0°	GC..060202	**GT21**	T7
3897896	**GSPM131651225L**	67.5	16,00	16,89	12,95	10,16	3,68	130,90	127,00	50,80	2,49	0.0°	0.0°	GC..060202	**GT21**	T7
3897895	**GSPM1016385L**	95.0	16,00	13,08	9,78	7,93	3,04	114,30	114,30	38,10	2,49	0.0°	0.0°	GC..060202	**GT21**	T7
3896052	**GSPM1316515L**	95.0	16,00	16,00	12,95	9,50	3,02	127,00	127,00	50,80	2,49	0.0°	0.0°	GC..060202	**GT21**	T7



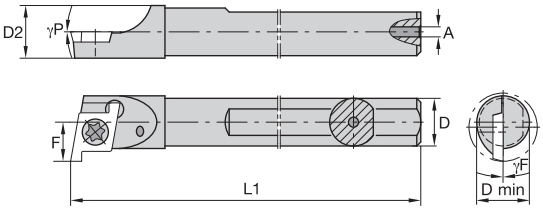
NOTE: KRI shown as 95°.



NOTE: KRI shown as 67,5°.

GCPM

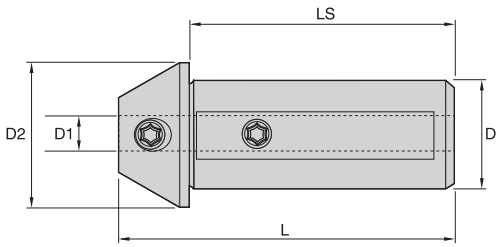
order number	catalogue number	KRI	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand														
2827656	**GCPM10254225R**	67.5	10,00	14,20	8,81	3,68	258,47	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897906	**GCPM12254225R**	67.5	12,00	16,18	9,80	3,71	257,86	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3896073	**GCPM16254225R**	67.5	16,00	20,09	11,76	3,67	258,01	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
3897904	**GCPM102545R**	95.0	10,00	13,54	8,15	3,06	254,00	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3759184	**GCPM122545R**	95.0	12,00	15,52	9,14	3,05	254,00	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3897909	**GCPM162545R**	95.0	16,00	19,43	11,10	3,01	254,00	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
left hand														
3897903	**GCPM10254225L**	67.5	10,00	14,20	8,81	3,72	257,49	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897905	**GCPM12254225L**	67.5	12,00	16,18	9,80	3,71	257,86	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
3897908	**GCPM16254225L**	67.5	16,00	20,07	11,76	3,67	258,02	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7
3782377	**GCPM102545L**	95.0	10,00	13,54	8,15	3,02	254,00	254,00	3,20	0.0°	0.0°	GC..060202	**GT21**	T7
3897907	**GCPM122545L**	95.0	12,00	15,52	9,14	3,05	254,00	254,00	4,70	0.0°	0.0°	GC..060202	**GT21**	T7
2827644	**GCPM162545L**	95.0	16,00	19,43	11,10	3,01	254,00	254,00	5,51	0.0°	0.0°	GC..060202	**GT21**	T7



CSMM

order number	catalogue number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
right hand												
2831048	**CSMM6760R**	6,00	7,92	6,60	4,44	76,20	1,02	0.0°	0.0°	CD.50302R	**CC11**	T6

NOTE: Refer to insert design for cutting depth, cutting width, and blind hole limitations.

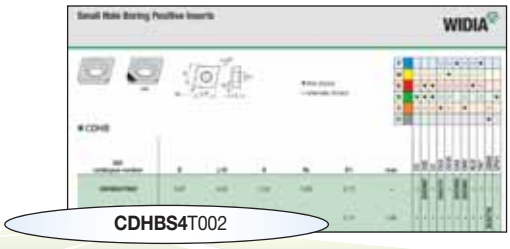


CSM

order number	catalogue number	D1	D	D2	LS	L
2832838	**CSM22156**	3,96	22,00	27,94	50,80	63,50
2832832	**CSM22187**	4,75	22,00	27,94	50,80	63,50
2832827	**CSM22250**	6,36	22,00	27,94	50,80	63,50
2832820	**CSM22312**	7,93	22,00	27,94	50,80	63,50
2832813	**CSM22375**	9,53	22,00	27,94	50,80	63,50
2832809	**CSM22500**	12,70	22,00	27,94	50,80	63,50

How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



C — Insert Shape

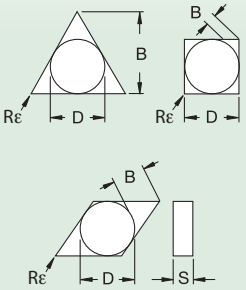
T	60°	
C	80°	80°
G	45°	45°
W	80°	

D — Insert Clearance Angle

B	5°
C	7°
D	15°
P	11°

H — Tolerance Class

Tolerances apply prior to edge prep and coating.



D = Theoretical diameter of the insert inscribed circle
S = Thickness
B = See figures below

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±0,025	±0,013	±0,025
H	±0,013	±0,013	±0,025
E	±0,025	±0,025	±0,025
G	±0,025	±0,025	±0,013
M	See tables on next page		±0,013
U	See tables on next page		±0,013

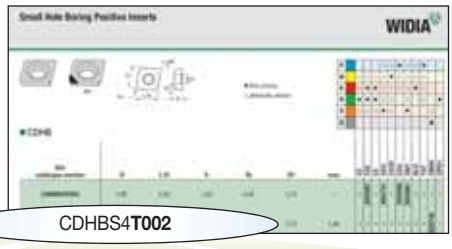
B — Insert Features

Partly cylindrical hole, 40–60° countersink, single-sided	**W**	without chipbreaker
	T	with chipbreaker
Partly cylindrical hole, 70–90° countersink, single-sided	**B**	without chipbreaker
	H	with chipbreaker

S4 — Size

"D" mm	Code for metric cutting edge length "L10" C	G	T	W
3,97	S4	05	06	–
4,06	–	–	07	–
4,76	04	06	08	S3
6,35	06	–	11	04
9,53	09	–	16	06
9,80	–	–	17	–

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



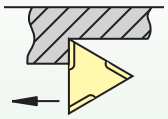
T0	**02**			
Thickness	Corner Radius "Rε"	Hand of Insert *(optional)*	Cutting Edge Condition or Chip Control Features *(optional)*	Tip Style *(optional)*

symbol mm	thickness mm
T0	1,00; 1,02
01	1,59; 1,58
T1	1,98; 1,91
02	2,38; 2,36
03	3,18
T3	3,97
S1	1,19

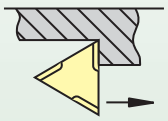
symbol mm	corner radius mm
X0	0,04; 0,05
01	0,1
02	0,2; 0,18
04	0,4; 0,38
05	0,5
08	0,8
09	0,9
12	1,2
16	1,6

R = Right hand

L = Left hand



R



L

HP = High positive

LF = Light finishing

Symbol

M

Usage

Mini tip

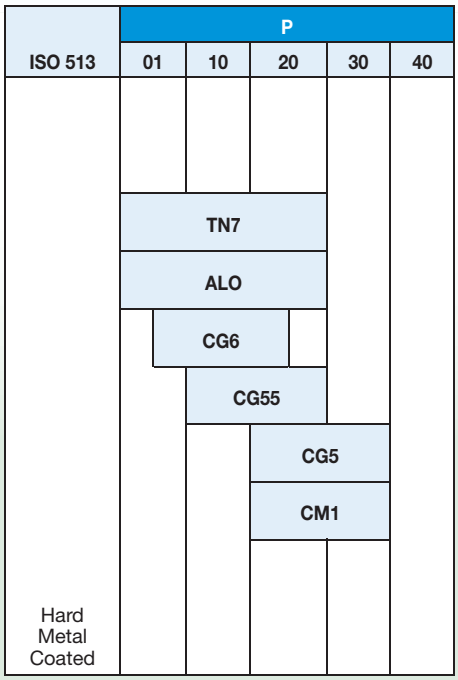
"D"	± Tolerance on "D" Class M Tolerance			± Tolerance on "D" Class U Tolerance	"D"	± Tolerance on "B" Class M Tolerance			± Tolerance on "B" Class U Tolerance
	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C		Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
3,97	0,05	–	–	–	3,97	0,08	–	–	–
4,76	0,05	–	–	0,08	4,76	0,08	–	–	0,13
5,56	0,05	0,05	0,05	0,08	5,56	0,08	0,11	–	0,13
6,35	0,05	0,05	0,05	0,08	6,35	0,08	0,11	–	0,13
7,94	0,05	0,05	0,05	0,08	7,94	0,08	0,11	–	0,13
9,52	0,05	0,05	0,05	0,08	9,52	0,08	0,11	0,18	0,13
11,11	0,08	0,08	0,08	0,13	11,11	0,13	0,15	–	–
12,70	0,08	0,08	0,08	0,13	12,70	0,13	0,15	0,25	0,20
14,29	0,08	0,08	0,08	0,13	14,29	0,13	0,15	–	–
15,88	0,10	0,10	0,10	0,18	15,88	0,15	0,18	–	0,27
17,46	0,10	0,10	0,10	0,18	17,46	0,15	0,18	–	0,27
19,05	0,10	0,10	0,10	0,18	19,05	0,15	0,18	–	0,27
22,22	0,13	–	–	0,25	22,22	0,15	–	–	0,38
25,40	0,13	–	–	0,25	25,40	0,18	–	–	0,38
31,75	0,15	–	–	0,25	31,75	0,20	–	–	0,38

The WIDIA™ three-step insert selection system makes choosing and applying the most productive tool easy. Tool recommendations are based on six workpiece material groups.

1 **Select the Insert Geometry:**
Based on the needed depth of cut and feed rate, choose the geometry that best matches your needs.

2 **Select the Grade:**
Determine your cutting conditions, and choose the proper grade.

TN7–CM1 for Steel



wear resistance = harder

TN7 — High edge strength and wear-resistant cermet. Finishing to semi-finishing of carbon, alloy, and stainless steels at medium to high speeds.

ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

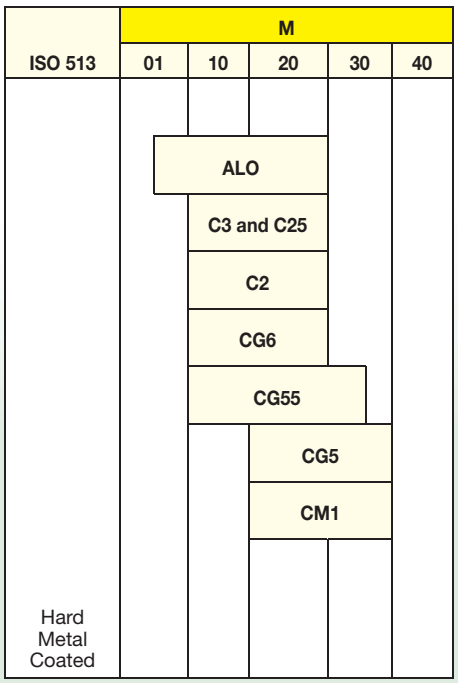
CG55 — High edge strength and wear resistance. Reduces problems with built-up edge. Superior thermal deformation resistance and depth-of-cut notch resistance.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

CM1 — For heavy turning and heavily interrupted cuts.

toughness = softer

ALO–CM1 for Stainless Steel



wear resistance = harder

ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

C3 and C25—Good wear resistance with some toughness.

C2 — Excellent abrasion resistance for machining cast irons, austenitic stainless steels,non-ferrous metals, non-metals, and most high-temperature alloys.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

CG55 — High edge strength and wear resistance. Reduces problems with built-up edge.Superior thermal deformation resistance and depth-of-cut notch resistance.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

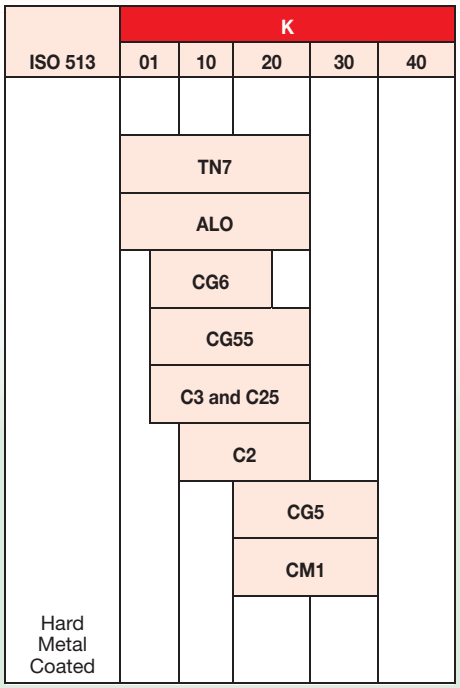
CM1 — For heavy turning and heavily interrupted cuts.

toughness = softer

3 Select the Cutting Speed:
In the foldout speed and feed chart, establish your cutting speed and obtain your optimal starting conditions and range.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

TN7–CM1 for Cast Iron



wear resistance = harder

TN7 — High edge strength and wear-resistant cermet.

ALO — Can withstand light interruptions. Alumina coating enables higher cutting speeds.

CG6 — High-speed, general-purpose grade for all kinds of steel and cast iron.

CG55 — High edge strength and wear resistance. Reduces problems with built-up edge. Superior thermal deformation resistance and depth-of-cut notch resistance.

C3 and C25 — Good wear resistance with some toughness.

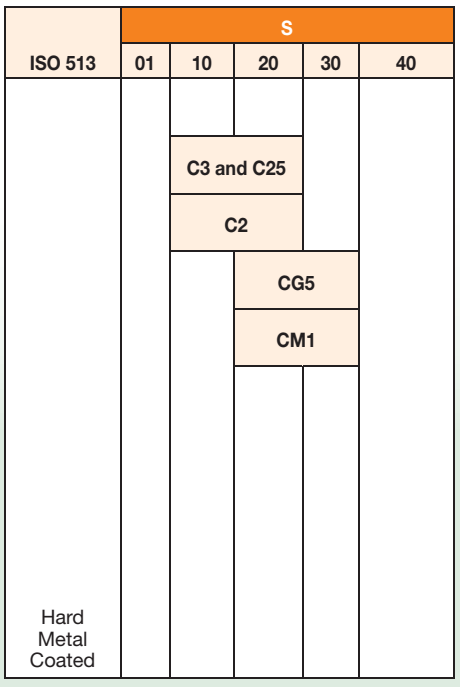
C2 — Excellent abrasion-resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.

CG5 — Best at low speeds. Will handle interruptions and high feed rates.

CM1 — For heavy turning and heavily interrupted cuts.

toughness = softer

C3–CM1 for High-Temperature Alloys



wear resistance = harder

C3 and C25 — Good wear resistance with some toughness.

C2 — Excellent abrasion resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.

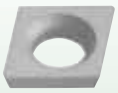
CG5 — Best at low speeds. Will handle interruptions and high feed rates.

CM1 — For heavy turning and heavily interrupted cuts.

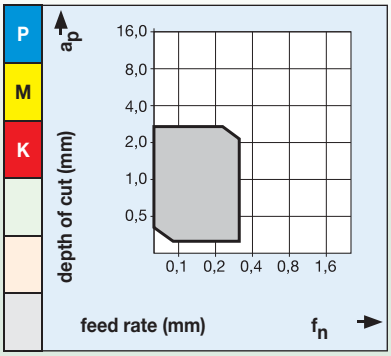
toughness = softer

Single-Sided, Positive Inserts

..HB



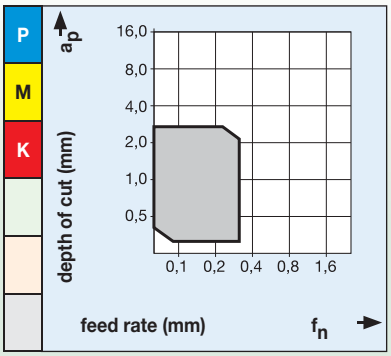
Flat inserts. Peripheral ground for best surface quality and reduced cutting pressure. Very stable cutting edge offers maximum rigidity.



..HT



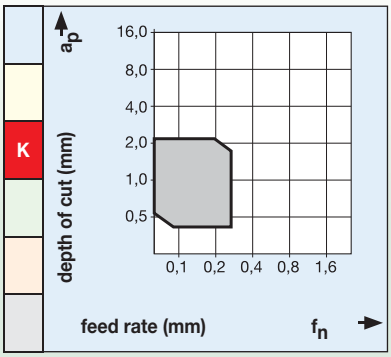
Peripheral ground insert chipbreaker. Good chip control. Geometry for general-purpose applications.



..HB-M



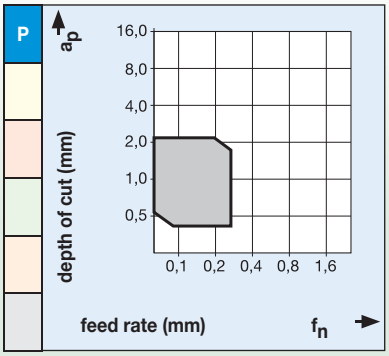
Cubic Boron Nitride (CBN) or Polycrystalline Diamond (PCD) tip for high-temp alloys and non-ferrous machining. Very stable cutting edge offers maximum rigidity.



..LF



Geometry for general-purpose applications. Very good chip control. Recommended for general finish machining.



Geometry Selection Criteria

Flat Top-Type Inserts

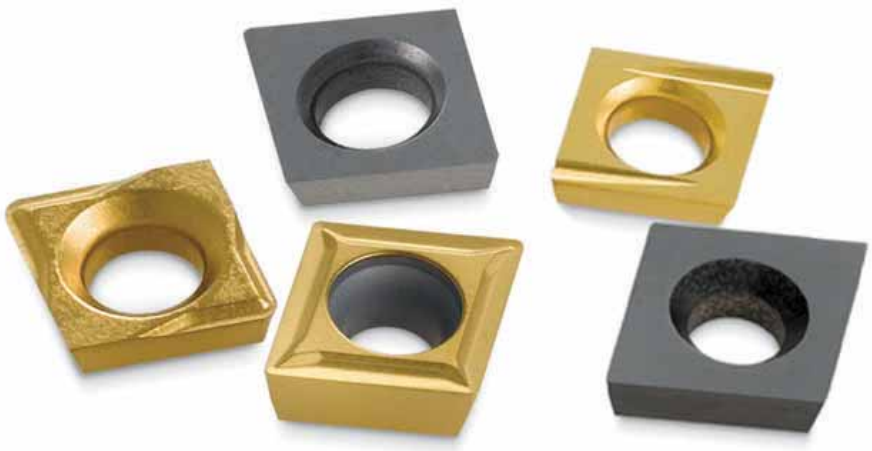
Chipbreaker Geometry ..HB, ..HB-M, ..HW

- Suitable for interrupted cuts.
- Use when chip control is not critical.

Pressed Chipbreaker-Type Inserts

Chipbreaker Geometry ..LF

- Suitable for moderate interruption of cuts.
- Use when chip control is a concern.

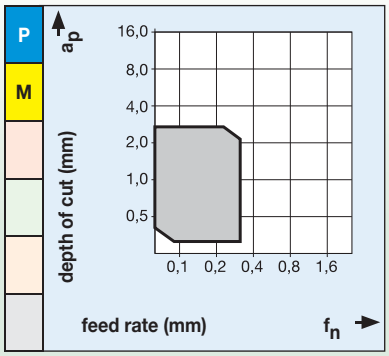


Single-Sided, Positive Inserts

..HH



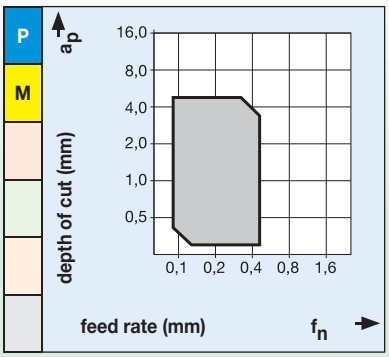
Peripheral ground for best surface quality and reduced cutting pressure. For fine to medium finishes.



HP



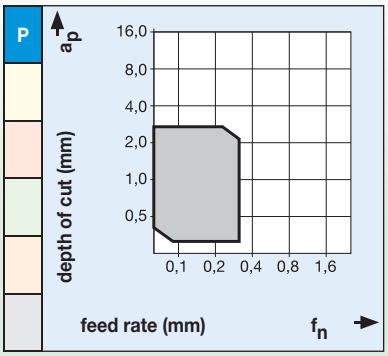
High positive-type chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure. Recommended for high-temp alloys and non-ferrous machining.



..HH-R/L



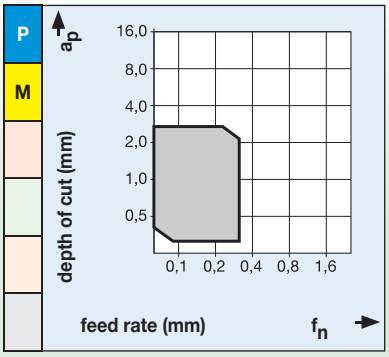
Ground-in chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure.
*Right-hand inserts used in left-hand bars ONLY. Left-hand inserts used in right-hand bars ONLY.



..HW



Flat insert for profiling. Very stable cutting edge offers maximum rigidity.



Geometry Selection Criteria

Pressed Chipbreaker-Type Inserts with Ground Periphery

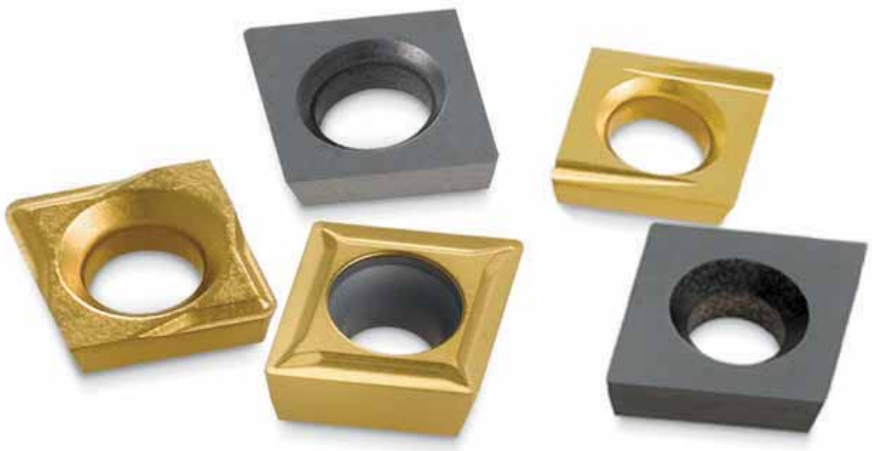
Chipbreaker Geometry ..HH, ..HT, HP

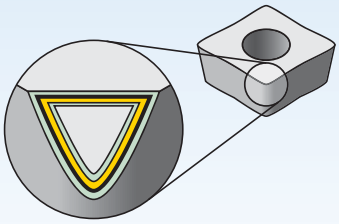
- Suitable for light to moderate interruption of cuts.
- Use when chip control is a concern.
- Superior surface finish and closer tolerance on workpiece.

Ground-In Chipbreaker-Type Inserts

Chipbreaker Geometry ..HH-R/L

- Suitable for smooth cuts.
- Use when chip control is a concern.
- Superior surface finish and closer tolerance on workpiece.



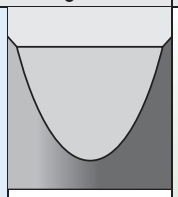
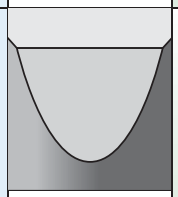
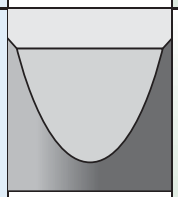
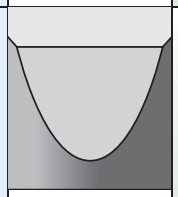
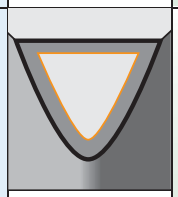


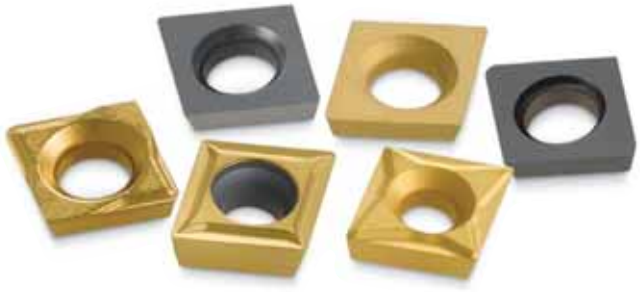
Coatings provide high-speed capability and are engineered for finishing to light roughing.

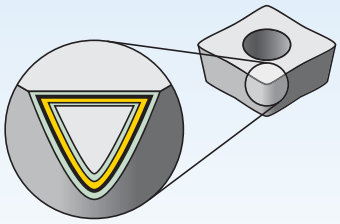
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
CM1	 HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
C2	 HW-N15	Uncoated carbide. A hard, low binder content, unalloyed WC/Co fine-grained grade. General-purpose grade for non-ferrous materials. Has excellent abrasion resistance for machining cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys.	M		■	■	■					
			K	■	■	■	■					
			N		■	■	■					
			S		■	■	■					
C3 and C25	 HW-K15	Uncoated carbide. Has excellent abrasion resistance for machining cast irons, aluminium, and non-ferrous metals. Good wear resistance with some toughness. Harder than C2, resulting in greater edge wear resistance. Suitable for finishing operations.	M		■	■	■					
			K	■	■	■	■					
			N		■	■	■					
			S		■	■	■					
TN7	 HT-P15	A highly wear-resistant (TiC/TiN-based) cermet grade. High edge strength and wear-resistant cermet offers improved tool life over uncoated/coated carbides and resists material build-up on cutting edge. Finishing to semi-finishing of carbon, alloy, and stainless steels at medium to high speeds. Can also be used on non-ferrous materials.	P	■	■	■	■					
			K	■	■	■	■					
ALO	 HC-K15	Coated carbide. CVD — TiCN-TiC-Al_2O_3. A thin alumina coating over a hard, deformation-resistant substrate. High-speed finishing of grey cast irons and medium-speed finishing of alloy steels that are in a hardness range of 35–50 HRC. Can withstand light interruptions. Alumina coating enables higher cutting speeds.	P	■	■	■	■					
			M	■	■	■	■					
			K	■	■	■	■					



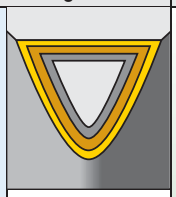
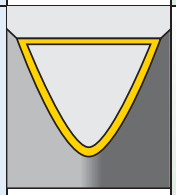
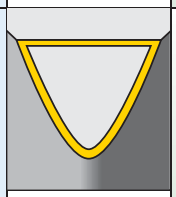
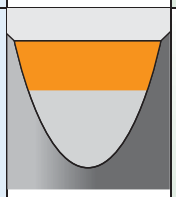
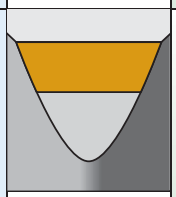


Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description	05	10	15	20	25	30	35	40	45
CG6	 HC-P10	Coated carbide. CVD — TiC-TiCN-TiN. Tri-phase coating on a hard, low binder content, fine-grained grade. High-speed, general-purpose grade for all kinds of steel. Gold in colour.	P	P	P						
			M		M	M	M				
			K	K	K	K					
CG5	 HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P	P	P	P	P	P			
			M	M	M	M	M	M			
			K	K	K	K	K	K			
			N	N	N	N	N	N			
			S	S	S	S	S	S			
CG55	 HC-M20	A PVD-TiN coating over a very wear-resistant, unalloyed carbide substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Grade provides combination of high edge strength and wear resistance. Coating increases wear resistance and reduces problems with built-up edge. The substrate offers superior thermal deformation resistance and depth-of-cut notch resistance.	P	P	P	P					
			M	M	M	M	M				
			K	K	K	K					
			S	S	S	S					
CBN6	 BN-H25	PcBN tip brazed onto a carbide insert. Recommended for machining hardened steel (45–65 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings. Can be run both dry and wet.									
			H		H	H	H	H			
CPD1	 DP-N10	Polycrystalline diamond (PCD) compact grade provides exceptional hardness and abrasion resistance. CPD1 is a superior finish boring grade that will significantly improve workpiece tolerances, surface finishes, and insert tool life in high-silicon aluminium, copper, aluminium carbon graphite, hard rubber, plastics, and/or wood.									
			N	N	N	N	N	N			

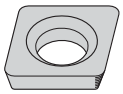


Material Group		Cutting Speed — vc m/min																	
		C2			C25			C3			CG5			CG55			CG6		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	–	–	–	–	–	–	–	–	–	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	0/1	–	–	–	–	–	–	–	–	–	95	**115**	140	105	**130**	155	125	**155**	190
	2	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	3	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	4	–	–	–	–	–	–	–	–	–	45	**60**	70	50	**65**	80	65	**80**	95
	5	–	–	–	–	–	–	–	–	–	60	**75**	90	65	**85**	100	80	**100**	125
	6	–	–	–	–	–	–	–	–	–	40	**50**	60	45	**55**	70	55	**65**	80
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	1	55	**70**	80	60	**80**	95	60	**80**	95	75	**90**	110	80	**100**	120	95	**115**	140
	2	50	**60**	75	55	**70**	85	55	**70**	85	65	**80**	100	75	**90**	110	85	**105**	125
	3	35	**45**	55	45	**50**	65	45	**50**	65	50	**60**	75	55	**65**	80	60	**80**	95
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300
	1	50	**65**	80	60	**70**	85	60	**70**	85	60	**75**	90	65	**80**	100	75	**90**	110
	2	65	**80**	100	75	**90**	110	75	**90**	110	75	**95**	115	85	**105**	125	95	**115**	140
	3	50	**60**	75	55	**65**	80	55	**65**	80	55	**70**	80	60	**75**	90	65	**85**	100
N	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–
	1	400	**505**	605	400	**505**	605	400	**505**	605	400	**505**	605	445	**555**	665	–	–	–
	2	295	**370**	440	295	**370**	445	295	**370**	445	295	**370**	445	325	**405**	490	–	–	–
	3	70	**85**	105	70	**85**	105	70	**85**	105	85	**105**	125	90	**115**	135	–	–	–
	4	310	**380**	465	310	**385**	465	310	**385**	465	140	**175**	210	155	**190**	230	–	–	–
	5	145	**185**	220	145	**185**	220	145	**185**	220	175	**220**	265	195	**240**	290	–	–	–
	6	140	**175**	210	140	**175**	210	140	**175**	210	170	**210**	255	185	**235**	280	–	–	–
	7	240	**295**	355	240	**300**	360	240	**300**	360	245	**305**	365	265	**335**	400	–	–	–
S	ap [mm]	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	0,025	–	0,200	–	–	–
	f [mm/rev]	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	0,025	–	0,127	–	–	–
	1	30	**35**	45	30	**35**	45	30	**35**	45	30	**35**	45	35	**40**	50	–	–	–
	2	25	**30**	35	25	**30**	35	25	**30**	35	25	**30**	35	25	**35**	40	–	–	–
	3	25	**30**	35	25	**30**	35	25	**30**	35	30	**40**	50	35	**45**	55	–	–	–
	4	25	**30**	35	25	**30**	35	25	**30**	35	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.

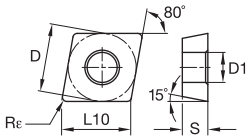
		Cutting Speed — vc m/min														
		CM1			ALO			TN7			CBN6			CPD1		
	Material Group	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	0/1	55	**65**	80	165	**205**	245	200	**245**	295	–	–	–	–	–	–
	2	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	3	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	4	25	**35**	40	85	**105**	125	100	**125**	150	–	–	–	–	–	–
	5	35	**45**	55	105	**135**	160	130	**160**	190	–	–	–	–	–	–
	6	25	**30**	35	70	**90**	105	85	**105**	130	–	–	–	–	–	–
M	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	1	55	**65**	80	105	**130**	160	105	**130**	155	–	–	–	–	–	–
	2	50	**60**	75	95	**120**	145	95	**115**	140	–	–	–	–	–	–
	3	35	**45**	55	70	**90**	110	70	**85**	105	–	–	–	–	–	–
K	ap [mm]	0,051	–	0,300	0,051	–	0,300	0,051	–	0,300	–	–	–	–	–	–
	f [mm/rev]	0,025	–	0,300	0,025	–	0,300	0,025	–	0,300	–	–	–	–	–	–
	1	45	**60**	70	125	**155**	185	80	**105**	125	–	–	–	–	–	–
	2	60	**75**	90	160	**200**	240	105	**130**	160	–	–	–	–	–	–
	3	45	**55**	65	115	**145**	170	80	**95**	115	–	–	–	–	–	–
N	ap [mm]	0,051	–	0,300	–	–	–	0,051	–	0,300	–	–	–	0,051	–	0,300
	f [mm/rev]	0,025	–	0,300	–	–	–	0,025	–	0,300	–	–	–	0,025	–	0,300
	1	400	**505**	605	–	–	–	400	**505**	605	–	–	–	855	**1065**	1280
	2	295	**370**	445	–	–	–	295	**370**	445	–	–	–	650	**810**	975
	3	70	**85**	105	–	–	–	80	**100**	120	–	–	–	365	**455**	550
	4	100	**125**	150	–	–	–	195	**240**	290	–	–	–	325	**405**	490
	5	145	**185**	220	–	–	–	195	**245**	295	–	–	–	340	**425**	510
	6	140	**175**	210	–	–	–	175	**220**	265	–	–	–	335	**420**	505
	7	240	**295**	360	–	–	–	240	**300**	365	–	–	–	525	**660**	790
S	ap [mm]	0,025	–	0,200	–	–	–	–	–	–	0,025	–	0,200	–	–	–
	f [mm/rev]	0,025	–	0,127	–	–	–	–	–	–	0,025	–	0,127	–	–	–
	1	25	**30**	40	–	–	–	–	–	–	90	**110**	135	–	–	–
	2	20	**25**	30	–	–	–	–	–	–	70	**85**	105	–	–	–
	3	25	**35**	40	–	–	–	–	–	–	100	**120**	145	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	–	–	–	0,025	–	0,200	–	–	–
	f [mm/rev]	–	–	–	–	–	–	–	–	–	0,025	–	0,127	–	–	–
	1	–	–	–	–	–	–	–	–	–	110	**135**	165	–	–	–
	2	–	–	–	–	–	–	–	–	–	105	**130**	155	–	–	–
	3	–	–	–	–	–	–	–	–	–	100	**120**	145	–	–	–
	4	–	–	–	–	–	–	–	–	–	90	**110**	135	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.





(M)



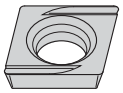
● first choice
○ alternate choice

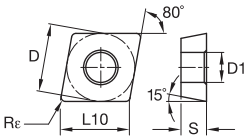
		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ CDHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CDHBS4T0X0	3,97	4,03	1,02	0,05	2,13	–	-	2830897	-	3884731	-	2830888	2830881	-	-	-	-
CDHBS4T0X0M	3,97	4,03	1,02	0,05	2,13	1,90	-	-	-	-	-	-	-	-	-	2830746	-
CDHBS4T002	3,97	4,03	1,02	0,18	2,13	–	-	2830864	-	3884732	-	2830853	2830848	2830870	2830843	-	-
CDHBS4T002M	3,97	4,03	1,02	0,18	2,13	0,96	-	-	-	-	-	-	-	-	-	2830741	2830774
CDHBS4T004M	3,97	4,03	1,02	0,38	2,13	0,96	-	-	-	-	-	-	-	-	-	-	2830769
CDHBS4T004	3,97	4,03	1,02	0,38	2,13	–	-	2830830	-	2830788	-	2830817	2830813	-	2830803	-	-

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.





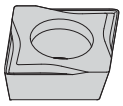
● first choice
○ alternate choice

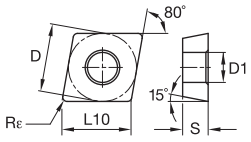
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ CDHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CDHHS4T002R	3,97	4,03	1,02	0,18	2,13	-	-	-	2830731	-	-	2830706	-	-	-	-
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13	-	-	-	2830682	-	-	-	-	-	-	-
left hand																
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13	-	-	-	2830724	-	2830712	2830700	-	-	-	-
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13	-	-	-	2830678	-	-	-	-	-	-	-

NOTE: Right-hand inserts used in left-hand bars only.



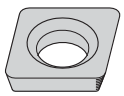


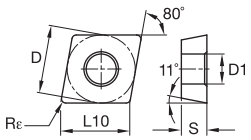
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

CDHH

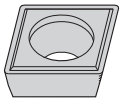
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CDHHS4T002	3,97	4,03	1,02	0,18	2,13	-	-	-	2830632	-	-	2830638	-	-	-	-
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13	-	-	-	2830724	-	2830712	2830700	-	-	-	-
CDHHS4T002R	3,97	4,03	1,02	0,18	2,13	-	-	-	2830731	-	-	2830706	-	-	-	-
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13	-	-	-	2830678	-	-	-	-	-	-	-
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13	-	-	-	2830682	-	-	-	-	-	-	-
CDHHS4T004	3,97	4,10	1,02	0,38	2,13	-	-	-	2830619	-	-	-	-	-	-	-

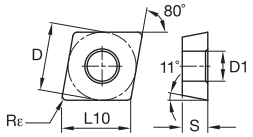




CPHB

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPHB06T102	6,35	6,45	1,91	0,18	2,80	-	-	-	2824583	-	-	-	-	-	-	-
CPHB06T104	6,35	6,45	1,91	0,38	2,80	-	-	-	2824562	-	-	-	-	-	-	-



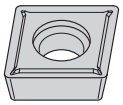


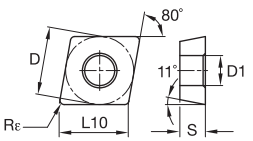
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

CPHH

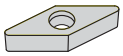
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPHH06T102	6,35	6,45	1,91	0,18	2,79	-	-	-	2824461	-	2824454	2824468	-	-	-	-
CPHH06T104	6,35	6,45	1,91	0,38	2,80	-	-	-	2824441	-	-	-	-	-	-	-

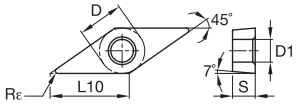




CPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPMT09T302LF	9,53	9,67	3,97	0,20	4,40	-	-	-	2821519	-	-	-	-	-	-	-
CPMT09T304LF	9,53	9,67	3,97	0,40	4,40	-	-	-	2821499	-	-	-	-	-	-	-
CPMT09T308LF	9,52	9,67	3,97	0,79	4,40	-	-	-	2821484	-	-	-	-	-	-	-



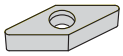


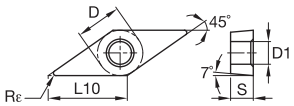
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

GCHW

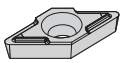
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GCHW060202	4,76	6,73	2,36	0,18	2,39	-	-	-	2827596	-	-	2827601	-	-	-	-
GCHW060204	4,76	6,73	2,36	0,38	2,39	-	-	-	2827577	-	-	2827584	-	-	-	-

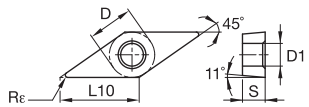




GCHT

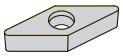
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GCHT060202	4,83	6,83	2,36	0,18	2,39	-	-	-	2827537	-	-	-	-	-	-	-
GCHT060204	4,76	6,83	2,36	0,38	2,39	-	-	-	2827525	-	-	2827531	-	-	-	-

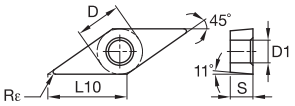




GPHW

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GPHW050102	3,97	5,61	1,59	0,18	2,13	-	-	-	2827631	-	2827625	2827637	-	-	-	-
GPHW050104	3,97	5,61	1,59	0,38	2,13	-	-	-	2827615	-	2827608	2827621	-	-	-	-



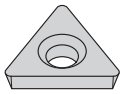


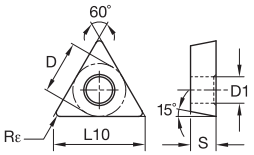
● first choice
○ alternate choice

P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○		●	
S		○	○	○	●	○		●			○		
H											●		

GPHT

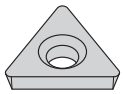
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GPHT050102	3,97	5,76	1,57	0,18	2,13	-	-	-	2827560	-	-	2827566	-	-	-	-
GPHT050104	4,08	5,76	1,57	0,38	2,13	-	-	-	2827548	-	-	2827554	-	-	-	-

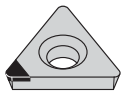


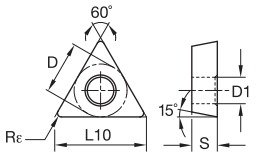


TBHB

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TBHB07S1X0	4,06	7,04	1,19	0,05	2,39	-	-	-	2828556	-	-	-	-	-	-	-
TBHB110201	6,35	11,00	2,38	0,10	3,33	-	-	-	2824266	-	-	-	-	-	-	-







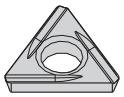
● first choice
○ alternate choice

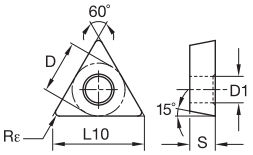
		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

TDHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHB07S1X0M	4,06	7,04	1,19	0,05	2,39	1,27	-	-	-	-	-	-	-	-	-	-	2828622
TDHB07S102M	4,06	7,04	1,19	0,18	2,39	1,27	-	-	-	-	-	-	-	-	-	2828579	-
TDHB07S104M	4,06	7,04	1,19	0,38	2,39	1,27	-	-	-	-	-	-	-	-	-	2828634	-
TDHB07S1X0	4,06	7,04	1,19	0,05	2,41	–	-	2828784	-	2828796	-	-	2828778	-	-	-	-
TDHB07S102	4,06	7,04	1,19	0,18	2,41	–	-	2828732	-	2828755	-	2828749	2828727	2828763	2828720	-	-
TDHB07S104	4,06	7,04	1,19	0,38	2,41	–	-	2828697	-	2828708	-	2828702	2828693	-	2828688	-	-
TDHB07S108	4,06	7,04	1,19	0,79	2,41	–	-	-	-	2828682	-	-	-	-	-	-	-

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.





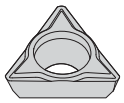
● first choice
○ alternate choice

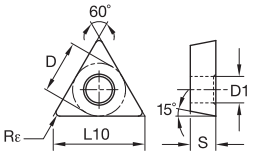
P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○			●
S		○	○	○	●	○		●			○		
H											●		

TDHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
TDHH07S102R	4,06	7,04	1,19	0,18	2,41	■	■	■	2828547	■	■	■	■	■	■	■
TDHH07S104R	4,06	7,04	1,19	0,38	2,41	■	■	■	2828499	■	■	■	■	■	■	■
left hand																
TDHH07S102L	4,06	7,04	1,19	0,18	2,41	■	■	■	2828541	■	2828529	2828516	■	2828508	■	■
TDHH07S104L	4,06	7,04	1,19	0,38	2,41	■	■	■	2828494	■	■	2828472	■	2828460	■	■

NOTE: Right-hand inserts used in left-hand bars only.

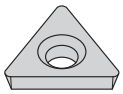


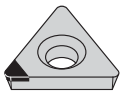


TDHH

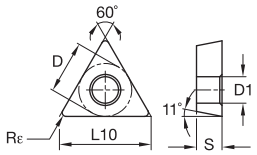
ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHH07S102	4,06	7,04	1,19	0,18	2,41	—	■	■	■	2828398	■	■	■	■	■	■	■
TDHH07S102L	4,06	7,04	1,19	0,18	2,41	4,52	■	■	■	2828541	■	2828529	2828516	■	2828508	■	■
TDHH07S102R	4,06	7,04	1,19	0,18	2,41	4,52	■	■	■	2828547	■	■	■	■	■	■	■
TDHH07S104L	4,06	7,04	1,19	0,38	2,41	4,36	■	■	■	2828494	■	■	2828472	■	2828460	■	■
TDHH07S104R	4,06	7,04	1,19	0,38	2,41	4,36	■	■	■	2828499	■	■	■	■	■	■	■
TDHH07S104	4,06	7,18	1,19	0,38	2,41	—	■	■	■	2828386	■	■	■	■	■	■	■

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.





(M)



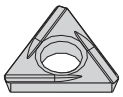
● first choice
○ alternate choice

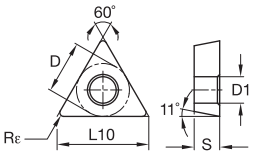
P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○		●	
S		○	○	○	●	○		●			○		
H											●		

■ TPHB

ISO catalogue number	D	L10	S	Rε	D1	max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHB1102X0	6,35	11,00	2,38	0,05	3,30	–	-	-	2824236	2824251	-	-	2824220	-	-	-	-
TPHB1102X0M	6,35	11,00	2,38	0,05	3,30	1,62	-	-	-	-	-	-	-	-	-	2823954	-
TPHB110202	6,35	11,00	2,38	0,18	3,30	–	-	-	2824191	2824200	-	2824195	2824168	-	2824148	-	-
TPHB110202M	6,35	11,00	2,38	0,18	3,30	1,62	-	-	-	-	-	-	-	-	-	2823949	2824022
TPHB110204	6,35	11,00	2,38	0,38	3,30	–	-	-	2824122	2824136	-	2824129	2824104	-	2824090	-	-
TPHB110204M	6,35	11,00	2,38	0,40	3,30	1,62	-	-	-	-	-	-	-	-	-	2823942	2824015
TPHB110208	6,35	11,00	2,38	0,79	3,30	–	-	-	-	2824077	-	-	2824044	-	2824037	-	-
TPHB1603X0	9,53	16,50	3,18	0,05	3,30	–	-	-	-	2821402	-	-	2821844	-	-	-	-
TPHB160302	9,53	16,50	3,18	0,18	3,30	–	2821834	-	-	2821397	-	-	2821816	-	-	-	-
TPHB160304	9,53	16,50	3,18	0,38	3,30	–	2821799	-	-	2821392	-	2821778	2821772	-	2821749	-	-
TPHB160308	9,53	16,50	3,18	0,79	3,30	–	2821371	-	-	2821381	-	2821377	2821349	-	2821331	-	-
TPCB160302	9,53	–	3,23	0,18	3,30	–	-	-	-	-	-	2821822	-	-	-	-	-

NOTE: Max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.





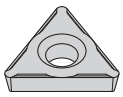
● first choice
○ alternate choice

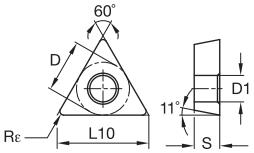
P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○		●	
S		○	○	○	●	○		●			○		
H											●		

■ TPHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
TPHH110202R	6,35	11,00	2,38	0,18	3,33	-	-	-	2823812	-	-	-	-	-	-	-
TPHH160302R	9,53	16,50	3,18	0,18	3,33	-	-	-	2821213	-	-	-	-	-	-	-
TPHH160304R	9,53	16,50	3,18	0,38	3,33	-	-	-	2821168	-	-	-	-	-	-	-
TPHH160308R	9,53	16,50	3,18	0,79	3,33	-	-	-	2821121	-	-	-	-	-	-	-
left hand																
TPHH110202L	6,35	11,00	2,38	0,18	3,33	-	-	-	2823805	-	-	-	-	2823767	-	-
TPHH110204L	6,35	11,00	2,38	0,38	3,33	-	-	-	2823753	-	2823739	-	-	-	-	-
TPHH160302L	9,53	16,50	3,18	0,18	3,33	-	-	-	2821208	-	-	-	-	-	-	-
TPHH160304L	9,53	16,50	3,18	0,38	3,33	-	-	-	2821162	-	2821150	-	-	-	-	-
TPHH160308L	9,53	16,50	3,18	0,79	3,33	-	-	-	2821115	-	-	-	-	-	-	-

NOTE: Right-hand inserts used in left-hand bars only.



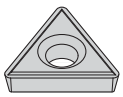


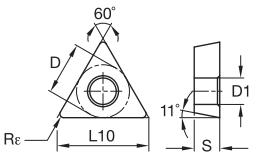
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ TPHH

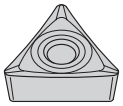
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHH110202	6,35	11,00	2,38	0,18	3,30	-	-	-	2823914	-	2823908	-	-	-	-	-
TPHH110204	6,35	11,00	2,38	0,38	3,30	-	-	-	2823858	-	-	-	-	-	-	-
TPCH110204	6,50	11,26	2,38	0,38	3,30	-	-	-	-	-	2823851	-	-	-	-	-

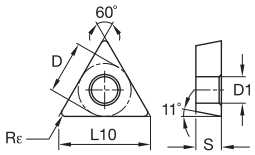




■ TPHH-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHH160304	9,53	16,50	3,18	0,40	3,33	-	-	-	2821070	-	2821705	-	-	-	-	-
TPHH160304LF	9,53	16,50	3,18	0,40	3,33	-	2821718	-	-	-	-	-	-	-	-	-
TPHH160308	9,53	16,50	3,18	0,79	3,33	-	-	-	-	-	2821670	-	2821688	-	-	-
TPHH160308	9,53	16,50	3,18	0,79	3,33	-	-	-	2821067	-	-	-	-	-	-	-
TPHH17T309LF	9,80	16,98	3,97	0,94	3,33	-	-	-	2821319	-	-	-	-	-	-	-



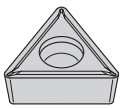


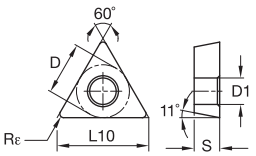
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

TPGT-HP

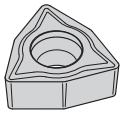
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPGT110202HP	6,35	11,00	2,38	0,20	2,90	-	-	-	2823605	-	-	-	-	-	-	-
TPGT110204HP	6,35	11,00	2,38	0,40	2,90	-	-	-	2823592	-	-	2823595	-	-	-	-
TPGT16T304HP	9,53	16,50	3,97	0,40	4,40	-	-	-	2821536	-	-	-	-	-	-	-

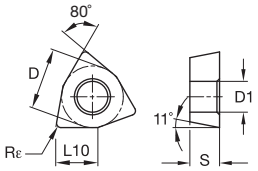




TPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPMT110202LF	6,35	11,00	2,38	0,20	2,80	-	-	-	2823646	-	-	-	-	-	-	-
TPMT110204LF	6,35	11,00	2,38	0,40	2,80	-	-	-	2823625	-	2823619	-	-	-	-	-
TPMT160304LF	9,53	16,50	3,18	0,40	4,40	-	-	-	2821577	-	2821571	-	-	-	-	-
TPMT160308LF	9,53	16,50	3,18	0,79	4,40	-	-	-	2821566	-	-	-	-	-	-	-



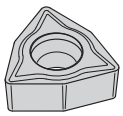


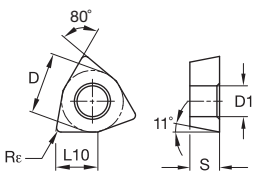
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

WPHT

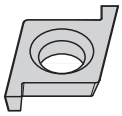
ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
WPHTS30101	4,76	3,26	1,59	0,10	2,16	-	-	-	2827496	-	-	-	-	-	-	-
WPHTS30102	4,76	3,26	1,59	0,20	2,16	-	-	-	2827483	-	-	2827490	-	-	-	-
WPHTS30104	4,76	3,26	1,59	0,40	2,16	-	-	-	2827471	-	-	2827477	-	-	-	-
WPGT040202UF	6,35	4,34	2,38	0,20	2,79	-	-	-	2824331	-	-	-	-	-	-	-
WPHT040201	6,35	4,34	2,38	0,10	2,80	-	-	-	2824344	-	-	-	-	-	-	-
WPHT040204	6,35	4,34	2,38	0,40	2,80	-	-	-	2824316	-	-	-	-	-	-	-

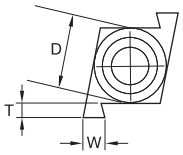


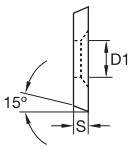


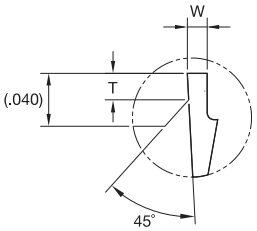
WPMT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
WPMTS3T104LF	4,76	3,25	1,98	0,40	2,15	-	-	-	-	2827521	-	-	-	-	-	-
WPMT040204LF	6,35	4,34	2,38	0,40	2,90	-	-	-	-	2824362	-	-	-	-	-	-
WPMT06T304LF	9,53	6,52	3,97	0,40	4,40	-	-	-	-	2821036	-	-	-	-	-	-
WPMT06T308LF	9,53	6,52	3,97	0,80	4,40	-	-	-	-	2821023	-	-	-	-	-	-









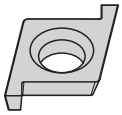
Detail of 0,38mm (.015") insert.

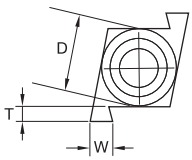
● first choice
○ alternate choice

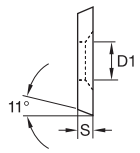
P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○			●
S		○	○	○	●	○		●			○		
H											●		

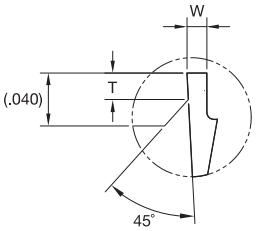
CDG-R/L

ISO catalogue number	D	S	T	W	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CDG50252R	3,97	1,27	1,02	0,64	2,13	-	-	-	2830541	-	-	-	-	-	-	-
CDG50302R	3,97	1,27	1,02	0,76	2,13	-	-	-	2830529	-	-	2830535	-	-	-	-





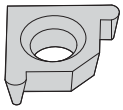


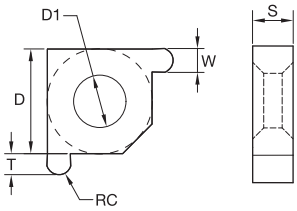


Detail of 0,38mm (.015") insert.

CPG-R/L

ISO catalogue number	D	S	T	W	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																
CPG2032R	6,35	1,91	1,65	0,76	2,79	-	-	-	2824546	-	-	-	-	-	-	-
CPG2062R	6,35	1,91	1,65	1,52	2,79	-	-	-	2824531	-	-	-	-	-	-	-



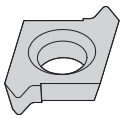


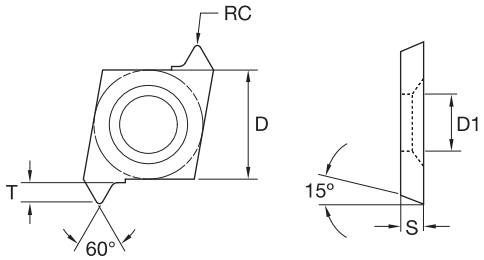
● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					●	○	●	○	○	●		
M		○	○	○	●	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	●	○		○		○		●
S		○	○	○	●	○		●			○	
H											●	

■ FNR-R/L

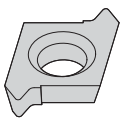
ISO catalogue number	D	S	T	W	RC	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNR150472R	5,00	1,85	1,00	1,20	0,60	2,50	■	■	■	2820783	■	■	■	■	■	■	■

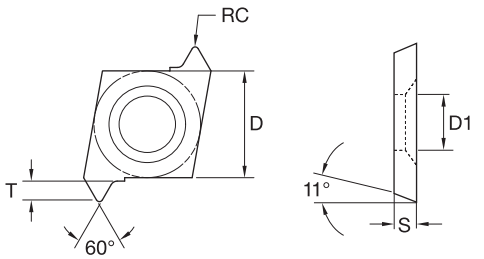




■ CDT-R/L

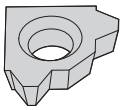
ISO catalogue number	D	S	T	RC	D1	TPI min	TPI max	TP min	TP max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																				
CDT50022R	3,97	1,27	0,76	0,05	2,11	24	48	0,5	1,0	■	■	■	2830567	■	■	■	■	■	■	■

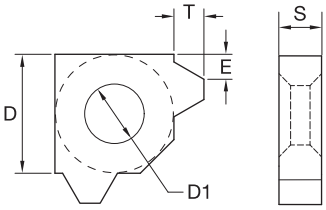




■ CPT-R/L

ISO catalogue number	D	S	T	RC	D1	TPI min	TPI max	TP min	TP max	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																				
CPT20052R	6,35	1,91	1,65	0,13	2,79	10	24	1,0	2,5	■	■	■	2824516	■	■	2824523	■	■	■	■



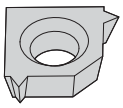


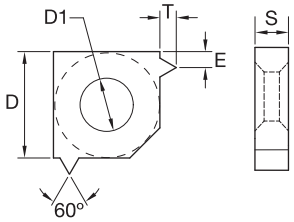
● first choice
○ alternate choice

P					●	○	●	○	○	●			
M		○	○	○	●	●	○	○	○	○			
K		○	●	●	○	○	○	○	●	○			
N		●	●	●	●	○		○		○			●
S		○	○	○	●	○		●				○	
H												●	

FNT-ACME-R/L

ISO catalogue number	D	S	T	E	D1	TPI min	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNT1512ACME2R	5,00	2,35	1,26	1,05	2,50	12	-	-	-	2820829	-	-	-	-	-	-	-





FNT-UN-R/L

ISO catalogue number	D	S	T	E	D1	TPI min	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
right hand																	
FNT1528UN2R	5,00	1,85	0,61	0,65	2,50	28	-	-	-	2820865	-	-	-	-	-	-	-

WIDIA-CIRCLE™ catalogue number	New ISO catalogue number
CDCD	CDHB
CDCG	CDHH
CDCT	CDHH
CPCA	CPHB
CPCM	CPHH
GCCD	GCHW
GCCT	GCHT
GPCD	GPHW
GPCT	GPHT
TD6P	TPHB
TDAB	TDHB
TDAT	TDHH
TDCG	TDHH
TPCB	TPHB
TPCG	TPHH
TPCH	TPHH
TPGH	TPHH
TPMT	TPMT
WPGT	WPHT



Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

A/B Series Small Hole Tooling

Available in steel and carbide shanks, the WIDIA™ line of micro boring bars is an excellent, economical choice for a wide range of applications — from creating small holes in small parts to precision micro boring typically found in large workpieces — manufactured in the aerospace, heavy equipment, and automotive industries.



A/B Series

A/B Series Micro Boring Bar

Features

- 1,56–3,96mm diameter boring range.
- Unique locking system enables quick, accurate insert changes.
- Insert repeatability guaranteed within ±0,013mm.

Benefits

- Quick, accurate insert setups.
- Available in multiple styles for machining a wide range of materials.
- Elliptical, ground insert shanks for maximum strength and rigidity.

ABD Type

Replaceable boring insert with coolant slot.



ABD Type

Replaceable boring insert available in coated and uncoated carbide, CBN, and PCD tip. A series has a coolant slot.



BB Type

Replaceable boring insert.

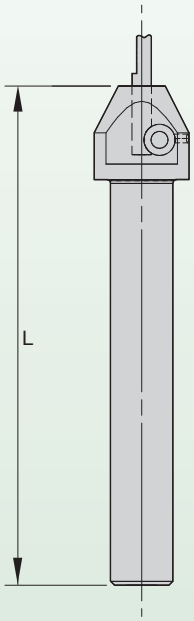


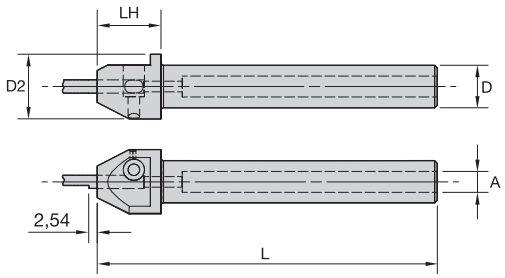
A/B Series Boring Bar Identification System

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



AT	B	M	8	38
Series Style and Bar Type *Construction Features of the Boring Bar*	Boring Bar	Type	Shank Diameter *shown as "D"*	Length *shown as "L"*
AT = Through Coolant **BS** = No Coolant		**M** = Metric	**Metric** **8** = 8,00mm **10** = 10,00mm **12** = 12,00mm **16** = 16,00mm **20** = 20,00mm	**Metric** **38** = 38,0mm **100** = 100,0mm **102** = 102,0mm **152** = 152,0mm

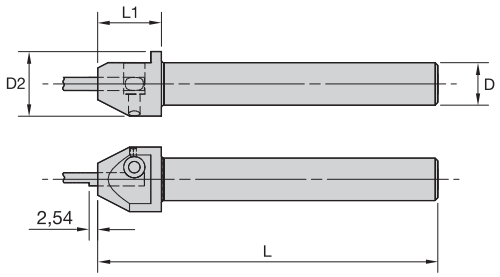




ATBM

order number	catalogue number	D	D2	L	A	wedge	wedge screw	hex
3896121	**ATBM12100**	12,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
2839192	**ATBM1638**	16,00	19,30	38	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896193	**ATBM16100**	16,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896194	**ATBM20102**	20,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64
3896195	**ATBM25102**	25,00	19,30	102	6,35	**AW250/AW-250**	**AS832/AS-8-32**	5/64

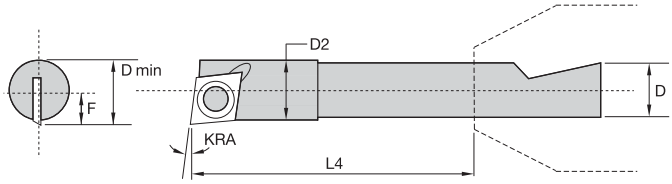
NOTE: These tools will accept any A-Series solid carbide insert (ABD, ABD-M, AGD, APD, and ATD).



BSBM

order number	catalogue number	D	D2	L	L1	wedge	wedge screw	hex
3896196	**BSBM20152**	20,00	25,65	152	29	**BW312**	**BS832**	5/64

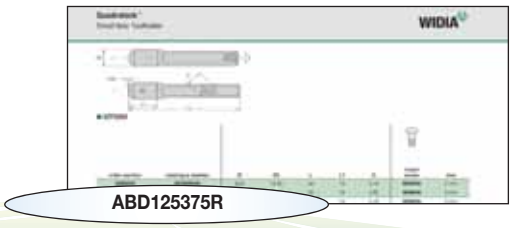
NOTE: These tools will accept any B-Series solid carbide insert (BB and BP).



ABC

order number	catalogue number	KRA	D	D min	D2	F	L4	gage insert	insert screw	Torx
right hand										
2836656	**ABC1000R**	-7	3,96	4,57	4,16	2,41	25,40	CD..120605	**CC09**	T6
2836651	**ABC1250R**	-7	3,96	4,57	4,16	2,41	31,75	CD..120605	**CC09**	T6
2836645	**ABC1500R**	-7	3,96	4,57	4,16	2,41	38,10	CD..120605	**CC09**	T6
2836667	**ABC500R**	-7	3,96	4,57	4,16	2,41	12,70	CD..120605	**CC09**	T6
2836660	**ABC750R**	-7	3,96	4,57	4,16	2,41	19,05	CD..120605	**CC09**	T6

A/B Series Boring Bar Identification System



ABD — Insert Style

A Series = Through Coolant

ABC = Indexable Boring
ABD = Boring
AGD = Grooving
APD = Profiling
ATD = Threading

B Series = Without Coolant

BB = Boring
BP = Profiling

125 — Minimum Bore *shown as "D min"*

A Series

06 = 1,58mm
09 = 2,39mm
125 = 3,18mm
156 = 3,96mm

(AGD style only)
095 = 2,79mm
125 = 3,56mm
156 = 4,45mm

(ATD style only)
095 = 2,79mm
125 = 3,56mm
156 = 4,45mm

B Series
187 = 4,75mm
250 = 6,35mm
312 = 7,93mm

375 — Bore Depth, Groove Width, Flat on Thread *shown as "L4, W"*

Bore Depth

187 = 4,75mm
281 = 7,14mm
312 = 7,93mm
375 = 9,53mm
500 = 12,70mm
600 = 15,24mm
625 = 15,88mm
750 = 19,05mm
825 = 20,96mm
875 = 22,23mm
1000 = 25,40mm
1250 = 31,75mm
1500 = 38,10mm
1750 = 44,45mm
2125 = 53,98mm

A Series

Groove Width (AGD style only)

03 = 0,76mm
04 = 1,02mm
05 = 1,27mm

Thread (ATD style only)

F2 = 0,05mm
Flat on thread

R — Hand of Tool

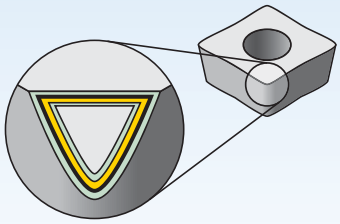
R = Right hand

L = Left hand

Tip Style *(optional)*

Symbol
M

Usage
Mini tip

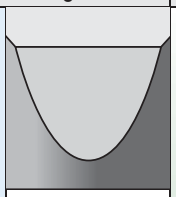
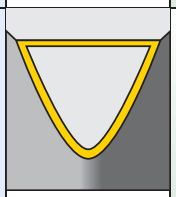
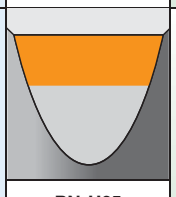


Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

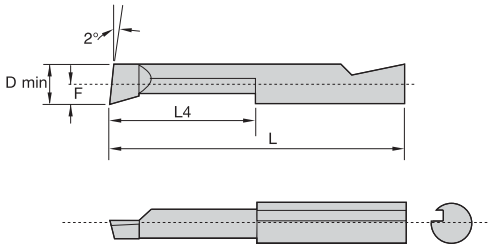
Grade

Coating	Grade Description		05	10	15	20	25	30	35	40	45
CM1  HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P									
		M									
		K									
		N									
		S									
CG5  HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P									
		M									
		K									
		N									
		S									
CBN6  BN-H25	PcBN tip brazed onto a carbide insert. Recommended for machining hardened steel (45–65 HRC). Use on bearing steel, hot and cold work tool steels, high-speed steels, die steels, case-hardened steels, carburised and nitrided irons, and some hard coatings. Can be run both dry and wet.										
		H									



Material Group		Cutting Speed — vc m/min								
		CG5			CM1			CBN6		
		min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,025	-	0,200	0,025	-	0,203	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	0/1	95	**120**	145	55	**70**	85	–	–	–
	2	65	**80**	90	40	**45**	55	–	–	–
	3	65	**80**	90	40	**45**	55	–	–	–
	4	50	**60**	75	30	**35**	45	–	–	–
	5	65	**80**	95	40	**45**	55	–	–	–
	6	45	**55**	65	25	**30**	40	–	–	–
M	ap [mm]	0,025	-	0,200	0,025	-	0,200	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	1	75	**95**	110	55	**70**	85	–	–	–
	2	70	**85**	100	50	**65**	75	–	–	–
	3	55	**65**	80	40	**50**	55	–	–	–
K	ap [mm]	0,001	-	0,010	0,001	-	0,010	–	–	–
	f [mm/rev]	0,0005	-	0,007	0,0005	-	0,007	–	–	–
	1	65	**80**	95	50	**60**	75	–	–	–
	2	80	**95**	115	60	**75**	90	–	–	–
	3	55	**70**	85	45	**55**	65	–	–	–
N	ap [mm]	0,025	–	0,640	0,025	–	0,640	–	–	–
	f [mm/rev]	0,013	–	0,178	0,013	–	0,178	–	–	–
	1	405	**505**	605	405	**505**	605	–	–	–
	2	300	**370**	445	300	**370**	445	–	–	–
	3	75	**95**	110	70	**90**	105	–	–	–
	4	140	**175**	210	105	**125**	155	–	–	–
	5	100	**125**	150	80	**100**	120	–	–	–
	6	100	**125**	150	80	**100**	120	–	–	–
	7	240	**300**	360	240	**300**	360	–	–	–
S	ap [mm]	0,025	-	0,200	0,025	-	0,200	–	–	–
	f [mm/rev]	0,013	-	0,178	0,013	-	0,178	–	–	–
	1	30	**35**	40	55	**70**	85	–	–	–
	2	20	**30**	35	45	**55**	65	–	–	–
	3	35	**40**	50	30	**35**	45	–	–	–
	4	–	–	–	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–	0,025	-	0,200
	f [mm/rev]	–	–	–	–	–	–	0,0005	-	0,004
	1	–	–	–	–	–	–	110	**140**	165
	2	–	–	–	–	–	–	105	**130**	155
	3	–	–	–	–	–	–	100	**125**	150
	4	–	–	–	–	–	–	100	**125**	150

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.

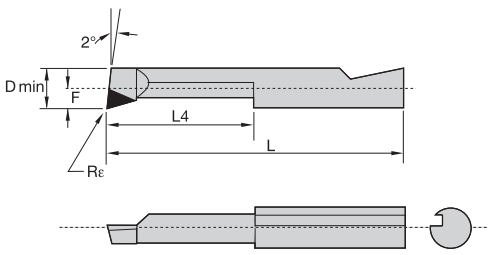


● first choice
○ alternate choice

P	●	○		
M	●	○		
K	○	●		
N	○	●		
S	●	○		
H				●

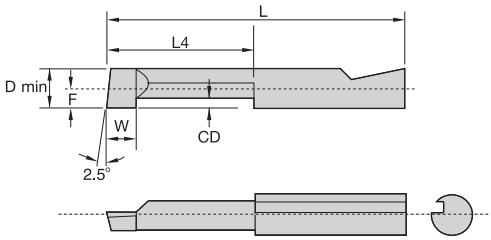
■ ABD

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6
right hand							
ABD06187R	1,58	5,41	21,92	0,66	2836639	2836632	■
ABD06312R	1,58	7,93	24,44	0,66	2836627	2836621	■
ABD09281R	2,39	7,14	23,65	1,04	2836614	2836608	■
ABD09500R	2,39	12,70	29,21	1,04	2836604	2836599	■
ABD125375R	3,18	9,53	26,04	1,45	2836593	2836588	■
ABD125625R	3,18	15,88	32,39	1,45	2836582	2836579	■
ABD156500R	3,96	12,70	29,21	1,85	2836573	■	■
ABD156875R	3,96	22,23	38,74	1,85	2836561	■	■



■ ABD-M

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1	CBN6
right hand								
ABD156875RM	3,96	22,23	38,74	1W,85	0,18	■	■	2836679

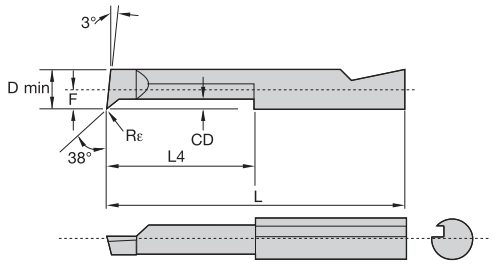


● first choice
○ alternate choice

P	●	○	
M	●	○	
K	○	●	
N	○	●	
S	●	○	
H			●

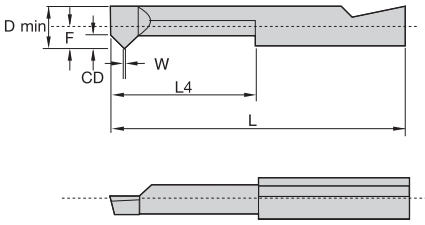
AGD

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1	CBN6
right hand									
AGD09503	2,79	7,93	24,44	1,17	0,76	0,76	2836550	2836545	-
AGD12504	3,56	9,53	26,04	1,55	0,89	1,02	2836537	-	-
AGD15605	4,45	12,70	29,21	1,93	1,27	1,27	2836524	-	-



APD

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6
right hand									
APD06187R	1,58	4,75	21,26	0,66	0,43	0,18	2836511	-	-
APD09281R	2,39	7,14	23,65	1,07	0,71	0,18	-	2836495	-
APD125375R	3,18	9,53	26,04	1,45	1,02	0,18	2836489	-	-
APD156500R	3,96	12,70	29,21	1,85	1,27	0,18	-	2836473	-

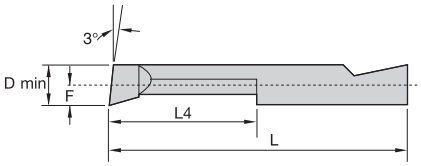


● first choice
○ alternate choice

P		●	○	
M		●	○	
K		○	●	
N		○	●	
S		●	○	
H				●

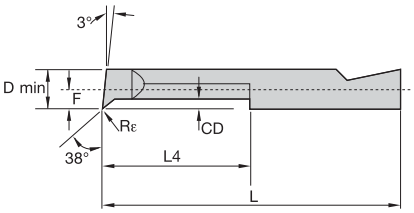
ATD

ISO catalogue number	D min	L4	L	F	CD	W	TP min	TP max	TPI min	TPI max	CG5	CM1	CBN6
right hand													
ATD12560F2	3,56	9,53	26,04	1,55	0,69	0,05	1,06	0,53	24	48	-	2836450	-
ATD15660F2	4,45	12,70	29,21	1,93	0,81	0,05	1,27	0,53	20	48	2836443	2836436	-



BB

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6
right hand							
BB187750R	4,75	19,05	45,72	2,24	2832769	-	-
BB1871250R	4,75	31,75	58,42	2,24	2832758	-	-
BB2501000R	6,35	25,40	52,07	3,05	2832747	2832742	-
BB3121250R	7,93	53,98	80,65	3,84	2832724	2832719	-



● first choice
○ alternate choice

P		●	○	
M		●	○	
K		○	●	
N		○	●	
S		●	○	●
H				

■ BP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6
right hand									
BP187600R	4,75	15,24	41,91	2,24	1,58	0,18	2832702	ı	ı
BP250825R	6,35	20,96	47,63	3,05	1,98	0,18	2832689	ı	ı

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

Quadralock™ •

High-Precision Products for I.D. Applications

Easy access, quick-change toolholders and inserts perform multiple I.D. applications for maximum productivity with one toolholder.

The unique cutting tip of the Quadralock™ I.D. Quick-Change Tooling System can be locked in four different positions, enabling operation in both Swiss-style and conventional machines. Four quick, easy setup steps and guaranteed insert repeatability within ±0,013mm ensures superior performance.



Quadralock

Quadralock Ultra-Precision Tooling

Features

- Fixed-limit stop for precise and repeatable cutting edge positioning.
- Tight insert seat pocket ensures secure hold.
- V-slots and limit-stop bolts for increased indexability.

Benefits

- Internal coolant supply directly lubricates cutting edge.
- Ability to rotate tool at 90° increments.
- For all boring, grooving, profiling, and threading applications.

Boring

Bore holes as small as 0,25mm.



Grooving

Groove in a 2,79mm diameter hole.



Profiling

Profile in diameters as small as 1,57mm.

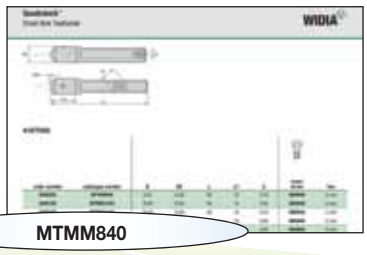


Threading

Thread down to a No. 5; 2,54mm.

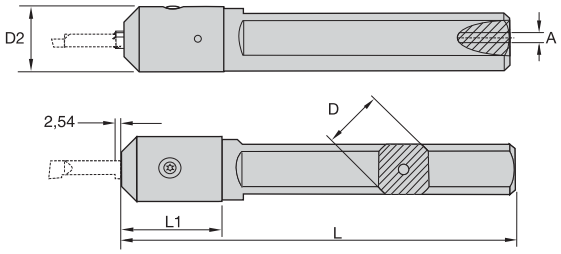


Quadralock Boring Bar Identification System



MTMM840

MTM	M	8	40
Quadralock Boring System	Type	Shank Diameter *shown as "D"*	Length *shown as "L"*
	M = Metric	**Metric** **8** = 8,00mm **10** = 10,00mm **12** = 12,00mm **16** = 16,00mm **22** = 22,00mm	**Metric** **40** = 38,10mm **100** = 101,60mm **127** = 127,00mm



MTMM

order number	catalogue number	D	D2	L	L1	A	insert screw	hex
3896202	**MTMM840**	8,00	12,95	38	19	3,18	**MSM46**	2 mm
3896198	**MTMM1040**	10,00	12,95	38	19	3,00	**MSM46**	2 mm
3896200	**MTMM1240**	12,00	12,95	38	19	3,18	**MSM46**	2 mm
3896199	**MTMM12100**	12,00	12,95	102	19	3,00	**MSM46**	2 mm
3896201	**MTMM22127**	22,00	12,95	127	19	3,00	**MSM46**	2 mm

Easy Access to Proven Metalworking Expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Customer Application Support (CAS)

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	+61 001 724 539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049 911 9735 429*	eu.techsupport@widia.com
Belgium	English / French	0800 80410	0049 911 9735 429*	eu.techsupport@widia.com
China	Chinese	+86 400 889 2237	+86 21 58999985 *	w-cn.techsupport@widia.com
Denmark	English	+45 808 89295	001 724 539 6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001 724 539 6830 *	na.techsupport@widia.com
France	Frensh	+33 080 5540 379	0049 911 9735 429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911 9735 429*	eu.techsupport@widia.com
India	English	+91 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Israel	English	+972 1809 449907	001 724 539 6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	+81 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Korea (South)	English	+82 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001 724 539 6830 *	na.techsupport@widia.com
New Zealand	English	+64 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001 724 539 6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504*	eu.techsupport@widia.com
Russia (landline)	Russian	+7 8800 5556395	0048 6166 56504*	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504*	eu.techsupport@widia.com
Singapore	English	+65 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
South Africa	English	+27 0800 981644	001 724 539 6830 *	na.techsupport@widia.com
Sweden	English	+46 020798794	001 724 539 6830 *	na.techsupport@widia.com
Taiwan	English	+886 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

Phone and fax numbers marked with * are not toll free.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Quadralock Boring Bar Insert Identification System

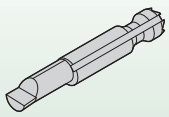


MB125625R

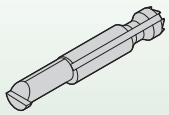
MB

Insert Style

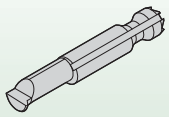
MB = Boring



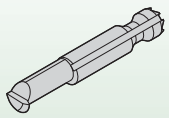
MG = Grooving



MP = Profiling



MT = Threading



125

Minimum Bore
shown as "D min"

Metric

010	=	0,25mm
030	=	0,76mm
062	=	1,58mm
094	=	2,39mm
125	=	3,18mm
156	=	3,96mm

(for MG and MT style only)

095	=	2,79mm
125	=	3,56mm
156	=	4,45mm

625

Bore Depth, Groove Width, Flat on Thread
shown as "L4, W"

Metric
Bore Depth

062	=	1,58mm
187	=	4,75mm
281	=	7,14mm
312	=	7,93mm
375	=	9,53mm
500	=	12,70mm
625	=	15,88mm
875	=	22,23mm

Groove Width
(for MG style only)

030	=	0,76mm
040	=	1,02mm
050	=	1,27mm

Thread
(for MT style only)

60F2	=	0,05mm

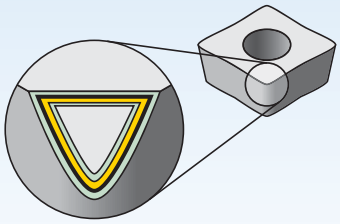
Flat on 60° thread

R

Hand of Tool

R =
Right hand

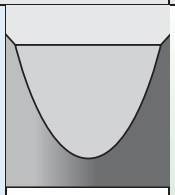
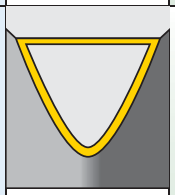
L =
Left hand



Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

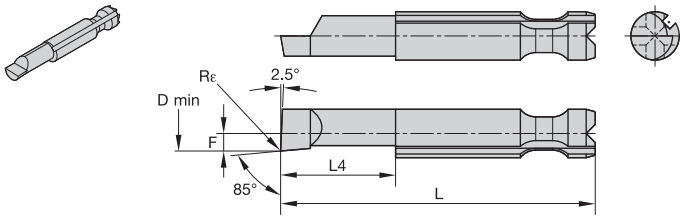
wear resistance ◄——► toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
CM1	 HW-S25	Uncoated carbide. A very tough, ultra-fine grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates. Use when C2, C3, or C25 fail due to chipping or breaking.	P									
			M									
			K									
			N									
			S									
CG5	 HC-S25	A PVD-TiN-coated grade. Straight 9.5% Co substrate. Submicron grain. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Performs best at low speeds and will handle interruptions and high feed rates.	P									
			M									
			K									
			N									
			S									



	Material Group	Cutting Speed — vc m/min					
		CG5			CM1		
		min	Start	max	min	Start	max
P	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	0/1	105	**130**	155	65	**80**	100
	2	70	**90**	105	45	**55**	65
	3	70	**90**	105	45	**55**	65
	4	55	**70**	85	40	**45**	55
	5	70	**90**	105	45	**55**	70
	6	50	**60**	70	35	**40**	45
M	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	1	75	**95**	110	55	**70**	85
	2	70	**85**	100	50	**65**	75
	3	55	**65**	80	40	**50**	55
K	ap [mm]	.001	-	.010	.001	-	.010
	f [mm/rev]	.0005	-	.007	.0005	-	.007
	1	65	**80**	95	50	**60**	75
	2	80	**95**	115	60	**75**	90
	3	55	**70**	85	45	**55**	65
N	ap [mm]	.001	–	.025	.001	–	.025
	f [mm/rev]	.0005	–	.007	.0005	–	.007
	1	405	**505**	605	405	**505**	605
	2	300	**370**	445	300	**370**	445
	3	75	**95**	110	70	**90**	105
	4	140	**175**	210	105	**125**	155
	5	100	**125**	150	80	**100**	120
	6	100	**125**	150	80	**100**	120
	7	240	**300**	360	240	**300**	360
S	ap [mm]	.001	-	.008	.001	-	.008
	f [mm/rev]	.001	-	.007	.001	-	.007
	1	30	**35**	40	55	**70**	85
	2	20	**30**	35	45	**55**	65
	3	35	**40**	50	30	**35**	45
	4	–	–	–	–	–	–
H	ap [mm]	–	–	–	–	–	–
	f [mm/rev]	–	–	–	–	–	–
	1	–	–	–	–	–	–
	2	–	–	–	–	–	–
	3	–	–	–	–	–	–
	4	–	–	–	–	–	–

NOTE: Speed and feed rates and depth of cut may vary depending on materials and machining conditions including, but not limited to, tool overhang, tool size, and finished surface requirements.



● first choice
○ alternate choice

P	●	○
M	●	○
K	○	●
N	○	●
S	●	○
H		

■ MB

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1
right hand							
MB010062R	0,25	1,58	20,57	0,09	0,03	2836098	2836085
MB062187R	1,58	5,41	21,92	0,66	0,05	2836423	3885985
MB062312R	1,58	7,93	24,44	0,66	0,05	2836418	2836263
MB094281R	2,39	7,14	23,65	1,04	0,05	-	3857732
MB094500R	2,39	12,70	29,21	1,04	0,05	2836405	2836251
MB125625R	3,18	15,88	32,39	1,45	0,10	-	2836240
MB156500R	3,96	12,70	29,21	1,85	0,10	2836388	3885997
MB156875R	3,96	22,23	38,74	1,85	0,10	-	2836229

(continued)

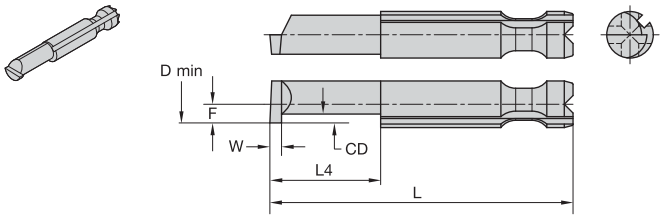
(MB — continued)

● first choice
○ alternate choice

P	●	○	
M	●	○	
K	○	●	
N	○	●	
S	●	○	
H			

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1
MB010062L	0,25	1,58	20,57	0,09	0,03	3885960	3885959
MB030187L	0,76	4,75	21,26	0,34	0,03	3885961	3885962
MB062187L	1,58	5,41	21,92	0,66	0,05	3885983	3885984
MB062312L	1,58	7,93	24,44	0,66	0,05	3885986	3885987
MB094281L	2,39	7,14	23,65	1,04	0,05	-	3885989
MB094500L	2,39	12,70	29,21	1,04	0,05	3885990	3885991
MB125375L	3,18	9,53	26,04	1,45	0,10	3885992	3885993
MB125625L	3,18	15,88	32,39	1,45	0,10	3885994	3885995
MB156500L	3,96	12,70	29,21	1,85	0,10	3027643	3885996
MB156875L	3,96	22,23	38,74	1,85	0,10	3885998	3885999

NOTE: Actual bore depth for MB062187R and MB062187L equals 5,41mm.
ANSI Catalogue Number MB062187R and ANSI Catalogue Number MB062187L have an actual bore depth of .213".

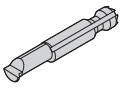


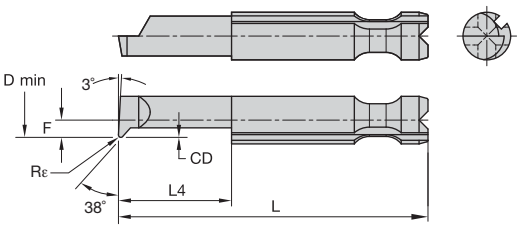
● first choice
○ alternate choice

P	●	○
M	●	○
K	○	●
N	○	●
S	●	○
H		

■ MG

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1
right hand								
MG095030R	2,79	7,93	24,44	1,17	0,76	0,76	-	2836223
MG125040R	3,56	9,53	26,04	1,55	0,89	1,02	3897442	-
MG156050R	4,45	12,70	29,21	1,93	1,27	1,27	-	2836210
left hand								
MG095030L	2,79	7,93	24,44	1,17	0,76	0,76	3886000	3886001
MG125040L	3,56	9,53	26,04	1,55	0,89	1,02	3886002	3886003
MG156050L	4,45	12,70	29,21	1,93	1,27	1,27	3897483	3897484



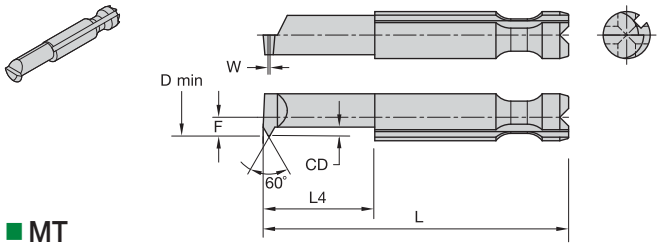


● first choice
○ alternate choice

P		●	○
M		●	○
K		○	●
N		○	●
S		●	○
H			

■ MP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1
right hand								
MP062187R	1,58	4,75	21,26	0,66	0,43	0,10	2836357	-
MP094281R	2,39	7,14	23,65	1,07	0,71	0,10	2836351	3897488
MP125375R	3,18	9,53	26,04	1,45	1,02	0,20	2836345	2836190
MP156500R	3,96	12,70	29,21	1,85	1,27	0,20	2836339	2836184
left hand								
MP062187L	1,58	4,75	21,26	0,66	0,43	0,10	-	3897486
MP094281L	2,39	7,14	23,65	1,07	0,71	0,10	3644074	3897487
MP125375L	3,18	9,53	26,04	1,45	1,02	0,20	-	3897490
MP156500L	3,96	12,70	29,21	1,85	1,27	0,20	3897491	3897492



■ MT

● first choice
○ alternate choice

P	●	○
M	●	○
K	○	●
N	○	●
S	●	○
H		

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1
right hand								
MT09560F2R	2,79	7,93	24,44	1,17	0,56	0,05	-	2836180
MT12560F2R	3,56	9,53	26,04	1,55	0,69	0,05	2836328	3897497
MT15660F2R	4,45	12,70	29,21	1,93	0,81	0,05	-	2836168
left hand								
MT09560F2L	2,79	7,93	24,44	1,17	0,56	0,05	3897493	3897494
MT12560F2L	3,56	9,53	26,04	1,55	0,69	0,05	3897496	3897495
MT15660F2L	4,45	12,70	29,21	1,93	0,81	0,05	3897498	3897499

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2 mm	M4X0.7
2840186	AS832/AS-8-32	5/64	#8-32
2892513	BS832	5/64	–
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2830477	FC11	T7	–
2828337	GT21	T7	#2-56
2825941	QTM20	T7	M2.5X0.45
2825948	QTM26	T7	M2.5X0.45
2826005	QC15	T8	#3-48
2826038	QC21	T9	#4-40
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72

Wrenches

order number	ISO catalogue number	Torx/hex
2840094	MKEY	2.0 mm
2840174	AKEY	5/64
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9
2823182	SKEY	T10

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2 mm
2832661	CBIT	T6
2830497	FBIT	T7
2825963	QTBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9
2823236	SBIT	T10
2823196	STBIT	T15

Wedges

order number	ISO catalogue number
2840192	AW250/AW-250
2836024	BW312

WMT™ System



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

The WMT platform is the economical and reliable option for all your grooving, cut-off, turning, and profiling applications. Trust the WMT system to ensure precise insert positioning and provide only the most accurate machining with exceptionally fast cycle times and superior performance.

Versatile and Well-Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even your most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.

WMT Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycle times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.
- Choice of integral or modular holders.

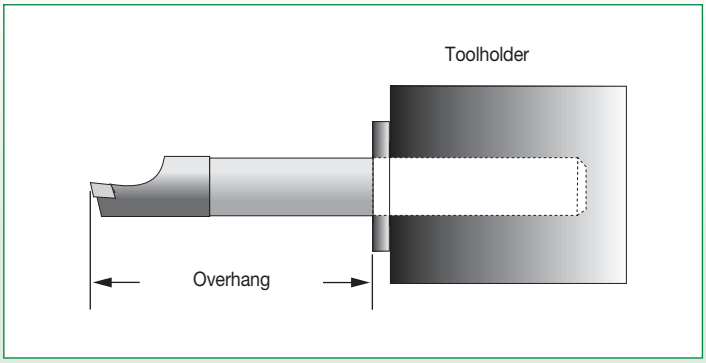
To learn more, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™

Setup Recommendations for Bar Overhang

WIDIA-CIRCLE™ cutting tools are the finest quality boring, grooving, profiling, and threading tools available. For more than 50 years, WIDIA-CIRCLE has been the industry leader in solving small-diameter hole machining problems in major manufacturing plants worldwide.

A common problem associated with any cutting tool is extending the tool beyond its support point. This condition of excessive overhang can cause chatter, poor finishes, or inadequate tool life.



We recommend a 4:1 ratio (4 times bar diameter) overhang when using steel shank bars and up to a 10:1 (10 times bar diameter) overhang when using carbide shank bars. The overhang ratios are affected by many factors:

- Type(s) of material(s) being machined.
- Depth of cut(s).
- Feed rate(s).

Recommended conditions may still be unsatisfactory because of chatter. Chatter can be induced by non-rigid setups or harmonics from the machine or machining conditions. In many cases, changing the RPM of the machine can reduce chatter.

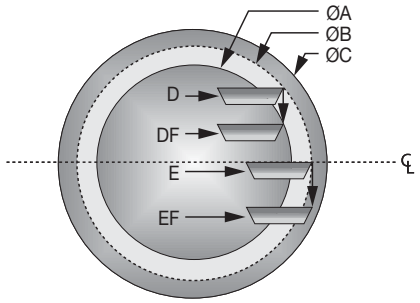
shank diameter (mm)	steel shank ratio 4:1 (mm)	carbide shank ratio 10:1 (mm)
4,00mm	16,00mm	40,00mm
5,00mm	20,00mm	50,00mm
6,00mm	24,00mm	60,00mm
8,00mm	32,00mm	80,00mm
10,00mm	40,00mm	100,00mm
12,00mm	48,00mm	120,00mm
16,00mm	64,00mm	160,00mm
20,00mm	80,00mm	200,00mm
25,00mm	100,00mm	250,00mm
32,00mm	128,00mm	320,00mm

Setup Information and Recommendations

Tool "D" (above centreline)
Set ØB is deflected to position "DF," relieving the load by deflecting to a smaller bore, ØA. Tool "D" cannot "dig in" because the cut (load) becomes lighter as it deflects.

Tool "E" (on centreline or below)
Set ØB "digs in" and is deflected toward position "EF" and bore ØC. The larger the load, the larger the deflection.

Tip of the Insert
This enables the end user to hold closer tolerances, produce a better finish, and avoid chatter.

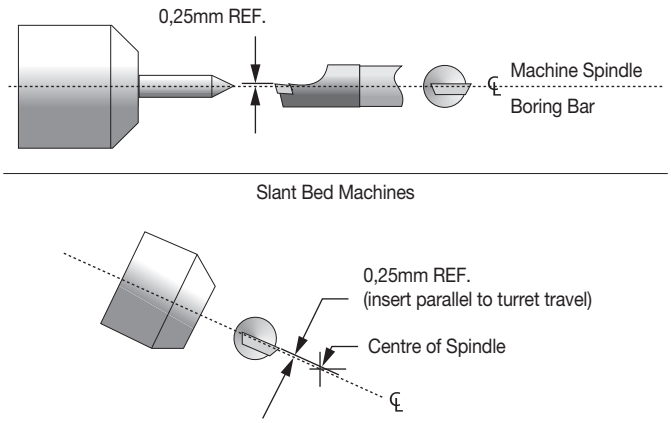


Built-in geometries of WIDIA-CIRCLE™ precision boring bars are based on the concept that the boring bar shank will always be positioned on the machine spindle centreline. The cutting point will be slightly high (against direction of rotation) except when facing centreline or cutting on outside diameters.

Use WIDIA-CIRCLE precision setup level or:

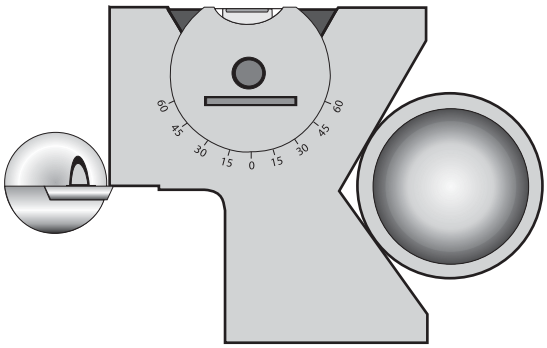
1. Use centre height gage and position insert as shown in illustration.
2. If centre point is unavailable, mark the centre of the bar stock with a centring punch or square. Position the insert as shown in illustration.
3. Lay a straight edge on the insert to help position the insert parallel to the travel or centreline.

NOTE: In some cases, to help reduce chatter or taper, the insert may need to be rotated less than 0,25mm but more than 0,05mm above centre.

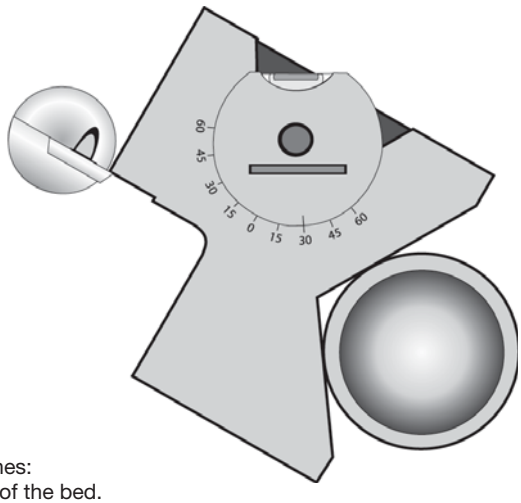




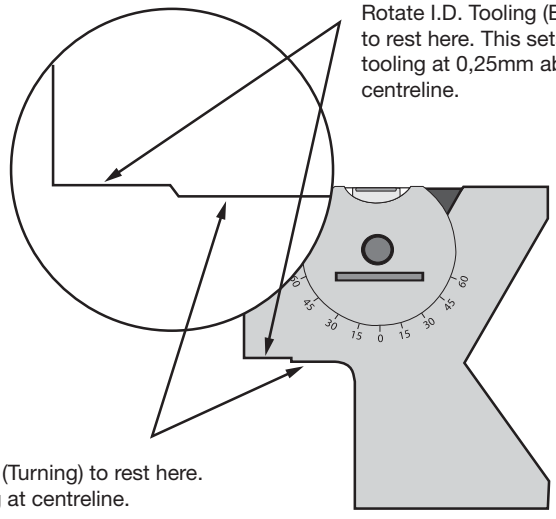
Uni-Level Precision Setup Level



For most machines:
Set the dial to the 0° mark.



For slant bed-type machines:
Set the dial to the degree of the bed.

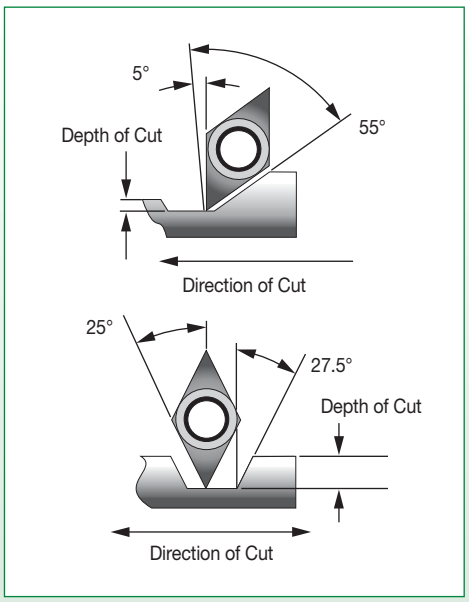


Rotate I.D. Tooling (Boring) to rest here. This sets the tooling at 0,25mm above centreline.

Rotate O.D. Tooling (Turning) to rest here.
This sets the tooling at centreline.

Setup Information and Recommendations for Boring and Profiling

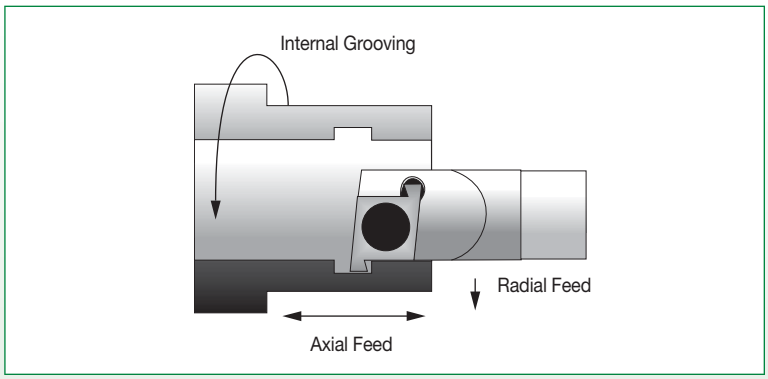






Setup Information and Recommendations for Grooving



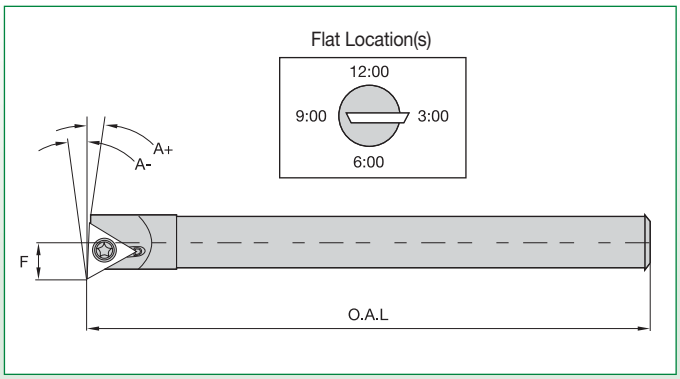


CDG Indexable-Type Grooving Inserts

safe overhang conditions:	steel ratio 4:1 (mm)	carbide ratio 10:1 (mm)
surface footage(s):	see pages D40–D41	
radial feeds:	C-Series = 0,008–0,025mm Q-Series = 0,008–0,051mm	
axial feeds:	C-Series = 0,013–0,051mm Q-Series = 0,013–0,127mm	

For more than 50 years, WIDIA-CIRCLE™ has offered the most reliable, highest-quality small hole boring bars available.

Although our extensive product line covers most machining applications, we understand that a custom solution tool may be required.



Straight Shank-Type Boring Bars

Steel or Carbide

Date

Customer-Specified Dimensions

	= **O.A.L. (Overall Length)**	From 3x bar diameter to catalogue length.
	= **"F" Dimension**	0,254mm from basic dimension shown in catalogue triangle insert bars only.
	= **"A" Dimension**	+10° to -10° triangle insert bars only.
	= **Flat Location(s)**	1 Flat — no charge (see illustration above).

Special Instructions
(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

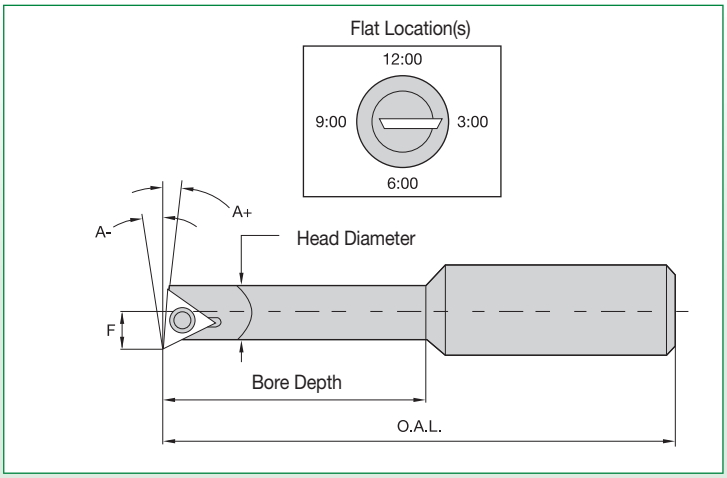
Distributor

Shipping Requirements

Attention Distributors: Use this worksheet to collect information for your customer.

❒ Ground ❒ Next Day Air ❒ 2nd Day Air ❒ 3rd Day Air

Use this worksheet to modify any of our existing products to meet your own specifications. If your special requirements do not fit any of these categories, contact us directly.



Step-Down Shank-Type Boring Bars

Steel or Carbide

Date

Customer-Specified Dimensions

	= **Bore Depth**	19,05mm to 6x diameter steel; 19,05mm to 10x diameter carbide.
	= **O.A.L. (Overall Length)**	Steel; smaller than O.A.L. listed in catalogue carbide, bore depth, and standard sleeve length.
	= **"F" Dimension**	0,254mm from basic dimension shown in catalogue triangle insert bars only.
	= **"A" Dimension**	+10° to -10° triangle insert bars only.
	= **Flat Location(s)**	1 Flat — no charge (see illustration above).

Special Instructions
(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

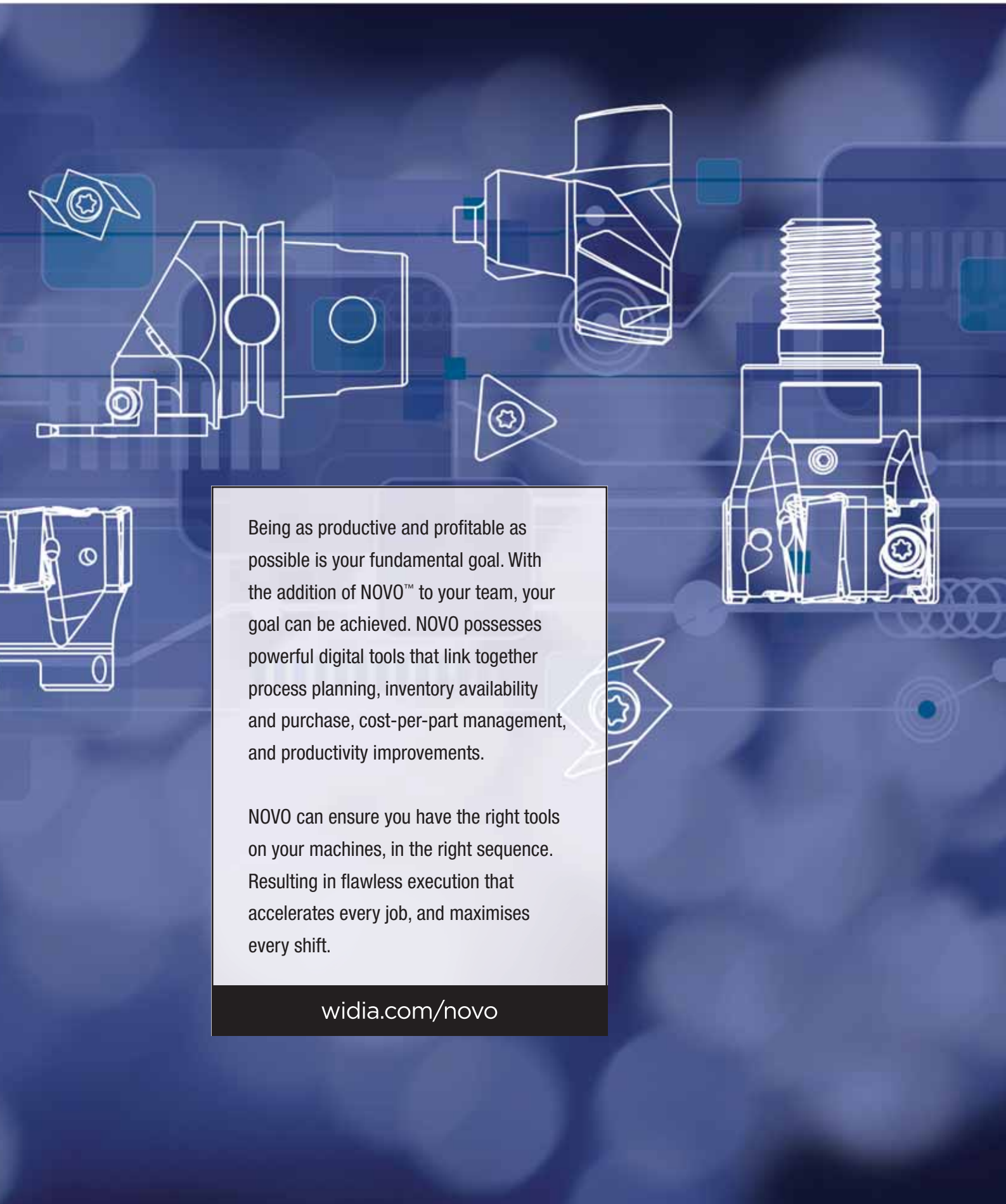
Distributor

Shipping Requirements

❒ Ground ❒ Next Day Air ❒ 2nd Day Air ❒ 3rd Day Air

Attention Distributors: Use this worksheet to collect information for your customer.

NOVO KNOWS
ART TO PART TO PROFIT

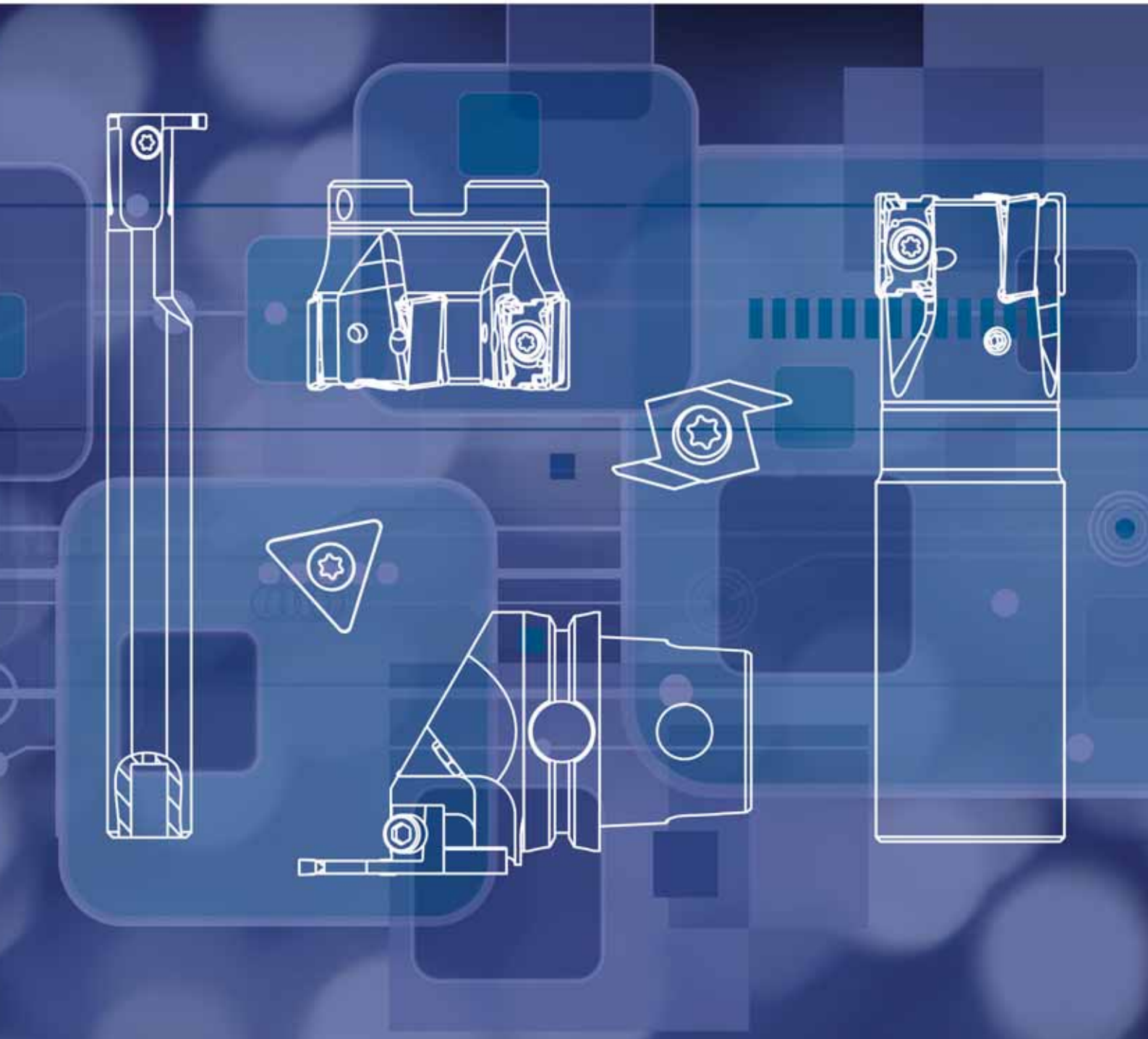


Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift.

widia.com/novo

WIDIA™



01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™



Turning • Grooving and Cut-Off

Grooving and Cut-Off Platforms E2–E3

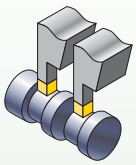
WMT Grooving, Face Grooving, Cut-Off, and Profiling E4–E39

TopGroove Shallow Grooving and Face Grooving E40–E91

ProGroove Grooving and Cut-Off E92–E107

Separator for Cut-Off E108–E133

Grooving



WMT™

- Insert cutting widths: 2–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- I.D. boring bar minimum bore diameter: 57,15mm.
- Screw-clamping integral shank/cartridge toolholders available.
- Geometry for deep grooving.

Pages:
E4–E39



TopGroove™

- Insert cutting widths: 0,5–6,35mm.
- Insert cutting depths: 0,64–12,7mm.
- I.D. boring bar minimum bore diameter: 11,2mm.
- Integral shank toolholders available.

Pages:
E40–E91

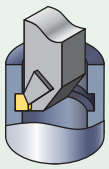


ProGroove™

- Insert cutting depths: 10–40mm.
- Inserts enable precision sintered execution, good tolerances, and repeatability.
- Screw-clamping integral shank toolholders available.
- Grooving and O.D. turning.

Pages:
E92–E104





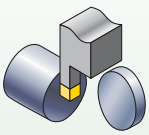
LG

- Insert cutting widths: 8–16mm.
- O.D. cutting depths: 20–32mm.
- Wedge-clamping integral shank tooling available.

Pages:
E105–E107

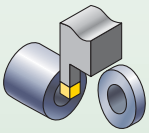


Cut-Off



WMT

- Cut-off widths: 1,5–4mm.
- Maximum cutting depth: 22,2mm.
- Screw-clamping integral shank/cartridge toolholders available.
- Economical double-sided inserts for rigidity and dimensional accuracy.
- Right-/left-hand styles: 5° and 12° lead angles.



Pages:
E4–E39



Separator™

- Cut-off widths: 2–4mm.
- Positive mechanical, self-clamping blades.
- Right-/left-hand style toolholders available.
- Single-edge inserts for maximum depth capacity.

Pages:
E108–E133



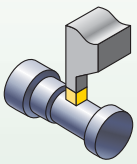
ProGroove

- Cut-off widths: 2–8mm.
- Single-edge inserts for maximum depth capacity.
- Right-/left-hand styles with 6° lead angles.
- Self-clamping blades/screw-clamping integral shank toolholders available.

Pages:
E92–E104



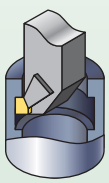
Plunge and Turn



WMT

Heavy Stock Removal in Turning Applications

- Double-sided inserts, cutting widths: 2–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- I.D. boring bar minimum bore diameter: 57,15mm.
- Screw-clamping integral shank/cartridge toolholders available.



Pages:
E4–E39



ProGroove

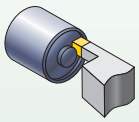
For Light-Cutting Inserts

- Cutting widths: 2–8mm.
- O.D. cutting depths: 10–40mm.
- Single-edge inserts for maximum depth capacity.
- Screw-clamping integral shank toolholders available.

Pages:
E92–E104



Face Grooving



WMT™

- Cutting widths: 3–6,35mm.
- Cutting depths: 13–25,4mm.
- Minimum face groove diameter: 38–205mm.

Pages: E4–E39



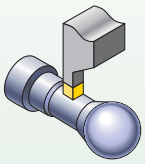
TopGroove™

- NF/NFD face groove insert range: 24–57mm.
- Cutting width range for standard inserts: 0,8–9,5mm.
- Cutting depth range for standard inserts: 1,27–12,70mm.
- Cutting width range for NF/NFD face grooving inserts: 2–6,35mm.
- Standard insert minimum face groove diameter range: 54–330mm.
- Cutting depth range for NF/NFD face grooving inserts: 1,52–12,70mm.
- Cutting depth range for NF: 1,52–3,81mm.
- Cutting depth range for NFD: 6,35–12,7mm.

Pages: E40–E91



Profiling



WMT

For Heavy Stock Removal

- Full-radius insert cutting widths: 3–8mm.
- O.D. cutting depths: 16,5–25,4mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages: E4–E39



TopGroove

Moderate/Heavy Stock Removal at Shallow Profile Depths

- Full-radius insert cutting widths: 1,57–6,35mm.
- Insert cutting depths: 2,39–6,35mm.
- Integral shank toolholders and ERICKSON™ heads available.

Pages: E40–E91



ProGroove™

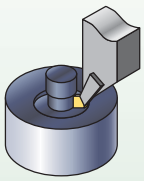
For Light Cutting

- Full-radius insert cutting widths: 3–6mm.
- O.D. cutting depths: 10–32mm.
- Screw-clamping integral shank/cartridge toolholders available.

Pages: E92–E104



Undercutting



TopGroove

- Undercutting insert widths: 2,4–4mm.
- Economical double-ended inserts.

Pages: E40–E91



WMT™ System •

One Platform for Grooving, Face Grooving, Cut-Off, and Profiling



WMT

The WMT platform is the economical and reliable option for all your grooving, cut-off, turning, and profiling applications. Trust the WMT system to ensure precise insert positioning and provide only the most accurate machining with exceptionally fast cycle times and superior performance.

Versatile and Well-Constructed

- Specifically designed to increase speeds and feeds.
- Excellent geometry for even your most demanding deep grooving applications.
- The WMT system enables heavy stock removal in turning applications.
- Ensures finer surface finishes and a long, reliable tool life.



WMT™ Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycle times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.
- Choice of integral or modular holders.



The Most Advanced Turning Solutions in the Industry

For unsurpassed quality, value, and performance, look no further than the WIDIA™ comprehensive line of specially engineered and dependable grooving and cut-off solutions. All the tools you need from the reliable name you can trust!

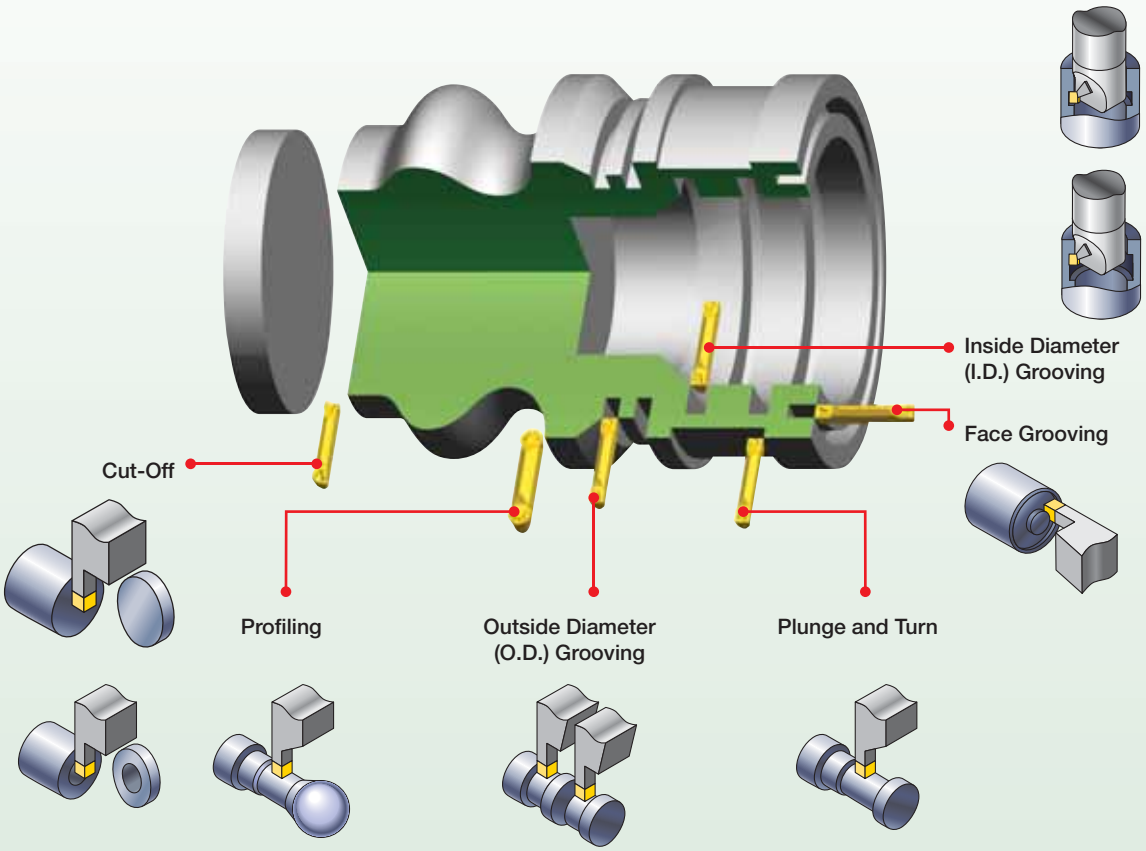
The WMT system, with its extra-long clamping area and precise insert positioning, ensures exceptionally fast and accurate machining, all-in-one tool, for your most demanding grooving, cut-off, turning, and profiling applications.

It is perfect for all general-purpose operations, including both shallow and deep grooving.

Utilise this handy, easy-to-use guide to identify and select the appropriate grooving and cut-off tools for your specific needs.

1 Choose the application to be performed:

Groove depth, width, and profile.



2 Identify the material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

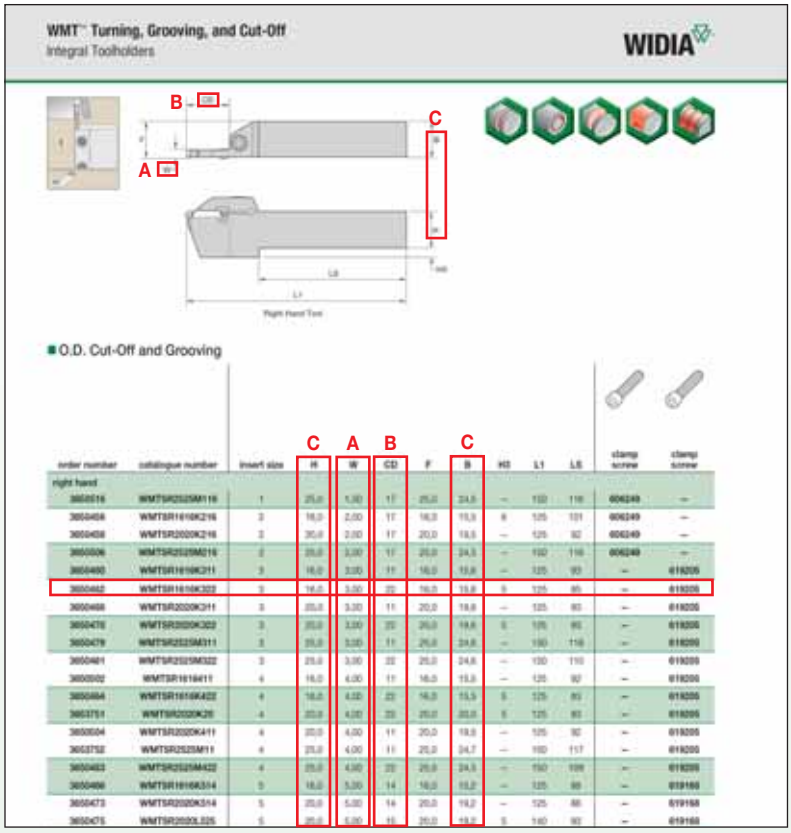
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

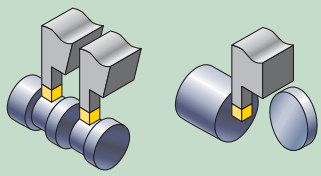
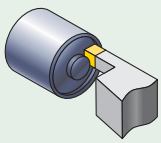
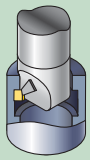
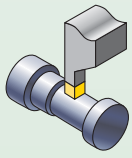
3 Select your toolholder based on the application:

A Choose the appropriate width "W" required for the application.

B Choose the shortest cutting depth "CD" dimension for increased tool rigidity.

C Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.

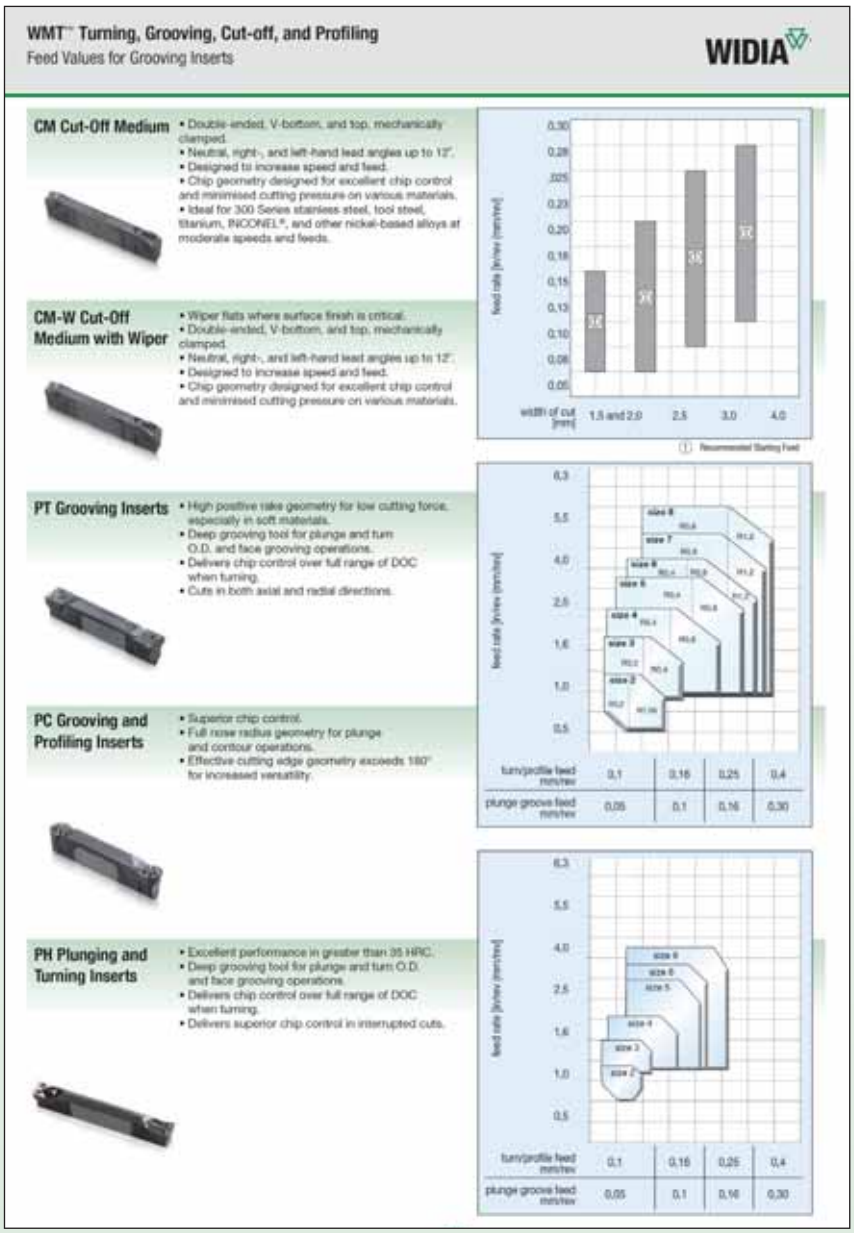


	application	conventional toolholders	modular blades
	O.D. Grooving and Cut-Off	pages E30–E32	page E38
	Face Grooving	pages E33–E34	page E39
	I.D. Grooving	page E35	–
	Plunge and Turn	pages E30–E32	page E38

4 Select chipbreaker style for the application:

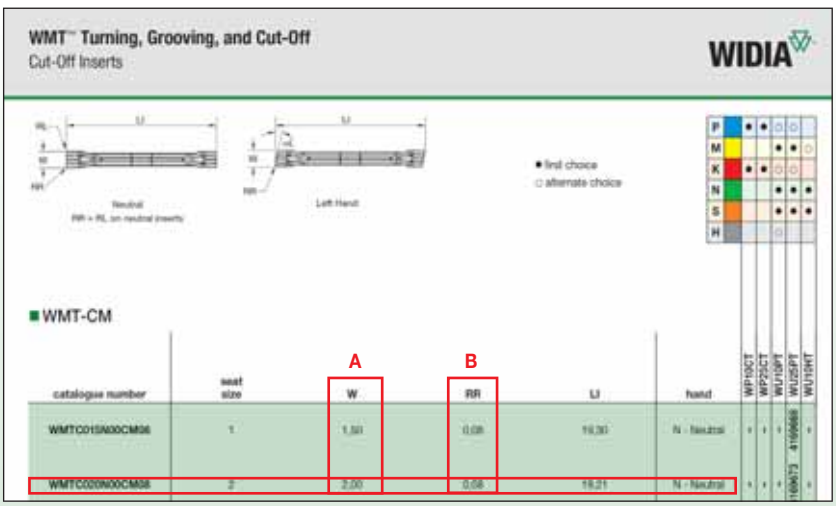
CM	Cut-Off Medium
CM-W	Cut-Off Medium with Wiper
PT	Groove, Plunge, and Turn
PC	Plunge and Contour
PH	Groove, Plunge, and Turn

NOTE: Chart shows recommended starting feed rates.



A Choose the appropriate insert width "W" for your specific application.

B Select the required corner radius value "RR".



5 Select grade:

Grooving cutting condition		Recommended Grades					
		steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
heavily interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
lightly interrupted cut		WP25CT/ WU25PT	WU25PT	WP25CT/ WU25PT	WU25PT	WU25PT	–
varying depth of cut, casting, or forging skin		WU10PT	WU10PT	WP10CT/ WU10PT	WU10PT	WU10HT/ WU10PT	WU10PT
smooth cut, pre-turned surface		WP10CT/ WU10PT	WU10PT	WP10CT/ WU10PT	WU10PT	WU10HT/ WU10PT	WU10PT

Cut-Off cutting condition		Recommended Grades					
		steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
heavily interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
lightly interrupted cut		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	–
varying depth of cut, casting, or forging skin		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	WU25PT
smooth cut, pre-turned surface		WU25PT	WU25PT	WU25PT	WU25PT	WU25PT	WU25PT

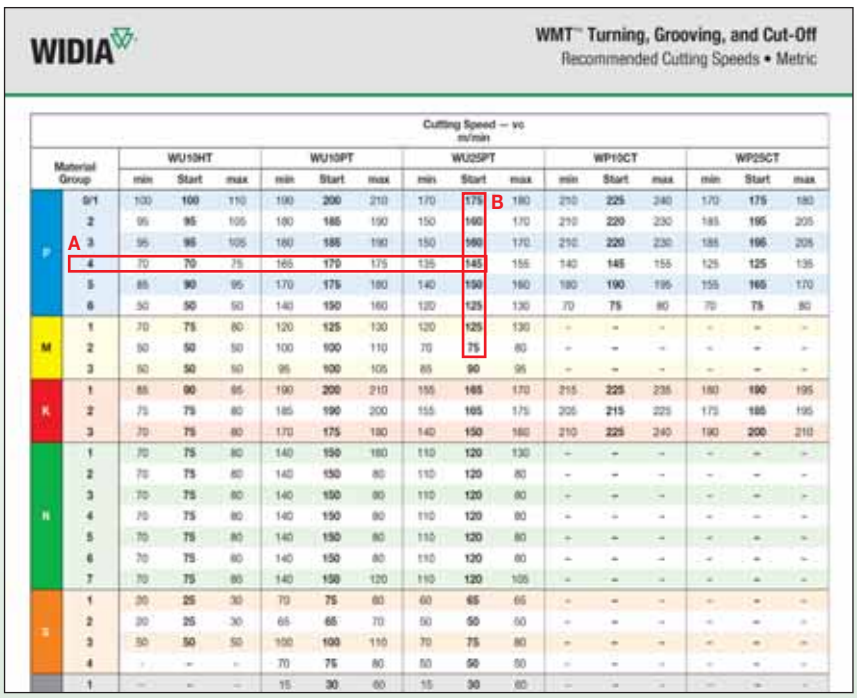
NOTE: See page E11 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).

B First choice starting speed is in **bold**.

NOTE: See page E13 for cutting data.

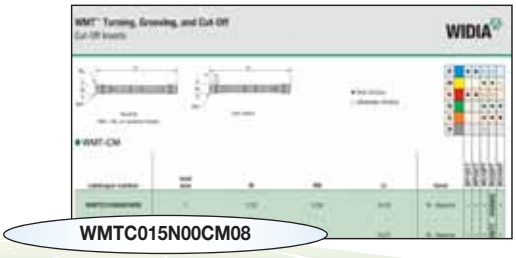

WIDIA
WMT™ Turning, Grooving, and Cut-Off
Recommended Cutting Speeds • Metric

Cutting Speed — vc m/min

Material Group		WU10HT min	WU10HT Start	WU10HT max	WU10PT min	WU10PT Start	WU10PT max	WU25PT min	WU25PT Start	WU25PT max	WP10CT min	WP10CT Start	WP10CT max	WP25CT min	WP25CT Start	WP25CT max
P	9/1	100	100	110	190	200	210	170	175	180	210	225	240	170	175	180
	2	95	95	105	180	185	190	150	160	170	210	220	230	185	195	205
	3	95	95	105	180	185	190	150	160	170	210	220	230	185	195	205
	4	70	70	75	165	170	175	135	145	155	140	145	155	125	125	135
	5	85	90	95	170	175	180	140	150	160	180	190	195	155	165	170
	6	50	50	50	140	150	160	120	125	130	70	75	80	70	75	80
M	1	70	75	80	120	125	130	120	125	130	–	–	–	–	–	–
	2	50	50	50	100	100	110	70	75	80	–	–	–	–	–	–
	3	50	50	50	95	100	105	85	90	95	–	–	–	–	–	–
K	1	85	90	95	190	200	210	155	165	170	215	225	235	180	190	195
	2	75	75	80	185	190	200	155	165	175	205	215	225	175	185	195
	3	70	75	80	170	175	180	140	150	160	210	225	240	190	200	210
N	1	70	75	80	140	150	160	110	120	130	–	–	–	–	–	–
	2	70	75	80	140	150	80	110	120	80	–	–	–	–	–	–
	3	70	75	80	140	150	80	110	120	80	–	–	–	–	–	–
	4	70	75	80	140	150	80	110	120	80	–	–	–	–	–	–
	5	70	75	80	140	150	80	110	120	80	–	–	–	–	–	–
	6	70	75	80	140	150	80	110	120	80	–	–	–	–	–	–
	7	70	75	80	140	150	120	110	120	105	–	–	–	–	–	–
S	1	20	25	30	70	75	80	60	65	65	–	–	–	–	–	–
	2	20	25	30	65	65	70	50	50	50	–	–	–	–	–	–
	3	50	50	50	150	100	110	70	75	80	–	–	–	–	–	–
	4	–	–	–	70	75	80	50	50	50	–	–	–	–	–	–
	1	–	–	–	15	30	60	15	30	60	–	–	–	–	–	–

WMT Identification System

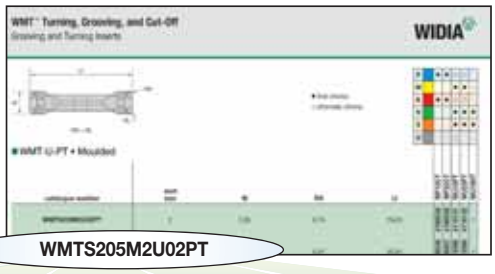
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



WMTC015N00CM08

Cut-Off

WMT	C	015	N	00	CM	08
Tooling System	Cut-Off	W in mm* 10	Hand of Insert	Main Cutting Edge Lead Angle	Chipbreaker Geometry **CM** = Cut-Off Medium **CM-W** = Cut-Off Medium with Wiper	Corner Radius in mm* 10



WMTS205M2U02PT

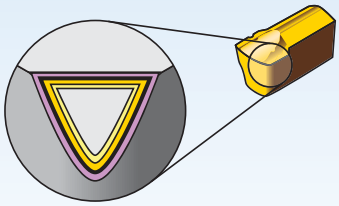
Groove, Plunge, Turn, and Contour Inserts

WMT	S	205	M	2	U	02	PT
Tooling System	Square	mm* 10 inch* 1000	Unit of Measurement for Width **M** = mm **I** = inch	Seat Size	Insert Tolerance	Corner Radius in mm* 10	Chipbreaker Geometry **PT** = Groove, Plunge, and Turn **PH** = Groove, Plunge, and Turn **PC** = Plunge and Contour

P = Precision ground grooving width tolerance:
± .001" (0,025mm)

U = Utility moulded grooving width tolerance:

3,05–4,05:	+ .006" / -0	(+0,15mm) / -0
5,05–10,05:	+ .010" / -0	(+0,25mm) / -0

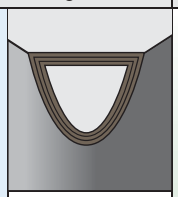
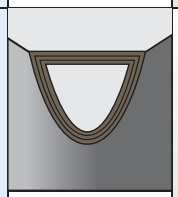
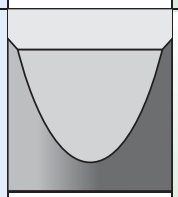
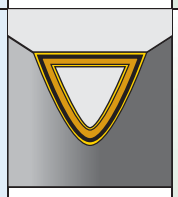
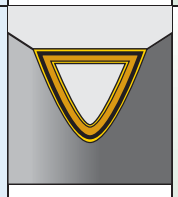


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

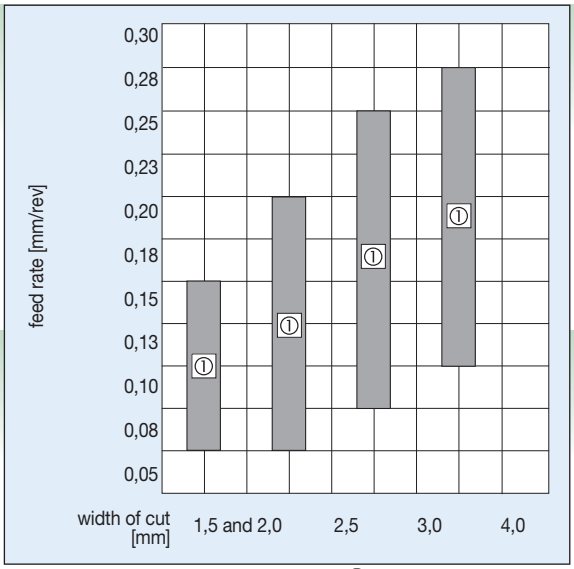
Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
WU10PT  HC-P15	An advanced PVD-TiAlN coating over a very deformation-resistant unalloyed carbide substrate. The WU10PT™ grade's new and improved coating enables speeds to be increased by 50–100%. The WU10PT grade is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well machining hardened and short chipping materials.									
WU25PT  HC-P30	An advanced PVD-TiAlN-coated grade with a tough, ultra-fine-grain, unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temperature alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.									
WU10HT  HW-K15	A hard, low binder content, unalloyed WC/Co fine-grained uncoated grade. Exceptional edge wear resistance combined with very high strength for machining titanium, cast irons, austenitic stainless steels, non-ferrous metals, non-metals, and most high-temperature alloys. Superior thermal deformation and depth of cut notch resistance. The grain structure is well controlled for minimal pits and flaws, which contributes to long, reliable service.									
WP10CT  HC-P10	A specially engineered, proprietary, cobalt-enriched carbide grade with thick K-MTCVD-TiCN coating layer, an Al_2O_3 layer of controlled grain size, and outer layers of TiCN and TiN for maximum wear resistance. An excellent finishing to medium machining grade for a variety of workpiece materials including most steels, ferritic and martensitic stainless steels, and cast irons. The specially engineered cobalt-enriched substrate offers a balanced combination of deformation resistance and edge toughness, while the thick coating layers offer outstanding abrasion resistance and crater wear resistance for high-speed machining. The smooth coating provides good resistance to edge build-up and microchipping and produces excellent surface finishes.									
WP25CT  HC-P25	A tough cobalt-enriched carbide grade with a newly designed multilayer K-MTCVD TiCN-Al_2O_3-TiCNTiN coating with superior interlayer adhesion. This is the industry's best general-purpose turning grade for most steels and ferritic and martensitic stainless steels. The substrate design, with cobalt-enrichment, ensures adequate deformation resistance along with excellent bulk toughness and insert edge strength. The coating layers offer good wear resistance over a wide range of machining conditions. The smoothness of the coating leads to reduced frictional heat, minimises microchipping, and improves workpiece surface finishes.									

CM Cut-Off Medium

- Double-ended, V-bottom, and top, mechanically clamped.
- Neutral, right-, and left-hand lead angles up to 12°.
- Designed to increase speed and feed.
- Chip geometry designed for excellent chip control and minimised cutting pressure on various materials.





① Recommended Starting Feed

CM-W Cut-Off Medium with Wiper

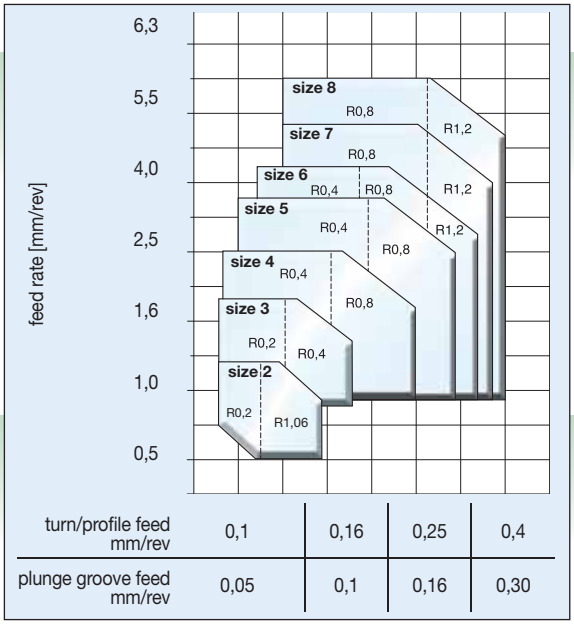
- Wiper flats where surface finish is critical.
- Double-ended, V-bottom, and top, mechanically clamped.
- Neutral, right-, and left-hand lead angles up to 12°.
- Designed to increase speed and feed.
- Chip geometry designed for excellent chip control and minimised cutting pressure on various materials.
- Ideal for 300 Series stainless steel, tool steel, titanium, INCONEL®, and other nickel-based alloys at moderate speeds and feeds.



PT Plunge, Groove, and Turn Inserts

- High positive rake geometry for low cutting force, especially in soft materials.
- Deep grooving tool for plunge and turn O.D. and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Cuts in both axial and radial directions.



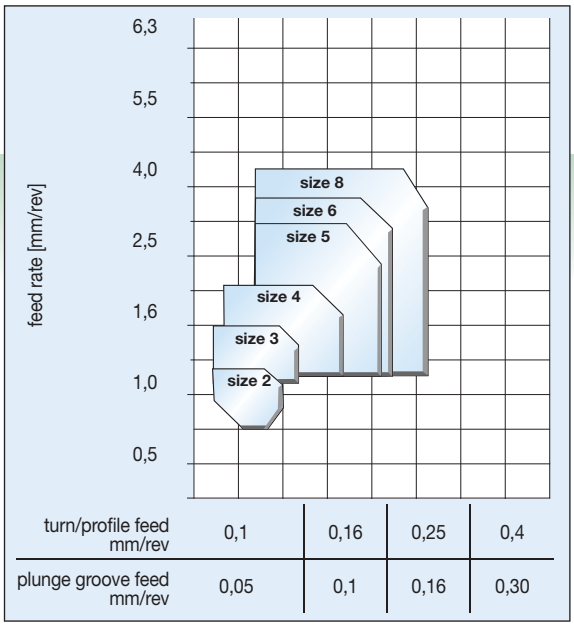


turn/profile feed mm/rev	0,1	0,16	0,25	0,4
plunge groove feed mm/rev	0,05	0,1	0,16	0,30

PC Grooving and Profiling Inserts

- Superior chip control.
- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.





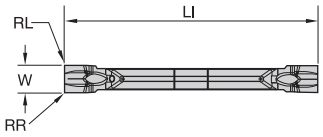
turn/profile feed mm/rev	0,1	0,16	0,25	0,4
plunge groove feed mm/rev	0,05	0,1	0,16	0,30

PH Plunge, Groove, and Turn Inserts

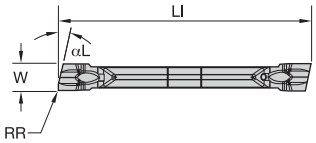
- Excellent performance in greater than 35 HRC.
- Deep grooving tool for plunge and turn O.D. and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Delivers superior chip control in interrupted cuts.



Material Group		Cutting Speed — vc m/min														
		WU10HT			WU10PT			WU25PT			WP10CT			WP25CT		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	100	**100**	110	190	**200**	210	170	**175**	180	210	**225**	240	170	**175**	180
	2	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	3	95	**95**	105	180	**185**	190	150	**160**	170	210	**220**	230	185	**195**	205
	4	70	**70**	75	165	**170**	175	135	**145**	155	140	**145**	155	125	**125**	135
	5	85	**90**	95	170	**175**	180	140	**150**	160	180	**190**	195	155	**165**	170
	6	50	**50**	50	140	**150**	160	120	**125**	130	70	**75**	80	70	**75**	80
M	1	70	**75**	80	120	**125**	130	120	**125**	130	–	**–**	–	–	**–**	–
	2	50	**50**	50	100	**100**	110	70	**75**	80	–	**–**	–	–	**–**	–
	3	50	**50**	50	95	**100**	105	85	**90**	95	–	**–**	–	–	**–**	–
K	1	85	**90**	95	190	**200**	210	155	**165**	170	215	**225**	235	180	**190**	195
	2	75	**75**	80	185	**190**	200	155	**165**	175	205	**215**	225	175	**185**	195
	3	70	**75**	80	170	**175**	180	140	**150**	160	210	**225**	240	190	**200**	210
N	1	70	**75**	80	140	**150**	160	110	**120**	130	–	**–**	–	–	**–**	–
	2	70	**75**	80	140	**150**	80	110	**120**	80	–	**–**	–	–	**–**	–
	3	70	**75**	80	140	**150**	80	110	**120**	80	–	**–**	–	–	**–**	–
	4	70	**75**	80	140	**150**	80	110	**120**	80	–	–	–	–	–	–
	5	70	**75**	80	140	**150**	80	110	**120**	80	–	**–**	–	–	**–**	–
	6	70	**75**	80	140	**150**	80	110	**120**	80	–	**–**	–	–	**–**	–
	7	70	**75**	80	140	**150**	120	110	**120**	105	–	**–**	–	–	**–**	–
S	1	20	**25**	30	70	**75**	80	60	**65**	65	–	**–**	–	–	**–**	–
	2	20	**25**	30	65	**65**	70	50	**50**	50	–	**–**	–	–	**–**	–
	3	50	**50**	50	100	**100**	110	70	**75**	80	–	**–**	–	–	**–**	–
	4	-	**–**	–	70	**75**	80	50	**50**	50	–	**–**	–	–	**–**	–
H	1	–	**–**	–	15	**30**	60	15	**30**	60	–	**–**	–	–	**–**	–
	2	–	**–**	–	15	**30**	60	15	**30**	60	–	**–**	–	–	**–**	–
	3	–	**–**	–	15	**30**	60	15	**30**	60	–	**–**	–	–	**–**	–
	4	–	**–**	–	15	**30**	60	15	**30**	60	–	**–**	–	–	**–**	–



Neutral
RR = RL on neutral inserts



Left Hand

● first choice
○ alternate choice

P	●	●	○	○		
M			●	●	○	
K	●	●	○	○		
N			●	●	●	
S			●	●	●	
H			○			

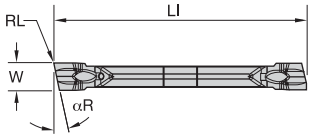
WMT-CM

catalogue number	seat size	W	RR	LI	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015N00CM08	1	1,50	0,08	19,30	N - Neutral	'	'	'	4169668	'
WMTC020N00CM08	2	2,00	0,08	19,21	N - Neutral	'	'	'	4169673	'
WMTC094N00CM13	2B	2,39	0,13	22,32	N - Neutral	'	'	'	4169576	'
WMTC030N00CM17	3	3,00	0,17	25,40	N - Neutral	'	'	'	4169682	'
WMTC125N00CM17	3	3,17	0,17	25,41	N - Neutral	'	'	'	4169582	'
WMTC040N00CM17	4	4,00	0,17	25,40	N - Neutral	'	'	'	4169692	'

catalogue number	seat size	W	RR	LI	αL	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015L05CM08	1	1,50	0,08	19,31	5	L - Left	'	'	'	4169671	'
WMTC020L05CM08	2	1,99	0,08	19,21	5	L - Left	'	'	'	4169677	'
WMTC020L12CM08	2	2,00	0,08	19,25	12	L - Left	'	'	'	4169680	'
WMTC030L12CM17	3	3,00	0,17	25,40	12	L - Left	'	'	'	4169690	'
WMTC030L05CM17	3	3,00	0,17	25,40	5	L - Left	'	'	'	4169686	'
WMTC040L12CM17	4	4,00	0,17	25,40	12	L - Left	'	'	'	4169697	'
WMTC040L05CM17	4	4,00	0,17	25,40	5	L - Left	'	'	'	4169695	'

(continued)

(WMT-CM — continued)

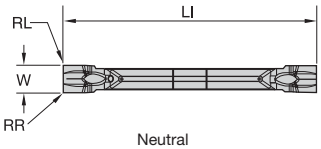


Right Hand

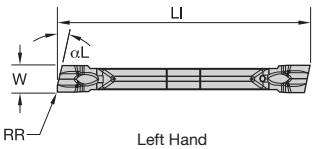
● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

catalogue number	seat size	W	RL	LI	αR	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015R12CM08	1	1,50	0,08	19,28	12	R - Right	'	'	'	4169672	'
WMTC015R05CM08	1	1,50	0,08	19,31	5	R - Right	'	'	'	4169670	'
WMTC020R05CM08	2	2,00	0,08	19,26	5	R - Right	'	'	'	4169675	'
WMTC020R12CM08	2	2,00	0,08	19,26	12	R - Right	'	'	'	4169678	'
WMTC094R12CM13	2B	2,39	0,13	22,28	12	R - Right	'	'	'	4169580	'
WMTC094R05CM13	2B	2,39	0,13	22,32	5	R - Right	'	'	'	4169578	'
WMTC030R05CM17	3	3,00	0,17	25,40	5	R - Right	'	'	'	4169684	'
WMTC030R12CM17	3	3,00	0,17	25,40	12	R - Right	'	'	'	4169688	'
WMTC125R05CM17	3	3,17	0,17	25,40	5	R - Right	'	'	'	4169664	'
WMTC125R12CM17	3	3,18	0,17	25,40	12	R - Right	'	'	'	4169666	'
WMTC040R12CM17	4	4,00	0,17	25,40	12	R - Right	'	'	'	4169696	'
WMTC040R05CM17	4	4,00	0,17	25,40	5	R - Right	'	'	'	4169694	'



Neutral
RR = RL on neutral inserts



Left Hand

● first choice
○ alternate choice

P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

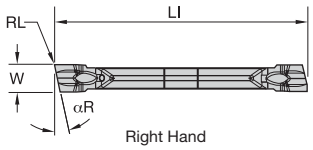
WMT-CM-W

catalogue number	seat size	W	RR	LI	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC015N00CMW08	1	1,50	0,08	19,30	N - Neutral	'	'	'	4169669	'
WMTC020N00CMW08	2	2,00	0,08	19,21	N - Neutral	'	'	'	4169674	'
WMTC094N00CMW13	2B	2,39	0,13	22,32	N - Neutral	'	'	'	4169577	'
WMTC030N00CMW17	3	3,00	0,17	25,40	N - Neutral	'	'	'	4169683	'
WMTC125N00CMW17	3	3,18	0,17	25,41	N - Neutral	'	'	'	4169663	'
WMTC040N00CMW17	4	4,00	0,17	25,40	N - Neutral	'	'	'	4169693	'

catalogue number	seat size	W	RR	LI	αL	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC020L12CMW08	2	2,00	0,08	19,27	12	L - Left	'	'	'	4169681	'
WMTC030L12CMW17	3	3,00	0,17	25,40	12	L - Left	'	'	'	4169691	'
WMTC030L05CMW17	3	3,00	0,17	25,40	5	L - Left	'	'	'	4169687	'

(continued)

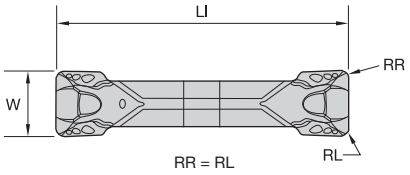
(WMT-CM-W — continued)



● first choice
○ alternate choice

P		●	●	○	○						
M				●	●	○					
K		●	●	○	○						
N				●	●	●					
S				●	●	●					
H				○							

catalogue number	seat size	W	RL	LI	αR	hand	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTC020R05CMW08	2	2,00	0,08	19,20	5	R - Right	'	'	'	4169676	'
WMTC020R12CMW08	2	2,00	0,08	19,27	12	R - Right	'	'	'	4169679	'
WMTC094R12CMW13	2B	2,39	0,13	22,29	12	R - Right	'	'	'	4169581	'
WMTC094R05CMW13	2B	2,39	0,13	22,32	5	R - Right	'	'	'	4169579	'
WMTC030R05CMW17	3	3,00	0,17	25,40	5	R - Right	'	'	'	4169685	'
WMTC030R12CMW17	3	3,00	0,17	25,40	12	R - Right	'	'	'	4169689	'
WMTC125R05CMW17	3	3,17	0,17	25,41	5	R - Right	'	'	'	4169665	'
WMTC125R12CMW17	3	3,17	0,17	25,41	12	R - Right	'	'	'	4169667	'

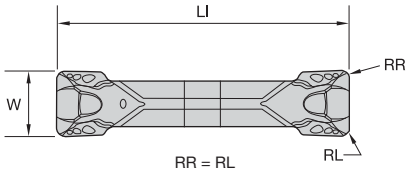


● first choice
○ alternate choice

P	●	●	○	○		
M			●	●	○	
K	●	●	○	○		
N			●	●	●	
S			●	●	●	
H			○			

■ WMT-U-PT • Moulded

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS205M2U02PT	2	2,05	0,15	19,23	4169554	4169555	4116131	4116132	-
WMTS305M3U03PT	3	3,05	0,31	25,81	4169556	4169557	4113568	4113569	-
WMTS305M3U06PT	3	3,05	0,61	25,78	4169558	4169559	4113570	4113571	-
WMTS405M4U03PT	4	4,05	0,31	25,53	4169560	4169561	4113577	4113578	-
WMTS405M4U06PT	4	4,05	0,61	25,53	4169562	4169563	4113579	4113580	-
WMTS505M5U03PT	5	5,05	0,30	28,76	4169564	4169565	4116148	4116149	-
WMTS505M5U06PT	5	5,05	0,61	28,76	4169566	4169567	4116150	4116151	-
WMTS605M6U03PT	6	6,05	0,30	28,76	4169568	4169569	4117253	4117254	-
WMTS605M6U06PT	6	6,05	0,59	28,76	4169570	4169571	4117255	4117256	-
WMTS805M8U06PT	8	8,05	0,61	28,70	4169572	4169573	4117261	4117262	-
WMTS805M8U15PT	8	8,05	1,50	28,71	4169574	4169575	4117263	4117264	-



● first choice
○ alternate choice

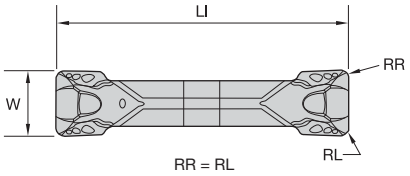
P	●	●	○	○		
M			●	●	○	
K	●	●	○	○		
N			●	●	●	
S			●	●	●	
H			○			

WMT-P-PT • Precision

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS200M2P02PT	2	2,00	0,15	19,10	-	-	4116129	4116130	-
WMTS094I2BP02PT	2B	2,38	0,15	22,15	-	-	4118451	4118452	-
WMTS094I2BP04PT	2B	2,38	0,38	22,14	-	-	4118583	4118584	-
WMTS300M3P03PH	3	3,00	0,30	25,65	-	-	5346412	5346413	5346414
WMTS300M3P03PT	3	3,00	0,31	25,65	-	-	4113563	4113564	4113566
WMTS300M3P06PH	3	3,00	0,60	25,65	-	-	5346415	5346416	5346417
WMTS300M3P06PT	3	3,00	0,61	25,65	-	-	4113565	4113567	-
WMTS125I3P03PT	3	3,17	0,23	25,40	-	-	4118585	4118586	-
WMTS125I3P08PT	3	3,17	0,76	25,40	-	-	4118587	4118588	-
WMTS125I3P03PH	3	3,18	0,25	25,40	-	-	5345914	5291300	-
WMTS125I3P08PH	3	3,18	0,75	25,40	-	-	5345915	5331093	-
WMTS156I4P03PH	4	3,95	0,30	25,40	-	-	5345916	5345917	-
WMTS156I4P08PH	4	3,96	0,75	25,40	-	-	5345918	5345919	-
WMTS400M4P03PH	4	4,00	0,30	25,40	-	-	5346418	5346419	5346420
WMTS400M4P03PT	4	4,00	0,31	25,40	-	-	4113572	4113574	4113573
WMTS400M4P06PH	4	4,00	0,60	25,40	-	-	5346421	5346422	5346423

(continued)

(WMT-P-PT • Precision — continued)



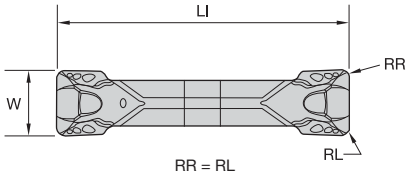
● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS400M4P06PT	4	4,00	0,60	25,40	–	–	4113575	4113576	–
WMTS188I5P03PT	5	4,76	0,26	28,63	–	–	4118589	4118590	–
WMTS188I5P03PH	5	4,77	0,25	28,63	–	–	5345980	5331095	–
WMTS188I5P08PH	5	4,77	0,75	28,63	–	–	5345981	5331097	–
WMTS188I5P08PT	5	4,77	0,76	28,63	–	–	4118591	4118592	–
WMTS500M5P03PH	5	5,00	0,30	28,63	–	–	5346424	5346425	5346426
WMTS500M5P03PT	5	5,00	0,30	28,63	–	–	4116143	4116144	4116145
WMTS500M5P06PH	5	5,00	0,60	28,63	–	–	5346427	5346428	5346429
WMTS500M5P06PT	5	5,00	0,61	28,63	–	–	4116146	4116147	–
WMTS600M6P03PH	6	6,00	0,30	28,63	–	–	5346430	5346431	–
WMTS600M6P03PT	6	6,00	0,30	28,63	–	–	4117239	4117240	–
WMTS600M6P06PT	6	6,00	0,58	28,63	–	–	4117241	4117242	–
WMTS600M6P06PH	6	6,00	0,60	28,63	–	–	5346432	5346433	–
WMTS250I6P08PH	6	6,32	0,75	28,63	–	–	5345984	5327621	–

(continued)

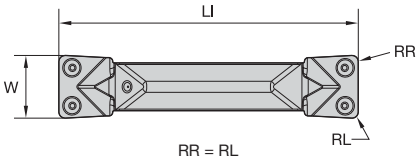
(WMT-P-PT • Precision — continued)



● first choice
○ alternate choice

P		●	●	○	○					
M				●	●	○				
K		●	●	○	○					
N				●	●	●				
S				●	●	●				
H				○						

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS250I6P08PT	6	6,34	0,76	28,63	'	'	4118595	4118596	'
WMTS250I6P03PH	6	6,35	0,25	28,63	'	'	5345983	5327620	'
WMTS250I6P03PT	6	6,35	0,25	28,63	'	'	4118593	4118594	'
WMTS312I8P03PH	8	7,92	0,25	28,57	'	'	5345985	5345986	'
WMTS312I8P08PH	8	7,92	0,75	28,57	'	'	5345987	5345988	'
WMTS800M8P03PH	8	8,00	0,30	28,57	'	'	5346436	5346437	'
WMTS800M8P06PH	8	8,00	0,60	28,57	'	'	5346434	5346435	'
WMTS800M8P06PT	8	8,00	0,61	28,57	'	'	4117257	4117258	'
WMTS800M8P15PT	8	8,00	1,50	28,57	'	'	4117259	4117260	'

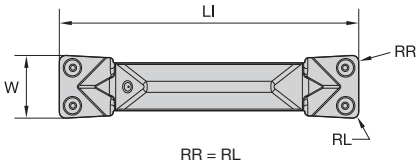


● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

■ WMT-U-PH • Moulded

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS305M3U03PH	3	3,05	0,30	25,81	■	■	5346392	5346393	■
WMTS305M3U06PH	3	3,05	0,60	25,81	■	■	5346394	5346395	■
WMTS405M4U03PH	4	4,05	0,30	25,53	■	■	5346396	5346397	■
WMTS405M4U06PH	4	4,05	0,60	25,53	■	■	5346398	5346399	■
WMTS505M5U03PH	5	5,05	0,30	28,76	■	■	5346400	5346401	■
WMTS505M5U06PH	5	5,05	0,60	28,76	■	■	5346402	5346403	■
WMTS605M6U03PH	6	6,05	0,30	28,76	■	■	5346404	5346405	■
WMTS605M6U06PH	6	6,05	0,60	28,76	■	■	5346406	5346407	■
WMTS805M8U03PH	8	8,05	0,30	28,70	■	■	5346410	5346411	■
WMTS805M8U06PH	8	8,05	0,60	28,70	■	■	5346408	5346409	■



● first choice
○ alternate choice

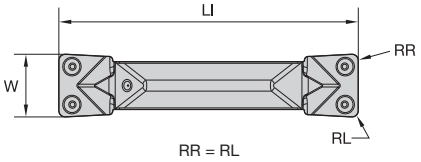
		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

■ WMT-P-PH • Precision

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS300M3P03PH	3	3,00	0,30	25,65	-	-	5346412	5346413	5346414
WMTS300M3P06PH	3	3,00	0,60	25,65	-	-	5346415	5346416	5346417
WMTS125I3P03PH	3	3,18	0,25	25,40	-	-	5345914	5291300	-
WMTS125I3P08PH	3	3,18	0,75	25,40	-	-	5345915	5331093	-
WMTS156I4P03PH	4	3,95	0,30	25,40	-	-	5345916	5345917	-
WMTS156I4P08PH	4	3,96	0,75	25,40	-	-	5345918	5345919	-
WMTS400M4P03PH	4	4,00	0,30	25,40	-	-	5346418	5346419	5346420
WMTS400M4P06PH	4	4,00	0,60	25,40	-	-	5346421	5346422	5346423
WMTS188I5P03PH	5	4,77	0,25	28,63	-	-	5345980	5331095	-
WMTS188I5P08PH	5	4,77	0,75	28,63	-	-	5345981	5331097	-

(continued)

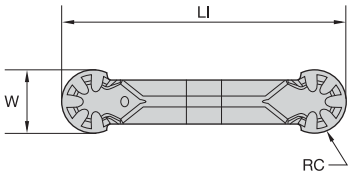
(WMT-P-PH • Precision — continued)



● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

catalogue number	seat size	W	RR	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTS500M5P03PH	5	5,00	0,30	28,63	-	-	5346424	5346425	5346426
WMTS500M5P06PH	5	5,00	0,60	28,63	-	-	5346427	5346428	5346429
WMTS600M6P03PH	6	6,00	0,30	28,63	-	-	5346430	5346431	-
WMTS600M6P06PH	6	6,00	0,60	28,63	-	-	5346432	5346433	-
WMTS250I6P08PH	6	6,32	0,75	28,63	-	-	5345984	5327621	-
WMTS250I6P03PH	6	6,35	0,25	28,63	-	-	5345983	5327620	-
WMTS312I8P03PH	8	7,92	0,25	28,57	-	-	5345985	5345986	-
WMTS312I8P08PH	8	7,92	0,75	28,57	-	-	5345987	5345988	-
WMTS800M8P03PH	8	8,00	0,30	28,57	-	-	5346436	5346437	-
WMTS800M8P06PH	8	8,00	0,60	28,57	-	-	5346434	5346435	-

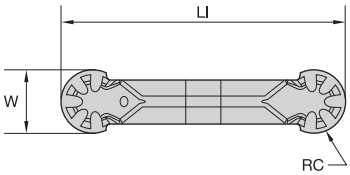


● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

■ WMT-U-PC • Moulded

catalogue number	seat size	W	RC	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTR305M3UPC	3	3,05	1,53	25,53	4170174	-	4170172	4170173	-
WMTR405M4UPC	4	4,05	2,03	25,58	4170179	-	4170177	4170178	-
WMTR505M5UPC	5	5,05	2,53	29,01	4170184	-	4170182	4170183	-
WMTR605M6UPC	6	6,05	3,03	28,77	4170189	-	4170187	4170188	-
WMTR805M8UPC	8	8,05	4,03	29,22	4170194	-	4170192	4170193	-



● first choice
○ alternate choice

		WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
P		●	●	○	○	
M				●	●	○
K		●	●	○	○	
N				●	●	●
S				●	●	●
H				○		

WMT-P-PC • Precision

catalogue number	seat size	W	RC	LI	WP10CT	WP25CT	WU10PT	WU25PT	WU10HT
WMTR300M3PPC	3	3,00	1,50	25,40	'	'	4170170	4170171	4170195
WMTR400M4PPC	4	4,00	2,00	25,45	'	'	4170175	4170176	4170196
WMTR188I5PPC	5	4,78	2,39	28,65	'	'	4170119	4170120	'
WMTR500M5PPC	5	5,00	2,50	28,88	'	'	4170180	4170181	'
WMTR600M6PPC	6	6,00	3,00	28,65	'	'	4170185	4170186	'
WMTR250I6PPC	6	6,36	3,18	29,01	'	'	4170121	4170122	'
WMTR312I8PPC	8	7,94	3,96	29,00	'	'	4170163	4170164	'
WMTR800M8PPC	8	8,00	4,00	29,08	'	'	4170190	4170191	'

NOVO KNOWS SEARCH

Searching for a tool by using the outdated method of a catalogue has been replaced with the Advise and Select functions from NOVO™ — saving you time and money.

ADVISE

Uses a rules-based approach to provide cutting tool recommendations:

- Define Machining Feature (face milling, slotting, blind hole, etc.)
- Apply Constraint Requirements (geometric, material, tolerance, etc.)
- Set Machining Sequence (single or multi-step operations, rough then finish, etc.)
- Receive Ranked Results

SELECT

A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

- If you know which product you are looking for, a quick search can be performed by just the catalogue number or product description.
- Smart filters significantly reduce the amount of potential tooling solutions.
- After the tool is selected, NOVO also provides cutting and adaptive item options that fit with your solution.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

WMT System

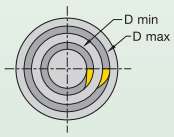
Our WMT toolholders now have a smart new naming system. Here are some examples of the improved nomenclature for our WMT Toolholders.

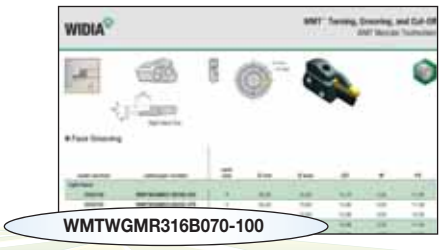


WMTBR2525M313038-052

Integral Toolholders

WMT	B	R	2525	M	3	13	—	038-052
Tooling System	Tool Style	Hand	Shank Size	Tool Length	Seat Size	Max Grooving Depth		Face Grooving Diameter
WMT = Groove and Turn (WMT Insert)	**S** = Straight **C** = Straight with circular support **E** = End mount **A** = Straight, face grooving, curve in **B** = Straight, face grooving, curve out	**R** = Right hand **L** = Left hand	Height x Width in mm	**H** = 100 **J** = 110 **K** = 125 **L** = 140 **M** = 150 **P** = 170	**1** **2** **2B** **3** **4** **5** **6** **8**	CD max in mm	D min – D max in mm (e.g., 70–100 = 70mm D min 100 mm D max)	Diameters are min and max for outer face groove diameter 999 = unlimited D max

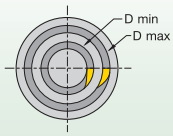




WMTWGMR316B070-100

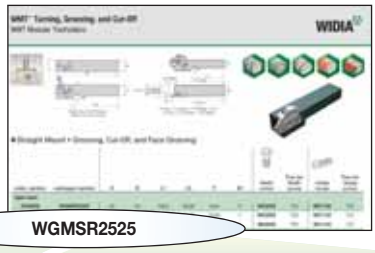
Modular Blades

WMT	WGM	R	3	16	B	070-100
Tooling System	Connection Type	Hand	Seat Size	Max Grooving Depth	Tool Style	Face Grooving Diameter
		R = Right hand **L** = Left hand			**A** = Curve In **B** = Curve Out	



WIDIA VICTORY

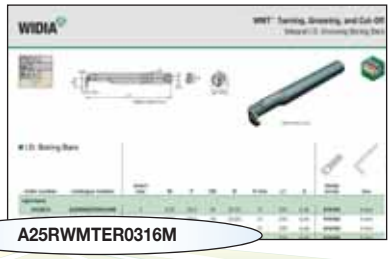




WGMSR2525

Modular Toolholders

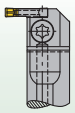
WGM	S	R	2525
Tooling System	Tool Style	Hand	Shank Size
MDG = Modular Deep Grooving **WGM** = Modular Serrated Locking System	**S** = Straight **E** = End mount	**R** = Right hand **L** = Left hand	

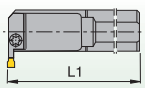


A25RWMTER0316M

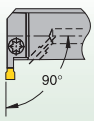
Integral Boring Bars

A	25	R	WMT	E	R	03	16	M
Steel Bar with Coolant	Bar Diameter	Bar Length	WMT™ Groove and Turn System	Tool Style	Hand	Seat Size	Max Grooving Depth	Tool Units





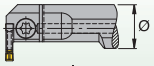
metric bars:		inch bars:		
R	= 200mm	R	=	8"
S	= 250mm	S	=	10"
T	= 300mm	T	=	12"



E = End mounted (90°)

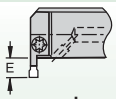
R = Right hand
L = Left hand

N = Inch
M = Metric



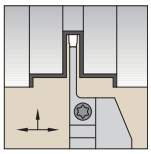
metric bars:	inch bars:
Bar diameter in millimetres	A two-digit number which indicates the bar diameter in 1/16" increments.

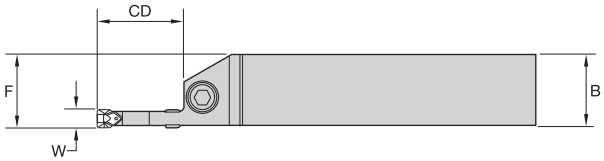
pocket seat size	cutting width (mm)
02	2,00–2,62
2B	2,39–2,62
03	3,0–3,05
04	4,0–4,05
05	5,0–5,05
06	6,0–6,05
08	8,0–8,05
10	10,0–10,05

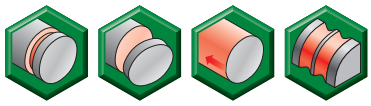


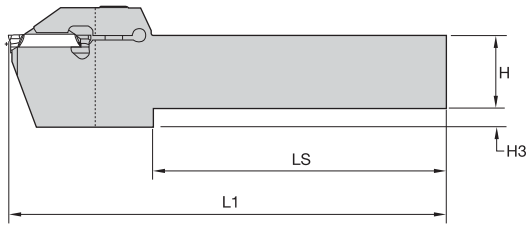
conversions:

mm	inch
7mm	.28"
10mm	.39"
12mm	.47"
16mm	.63"









Right Hand Tool

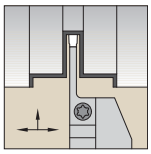
O.D. Grooving and Cut-Off

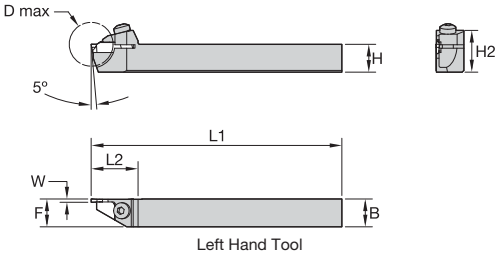
order number	catalogue number	seat size	W	H	B	CD	F	H3	L1	LS	clamp screw	clamp screw
right hand												
3650516	WMTSR2525M116	1	1,50	25,0	25,0	17	25,0	–	150	116	606249	–
3650456	WMTSR1616K216	2	2,00	16,0	16,0	17	16,0	6	125	101	606249	–
3650458	WMTSR2020K216	2	2,00	20,0	20,0	17	20,0	–	125	92	606249	–
3650506	WMTSR2525M216	2	2,00	25,0	25,0	17	25,0	–	150	116	606249	–
3539172	WMTSR1616K2B19	2B	2,38	16,0	16,0	24	15,9	5	125	88	–	MS326
3539174	WMTSR2020K2B19	2B	2,38	20,0	20,0	24	19,9	5	125	88	–	MS326
3539221	WMTCR2525M2B19	2B	2,38	25,0	25,0	24	24,9	–	150	113	–	MS326
3650460	WMTSR1616K311	3	3,00	16,0	16,0	11	16,0	–	125	93	–	619205
3650462	WMTSR1616K322	3	3,00	16,0	16,0	22	16,0	5	125	85	–	619205
3650468	WMTSR2020K311	3	3,00	20,0	20,0	11	20,0	–	125	93	–	619205
3650470	WMTSR2020K322	3	3,00	20,0	20,0	22	20,0	5	125	85	–	619205
3650479	WMTSR2525M311	3	3,00	25,0	25,0	11	25,0	–	150	118	–	619205
3650481	WMTSR2525M322	3	3,00	25,0	25,0	22	25,0	–	150	110	–	619205
3650502	WMTSR1616411	4	4,00	16,0	16,0	11	16,0	–	125	92	–	619205
3650464	WMTSR1616K422	4	4,00	16,0	16,0	22	16,0	5	125	83	–	619205
3653751	WMTSR2020K20	4	4,00	20,0	20,0	22	20,0	5	125	83	–	619205
3650504	WMTSR2020K411	4	4,00	20,0	20,0	11	20,0	–	125	92	–	619205
3653752	WMTSR2525M11	4	4,00	25,0	25,0	11	25,0	–	150	117	–	619205
3650483	WMTSR2525M422	4	4,00	25,0	25,0	22	25,0	–	150	109	–	619205
3650466	WMTSR1616K514	5	5,00	16,0	16,0	14	16,0	–	125	88	–	619168
3650473	WMTSR2020K514	5	5,00	20,0	20,0	14	20,0	–	125	88	–	619168
3650475	WMTSR2020L525	5	5,00	20,0	20,0	15	20,0	5	140	93	–	619168
3650485	WMTSR2525M514	5	5,00	25,0	25,0	14	25,0	–	150	115	–	619168
3650487	WMTSR2525M525	5	5,00	25,0	25,0	25	25,0	–	150	104	–	619168
3650477	WMTSR2020L614	6	6,00	20,0	20,0	14	20,0	–	140	103	–	619168
3650489	WMTSR2525M614	6	6,00	25,0	25,0	14	25,0	–	150	114	–	619168
3650491	WMTSR2525M625	6	6,00	25,0	25,0	25	25,0	–	150	104	–	619168
3650494	WMTSR2525M814	8	8,00	25,0	25,0	14	25,0	–	150	113	–	619168
3650496	WMTSR2525M825	8	8,00	25,0	25,0	25	25,0	–	150	104	–	619168
3650498	WMTSR3232M814	8	8,00	32,0	32,0	14	32,0	–	150	113	–	619168
3650500	WMTSR3232M825	8	8,00	32,0	32,0	25	32,0	–	150	104	–	619168

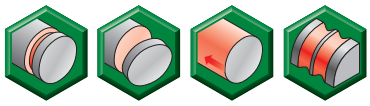
(continued)

(O.D. Grooving and Cut-Off — continued)

order number	catalogue number	seat size	W	H	B	CD	F	H3	L1	LS	 clamp screw	 clamp screw
left hand												
3653332	**WMTSL2525M116**	1	1,50	25,0	25,0	16	25,0	–	150	116	**606249**	**–**
3650457	**WMTSL1616K216**	2	2,00	16,0	16,0	17	16,0	6	125	101	**606249**	**–**
3650459	**WMTSL2020K216**	2	2,00	20,0	20,0	17	20,0	–	125	92	**606249**	**–**
3650507	**WMTSL2525M216**	2	2,00	25,0	25,0	17	25,0	–	150	116	**606249**	**–**
3539173	**WMTSL1616K2B19**	2B	2,38	16,0	16,0	24	15,9	5	125	88	**–**	**MS326**
3539175	**WMTSL2020K2B19**	2B	2,38	20,0	20,0	24	19,9	5	125	88	**–**	**MS326**
3650461	**WMTSL1616K311**	3	3,00	16,0	16,0	11	16,0	–	125	93	**–**	**619205**
3650463	**WMTSL1616K322**	3	3,00	16,0	16,0	22	16,0	5	125	85	**–**	**619205**
3650469	**WMTSL2020K311**	3	3,00	20,0	20,0	11	20,0	–	125	93	**–**	**619205**
3650471	**WMTSL2020K322**	3	3,00	20,0	20,0	22	20,0	5	125	85	**–**	**619205**
3650480	**WMTSL2525M311**	3	3,00	25,0	25,0	11	25,0	–	150	118	**–**	**619205**
3650482	**WMTSL2525M322**	3	3,00	25,0	25,0	22	25,0	–	150	110	**–**	**619205**
3650465	**WMTSL1616K422**	4	4,00	16,0	16,0	22	16,0	5	125	83	**–**	**619205**
3650472	**WMTSL2020K22**	4	4,00	20,0	20,0	22	20,0	5	125	83	**–**	**619205**
3650505	**WMTSL2020K411**	4	4,00	20,0	20,0	11	20,0	–	125	92	**–**	**619205**
3653763	**WMTSL2525M11**	4	4,00	25,0	25,0	11	25,0	–	150	117	**–**	**619205**
3650484	**WMTSL2525M422**	4	4,00	25,0	25,0	22	25,0	–	150	109	**–**	**619205**
3650467	**WMTSL1616K514**	5	5,00	16,0	16,0	14	16,0	–	125	88	**–**	**619168**
3650474	**WMTSL2020K514**	5	5,00	20,0	20,0	14	20,0	–	125	88	**–**	**619168**
3650486	**WMTSL2525M514**	5	5,00	25,0	25,0	14	25,0	–	150	113	**–**	**619168**
3650488	**WMTSL2525M525**	5	5,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650478	**WMTSL2020L614**	6	6,00	20,0	20,0	14	20,0	–	140	103	**–**	**619168**
3650490	**WMTSL2525M614**	6	6,00	25,0	25,0	14	25,0	–	150	114	**–**	**619168**
3650493	**WMTSL2525M625**	6	6,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650495	**WMTSL2525M814**	8	8,00	25,0	25,0	14	25,0	–	150	113	**–**	**619168**
3650497	**WMTSL2525M825**	8	8,00	25,0	25,0	25	25,0	–	150	104	**–**	**619168**
3650499	**WMTSL3232M814**	8	8,00	32,0	32,0	14	32,0	–	150	113	**–**	**619168**
3650501	**WMTSL3232M825**	8	8,00	32,0	32,0	25	32,0	–	150	104	**–**	**619168**







Swiss Grooving and Cut-Off • Metric

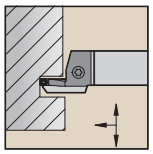


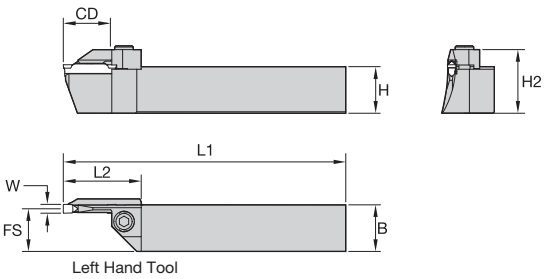
order number	catalogue number	seat size	W	H	B	F	D max	H2	L1	L2	clamp screw
right hand											
3650508	**WMTCR1010H110**	1	1,50	10,0	10,0	10,0	20	16	100	21	**606249**
3650510	**WMTCR1212H110**	1	1,50	12,0	12,0	12,0	20	18	100	21	**606249**
3650512	**WMTCR1616K113**	1	1,50	16,0	15,9	16,0	26	24	125	24	**606266**
3650514	**WMTCR2020K113**	1	1,50	20,0	19,9	20,0	26	28	125	24	**606266**
3653413	**WMTCR1010H210**	2	2,00	10,0	10,0	10,0	20	16	100	21	**606249**
3653415	**WMTCR1212H210**	2	2,00	12,0	12,0	12,0	20	18	100	21	**606249**
3653417	**WMTCR1616K213**	2	2,00	16,0	15,8	16,0	26	24	125	24	**606266**
3653419	**WMTCR2020K213**	2	2,00	20,0	19,8	20,0	26	28	125	24	**606266**
3539170	**WMTCR1212H2B16**	2B	2,38	12,0	11,7	11,9	32	23	100	30	**606249**
left hand											
3650509	**WMTCL1010H110**	1	1,50	10,0	10,0	10,0	20	16	100	21	**606249**
3650511	**WMTCL1212H110**	1	1,50	12,0	12,0	12,0	20	18	100	21	**606249**
3650513	**WMTCL1616K113**	1	1,50	16,0	15,9	16,0	26	24	125	24	**606266**
3650515	**WMTCL2020K113**	1	1,50	20,0	19,9	20,0	26	28	125	24	**606266**
3653414	**WMTCL1010H210**	2	2,00	10,0	10,0	10,0	20	16	100	21	**606249**
3653416	**WMTCL1212H210**	2	2,00	12,0	12,0	12,0	20	18	100	21	**606249**
3653418	**WMTCL1616K213**	2	2,00	16,0	15,8	16,0	26	24	125	24	**606266**
3653420	**WMTCL2020K213**	2	2,00	20,0	19,8	20,0	26	28	125	24	**606266**
3539171	**WMTCL1212H2B16**	2B	2,38	12,0	11,7	11,9	32	23	100	30	**606249**

NOTE: Insert exterior edge in line with toolholder edge for 10mm and 12mm shank toolholders.

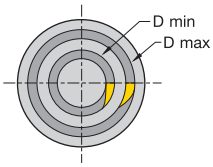
Update to our latest style cut-off inserts for use in the above style toolholders.
These holders can be used in many machines including Stars, Citizens, Tsugami, and Tonos/DECO.

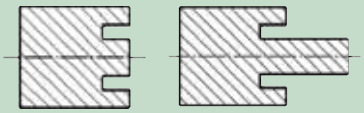
Insert Width	Lead Angle	Old Manchester Catalogue Number	Old Manchester Grade	WMT Cut-Off Insert	WMT Insert Grade	WIDIA™ Order Number
1,5mm	Neutral	583-165	M443B	WMTC015N00CM08	WU25PT	**4169668**
1,5mm	Right - 5°	583-166	M443B	WMTC015R05CM08	WU25PT	**4169670**
1,5mm	Right - 12°	583-168	M443B	WMTC015R12CM08	WU25PT	**4169672**
1,5mm	Left - 5°	583-167	M443B	WMTC015L05CM08	WU25PT	**4169671**
2,0mm	Neutral	583-170	M443B	WMTC020N00CM08	WU25PT	**4169673**
2,0mm	Right - 5°	583-170	M443B	WMTC020R05CM08	WU25PT	**4169675**
2,0mm	Right - 12°	583-173	M443B	WMTC020R12CM08	WU25PT	**4169678**
2,0mm	Left - 5°	583-172	M443B	WMTC020L05CM08	WU25PT	**4169677**
2,0mm	Left - 12°	583-174	M443B	WMTC020L12CM08	WU25PT	**4169680**
2,0mm	Neutral - Groove	583-129	M45 / M43	WMTS200M2P02PT	WU25PT	**4116130**
2,0mm	Neutral	583-125	M45 / M43	WMTC020N00CMW08	WU25PT	**4169674**
2,0mm	Right - 5°	583-126	M45 / M43	WMTC020R05CMW08	WU25PT	**4169676**
2,0mm	Right - 12°	583-128	M45 / M43	WMTC020R12CMW08	WU25PT	**4169679**
2,0mm	Left - 12°	583-129	M45 / M43	WMTC020L12CMW08	WU25PT	**4169681**









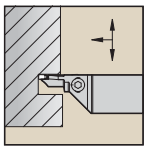
Blade Style	Part Shape	Left Hand	Right Hand
Curve Out			

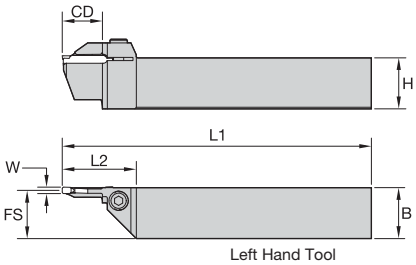
Curve Out



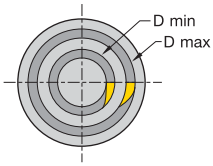

order number	catalogue number	seat size	W	H	B	FS	CD	D max	D min	H2	L1	L2	clamp	clamp screw
right hand														
3653421	**WMTBR2525M313-038-052**	3	3,00	24,8	24,8	23,5	13	52	38	32	150	34	–	**619205**
3653423	**WMTBR2525M316-052-070**	3	3,00	24,8	24,8	23,5	16	70	52	32	150	34	–	**619205**
3653425	**WMTBR2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	–	**619205**
3653427	**WMTBR2525M319-100-205**	3	3,00	25,0	24,8	23,5	19	205	100	32	150	37	–	**619205**
3653764	**WMTBR2525M412-032-052**	4	4,00	24,8	24,8	23,0	13	52	32	32	150	34	–	**619205**
3653766	**WMTBR2525M415-052-070**	4	4,00	24,8	24,8	23,0	16	70	52	32	150	34	–	**619205**
3653770	**WMTBR2525M418-100-205**	4	4,00	24,8	24,8	23,0	19	205	100	32	150	37	–	**619205**
3653431	**WMTBR2525M519-052-070**	5	5,00	24,8	24,8	22,5	19	70	52	34	150	38	**446102**	**619168**
3653433	**WMTBR2525M519-070-100**	5	5,00	24,8	24,8	22,5	19	100	70	34	150	42	**446104**	**619168**
3653435	**WMTBR2525M525-100-205**	5	5,00	24,8	24,8	22,5	25	205	100	34	150	42	**446104**	**619168**
3653437	**WMTBR2525M616-038-052**	6	6,00	24,8	24,8	22,0	16	52	38	35	150	38	**446102**	**619168**
3653441	**WMTBR2525M619-070-100**	6	6,00	24,8	24,8	22,0	19	100	70	36	150	42	**446104**	**619168**
3653443	**WMTBR2525M625-100-205**	6	6,00	24,8	24,8	22,0	25	205	100	34	150	42	**446104**	**619168**
left hand														
3653422	**WMTBL2525M313-038-052**	3	3,00	24,8	24,8	23,5	13	52	38	32	150	34	–	**619205**
3653424	**WMTBL2525M316-052-070**	3	3,00	24,8	24,8	23,5	16	70	52	32	150	34	–	**619205**
3653426	**WMTBL2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	–	**619205**
3653428	**WMTBL2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	–	**619205**
3653765	**WMTBL2525M412-032-052**	4	4,00	24,8	24,8	23,0	13	52	32	32	150	34	–	**619205**
3653767	**WMTBL2525M415-052-070**	4	4,00	24,8	24,8	23,0	16	70	52	32	150	34	–	**619205**
3653769	**WMTBL2525M415-070-100**	4	4,00	24,8	24,8	23,0	16	100	70	32	150	34	–	**619205**
3653771	**WMTBL2525M418-100-205**	4	4,00	24,8	24,8	23,0	19	205	100	32	150	37	–	**619205**
3653432	**WMTBL2525M519-052-070**	5	5,00	24,8	24,8	22,5	19	70	52	34	150	38	**446101**	**619168**
3653434	**WMTBL2525M519-070-100**	5	5,00	24,8	24,8	22,5	19	100	70	34	150	42	**446103**	**619168**
3653436	**WMTBL2525M525-100-205**	5	5,00	24,8	24,8	22,5	25	205	100	34	150	42	**446103**	**619168**
3653438	**WMTBL2525M616-038-052**	6	6,00	24,8	24,8	22,0	16	52	38	35	150	38	**446101**	**619168**
3653444	**WMTBL2525M625-100-205**	6	6,00	24,8	24,8	22,0	25	205	100	34	150	42	**446103**	**619168**

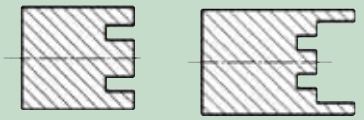
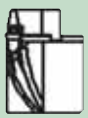
NOTE: Initial cut of tool must be between D min and D max. Due to the insert being positioned 0,75mm above centre, minimum diameter after initial cut is 12,6mm.
Toolholders that accept 3mm and 4mm width inserts have an integral clamp.
Toolholders that accept 5mm and 6mm width inserts are supplied with a detachable clamp.









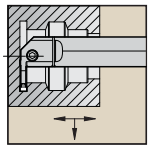
Blade Style	Part Shape	Left Hand	Right Hand
Curve In			

Curve In

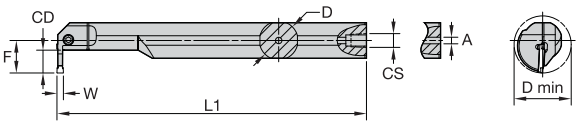



order number	catalogue number	seat size	W	H	B	FS	CD	D max	D min	H2	L1	L2	clamp	clamp screw
right hand														
3634282	**WMTAR2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	–	**MS326**
3634284	**WMTAR2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	–	**MS326**
3634290	**WMTAR2525M619-070-100**	6	6,00	24,8	24,8	22,0	19	100	70	34	150	42	**446104**	**619168**
left hand														
3634283	**WMTAL2525M316-070-100**	3	3,00	24,8	24,8	23,5	16	100	70	32	150	34	–	**MS326**
3634285	**WMTAL2525M319-100-205**	3	3,00	24,8	24,8	23,5	19	205	100	32	150	37	–	**MS326**

NOTE: Initial cut of tool must be between D min and D max. Due to the insert being positioned 0,75mm above centre, minimum diameter after initial cut is 12,6mm.
Toolholders that accept 3mm and 4mm width inserts have an integral clamp.
Toolholders that accept 5mm and 6mm width inserts are supplied with a detachable clamp.



Steel shank with through coolant.

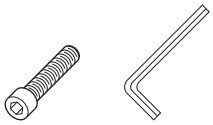


Right Hand Tool



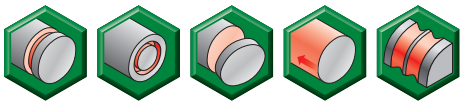
Right Hand Tool

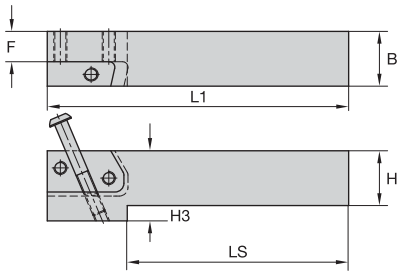
I.D. Boring Bars



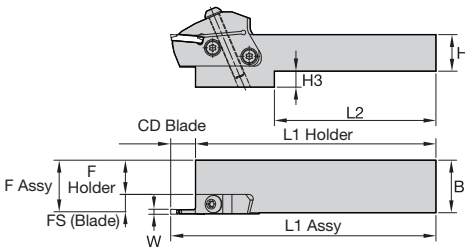
order number	catalogue number	insert size	W	F	CD	D	D min	L1	A	clamp screw	hex
right hand											
5423874	**A25RWMTER0316M**	3	3,00	26,0	16	25,00	41	200	6,40	**619168**	5 mm
5423875	**A32SWMTER0319M**	3	3,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423876	**A25RWMTER0416M**	4	4,00	26,0	16	25,00	41	200	6,40	**619168**	5 mm
5423877	**A32SWMTER0419M**	4	4,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423878	**A32SWMTER0519M**	5	5,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423879	**A40TWMTER0522M**	5	5,00	32,0	22	40,00	54	300	6,40	**619168**	5 mm
5423880	**A32SWMTER0619M**	6	6,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423881	**A40TWMTER0622M**	6	6,00	31,8	22	40,00	54	300	6,40	**619168**	5 mm
left hand											
5423882	**A25RWMTEL0316M**	3	3,00	26,0	16	25,00	41	200	6,40	**619168**	5 mm
5423883	**A32SWMTEL0319M**	3	3,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423884	**A25RWMTEL0416M**	4	4,00	26,0	16	25,00	41	200	6,40	**619168**	5 mm
5423885	**A32SWMTEL0419M**	4	4,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423886	**A32SWMTEL0519M**	5	5,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423887	**A40TWMTEL0522M**	5	5,00	32,0	22	40,00	54	300	6,40	**619168**	5 mm
5423888	**A32SWMTEL0619M**	6	6,00	29,0	19	32,00	47	250	6,40	**619168**	5 mm
5423889	**A40TWMTEL0622M**	6	6,00	31,8	22	40,00	54	300	6,40	**619168**	5 mm







Right Hand Tool
2 blade screws required



F Assy = F (Holder) + FS (Blade) + W/2
L1 Assy = L1 (Holder) + CD (Blade)



Straight Mount • Grooving, Cut-Off, and Face Grooving

order number	catalogue number	H	B	L1	LS	F	H3	 blade screw	Torx for blade screw	 clamp screw	Torx for clamp screw
right hand											
5349628	**WGMSR2020**	20	20	108,0	68,00	8,84	12	**MS2002**	T25	**MS1162**	T25
5349629	**WGMSR2525**	25	25	126,0	95,78	13,84	7	**MS2002**	T25	**MS1162**	T25
5349641	**WGMSR3232**	32	32	126,0	69,85	20,81	—	**MS2002**	T25	**MS1162**	T25
left hand											
5349625	**WGMSL1620**	16	20	108,0	68,00	8,84	16	**MS2002**	T25	**MS1162**	T25
5349626	**WGMSL2020**	20	20	108,0	68,00	8,84	12	**MS2002**	T25	**MS1162**	T25
5349627	**WGMSL2525**	25	25	126,0	95,78	13,84	7	**MS2002**	T25	**MS1162**	T25
5349640	**WGMSL3232**	32	32	126,0	69,85	20,81	—	**MS2002**	T25	**MS1162**	T25

NOTE: Use the larger seat size toolholder for optimal performance.
Blade screws and clamp screw included with holder.

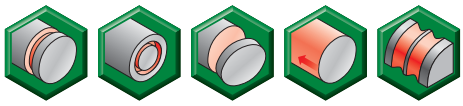
Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right

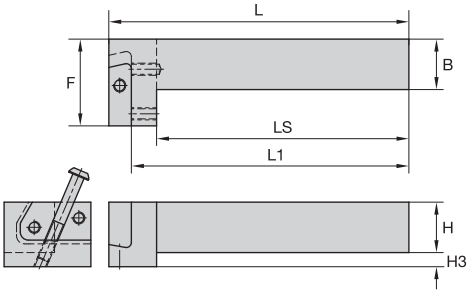


Grooving and Cut-Off Blades found on page E38.

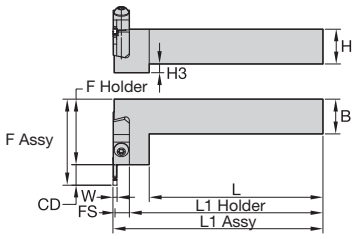


Face Grooving Blades found on page E39.





Right Hand Tool



F Assy = F (Holder) + CD (Blade)
L1 Assy = L1 (Holder) + FS (Blade) + W/2



End Mount • Grooving, Cut-Off, and Face Grooving

order number	catalogue number	H	B	L	L1	LS	F	H3
right hand								
5514979	**WGMER2525**	25	25	150,3	139,3	125,25	42,75	9
5515021	**WGMER3232**	32	32	170,3	159,3	145,25	42,75	–
left hand								
5514978	**WGMEL2525**	25	25	150,3	139,3	125,25	42,75	9
5515020	**WGMEL3232**	32	32	170,3	159,3	145,25	42,75	–

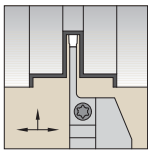
Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right

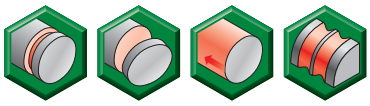


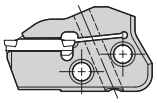
Grooving and Cut-Off Blades found on page E38.



Face Grooving Blades found on page E39.

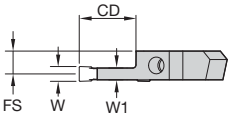












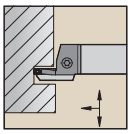
Right Hand Blade

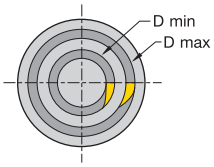
Grooving and Cut-Off

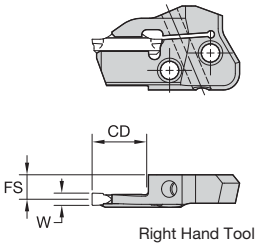
order number	catalogue number	seat size	CD	W	FS	W1
right hand						
5359127	**WMTWGMR114S**	1	14,00	1,50	11,04	1,22
5359128	**WMTWGMR213S**	2	13,00	2,00	10,81	1,68
5359129	**WMTWGMR2B16S**	2B	16,50	2,39	10,71	1,88
5359130	**WMTWGMR319S**	3	19,00	3,00	10,38	2,54
5359131	**WMTWGMR419S**	4	19,00	4,00	10,00	3,30
5359132	**WMTWGMR522S**	5	22,00	5,00	9,82	3,66
5359133	**WMTWGMR622S**	6	22,00	6,00	9,26	4,78
left hand						
5359120	**WMTWGML114S**	1	14,00	1,50	11,04	1,22
5359121	**WMTWGML213S**	2	13,00	2,00	10,81	1,68
5359122	**WMTWGML2B16S**	2B	16,50	2,39	10,71	1,88
5359123	**WMTWGML319S**	3	19,00	3,00	10,38	2,54
5359124	**WMTWGML419S**	4	19,00	4,00	10,00	3,30
5359125	**WMTWGML522S**	5	22,00	5,00	9,82	3,66
5359126	**WMTWGML622S**	6	22,00	6,00	9,26	4,78

NOTE: Blade and clamp screw torque equals 8–10 Nm.

Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right







Right Hand Tool





Face Grooving

order number	catalogue number	seat size	D min	D max	CD	W	FS
right hand							
5359150	**WMTWGMR313B038-052**	3	38,00	52,00	12,70	3,00	11,00
5359151	**WMTWGMR316B052-070**	3	52,00	70,00	15,88	3,00	11,00
5359154	**WMTWGMR416B052-070**	4	52,00	70,00	15,88	4,00	10,50
5359152	**WMTWGMR316B070-100**	3	70,00	100,00	15,88	3,00	11,00
5359155	**WMTWGMR416B070-100**	4	70,00	100,00	15,88	4,00	10,50
5359153	**WMTWGMR319B100-205**	3	100,00	205,00	19,05	3,00	11,00
5359156	**WMTWGMR419B100-205**	4	100,00	205,00	19,05	4,00	10,50
5359157	**WMTWGMR522B100-205**	5	100,00	205,00	22,00	5,00	10,00
5359158	**WMTWGMR622B100-205**	6	100,00	205,00	22,00	6,00	10,00
left hand							
5359146	**WMTWGML616B030-052**	6	30,00	52,00	15,88	6,00	10,00
5359134	**WMTWGML313B038-052**	3	38,00	52,00	12,70	3,00	11,00
5359138	**WMTWGML413B038-052**	4	38,00	52,00	12,70	4,00	10,50
5359142	**WMTWGML516B038-052**	5	38,00	52,00	15,88	5,00	10,00
5359135	**WMTWGML316B052-070**	3	52,00	70,00	15,88	3,00	11,00
5359139	**WMTWGML416B052-070**	4	52,00	70,00	15,88	4,00	10,50
5359143	**WMTWGML519B052-070**	5	52,00	70,00	19,05	5,00	10,00
5359147	**WMTWGML619B052-070**	6	52,00	70,00	19,05	6,00	10,00
5359136	**WMTWGML316B070-100**	3	70,00	100,00	15,88	3,00	11,00
5359140	**WMTWGML416B070-100**	4	70,00	100,00	15,88	4,00	10,50
5359144	**WMTWGML519B070-100**	5	70,00	100,00	19,05	5,00	10,00
5359148	**WMTWGML619B070-100**	6	70,00	100,00	19,05	6,00	10,00
5359137	**WMTWGML319100-205**	3	100,00	205,00	19,05	3,00	11,00
5359141	**WMTWGML419B100-205**	4	100,00	205,00	19,05	4,00	10,50
5359145	**WMTWGML522B100-205**	5	100,00	205,00	22,00	5,00	10,00
5359149	**WMTWGML622B100-205**	6	100,00	205,00	22,00	6,00	10,00

NOTE: Blade and clamp screw torque equals 8–10 Nm.

Toolholder Style	Hand of Holder	Hand of Blade
WGMS — Straight Mount	Right	Right
	Left	Left
WGME — End Mount	Right	Left
	Left	Right

WIDIA™ TopGroove™ for Shallow Grooving and Face Grooving



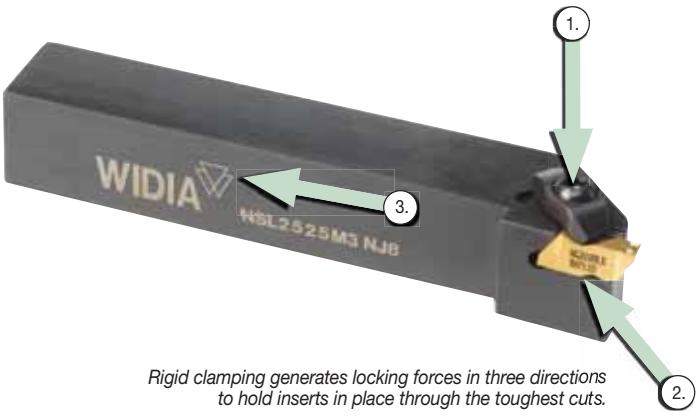
TopGroove

WIDIA has set the industry standard for threading and grooving productivity with the TopGroove clamping design. The TopGroove design provides consistent tool performance, accurate indexing, and superior clamping to provide excellent surface finish and outstanding tool life.

Let us help you select the correct insert for your application needs or upgrade your current TopGroove tooling inventory to include chip control geometries and the high productivity grades available from WIDIA.

Rigidity, Versatility, and Chip Control

- TopGroove clamping design features a rugged bridge clamp, which locates in a groove moulded into the insert to provide superior resistance to side and radial cutting forces.
- TopGroove inserts are available for shallow grooving, deep grooving, light turning, profiling, shallow and deep face grooving, back turning, undercutting, and Poly-Vee grooving.
- The proprietary WIDIA chip control design works in multi-directional turning as well as radial feed applications to provide excellent chip evacuation in deep grooving applications.



Rigid clamping generates locking forces in three directions to hold inserts in place through the toughest cuts.

TopGroove inserts employ a unique top rake chip control geometry that efficiently evacuates chips and produces better quality parts faster.

The WIDIA™ TopGroove™ clamping system offers a complete line of grooving geometries and an extensive grade selection.



Carbide Grades and Proven Solutions for High Productivity

- The TopGroove system has a carbide grade to match your application needs that include uncoated grades, PVD-coated grades, CVD-coated grades, and advanced material grades, including cermets, ceramics, PcBNs, and PCDs (as custom solutions).
- PVD TiAlN-coated grades are designed to cut a variety of workpiece materials.
- Versatile design enables one system to handle O.D. and I.D. grooving, face grooving, back turning, undercutting, and even threading operations.

The Most Advanced Turning Solutions in the Industry

Perfect for shallow grooving operations, the WIDIA™ TopGroove clamping system provides a complete line of grooving geometries and an extensive grade selection to meet even the most demanding application requirements. For increased rigidity, versatility, chip control, and carbide grade options, the TopGroove clamping system is the proven solution.

With maximum clamping rigidity and superior versatility, TopGroove inserts employ a unique top rake chip control geometry that efficiently evacuates chips and produces better quality parts, faster than ever before.

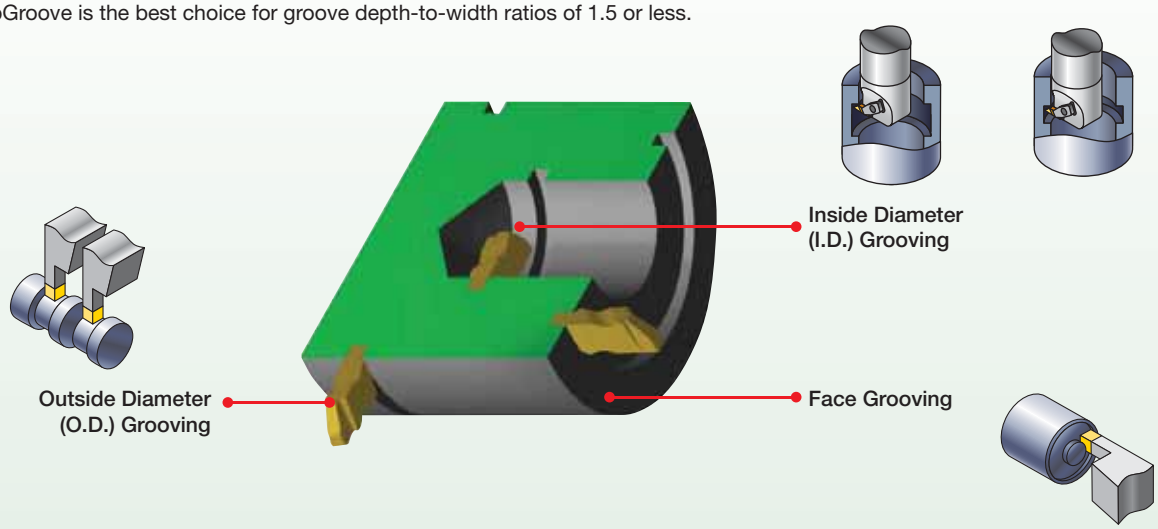
Utilise this comprehensive, easy-to-use guide for the information necessary to identify, choose, and select the appropriate cutting tools for your specific needs.

What you need to know:

- Material being machined.
- Groove depth, width, and profile.
- Application to be performed (face, O.D., or I.D. grooving).
- Toolholder requirements (e.g. KM™, ERICKSON™, square shank, right/left).

1 Choose the application to be performed:

Groove depth, width, and profile.
TopGroove is the best choice for groove depth-to-width ratios of 1.5 or less.



For deep grooving, use WMT™ on page E4.



TopGroove™ for Internal, External, and Face Grooving Applications

system capabilities			minimum	maximum
	O.D./I.D. Grooving	width	0,50mm	9,53mm
		depth	–	12,7mm
	Face Grooving	width	3,2mm	6,35mm
		depth	–	12,7mm
	Internal Grooving	diameter	11,2mm	–
	Face Grooving Diameter	standard	23,9mm	–
		deep	–	–
	Deep O.D./I.D. Grooving	width	1,50mm	6,35mm
		depth	–	12,7mm
	Deep Face Grooving	width	3,18mm	6,35mm
		depth	–	12,7mm

2 Identify the material to be machined:
Each tool has a material grid marked with a letter indicating the materials that can be machined.

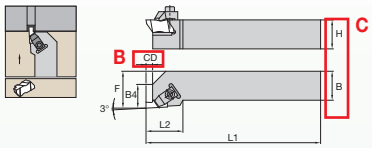
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

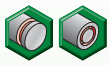
3 Select your toolholder based on the application:

A Choose the appropriate gage insert (width) required for the application.
B Choose the shortest cutting depth "CD" dimension for increased tool rigidity.
C Select the largest toolholder shank "H" and "B" dimensions for maximum rigidity.

TopGroove™
Toolholders

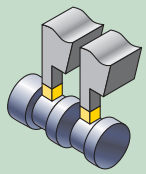
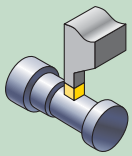
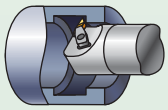
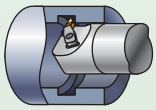
WIDIA





■ NS

		C					B	A				
order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand													
3641682	NSR1010E2	10,0	10,0	14,0	70	19	9	4	N.2R	CM74	MS1200	–	T10
3641660	NSR1212F2	12,0	12,0	16,0	80	19	9	4	N.2R	CM74	MS1200	–	T10
3636542	NSR1616H2	16,0	16,0	20,0	100	19	9	4	N.2R	CM74	MS1200	–	T10
3638589	NSR2020K2	20,0	20,0	25,0	125	19	9	4	N.2R	CM74	MS1200	–	T10
3638588	NSR2020K3	20,0	20,0	25,0	125	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3638590	NSR2525M2	25,0	25,0	32,0	150	19	9	4	N.2R	CM74	MS1200	–	T10
3636536	NSR2525M3	25,0	25,0	32,0	150	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3636540	NSR2525M4	25,0	25,0	32,0	150	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641664	NSR3225P3	32,0	25,0	32,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641675	NSR3225P4	32,0	25,0	32,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
3641666	NSR3232P3	32,0	32,0	40,0	170	32	13	5	N.3R	CM72LP	–	MS2111	25 IP
3641669	NSR3232P4	32,0	32,0	40,0	170	35	14	7	N.4R	CM72LP	–	MS2111	25 IP
left hand													
3641683	NSL1010E2	10,0	10,0	14,0	70	19	9	4	N.2L	CM75	MS1200	–	T10
3641681	NSL1212F2	12,0	12,0	16,0	80	19	9	4	N.2L	CM75	MS1200	–	T10
3636545	NSL1616H2	16,0	16,0	20,0	100	19	9	4	N.2L	CM75	MS1200	–	T10
3639045	NSL2020K2	20,0	20,0	25,0	125	19	9	4	N.2L	CM75	MS1200	–	T10

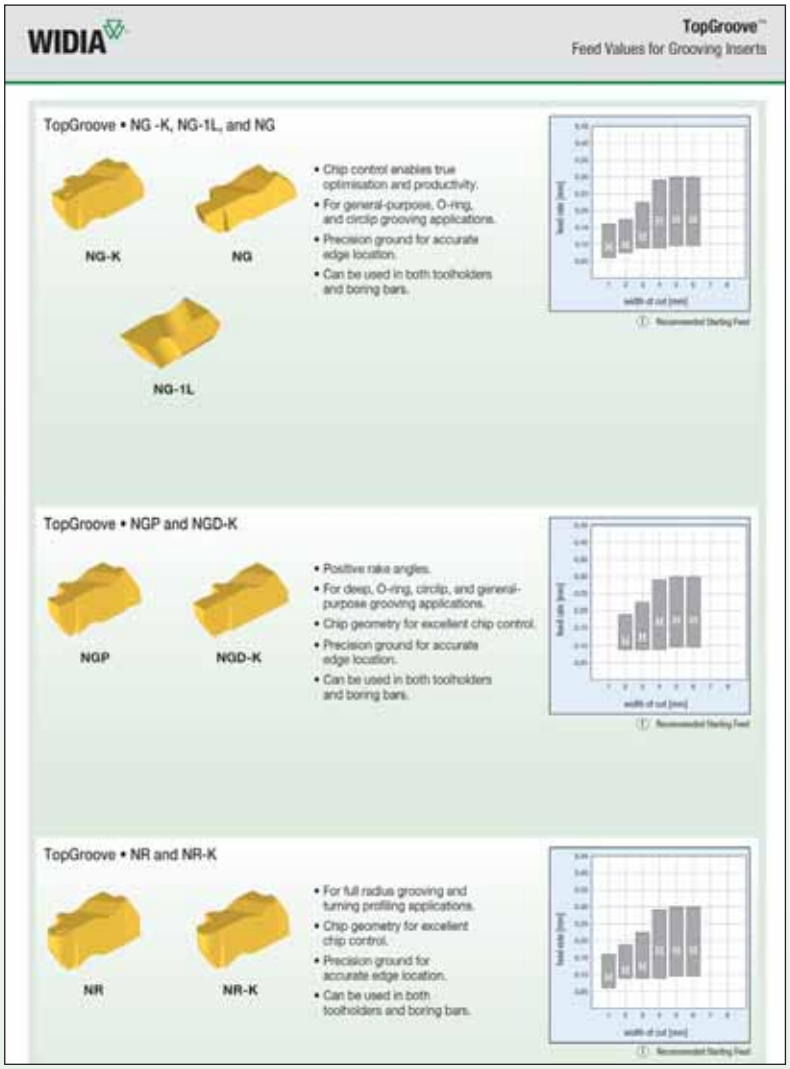
		application	conventional toolholders	modular blades
		O.D. Grooving and Plunge and Turn	pages E74–E76	–
		I.D. Grooving	pages E78–E79	–

4 Select chipbreaker style for the application:

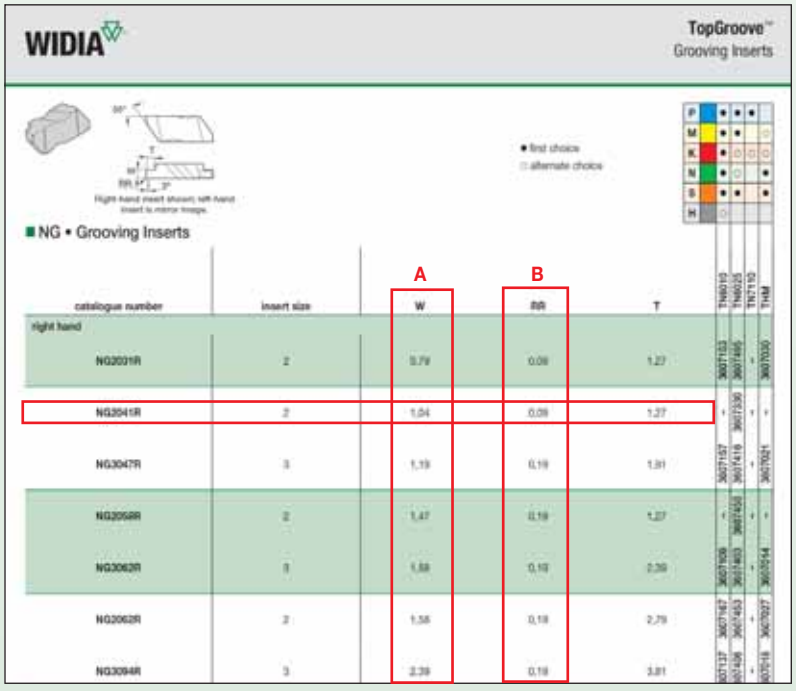
See application guide on page E48 for a complete list of insert styles.

NOTE: Chart shows recommended starting feed rates.

See page E49.



A Choose the appropriate insert width "W" for your specific application.
B Select the required corner radius value "RR".



5 Select grade:

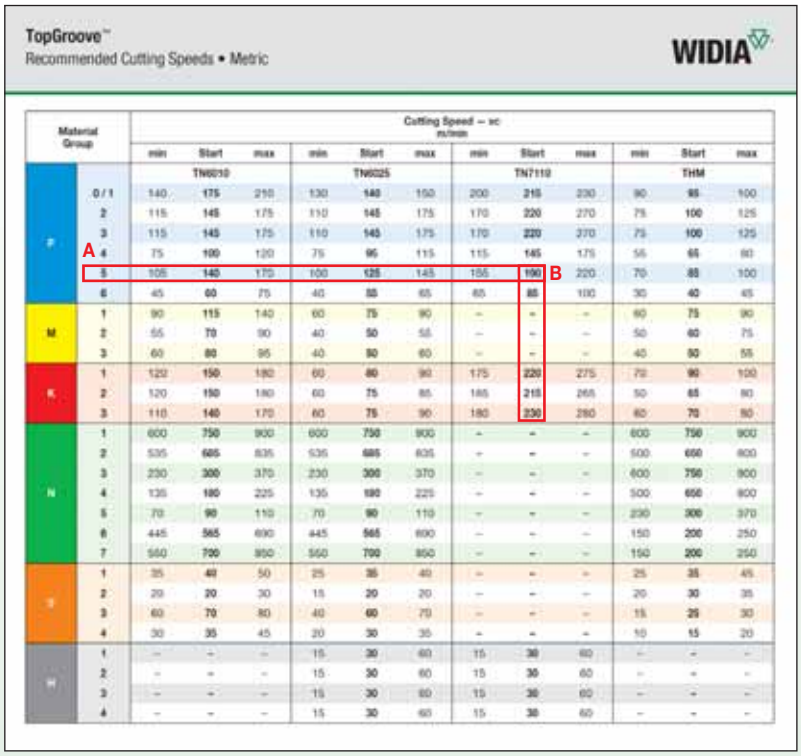
cutting condition		Recommended Grades: steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
smooth cut, pre-turned surface		TN7110	TN6010	TN7110	TN6010/ THM	TN6010	TN6010
varying depth of cut, casting, or forging skin		TN6010	TN6010	TN6010	TN6010/ THM	TN6010	TN6010
lightly interrupted cut		TN6025	TN6025	TN6025	TN6010/ THM	TN6010	TN6025
heavily interrupted cut		TN6025	TN6025	TN6025	TN6010/ THM	TN6010	TN6025

See page E47 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).
B First choice starting speed is in **bold**.

See page E50 for cutting data.

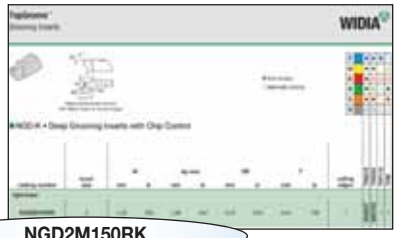


TopGroove™
Recommended Cutting Speeds • Metric

WIDIA

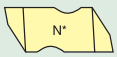
Material Group		Cutting Speed – vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
		TN6010			TN6025			TN7110			THM		
P	0 / 1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	3	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	A 4	75	**100**	120	75	**95**	115	115	**145**	175	55	**65**	80
	5	105	**140**	170	100	**125**	145	155	**190**	B 220	70	**85**	100
	6	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
M	1	90	**115**	140	60	**75**	90	–	–	–	60	**75**	90
	2	55	**70**	90	40	**50**	55	–	–	–	50	**60**	75
	3	60	**80**	95	40	**50**	60	–	–	–	40	**50**	55
K	1	122	**150**	180	60	**80**	90	175	**220**	275	70	**90**	100
	2	120	**150**	180	60	**75**	85	165	**215**	265	50	**65**	80
	3	110	**140**	170	60	**75**	90	180	**230**	280	60	**70**	80
N	1	600	**750**	900	600	**750**	900	–	–	–	600	**750**	900
	2	535	**685**	835	535	**685**	835	–	–	–	500	**650**	800
	3	230	**300**	370	230	**300**	370	–	–	–	600	**750**	900
	4	135	**180**	225	135	**180**	225	–	–	–	500	**650**	800
	5	70	**90**	110	70	**90**	110	–	–	–	230	**300**	370
	6	445	**565**	690	445	**565**	690	–	–	–	150	**200**	250
	7	560	**700**	850	560	**700**	850	–	–	–	150	**200**	250
S	1	35	**40**	50	25	**35**	40	–	–	–	25	**35**	45
	2	20	**20**	30	15	**20**	20	–	–	–	20	**30**	35
	3	60	**70**	80	40	**60**	70	–	–	–	15	**25**	30
	4	30	**35**	45	20	**30**	35	–	–	–	10	**15**	20
H	1	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	2	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	3	–	–	–	15	**30**	60	15	**30**	60	–	–	–
	4	–	–	–	15	**30**	60	15	**30**	60	–	–	–

TopGroove
Insert Identification System



N	G	D	2	M	150	R		K	
Type of Insert	Insert Style	Additional Information	Insert Size	Size Identification	Groove Size**	Hand of Insert	Cutting Depth	Chipbreaker Design	Definition of Inserts

N — TopGroove



G — Insert Style

- **B —** Blank (for special forms)
- **F —** Face grooving
- **G —** Grooving
- **P —** Back turning
- **R —** Full radius
- **U —** Undercutting (or relieving)
- **V —** Poly-Vee

D — Additional Information

- **D —** Deep grooving
- **P —** Positive
- **C —** Groove and chamfer

2 — Insert Size

insert number	W1 mm
1	2,54
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73

M — Size Identification

- **M —** Metric insert groove width
- **C —** Circlip groove insert width is nominal circlip size
- **Blank —** Indicates inch width insert

150 — Groove Size**

Position pertains to groove width for F-, G-, and U-style inserts, radii for R-style grooving inserts, and circlip size for groove and chamfer inserts. Dimension in 0,01mm.
Example: 3,25mm width groove or radius equals "325" catalogue position number.
Width Tolerance: ±0,025mm unless otherwise specified.

R — Hand of Insert

- **L —** Left hand
- **R —** Right hand

Cutting Depth

Shown for groove and chamfer inserts in 0,01mm increments.

K — Chipbreaker Design

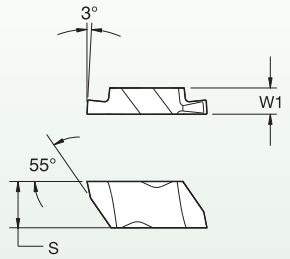
- **K —** Standard chip control
- **E —** Hone only

Definition of Inserts

Groove size
J or L — Poly-Vee inserts
I — Internal face grooving

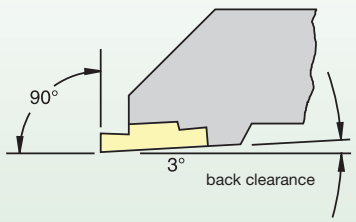
***Omit position for TopGroove NB-style blanks.*

TopGroove/TopThread Threading and Grooving Insert Dimensions



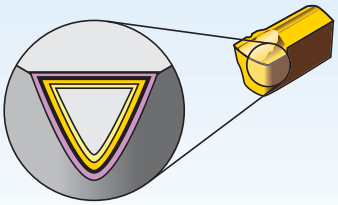
insert size	S mm	S inch	W1 mm	W1 Inch
1	2,54	.100	2,54	.100
2	5,56	.219	3,81	.150
3	8,74	.344	4,95	.195
4	11,51	.453	6,48	.255
5	17,48	.688	9,65	.380
6	11,51	.453	9,73	.383
8	7,93	.312	11,13	.438

TopGroove/TopThread Holder Design



NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.

WIDIA™ TopGroove and TopThread™ tooling technology combine to bring you the very best threading and grooving system available in the world today.

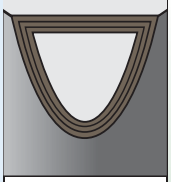
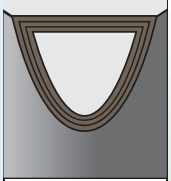
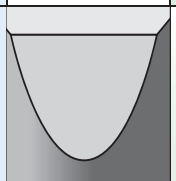


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

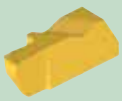
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

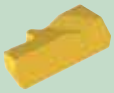
wear resistance ← → toughness

Grade

Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6010  HC-S10	An advanced PVD TiAlN coating over a very deformation-resistant unalloyed carbide substrate. TN6010 is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well machining hardened and short chipping materials.	P									
		M									
		K									
		N									
		S									
		H									
TN6025  HC-S25	An advanced PVD TiAlN-coated grade with a tough, ultra-fine-grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.	P									
		M									
		K									
		N									
		S									
		H									
TN7110  HC-P10	Coated carbide. MTCVD/CVD — TiN-TiCN-Al_2O_3-TiN. Very wear resistant. Light and medium machining. For steels and nodular cast iron.	P									
		K									
THM  HW-K15	Uncoated carbide. Extraordinarily good balance of hardness, wear resistance, edge stability, and toughness. Light and medium machining. For cast iron and all non-ferrous metals and non-metals. Useful in unfavourable conditions.	P									
		M									
		K									
		N									
		S									
		H									

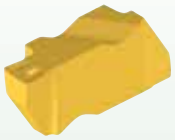


insert style	application	rake angle	page(s)
NG 	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	neutral	**E51–E52**
NG-K 	• Chip control geometry. • General-purpose grooving. • O-ring grooving. • Circlip grooving. • Light turning.	10° positive	**E53–E59**
NGC-K* 	• Combined groove and chamfered edge break in one positive plunge with chip control. • Designed for DIN 471/472 standard circlip grooves.	10° positive	–
NGD* 	• Deep grooving.	neutral	–
NGD-K 	• Chip control geometry. • Deep grooving. • Light turning.	10° positive	**E60–E62**
NGP 	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	5° positive	**E63–E64**
NF* 	• Face grooving. • Additional side clearance.	neutral	–
NF-K 	• Face grooving with chip control. • Additional side clearance.	10° positive	**E65**
NFD-K 	• Deep face grooving with chip control. • Additional side clearance.	10° positive	**E66**

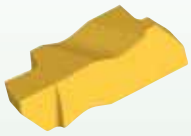
insert style	application	rake angle	page(s)
NFD-KI* 	• Internal deep face grooving with chip control. • For use in boring bars for internal face grooves.	10° positive	–
NP-K 	• Turning. • Back turning positive. • Profiling with chip control.	10° positive	**E66**
NR 	• Full radius grooving. • Turning and profiling.	neutral	**E67–E69**
NR-K 	• Chip control geometry. • Full radius grooving, turning, and profiling.	10° positive	**E70**
NRD 	• Deep grooving. • Full radius end-form.	neutral	**E71**
NRP* 	• Full radius grooving. • Light-turning profiling.	5° positive	–
NU* 	• Undercutting.	neutral	–
NV* 	• Poly-Vee grooving.	neutral	–
NB/NBD 	• Blanks. • Blanks for deep grooving. • Available in uncoated grades only.	–	**E72**

**Inserts are available as custom solutions.*

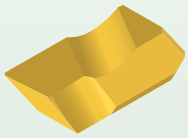
TopGroove • NG -K, NG-1L, and NG



NG-K

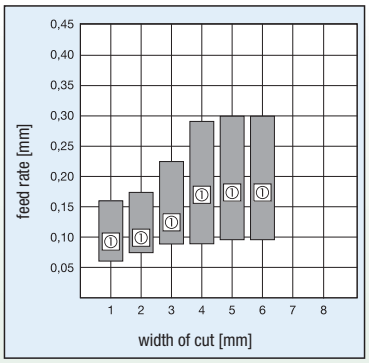


NG



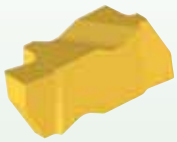
NG-1L

- Chip control enables true optimisation and productivity.
- For general-purpose, O-ring, and circlip grooving applications.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

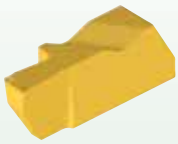


① Recommended Starting Feed

TopGroove • NGP and NGD-K

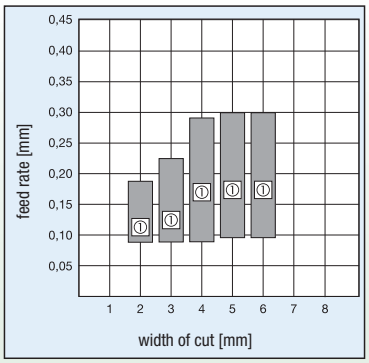


NGP



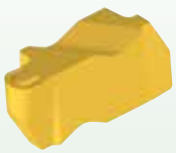
NGD-K

- Positive rake angles.
- For deep, O-ring, circlip, and general-purpose grooving applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

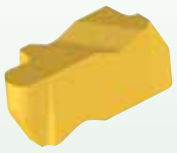


① Recommended Starting Feed

TopGroove • NR and NR-K

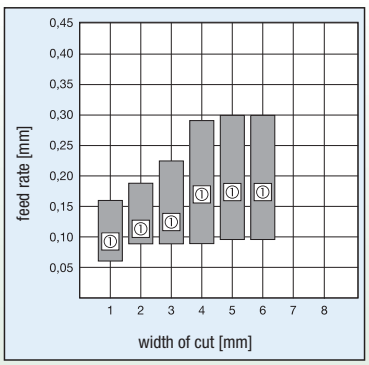


NR



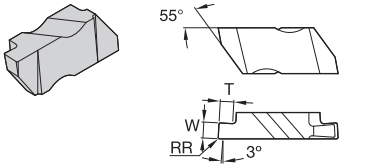
NR-K

- For full radius grooving and turning profiling applications.
- Chip geometry for excellent chip control.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.



① Recommended Starting Feed

Material Group		Cutting Speed — vc m/min											
		TN6010			TN6025			TN7110			THM		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	3	115	**145**	175	110	**145**	175	170	**220**	270	75	**100**	125
	4	75	**100**	120	75	**95**	115	115	**145**	175	55	**65**	80
	5	105	**140**	170	100	**125**	145	155	**190**	220	70	**85**	100
	6	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
M	1	90	**115**	140	60	**75**	90	–	**–**	–	60	**75**	90
	2	55	**70**	90	40	**50**	55	–	**–**	–	50	**60**	75
	3	60	**80**	95	40	**50**	60	–	**–**	–	40	**50**	55
K	1	120	**150**	180	60	**80**	90	175	**220**	275	70	**90**	100
	2	120	**150**	180	60	**75**	85	165	**215**	265	50	**65**	80
	3	110	**140**	170	60	**75**	90	180	**230**	280	60	**70**	80
N	1	600	**750**	900	600	**750**	900	–	**–**	–	600	**750**	900
	2	535	**685**	835	535	**685**	835	–	**–**	–	500	**650**	800
	3	230	**300**	370	230	**300**	370	–	**–**	–	600	**750**	900
	4	135	**180**	225	135	**180**	225	–	**–**	–	500	**650**	800
	5	70	**90**	110	70	**90**	110	–	**–**	–	230	**300**	370
	6	445	**565**	690	445	**565**	690	–	**–**	–	150	**200**	250
	7	550	**700**	850	550	**700**	850	–	**–**	–	150	**200**	250
S	1	35	**40**	50	25	**35**	40	–	**–**	–	25	**35**	45
	2	20	**20**	30	15	**20**	20	–	**–**	–	20	**30**	35
	3	60	**70**	80	40	**60**	70	–	**–**	–	15	**25**	30
	4	30	**35**	45	20	**30**	35	–	**–**	–	10	**15**	20
H	1	15	**30**	60	15	**30**	60	–	**–**	–	10	**20**	35
	2	15	**30**	60	15	**30**	60	–	**–**	–	10	**20**	35
	3	15	**30**	60	15	**30**	60	–	**–**	–	10	**20**	35
	4	15	**30**	60	15	**30**	60	–	**–**	–	10	**20**	35

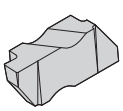


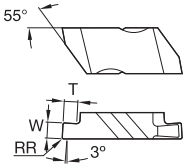
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

| | | |

(NG • Grooving Inserts — continued)



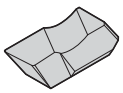


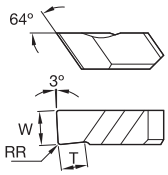
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
NG3094L	3	2,39	0,19	3,81	3607160	3607323	-	-
NG3125L	3	3,18	0,19	3,81	3607152	3607445	-	3607022
NG5M500L	5	5,00	0,32	9,52	-	3636572	-	-
NG4250L	4	6,35	0,57	6,35	3607175	3607513	-	-

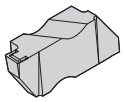


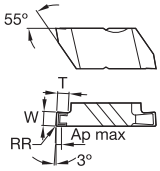


NG-1L • Grooving Inserts

catalogue number	insert size	W	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
left hand									
NG1047L	1	1,19	0,19	1,91	1	-	3636571	-	-
NG1062L	1	1,58	0,19	1,91	1	-	3636569	-	-
NG1094L	1	2,39	0,19	1,91	1	-	3636570	-	-

NOTE: Width tolerance is +/– 0,076mm on NG-1L inserts.





Right-hand insert shown; left-hand insert is mirror image.

P	●	●	●
M	●	●	○
K	●	○	○
N	●	○	●
S	●	●	●
H	○	○	

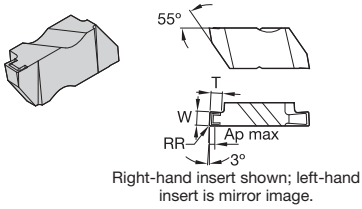
● first choice
○ alternate choice

NG-K • Grooving Inserts with Chip Control

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
right hand									
NG2M050RK	2	0,50	0,64	0,09	0,64	3606991	3607394	-	-
NG2031RK	2	0,79	0,76	0,09	1,27	3607090	3607313	-	-
NG2M080RK	2	0,80	0,76	0,09	1,27	3606903	3607291	-	-
NG2M100RK	2	1,00	0,76	0,09	1,27	3607129	3607218	-	-
NG3M100RK	3	1,00	0,76	0,19	1,91	-	3607219	-	-
NG2047RK	2	1,19	0,76	0,09	1,27	3607123	3607404	-	-
NG3047RK	3	1,19	0,76	0,19	1,91	3607084	3607238	-	-
NG2M120RK	2	1,20	0,76	0,09	1,27	3606679	3607299	-	-
NG3M120RK	3	1,20	0,76	0,19	1,91	3606915	3607412	-	-
NG2M140RK	2	1,40	0,76	0,09	1,27	3607151	3607318	-	-
NG2M150RK	2	1,50	1,09	0,19	2,79	-	3607234	-	-
NG3M150RK	3	1,50	1,02	0,19	2,39	-	3607221	3607668	-
NG2062RK	2	1,58	1,09	0,19	2,79	3607089	3607215	-	-
NG3062RK	3	1,58	1,02	0,19	2,39	3607055	3607070	3607628	-
NG2M170RK	2	1,70	1,09	0,19	2,79	3606673	3607242	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

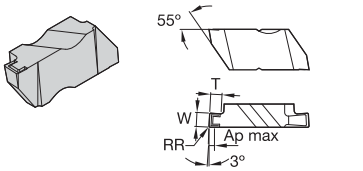
● first choice
○ alternate choice

P		●	●	●						
M		●	●		○					
K		●	○	○	○					
N		●	○		●					
S		●	●		●					
H		○	○							

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M175RK	2	1,75	1,09	0,19	2,79	-	3607379	-	-
NG3M175RK	3	1,75	1,02	0,19	2,39	-	3607418	-	-
NG3072RK	3	1,83	1,02	0,19	2,39	3607145	3607332	-	-
NG2M195RK	2	1,95	1,09	0,19	2,79	3606829	3607417	-	-
NG3078RK	3	1,98	1,02	0,19	2,39	3607111	3607309	-	-
NG2M200RK	2	2,00	1,09	0,19	2,79	3607100	3607071	-	-
NG3M200RK	3	2,00	1,02	0,19	2,39	-	3607208	3607662	-
NG2M220RK	2	2,20	1,09	0,19	2,79	-	3607521	-	-
NG3M220RK	3	2,20	1,02	0,19	2,39	-	3607336	-	-
NG3M225RK	3	2,24	1,02	0,19	2,39	3606674	3607310	-	-
NG2M225RK	2	2,25	1,09	0,19	2,79	3606828	3607411	-	-
NG2094RK	2	2,39	1,09	0,19	2,79	3607146	3607317	-	-
NG3094RK	3	2,39	1,02	0,19	3,81	3606660	3607069	-	-
NG2M250RK	2	2,50	1,09	0,19	2,79	-	3607324	-	-
NG3M250RK	3	2,50	1,02	0,19	3,81	-	3607217	3607664	-
NG2M275RK	2	2,75	1,09	0,19	2,79	3606916	3607409	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

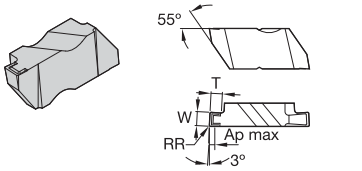
● first choice
○ alternate choice

P		●	●	●						
M		●	●		○					
K		●	○	○	○					
N		●	○		●					
S		●	●		●					
H		○	○							

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M275RK	3	2,75	1,02	0,19	3,81	3606677	3607337	-	-
NG2M300RK	2	3,00	1,09	0,19	2,79	3606676	3607340	-	-
NG3M300RK	3	3,00	1,02	0,19	3,81	3607138	3607072	3607655	-
NG4M300RK	4	3,00	1,02	0,19	3,81	-	3607388	-	-
NG2125RK	2	3,18	1,09	0,19	2,79	3607155	3607381	-	-
NG3125RK	3	3,18	1,02	0,19	3,81	3607057	3607068	-	-
NG4125RK	4	3,18	1,06	0,19	3,81	3607163	3607449	-	-
NG3M320RK	3	3,20	1,02	0,19	3,81	-	3607365	-	-
NG2M325RK	2	3,25	1,09	0,19	2,79	-	3607533	-	-
NG3M325RK	3	3,25	1,02	0,19	3,81	-	3607515	-	-
NG3M350RK	3	3,50	2,92	0,32	3,81	-	3607302	-	-
NG4M350RK	4	3,50	2,92	0,57	6,35	-	3607370	-	-
NG3156RK	3	3,96	2,92	0,19	3,81	3607127	3607456	-	-
NG3M400RK	3	3,99	2,92	0,32	3,81	3606678	3607235	-	-
NG4M400RK	4	4,00	2,92	0,57	6,35	3606908	3607364	-	-
NG3M425RK	3	4,24	2,92	0,32	3,81	3606914	3607517	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

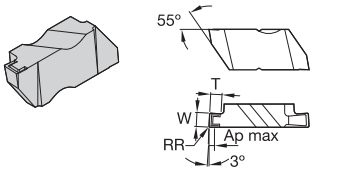
● first choice
○ alternate choice

P		●	●	●						
M		●	●		○					
K		●	○	○	○					
N		●	○		●					
S		●	●		●					
H		○	○							

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M450RK	3	4,50	2,92	0,32	3,81	–	3607362	–	–
NG4M450RK	4	4,50	2,92	0,57	6,35	–	3607390	–	–
NG3189RK	3	4,80	2,92	0,57	3,81	3607108	3607305	3607630	–
NG4189RK	4	4,80	2,92	0,57	6,35	3607103	3607220	–	–
NG4M500RK	4	5,00	2,92	0,32	6,35	3606830	3607447	–	–
NG4M550RK	4	5,50	3,81	0,57	6,35	–	3607383	–	–
NG4M600RK	4	6,00	3,81	0,57	6,35	–	3607385	–	–
NG4250RK	4	6,35	3,81	0,57	6,35	3607168	3607304	–	–
left hand									
NG2M050LK	2	0,50	0,64	0,09	0,64	3606990	3607463	–	–
NG2031LK	2	0,79	0,76	0,09	1,27	3607112	3607443	–	–
NG2M080LK	2	0,80	0,76	0,09	1,27	3606911	3607534	–	–
NG2M100LK	2	1,00	0,76	0,09	1,27	3607159	3607239	–	–
NG3M100LK	3	1,00	0,76	0,19	1,91	–	3607419	–	–
NG2047LK	2	1,19	0,76	0,09	1,27	–	3607376	–	–
NG3047LK	3	1,19	0,76	0,19	1,91	3607105	3607374	–	–

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

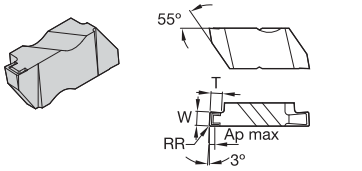
● first choice
○ alternate choice

P	●	●	●		
M	●	●		○	
K	●	○	○	○	
N	●	○		●	
S	●	●		●	
H	○	○			

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M120LK	2	1,20	0,76	0,09	1,27	3606827	3607334	-	-
NG3M120LK	3	1,20	0,76	0,19	1,91	3606917	3607384	-	-
NG2M140LK	2	1,40	0,76	0,09	1,27	3606904	3607338	-	-
NG2M150LK	2	1,50	1,09	0,19	2,79	-	3607294	-	-
NG3M150LK	3	1,50	1,02	0,19	2,39	-	3607308	3607663	-
NG2062LK	2	1,58	1,09	0,19	2,79	3607126	3607307	-	-
NG3062LK	3	1,58	1,02	0,19	2,39	3607092	3607213	3607631	-
NG2M170LK	2	1,70	1,09	0,19	2,79	3606905	3607327	-	-
NG2M175LK	2	1,75	1,09	0,19	2,79	-	3607421	-	-
NG3M175LK	3	1,75	1,02	0,19	2,39	-	3607331	-	-
NG3072LK	3	1,83	1,02	0,19	2,39	3607184	3607454	-	-
NG2M195LK	2	1,95	1,09	0,19	2,79	3606910	3607420	-	-
NG3078LK	3	1,98	1,02	0,19	2,39	3607106	3607460	-	-
NG2M200LK	2	2,00	1,09	0,19	2,79	3607144	3607207	-	-
NG3M200LK	3	2,00	1,02	0,19	2,39	-	3607211	3607666	-
NG2M220LK	2	2,20	1,09	0,19	2,79	-	3607367	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)



Right-hand insert shown; left-hand insert is mirror image.

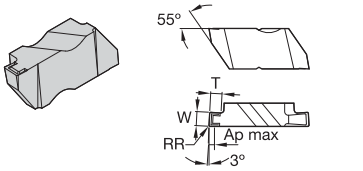
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG3M220LK	3	2,20	1,02	0,19	2,39	-	3607516	-	-
NG3M225LK	3	2,24	1,02	0,19	2,39	3606909	3607329	-	-
NG2M225LK	2	2,25	1,09	0,19	2,79	3606907	3607413	-	-
NG2094LK	2	2,39	1,09	0,19	2,79	3607149	3607380	-	-
NG3094LK	3	2,39	1,02	0,19	3,81	3607058	3607204	-	-
NG2M250LK	2	2,50	1,09	0,19	2,79	-	3607518	-	-
NG3M250LK	3	2,50	1,02	0,19	3,81	-	3607300	-	-
NG2M275LK	2	2,75	1,09	0,19	2,79	3606913	3607292	-	-
NG3M275LK	3	2,75	1,02	0,19	3,81	3606831	3607297	-	-
NG2M300LK	2	3,00	1,09	0,19	2,79	3606680	3607326	-	-
NG3M300LK	3	3,00	1,02	0,19	3,81	3606522	3607212	-	-
NG4M300LK	4	3,00	1,02	0,19	3,81	-	3607386	-	-
NG2125LK	2	3,18	1,09	0,19	2,79	3607165	3607444	-	-
NG3125LK	3	3,18	1,02	0,19	3,81	3607061	3607203	-	-
NG4125LK	4	3,18	1,06	0,19	3,81	3607183	3607448	-	-
NG3M320LK	3	3,20	1,02	0,19	3,81	-	3607372	-	-

(continued)

(NG-K • Grooving Inserts with Chip Control — continued)

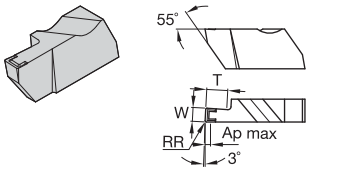


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

P	●	●	●		
M	●	●		○	
K	●	○	○	○	
N	●	○		●	
S	●	●		●	
H	○	○			

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
NG2M325LK	2	3,25	1,09	0,19	2,79	-	3607368	-	-
NG3M325LK	3	3,25	1,02	0,19	3,81	-	3607315	-	-
NG3M350LK	3	3,50	2,92	0,32	3,81	-	3607519	-	-
NG4M350LK	4	3,50	2,92	0,57	6,35	-	3607371	3607653	-
NG3156LK	3	3,96	2,92	0,19	3,81	3607177	3607335	-	-
NG3M400LK	3	3,99	2,92	0,32	3,81	3606906	3607237	3607656	-
NG4M400LK	4	4,00	2,92	0,57	6,35	3606912	3607363	-	-
NG3M425LK	3	4,24	2,92	0,32	3,81	3606918	3607520	-	-
NG3M450LK	3	4,50	2,92	0,32	3,81	-	3607369	-	-
NG4M450LK	4	4,50	2,92	0,57	6,35	-	3607389	-	-
NG3189LK	3	4,80	2,92	0,57	3,81	3607107	3607320	3607629	-
NG4189LK	4	4,80	2,92	0,57	6,35	3607140	3607377	-	-
NG4M500LK	4	5,00	2,92	0,32	6,34	3606832	3607522	-	-
NG4M550LK	4	5,50	3,81	0,57	6,35	-	3607366	-	-
NG4M600LK	4	6,00	3,81	0,57	6,35	-	3607387	-	-
NG4250LK	4	6,35	3,81	0,57	6,35	3607142	3607311	-	-



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

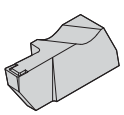
P	●	●	●	
M	●	●		○
K	●	○	○	○
N	●	○		●
S	●	●		●
H	○	○		

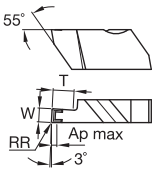
■ NGD-K • Deep Grooving Inserts with Chip Control

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand										
NGD2M150RK	2	1,50	1,09	0,19	4,06	1	3606937	3607503	-	-
NGD3062RK	3	1,58	1,02	0,19	3,18	2	3607104	3607233	-	-
NGD2M200RK	2	2,00	1,09	0,19	5,08	1	3606938	3607465	-	-
NGD3M200RK	3	2,00	1,02	0,19	4,06	1	3606945	3607505	-	-
NGD3094RK	3	2,39	1,02	0,19	6,35	1	3607083	3607205	-	3607029
NGD2M250RK	2	2,50	1,09	0,19	5,08	1	3606939	3607504	-	-
NGD3M250RK	3	2,50	1,02	0,19	6,35	1	3606946	3607425	-	-
NGD3M300RK	3	3,00	1,02	0,19	6,35	1	3606922	3607426	-	-
NGD3125RK	3	3,18	1,02	0,19	6,35	1	3607088	3607210	-	-
NGD4125RK	4	3,18	1,02	0,19	6,35	2	3607133	3607312	-	-
NGD3M350RK	3	3,50	2,92	0,32	6,35	1	-	3607506	-	-
NGD3M400RK	3	4,00	2,92	0,32	6,35	1	3606940	3607427	-	-
NGD4M400RK	4	4,00	2,92	0,57	9,53	1	3606986	3607507	-	-
NGD4M450RK	4	4,50	2,92	0,57	12,70	1	-	3607508	-	-
NGD3189RK	3	4,80	2,92	0,57	6,35	1	3607170	3607373	-	-

(continued)

(NGD-K • Deep Grooving Inserts with Chip Control — continued)





Right-hand insert shown; left-hand insert is mirror image.

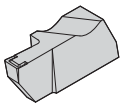
● first choice
○ alternate choice

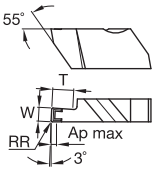
P		●	●	●						
M		●	●		○					
K		●	○	○	○					
N		●	○		●					
S		●	●		●					
H		○	○							

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
NGD4189RK	4	4,80	2,92	0,57	9,53	1	3607161	3607321	-	-
NGD4M500RK	4	5,00	2,92	0,57	12,70	1	3606988	3607509	-	-
NGD4M550RK	4	5,50	3,81	0,57	12,70	1	3606989	-	-	-
NGD4250RK	4	6,35	3,81	0,57	12,70	1	3607134	3607414	-	-
left hand										
NGD2M150LK	2	1,50	1,09	0,19	4,06	1	3606935	3607402	-	-
NGD3062LK	3	1,58	1,02	0,19	3,18	2	3607098	3607451	-	-
NGD2M200LK	2	2,00	1,09	0,19	5,08	1	3606936	3607399	-	-
NGD3M200LK	3	2,00	1,02	0,19	4,06	1	3606941	3607487	-	-
NGD3094LK	3	2,39	1,02	0,19	6,34	1	3607096	3607240	-	3607035
NGD2M250LK	2	2,50	1,09	0,19	5,08	1	3606992	3607391	-	-
NGD3M250LK	3	2,50	1,02	0,19	6,35	1	3606942	3607423	-	-
NGD3M300LK	3	3,00	1,02	0,19	6,35	1	3606943	3607400	-	-
NGD3125LK	3	3,18	1,02	0,19	6,35	1	3607097	3607209	-	-
NGD4125LK	4	3,18	1,02	0,19	6,35	2	3607132	3607316	-	-
NGD3M350LK	3	3,50	2,92	0,32	6,35	1	-	3607488	-	-

(continued)

(NGD-K • Deep Grooving Inserts with Chip Control — continued)



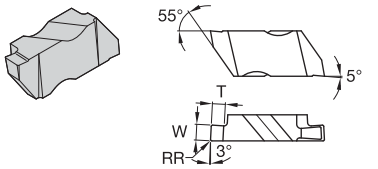


Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

P		●	●	●						
M		●	●		○					
K		●	○	○	○					
N		●	○		●					
S		●	●		●					
H		○	○							

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
NGD3M400LK	3	4,00	2,92	0,32	6,35	1	3606921	3607424	'	'
NGD4M400LK	4	4,00	2,92	0,57	9,53	1	3606923	3607489	'	'
NGD4M450LK	4	4,50	2,92	0,57	12,70	1	'	3607490	'	'
NGD3189LK	3	4,80	2,92	0,57	6,35	1	3607148	3607410	'	'
NGD4189LK	4	4,80	2,92	0,57	9,53	1	3607147	3607314	'	'
NGD4M500LK	4	5,00	2,92	0,57	12,70	1	'	3607491	'	'
NGD4M550LK	4	5,50	3,81	0,57	12,70	1	'	3607492	'	'
NGD4250LK	4	6,35	3,80	0,57	12,70	1	3607178	3607422	'	'



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

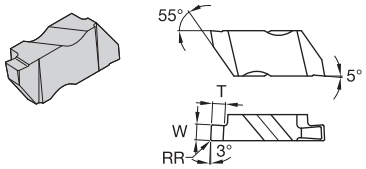
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NGP • Grooving Positive Rake Inserts

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
right hand								
NGP2M150R	2	1,50	0,19	2,79	3606975	-	-	3607045
NGP3M150R	3	1,50	0,19	1,90	3606979	-	-	3607049
NGP2062R	2	1,58	0,19	2,79	3607128	-	-	-
NGP2M200R	2	2,00	0,19	2,79	3606976	-	-	3607046
NGP3M200R	3	2,00	0,19	2,79	3606980	-	-	3607050
NGP2M250R	2	2,50	0,19	2,79	3606977	-	-	3607047
NGP3M250R	3	2,50	0,19	3,81	3606981	-	-	3607051
NGP2M300R	2	3,00	0,19	2,79	3606978	-	-	3607048
NGP3M300R	3	3,00	0,19	3,81	-	-	-	3607052

(continued)

(NGP • Grooving Positive Rake Inserts — continued)

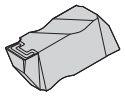


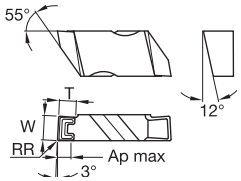
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

P	●	●	●		
M	●	●		○	
K	●	○	○	○	
N	●	○		●	
S	●	●		●	
H	○	○			

catalogue number	insert size	W	RR	T	TN6010	TN6025	TN7110	THM
left hand								
NGP2M150L	2	1,50	0,19	2,79	3606967	-	-	3607037
NGP3M150L	3	1,50	0,19	1,90	3606971	-	-	3607041
NGP2062L	2	1,57	0,19	2,79	3607182	-	-	-
NGP2M200L	2	2,00	0,19	2,79	3606968	-	-	3607038
NGP3M200L	3	2,00	0,19	2,79	3606972	-	-	3607042
NGP2M250L	2	2,50	0,19	2,79	3606969	-	-	3607039
NGP3M250L	3	2,50	0,19	3,81	3606973	-	-	3607043
NGP2M300L	2	3,00	0,19	2,79	-	-	-	3607040
NGP3M300L	3	3,00	0,19	3,81	3606974	-	-	3607044





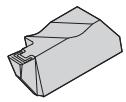
Right-hand insert shown; left-hand insert is mirror image.

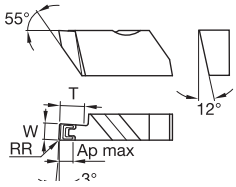
● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NF-K • Face Grooving Positive Rake Inserts

catalogue number	insert size	W	Ap max	RR	T	TN6010	TN6025	TN7110	THM
right hand									
NF3M200RK	3	2,00	1,02	0,19	1,78	'	3607511	'	'
NF3M300RK	3	3,00	1,02	0,19	3,81	'	3607512	'	'
NF3125RK	3	3,18	1,02	0,19	3,81	'	3607241	'	'
left hand									
NF3M200LK	3	2,00	1,02	0,19	1,78	'	3607428	'	'
NF3M300LK	3	3,00	1,02	0,19	3,81	'	3607429	'	'
NF3125LK	3	3,18	1,02	0,19	3,81	'	3607322	'	'
NF3156LK	3	3,96	2,92	0,19	3,81	'	3607333	'	'





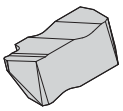
Right-hand insert shown; left-hand insert is mirror image.

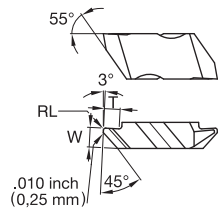
● first choice
○ alternate choice

P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NFD-K • Face Grooving Deep-Grooving Inserts

catalogue number	insert size	W	Ap max	RR	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand										
NFD3M300RK	3	3,00	1,02	0,19	6,35	1	■	3607523	■	■
NFD3125RK	3	3,18	1,02	0,19	6,35	1	■	3607296	■	■
NFD4189RK	4	4,80	2,92	0,57	9,53	1	■	3607325	■	■
NFD4250RK	4	6,35	3,81	0,57	12,70	1	■	3607378	■	■
left hand										
NFD3M300LK	3	3,00	1,02	0,19	6,35	1	■	3607464	■	■
NFD3125LK	3	3,18	1,02	0,19	6,35	1	■	3607293	■	■
NFD4189LK	4	4,80	2,92	0,57	9,53	1	■	3607415	■	■



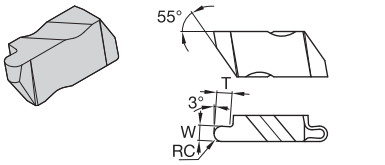


Right-hand insert shown; left-hand insert is mirror image.

■ NP-K • Profiling Inserts

catalogue number	insert size	W	RL	T	TN6010	TN6025	TN7110	THM
right hand								
NP2002RK	2	3,68	0,25	2,79	3607136	3607477	■	■
NP3002RK	3	4,83	0,25	5,08	3607154	3607493	■	■
NP3012RK	3	4,83	0,25	5,08	■	3607328	■	■

NOTE: Width tolerance is +/- 0,13mm.



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

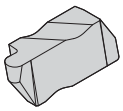
P	●	●	●		
M	●	●		○	
K	●	○	○	○	
N	●	○		●	
S	●	●		●	
H	○	○			

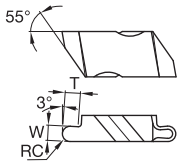
NR • Full Radius Inserts

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
right hand								
NR2M050R	2	1,00	0,50	1,27	3606957	3607393	-	-
NR2M075R	2	1,50	0,75	2,79	3606929	3607469	-	-
NR2031R	2	1,58	0,79	2,79	3607174	3607301	-	-
NR3031R	3	1,58	0,79	2,39	3607125	3607475	-	3607015
NR2M100R	2	2,00	1,00	2,79	3606930	3607470	-	-
NR3M100R	3	2,00	1,00	2,39	3606958	3607397	-	-
NR2047R	2	2,39	1,19	2,79	-	3607494	-	-
NR3047R	3	2,39	1,19	3,81	3607093	3607502	-	3607031
NR2M125R	2	2,50	1,25	2,79	3606931	3607471	-	-
NR3M125R	3	2,50	1,25	3,81	3606959	3607439	-	-
NR2M150R	2	3,00	1,50	2,79	3606932	3607472	-	-
NR3M150R	3	3,00	1,50	3,81	3606960	3607440	-	-
NR3062R	3	3,18	1,59	3,81	3607131	3607473	-	3607026
NR2M175R	2	3,50	1,75	2,79	3606933	3607483	-	-
NR3M175R	3	3,50	1,75	3,81	3606961	3607441	-	-

(continued)

(NR • Full Radius Inserts — continued)





Right-hand insert shown; left-hand insert is mirror image.

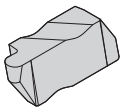
● first choice
○ alternate choice

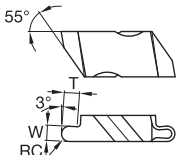
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
NR3M200R	3	4,00	2,00	3,81	3606962	3607398	-	-
NR4M200R	4	4,00	2,00	6,35	3606964	3607484	-	-
NR3M225R	3	4,50	2,25	3,81	3606963	3607442	-	-
NR4M225R	4	4,50	2,25	6,35	3606965	3607485	-	-
NR3094R	3	4,78	2,39	3,81	3607180	3607476	-	-
NR4M250R	4	5,00	2,50	6,35	3606966	3607486	-	-
NR4125R	4	6,35	3,18	6,35	3607130	3607500	-	-
left hand								
NR2M050L	2	1,00	0,50	1,27	3606948	3607401	3607672	-
NR2M075L	2	1,50	0,75	2,79	3606924	3607430	-	-
NR2031L	2	1,58	0,79	2,79	3607176	3607319	-	-
NR3031L	3	1,58	0,79	2,39	3607139	3607478	-	3607034
NR2M100L	2	2,00	1,00	2,79	3606925	3607431	3607684	-
NR3M100L	3	2,00	1,00	2,39	3606949	3607395	-	-
NR2047L	2	2,39	1,19	2,79	-	3607446	-	-
NR3047L	3	2,39	1,19	3,81	3607135	3607479	-	3607028

(continued)

(NR • Full Radius Inserts — continued)



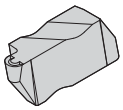


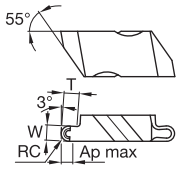
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

catalogue number	insert size	W	RC	T	TN6010	TN6025	TN7110	THM
NR2M125L	2	2,50	1,25	2,79	3606926	3607432	-	-
NR3M125L	3	2,50	1,25	3,81	3606950	3607435	3607689	-
NR2M150L	2	3,00	1,50	2,79	3606927	3607433	-	-
NR3M150L	3	3,00	1,50	3,81	3606951	3607436	-	-
NR3062L	3	3,18	1,59	3,81	3607171	3607497	-	3607032
NR2M175L	2	3,50	1,75	2,79	3606928	3607434	-	-
NR3M175L	3	3,50	1,75	3,81	3606952	3607437	3607691	-
NR3M200L	3	4,00	2,00	3,81	3606953	3607396	-	-
NR4M200L	4	4,00	2,00	6,35	3606954	3607466	-	-
NR3M225L	3	4,50	2,25	3,81	3606934	3607438	-	-
NR4M225L	4	4,50	2,25	6,35	3606955	3607467	-	-
NR3094L	3	4,78	2,39	3,81	3607169	3607339	-	-
NR4M250L	4	5,00	2,50	6,35	3606956	3607468	-	-
NR4125L	4	6,35	3,18	6,35	3607181	3607514	-	-





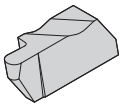
Right-hand insert shown; left-hand insert is mirror image.

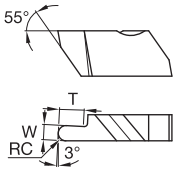
● first choice
○ alternate choice

P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NR-K • Full Radius Inserts with Chip Control

catalogue number	insert size	W	Ap max	RC	T	TN6010	TN6025	TN7110	THM
right hand									
NR3031RK	3	1,57	1,97	0,79	2,39	3607062	3607206	■	■
NR3047RK	3	2,39	1,91	1,19	3,81	3607086	3607214	■	■
NR3062RK	3	3,18	2,92	1,59	3,81	3607056	3607236	■	■
NR4062RK	4	3,18	2,92	1,59	3,81	■	3607461	■	■
NR3078RK	3	3,96	2,54	1,98	3,81	3607094	3607407	■	■
NR4094RK	4	4,78	3,81	2,39	6,35	3607101	3607480	■	■
NR4125RK	4	6,35	3,81	3,18	6,35	3607141	3607303	■	■
left hand									
NR3031LK	3	1,58	1,98	0,79	2,39	3607095	3607222	■	■
NR3047LK	3	2,39	1,91	1,19	3,81	3607102	3607408	■	■
NR3062LK	3	3,18	2,92	1,59	3,81	3607091	3607216	■	■
NR4062LK	4	3,18	2,92	1,59	3,81	3607156	3607405	■	■
NR3078LK	3	3,96	2,54	1,98	3,81	3607172	3607306	■	■
NR4094LK	4	4,78	3,81	2,39	6,35	3607150	3607452	■	■
NR4125LK	4	6,35	3,81	3,18	6,35	3607166	3607458	■	■





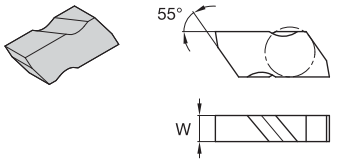
Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NRD • Full Radius Deep-Grooving Inserts

catalogue number	insert size	W	T	cutting edges	TN6010	TN6025	TN7110	THM
right hand								
NRD3031R	3	1,58	3,18	2	3607087	3607457	'	'
NRD3062R	3	3,18	6,35	1	3607099	3607474	'	'
NRD4062R	4	3,18	6,35	2	3607173	3607499	'	'
NRD4125R	4	6,35	12,70	1	'	3607496	'	'
left hand								
NRD3031L	3	1,58	3,18	2	3607085	3607455	'	'
NRD3062L	3	3,18	6,35	1	3607124	3607462	'	'
NRD4062L	4	3,18	6,35	2	3607162	3607295	'	'
NRD4125L	4	6,35	12,70	1	3607186	3607298	'	'



Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

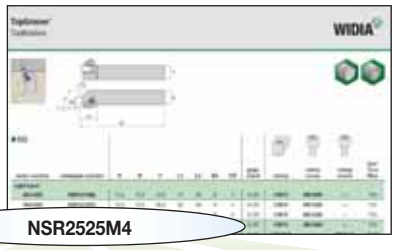
		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●		○
K		●	○	○	○
N		●	○		●
S		●	●		●
H		○	○		

■ NB • Blanks

catalogue number	insert size	W	TN6010	TN6025	TN7110	THM
right hand						
NB2R	2	3,81	I	I	I	3607064
NB3R	3	4,95	I	I	I	3607019
left hand						
NB2L	2	3,81	I	I	I	3607016
NB3L	3	4,95	I	I	I	3607017

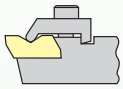
NOTE: NB blanks are designed to allow modification of the W dimension and end form.
W dimension is provided to indicate maximum possible width.
Available in uncoated grades only.

TopGroove™
Holder Identification System



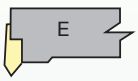
N	S	R		2525	M	4	
Insert Holding Method	Insert Mounting Location	Hand of Tool	Drop Head	Shank Size	Tool Length	Insert Size	Qualified Surface and Length

N —
TopGroove*

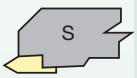


*Proprietary standard only.

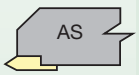
End mount



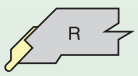
Side mount
Offset



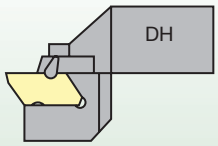
Side mount
No offset
for swiss
machining



NRR undercut



Shank height and width in mm and holder length according to ISO standard.



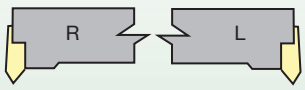
DH = Drop Head

L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	I
125	J
140	K
150	L
160	M
170	N
180	P
200	Q
250	R
300	S
350	T
400	U
450	V
500	W
Special Length	Y
	X

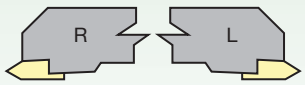


insert size	W1
2	3,81mm
3	4,95mm
4	6,98mm
5	9,65mm
6	9,73mm
8	11,13mm

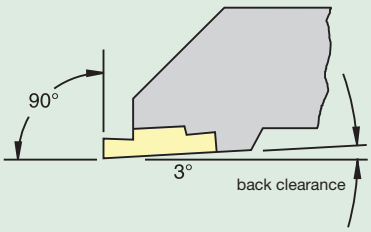
End mount



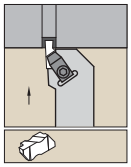
Side mount

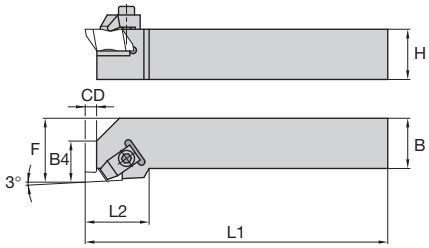


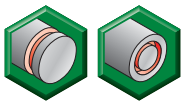
Q —
qualified metric holder



NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.



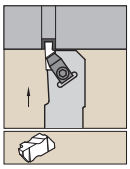


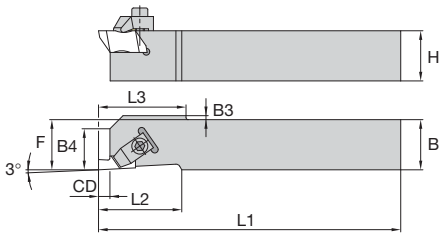


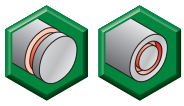
NS

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand													
3641682	**NSR1010E2**	10,0	10,0	14,0	70	19	9	4	N.2R	**CM74**	**MS1200**	–	T10
3641660	**NSR1212F2**	12,0	12,0	16,0	80	19	9	4	N.2R	**CM74**	**MS1200**	–	T10
3636542	**NSR1616H2**	16,0	16,0	20,0	100	19	9	4	N.2R	**CM74**	**MS1200**	–	T10
3638589	**NSR2020K2**	20,0	20,0	25,0	125	19	9	4	N.2R	**CM74**	**MS1200**	–	T10
3638588	**NSR2020K3**	20,0	20,0	25,0	125	32	13	5	N.3R	**CM72LP**	–	**MS2111**	25 IP
3638590	**NSR2525M2**	25,0	25,0	32,0	150	19	9	4	N.2R	**CM74**	**MS1200**	–	T10
3636536	**NSR2525M3**	25,0	25,0	32,0	150	32	13	5	N.3R	**CM72LP**	–	**MS2111**	25 IP
3636540	**NSR2525M4**	25,0	25,0	32,0	150	35	14	7	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641664	**NSR3225P3**	32,0	25,0	32,0	170	32	13	5	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641675	**NSR3225P4**	32,0	25,0	32,0	170	35	14	7	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641666	**NSR3232P3**	32,0	32,0	40,0	170	32	13	5	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641669	**NSR3232P4**	32,0	32,0	40,0	170	35	14	7	N.4R	**CM72LP**	–	**MS2111**	25 IP
left hand													
3641683	**NSL1010E2**	10,0	10,0	14,0	70	19	9	4	N.2L	**CM75**	**MS1200**	–	T10
3641681	**NSL1212F2**	12,0	12,0	16,0	80	19	9	4	N.2L	**CM75**	**MS1200**	–	T10
3636545	**NSL1616H2**	16,0	16,0	20,0	100	19	9	4	N.2L	**CM75**	**MS1200**	–	T10
3639045	**NSL2020K2**	20,0	20,0	25,0	125	19	9	4	N.2L	**CM75**	**MS1200**	–	T10
3639046	**NSL2020K3**	20,0	20,0	32,0	125	32	13	5	N.3L	**CM73LP**	–	**MS2111**	25 IP
3639047	**NSL2525M2**	25,0	25,0	32,0	150	19	9	4	N.2L	**CM75**	**MS1200**	–	T10
3636539	**NSL2525M3**	25,0	25,0	32,0	150	32	13	5	N.3L	**CM73LP**	–	**MS2111**	25 IP
3636544	**NSL2525M4**	25,0	25,0	32,0	150	35	14	7	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641670	**NSL3225P3**	32,0	25,0	32,0	170	32	13	5	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641678	**NSL3225P4**	32,0	25,0	32,0	170	35	14	7	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641671	**NSL3232P3**	32,0	32,0	40,0	170	32	13	5	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641679	**NSL3232P4**	32,0	32,0	40,0	170	35	14	7	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641688	**NSL3232P5**	32,0	32,0	40,0	170	51	16	11	N.5L	**CM81**	**MS352**	–	6 mm

NOTE: F dimension measured over sharp point of insert.



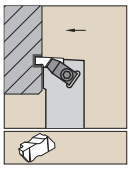


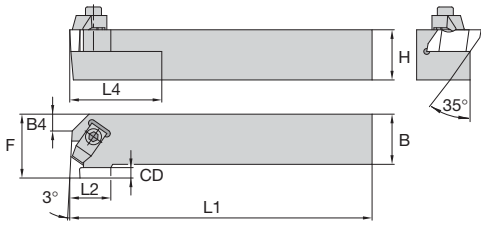


NAS

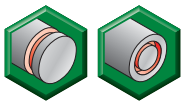
order number	catalogue number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand															
3641667	**NASR1010M2Q**	10,0	10,0	10,0	150	19	9	3,5	2,03	19	N.2R	**CM182**	**MS1200**	**–**	T10
3641662	**NASR1212M2Q**	12,0	12,0	12,0	150	19	9	3,5	–	–	N.2R	**CM182**	**MS1200**	**–**	T10
3639048	**NASR1616K3Q**	16,0	16,0	16,0	125	32	12	5,3	–	–	N.3R	**CM184LP**	**–**	**MS2111**	25 IP
left hand															
3641691	**NASL1010M2Q**	10,0	10,0	10,0	150	19	9	3,5	2,03	19	N.2L	**CM183**	**MS1200**	**–**	T10
3641686	**NASL1212M2Q**	12,0	12,0	12,0	150	19	9	3,5	–	–	N.2L	**CM183**	**MS1200**	**–**	T10
3641687	**NASL1616K3Q**	16,0	16,0	16,0	125	32	12	5,3	–	–	N.3L	**CM185LP**	**–**	**MS2111**	25 IP

NOTE: F dimension measured over sharp point of insert.





Right-hand toolholder shown.

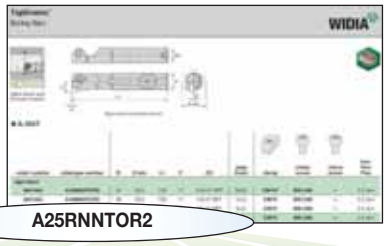


NE

order number	catalogue number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand														
3641674	**NER1616H2**	16,0	16,0	20,0	100	15	25	–	4	N.2L	**CM75**	**MS1200**	–	T10
3641658	**NER2020K2**	20,0	20,0	25,0	125	15	25	6	4	N.2L	**CM75**	**MS1200**	–	T10
3641665	**NER2525M2**	25,0	25,0	32,0	150	15	25	12	4	N.2L	**CM75**	**MS1200**	–	T10
3636541	**NER2525M3**	25,0	25,0	32,0	150	22	51	–	5	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641672	**NER2525M4**	25,0	25,0	35,0	150	24	51	–	7	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641680	**NER3225P3**	32,0	25,0	32,0	170	22	51	–	4	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641689	**NER3225P4**	32,0	25,0	35,0	170	24	51	–	7	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641693	**NER3232P4**	32,0	32,0	40,0	170	24	51	–	6	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641692	**NER3232P5**	32,0	32,0	50,0	170	35	51	–	11	N.5L	**CM81**	**MS352**	–	6 mm
left hand														
3641684	**NEL1616H2**	16,0	16,0	20,0	100	15	25	–	4	N.2R	**CM74**	**MS1200**	–	T10
3641677	**NEL2020K2**	20,0	20,0	25,0	125	15	25	6	4	N.2R	**CM74**	**MS1200**	–	T10
3641676	**NEL2525M2**	25,0	25,0	32,0	150	15	25	12	4	N.2R	**CM74**	**MS1200**	–	T10
3636543	**NEL2525M3**	25,0	25,0	32,0	150	22	51	–	5	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641668	**NEL2525M4**	25,0	25,0	35,0	150	24	51	–	7	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641685	**NEL3225P3**	32,0	25,0	32,0	170	22	51	–	4	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641694	**NEL3225P4**	32,0	25,0	35,0	170	24	51	–	7	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641696	**NEL3232P4**	32,0	32,0	40,0	170	24	51	–	6	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641695	**NEL3232P5**	32,0	32,0	50,0	170	35	51	–	11	N.5R	**CM80**	**MS352**	–	6 mm

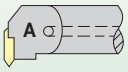
NOTE: F dimension measured over sharp point of insert.

TopGroove
Boring Bar Identification System

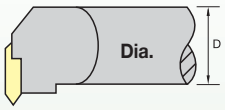


A	25	R	N	N	T	O	R	2
Bar Type	Bar Diameter	Bar Length	Insert Holding Method	Insert Shape	Insert Location	Rake Angle	Hand of Tool	Insert Size

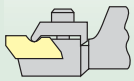
Steel with coolant

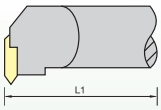


Bar diameter



N – TopGroove



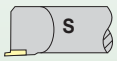


Metric Bars	
M	150mm
Q	180mm
R	200mm
S	250mm
T	300mm
U	350mm

End mount



Side mount



Right hand

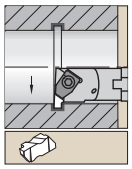


Left hand

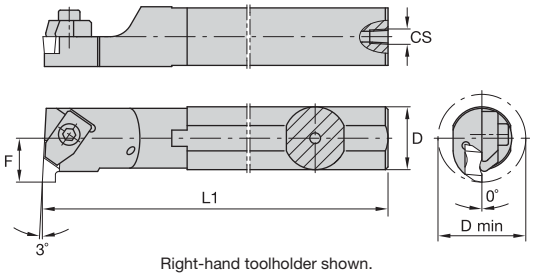




insert size	W1
1	3,54mm
2	3,81mm
3	5,35mm
4	6,40mm
5	9,65mm
6	9,73mm
8	11,13mm



Steel shank with through coolant.



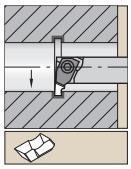
Right-hand toolholder shown.



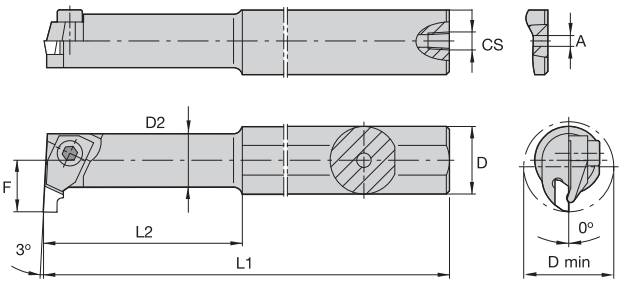
A-NNT

order number	catalogue number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand											
3641644	**A12MNNTOR2**	12	18,5	150	11	1/16-27 NPT	NG2L	**CM147**	**MS1200**	**–**	2.5 mm
3641643	**A16MNNTOR2**	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641645	**A20QNNTOR2**	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641651	**A25RNNTOR2**	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641622	**A25RNNTOR3**	25	34,0	200	17	1/8 - 27 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641646	**A32SNNTOR3**	32	44,0	250	22	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641653	**A40TNNTOR3**	40	54,0	300	27	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641654	**A40TNNTOR4**	40	54,0	300	27	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641661	**A50UNNTOR4**	50	70,0	350	35	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
left hand											
3641655	**A12MNNTOL2**	12	18,5	150	11	1/16-27 NPT	NG2R	**CM146**	**MS1200**	**–**	2.5 mm
3641649	**A16MNNTOL2**	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641652	**A20QNNTOL2**	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641657	**A25RNNTOL2**	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641650	**A25RNNTOL3**	25	34,0	200	17	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641656	**A32SNNTOL3**	32	44,0	250	22	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641659	**A40TNNTOL3**	40	54,0	300	27	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641663	**A40TNNTOL4**	40	54,0	300	27	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641690	**A50UNNTOL4**	50	70,0	350	35	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP

NOTE: Minimum bore capability varies with depth of groove. See pages E86–E87 for details.
F dimension measured over sharp point of insert.



Necked steel shank with through coolant.



Right-hand toolholder shown.



A-NNT-1

order number	catalogue number	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
right hand													
3641648	**A10KNNTOR1**	10	11,5	10,0	125	—	7	3,2	—	NG1L	**CM109**	**MS1034**	1.5 mm
3641647	**A12MNNTOR1**	12	11,5	8,7	150	31,30	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5 mm

NOTE: Minimum bore capability varies with depth of groove. See pages E86–E87 for details.
F dimension measured over sharp point of insert.

TopGroove™ Inserts: The Best Platform for Customisation

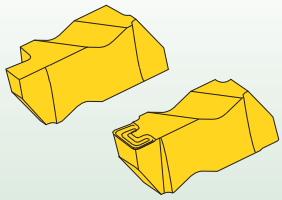
All TopGroove custom order inserts benefit from the superior rigidity of our TopGroove toolholder and clamping system. For added productivity, most custom orders can be incorporated into the double-ended inserts.

Custom orders start with proven WIDIA™ carbide grade technology as the basis for optimising tool performance. Positive top rake angles are also available in most inserts.

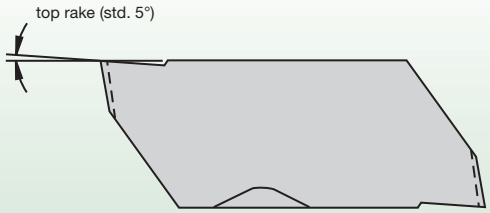
State-of-the-art CAD enables rapid development of your custom insert design. For convenience, a concept drawing is always available to facilitate engineering development of an insert.

There are limitless variations of the flat-top TopGroove design. Additionally, chip control in the most common styles enables true optimisation and productivity. WIDIA offers NB- and NBD-style insert blanks as well. These blanks can be end-form ground in your own shop.

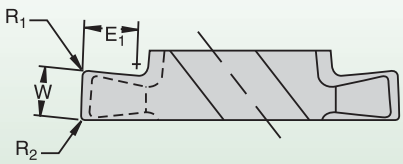
Whatever your special grooving requirements may be, WIDIA can provide an effective solution. We have the technical expertise, resources, and commitment to help you develop insert designs that satisfy your metalcutting application demands.



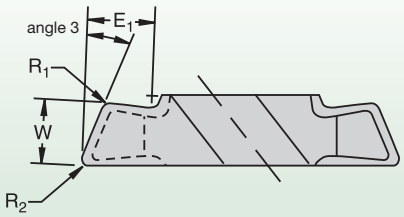
top rake



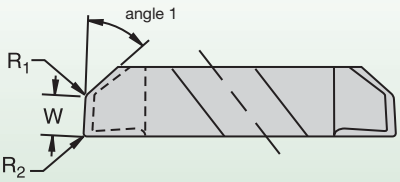
style A



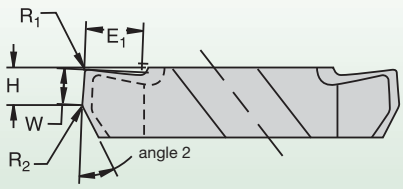
style B1



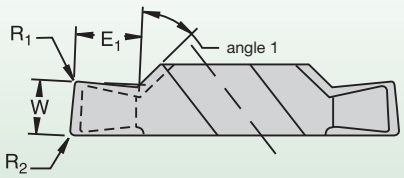
style B2



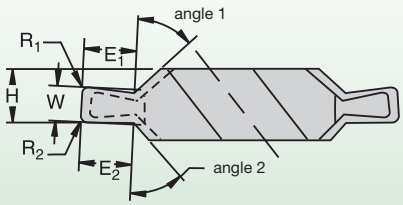
style B3



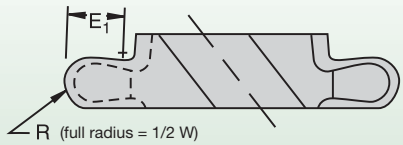
style B4



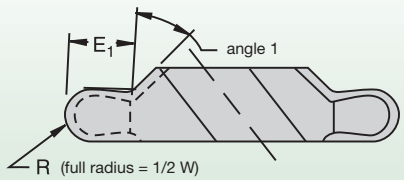
style C1



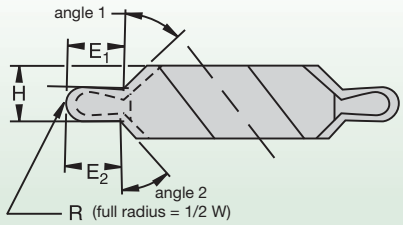
style D



style F



style G



NOTE: Common styles are shown here in right-hand versions. Left-hand versions are also available.

TopGroove Grooving Systems

Use this Custom Order Worksheet to modify an existing product to meet your specifications. If your custom requirements do not fall into these categories, simply contact your WIDIA™ Distributor.

Trust our experienced distributors and WIDIA engineering team to design the best solution for you.

Date

Customer-Specified Dimensions

Style (circle one) A B1 B2 B3 B4 C1 D F G

Orientation (circle one) left hand right hand

Top Rake		**Total Width (T)**	
Cutting Width (W)		**Angle 1**	
Corner Radius 1 (R_1)		**Angle 2**	
Corner Radius 2 (R_2)		**Offset (H)**	
Cutting Depth (E_1)		**Other** (please specify)	

Special Instructions

(please make any necessary notes or sketches in the box at right)

Closest Catalogue Standard

Customer

Distributor

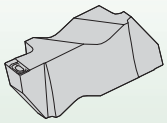
Shipping Requirements

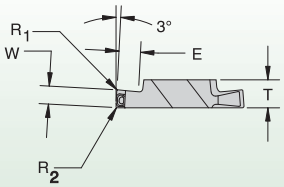
Attention Distributors: Use this worksheet to collect information for your customer.

❒ Ground ❒ Next Day Air ❒ 2nd Day Air ❒ 3rd Day Air

A-SK Specials

10° positive cutting action
- Grooving
- Face grooving







insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NG2-R-SK	**NG2-L-SK**	0,66–1,42	0,00–0,18	1,27	3,810	Carbide grades quoted upon request. **See page E47.**
or NF2-R-SK	**or NF2-L-SK**	1,45–3,43	0,08–0,33	2,79		
		1,07–1,70	0,08–0,33	2,39		
		1,73–1,93	0,13–0,51	2,39		
		1,96–2,39	0,13–0,76	3,81		
NG3-R-SK	**NG3-L-SK**	2,41–2,67	0,13–0,51	3,81		
or	**or**	2,69–3,18	0,13–0,76	3,81	4,950	
NF3-R-SK	**NF3-L-SK**	3,20–3,40	0,13–0,51	3,81		
		3,43–3,96	0,13–0,76	3,81		
		3,99–4,42	0,20–0,46	3,81		
		4,67–4,98	0,46–0,71	3,81		
		2,54–2,79	0,13–0,51	3,81		
		2,82–3,18	0,13–0,76	3,81		
		3,20–3,33	0,13–0,51	3,81		
NG4-R-SK	**NG4-L-SK**	3,35–3,96	0,13–0,76	3,81		
or	**or**	3,99–4,11	0,13–0,51	3,81	6,480	
NF4-R-SK	**NF4-L-SK**	3,89–4,80	0,13–0,76	6,35		
		4,83–4,85	0,46–0,71	6,35		
		4,88–5,18	0,20–0,46	6,35		
		6,22–6,53	0,46–0,64	6,35		

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W = .090, R_1 = .010, R_2 = .010, grade TN6010™.

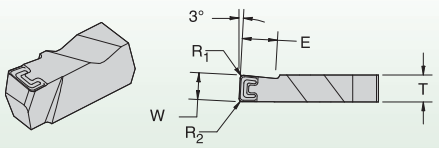
Unless otherwise specified, a standard tolerance of ±0,03mm on width (W) will be applied, and a standard tolerance of ±0,06mm on radii (R_1 and R_2) will be applied.

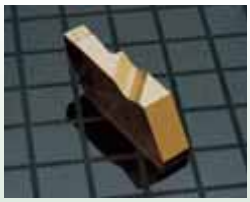
If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

A-SK Specials

10˚ positive cutting action
- Deep grooving
- Deep face grooving





insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NGD3-R-SK	NGD3-L-SK	1,45–1,75	.008–.033	3,18	4,95	Carbide grades quoted upon request. **See page E47.**
or	or	2,26–2,57*	.008–.033	6,35		
NFD3-R-SK	NFD3-L-SK	3,05–3,35*	.008–.033	6,35		
		4,67–4,98*	.046–.071	6,35		
NGD4-R-SK	NG4-L-SK	3,05–3,35*	.008–.033	6,35	6,48	
or	or	4,57–4,98*	.046–.071	9,53		
NFD4-R-SK	NF4-L-SK	6,22–6,53*	.046–.071	12,70		

**One cutting edge.*

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W = .090, R_1 = .010, R_2 = .010, grade TN6010™.

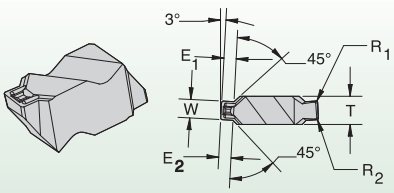
Unless otherwise specified, a standard tolerance of ±0,03mm on width (W) will be applied, and a standard tolerance of ±0,06mm on radii (R_1 and R_2) will be applied.

If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

C1-SK Specials

- Groove and chamfer

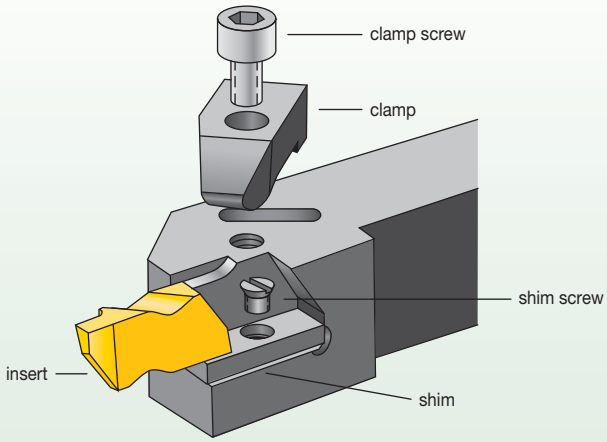




insert catalogue number		width range W	corner radii range R_1 and R_2	E	T	grades
right hand	left hand					
NB2-R-K	NB2-L-K	1,19–3,18	0,13–0,38	2,54	3,81	Carbide grades quoted upon request. **See page E47.**
NB3-R-K	NB3-L-K	2,39–4,32	0,13–0,64	3,81	4,95	

NOTE: The above insert style is for simultaneous groove and chamfer operations with chip control.

TopGroove Toolholders and Boring Bars



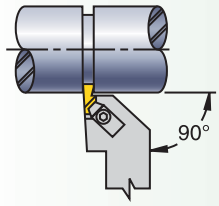
insert size and style	clamp	clamp screw	shim	shim screw
NG-1L	CM-109	S-304	–	–
NG-2R	CM-182	S-310	–	–
NG-2L	CM-183	S-310	–	–
NG-2R	CM-74	S-310	–	–
NG-2L	CM-75	S-310	–	–
NG-3R	CM-184	S-412	–	–
NG-3L	CM-185	S-412	–	–
NG-3R	CM-72	S-412	–	–
NG-3L	CM-73	S-412	–	–
NG-3R*	CM-78	S-412	–	–
NG-3L*	CM-70	S-412	–	–
NG-4R	CM-72	S-412	SM-420	SL-344
NG-4L	CM-73	S-412	SM-420	SL-344
NG-5R	CM-80	S-352	–	–
NG-5L	CM-81	S-352	–	–
NG-6R	CM-120	S-412	SM-416	S-111
NG-6L	CM-121	S-412	SM-416	S-111
TopGroove relief grooving				
NU-3125R	CM-72	S-412	–	–
NU-3125L	CM-73	S-412	–	–
NU-3125R**	CM-72	S-618	–	–
NU-3125L**	CM-73	S-618	–	–
Utility threading				
NTU-4R	CM-72	S-412	–	–
NTU-4L	CM-73	S-412	–	–

**25mm diameter boring head.*
***Boring head.*

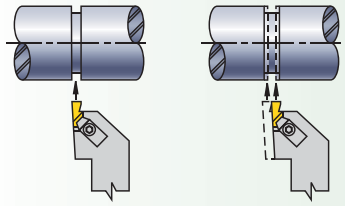
Grooving Tool Failure and Solution Guide

Practical Solutions to Common Grooving Problems

Holder Position for Grooving Operation

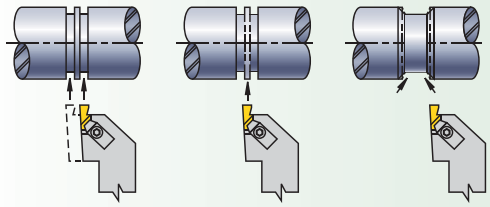


How to Cut a Groove Slightly Wider than the Groove Tool



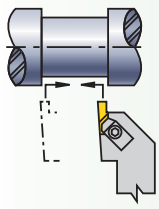
1. Plunge the centre of the groove.
2. Plunge each side of the groove to get the specified width. Use a slower feed rate when cutting groove sides.

How to Cut Wider Grooves



1. Plunge out both sides of groove width.
2. Plunge centre area to remove web of material remaining.
3. Plunge both sides of groove at the required angle, using approximately one-half the width of the grooving tool for maximum width of cut.

Finish Turning the Groove



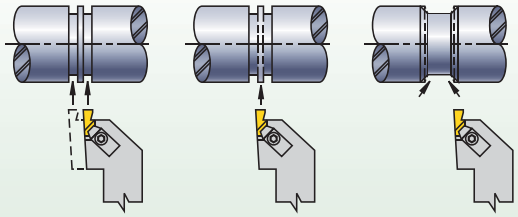
1. Follow recommendations explained above.
2. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined here.
3. Use the lightest depth of cut that still enables good chip surface finishing.

problem	solution
bur	1. Ensure tool centre height. 2. Use sharp tool (index more often). 3. Use positive rake PVD-coated insert. 4. Use correct grade for workpiece material. 5. Use correct geometry (e.g., positive rake for work-hardening material). 6. Chamfer before grooving. 7. Change tool path.
poor surface finish	1. Increase speed. 2. Use sharp tool (index more often). 3. Dwell tool in bottom 1–3 revolutions (max). 4. Use proper chip control geometry. 5. Increase coolant flow/concentration. 6. Ensure proper setup (overhang, shank size). 7. Use correct geometry (e.g., positive rake for work-hardening material).
groove bottom that is not flat	1. Use sharp tool (index more often). 2. Dwell tool in bottom 1–3 revolutions (max). 3. Reduce tool overhang (increase rigidity). 4. Ensure correct tool alignment. 5. Reduce feed rate at groove bottom. 6. Use a wider insert. 7. Ensure tool centre height.
poor chip control	1. Use “K” chip control geometry insert. 2. Use sharp tool (index more often). 3. Increase coolant concentration. 4. Adjust feed rate (usually increase first).
chatter	1. Reduce tool and workpiece overhang. 2. Adjust speed and feed (usually increase first). 3. Ensure centre height.
insert chipping	1. Use correct grade for workpiece material. 2. Increase speed. 3. Reduce feed. 4. Use a stronger grade. 5. Increase tool and setup rigidity.
side walls not straight	1. Check tool alignment for square. 2. Use correct insert hand. 3. Reduce workpiece and tool overhang. 4. Use sharp insert (index more often).

Machining Guidelines for Chip Control • Grooving

When the proper cutter diameter is not available, proper cutter positioning will provide positive results.

- Centre height of insert should be positioned at the centre of the workpiece or up to 0,13mm above.
- Dwell time in the bottom of the groove (more than three revolutions) is not recommended.
- Chip control is feed-rate related and should be adjusted to fit the particular situation. Recommended feed range is 0,08–0,3 mm/rev.

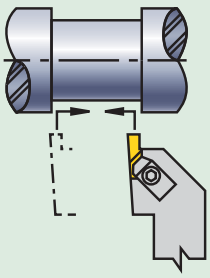


Machining Guidelines for Chip Control • Turning/Profiling

Maximum depth of cut for side cutting (turning/profiling) depends on the material being cut and the width of the tool.

- 0,79–1,6mm wide insert can cut up to 0,6mm deep.
- 1,7–3,3mm wide insert can cut up to 1mm deep.
- 3,5–4,8mm wide insert can cut up to 2mm deep.
- 5–6,35mm wide insert can cut up to 3mm deep.

Finish Turning the Groove

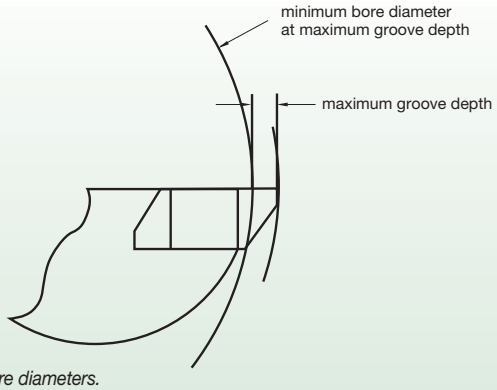


1. Plunge both sides of groove width.
2. Plunge centre area to remove web of material remaining.
3. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined.
4. Use the lightest depth of cut that still allows good chipbreaking, tool life, and surface finish.

Groove Limits		
insert catalogue number	maximum internal groove depth mm	minimum bore diameter mm
NG-1094L	1,91	20,32
–	1,02	11,18
NG-2031R/L	1,27	18,54
NG-2041R/L	–	–
NG-2047R/L	–	–
NG-2058R/L	–	–
–	2,79	63,50
NG-2062R/L	2,59	44,45
NG-2094R/L	2,49	38,10
NG-2125R/L	2,03	25,40
–	1,40	18,54
NG-3047R/L	–	–
NG-3062R/L	2,39	44,45
NG-3072R/L	2,29	41,28
NG-3078R/L	1,91	34,93
NG-3088R/L	–	–
NG-3094R/L	–	–
NG-3097R/L	3,81	60,33
NG-3105R/L	–	–
NG-3110R/L	3,68	53,98
NG-3122R/L	–	–
NG-3125R/L	3,51	47,63
NG-3142R/L	–	–
NG-3156R/L	3,18	41,28
NG-3178R/L	–	–
NG-3185R/L	2,79	34,93
NG-3189R/L	–	–
NG-4125R/L	3,81	69,85
–	6,35	146,05
NG-4189R/L	6,22	127,00
NG-4213R/L	6,10	114,30
NG-4219R/L	5,54	82,55
NG-4250R/L	5,08	63,50

NOTE: The same maximum groove depth and minimum bore diameter values also apply to metric, NG-K (chip control), and NR (full radius) inserts of similar size. The same internal grooving depth limits are a function of bar clearance versus bore diameters.

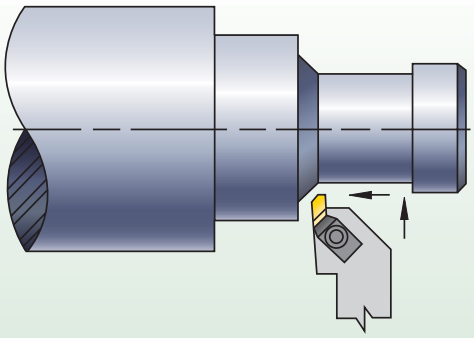
Internal Groove Depth versus Bar Interference



NOTE: Internal grooving depth limits are a function of bar clearance versus bore diameters.

Machining Guidelines for Back Turning/Turning/Profiling

The NP-K-style TopGroove inserts were engineered specifically for back turning on small automatic lathes, but they also find applications for other light turning and profiling operations. For general applications, maximum depth of cut should not exceed 2,74mm for size 2 inserts or 3,84mm for size 3 inserts.



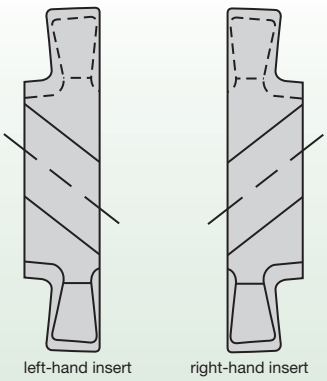
Machining Guidelines for Using TopGroove Deep Grooving Inserts (NGD)

Typically, those NGD- and NRD-style inserts with two cutting edges require no machine offset changes. However, those inserts with only one cutting edge do require offset changes. Refer to the chart here to ensure proper offset adjustments.

insert catalogue number	add to C dimension mm	add to F dimension mm
NGD-3062	0,00	0,00
NGD-3094	2,54	2,54
NGD-3125	2,54	2,54
NGD-3189	2,54	2,54
NGD-4125	0,00	0,00
NGD-4189	3,18	3,18
NGD-4250	6,35	6,35
NRD-3031	0,00	0,00
NRD-3062	2,54	2,54
NRD-4062	0,00	0,00
NRD-4094	6,35	6,35
NRD-4125	6,35	6,35

TopGroove Insert Selection Guide

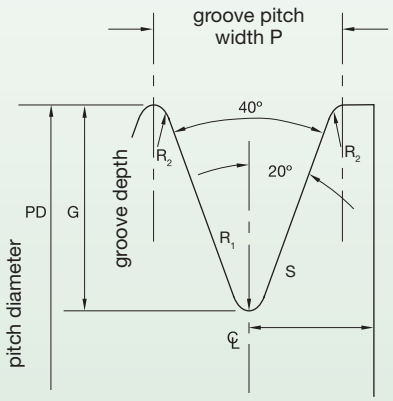
- All TopGroove inserts are precision ground to provide accurate edge location and secure locking of the insert in the toolholder pocket.
- TopGroove inserts can be used in either toolholders or boring bars.
- Right-hand TopGroove toolholders use right-hand inserts. Left-hand TopGroove toolholders use left-hand inserts.
- Right-hand TopGroove boring bars use left-hand inserts. Left-hand TopGroove boring bars use right-hand inserts.



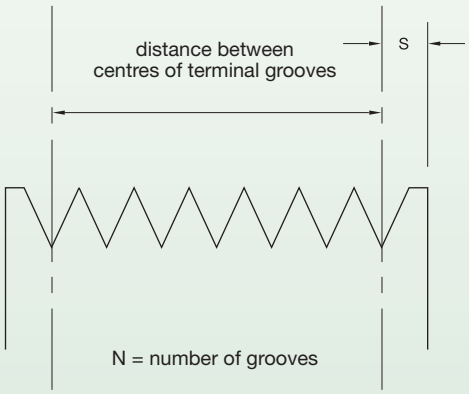
Machining Guidelines for Poly-Vee Grooving with Custom Solution and TopGroove NV Inserts (NV3-J and NV4-L)

- To machine cross section “J”, use insert NV3-J.
- To machine cross section “L”, use insert NV4-L.

Section J



Section L

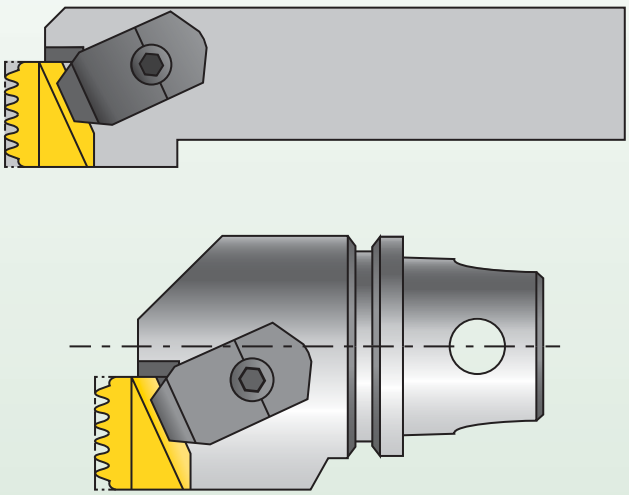


Groove Dimensions and Tolerances for Sheaves

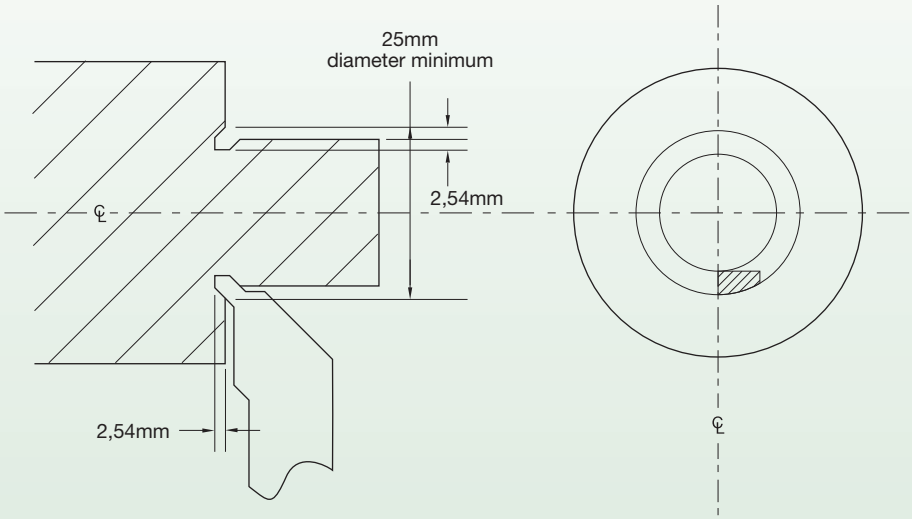
groove cross section	pitch width (P)	groove depth (G)	minimum radius (R2)	radius (R1)	terminal distance	distance between centres of terminal grooves and maximum accumulated tolerance
J	2,34 ±0,03	2,21 ±0,13	0,20	0,32 ±0,06	3,18	(N-1)4,88 ±0,25
L	4,70 ±0,05	5,11 ±0,13	0,38	0,32 ±0,06	3,18	(N-1)4,70 ±0,25

Multiple Tooth Poly–Vee Grooving

Let WIDIA™ quote your multiple tooth poly-vee grooving applications. Semi-standard inserts and holders are available. The strong TopGroove design holds the insert rigid and outperforms any other tooling method for this application.



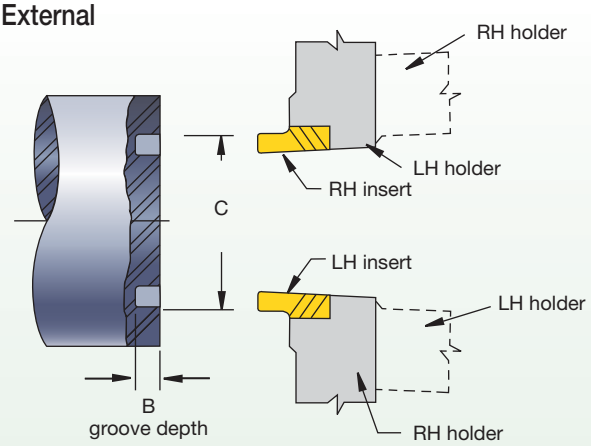
Machining Guidelines for Undercutting Operations Performed with Custom Solution and TopGroove NU Inserts (NU3094, NU3125, and NU3156)



NOTE: Items shown are non-standard items.

Machining Guidelines for Face Grooving Operations • External

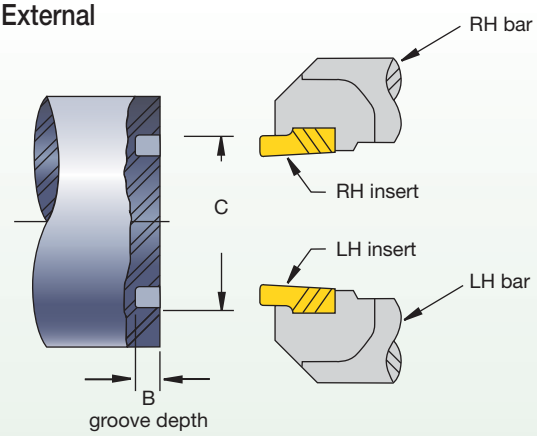
Toolholders



Standard NF/NDF Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NF-3	1,52	23,9
NF-3	2,39	30,5
NF-3	3,18	36,1
NF-3	3,81	41,3
NFD-3	6,35	47,6
NFD-4	9,53	57,2
NFD-4	12,70	57,2

Machining Guidelines for Face Grooving Operations • External

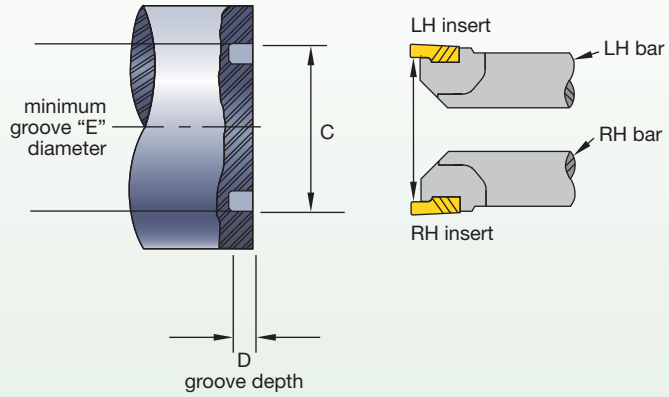
Boring Bars



Standard NG/NGD Inserts		
insert family	maximum groove depth B mm	minimum groove diameter C mm
NG-2	1,27	54,0
NG-2	2,79	88,9
NG-3	2,39	101,6
NG-3	3,18	127,0
NG-3	3,81	139,7
NGD-3	6,35	174,6
NG-4	3,81	152,4
NG-4	6,35	209,6
NGD-4	9,53	222,3
NGD-4	12,70	222,3

Machining Guidelines for Face Grooving Operations • Internal

Boring Bars



Standard NG/NGD Inserts		
insert family	**maximum groove depth B mm**	**minimum groove diameter C mm**
NFD-3-KI	6,35	63,5 *NOTE: Also check minimum bore diameter of boring bar. See page E78.*

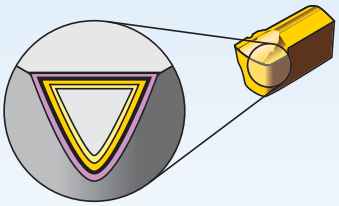
ProGroove



With easy-to-change inserts available in multiple high-performance carbide grades, the ProGroove system ensures accurate, reliable, and reproducible cutting edge performance.

- Single-end grooving and cut-off inserts.
- Offered with integral toolholders and blades.
- Shallow, deep grooving, and cut-off capabilities.
- Available in four different geometries.





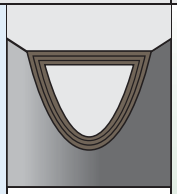
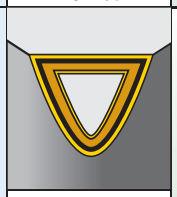
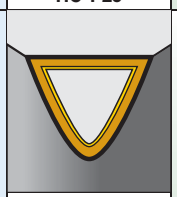
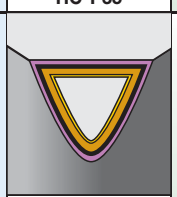
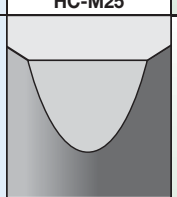
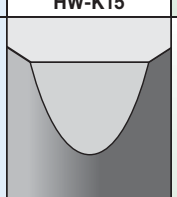
Coatings provide high-speed capability and are engineered for finishing to light roughing.

- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

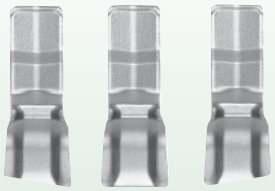
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

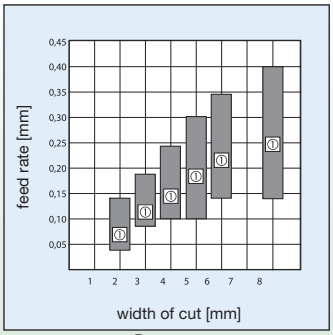
Coating		Grade Description		05	10	15	20	25	30	35	40	45
TN6030	 HC-P30	PVD-TiAlN Nanolayer coated carbide. Medium and heavy machining for steels and nodular cast irons. Recommended at medium cutting speeds when good toughness properties are required.	P									
			M									
			K									
TN7525	 HC-P25	MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN coated carbide. Light and medium machining for steels and nodular cast irons.	P									
			K									
TN7535	 HC-P35	MT-CVD/CVD — TiN-TiCN-Al_2O_3 coated carbide. Medium and heavy machining for steels and nodular cast iron.	P									
			K									
TN8025	 HC-M25	MT-CVD/CVD-TiN-TiCN-Al_2O_3-ZrCN coated carbide. Light and medium machining for all stainless steels. Can be used both with or without coolant.	M									
THM	 HW-K15	Uncoated carbide for light and medium machining. For cast iron and all non-ferrous metals and non-metals. Also capable of machining hardened materials at low cutting speeds.	K									
			N									
			S									
			H									
TTM	 HW-P25	Uncoated carbide with good toughness and wear properties. Medium machining for steels.	P									
			M									

PGU



left-hand neutral right-hand

For grooving and parting operations, universal use. Positive chipbreaker groove for light cutting action. Right-hand and left-hand styles with 6° front angle.

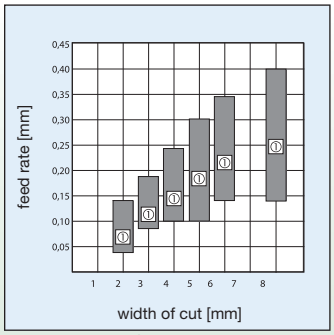


① Recommended Starting Feed

PGM



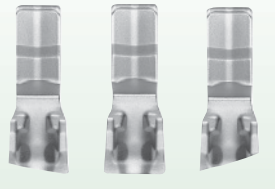
neutral



① Recommended Starting Feed

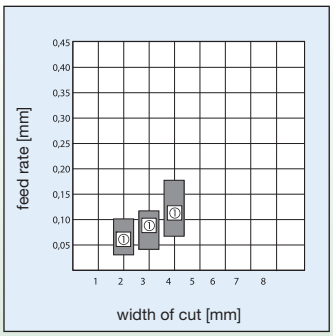
For grooving and parting, also capable of copy and straight turning as well as chamfering. With additional chip forming element for good chip control with varying depths of cut.

PGS



left-hand neutral right-hand

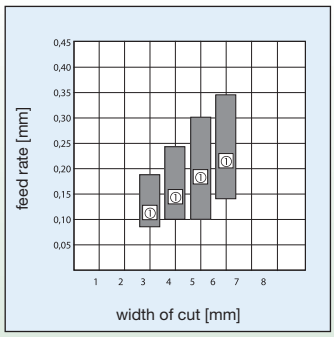
For low-bur parting with straight flanks and smooth surface finishes. All inserts are recommended for parting and grooving slender workpieces, part diameter <32mm, and thin-wall tubes.



① Recommended Starting Feed

PGR

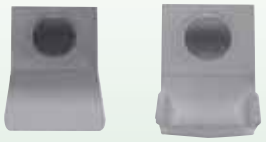




① Recommended Starting Feed

Full round inserts for profiling, grooving, and copy turning. Very good chip control for broad general use. Accurate, reproducible cutting edge positioning.

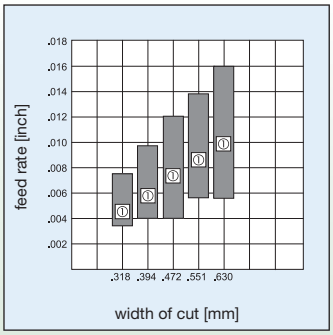
LG System • 0 and 1



0 1

…0
Inserts with wide range of applications in grooving and deep grooving. With additional chip control element for good chip control, even with varying widths of cut.

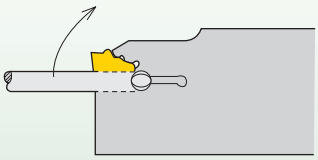
…1
Inserts with wide range of uses in grooving and deep grooving of short chipping materials.



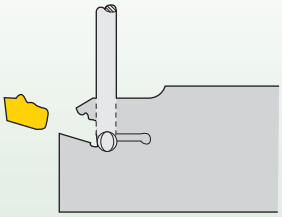
① Recommended Starting Feed

Material Group		Cutting Speed — vc m/min																	
		TN6030			TN7525			TN7535			TN8025			THM			TTM		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	130	**140**	150	200	**215**	230	140	**175**	210	–	–	–	–	–	–	90	**95**	100
	2	110	**145**	175	170	**220**	270	115	**145**	175	–	–	–	–	–	–	75	**100**	125
	3	110	**145**	175	170	**220**	270	115	**145**	175	–	–	–	–	–	–	75	**100**	125
	4	75	**95**	115	115	**145**	175	75	**100**	120	–	–	–	–	–	–	55	**65**	80
	5	100	**125**	145	155	**190**	220	105	**140**	170	–	–	–	–	–	–	70	**85**	100
	6	40	**55**	65	65	**85**	100	45	**60**	75	–	–	–	–	–	–	30	**40**	45
M	1	90	**110**	140	–	–	–	–	–	–	90	**120**	150	–	–	–	60	**75**	90
	2	55	**70**	90	–	–	–	–	–	–	55	**75**	95	–	–	–	40	**50**	55
	3	60	**75**	95	–	–	–	–	–	–	60	**80**	100	–	–	–	40	**50**	60
K	1	60	**80**	90	120	**150**	180	–	–	–	–	–	–	60	**80**	90	–	–	–
	2	60	**75**	85	120	**150**	180	–	–	–	–	–	–	60	**75**	85	–	–	–
	3	60	**75**	90	110	**140**	170	–	–	–	–	–	–	60	**75**	90	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	600	**750**	900	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	535	**685**	835	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	230	**300**	370	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	135	**180**	225	–	–	–
	5	–	–	–	–	–	–	–	–	–	–	–	–	70	**90**	110	–	–	–
	6	–	–	–	–	–	–	–	–	–	–	–	–	445	**565**	690	–	–	–
	7	–	–	–	–	–	–	–	–	–	–	–	–	550	**700**	850	–	–	–
S	1	–	–	–	–	–	–	–	–	–	–	–	–	25	**35**	40	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	15	**20**	20	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	40	**60**	70	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	20	**30**	35	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–	10	**20**	35	–	–	–

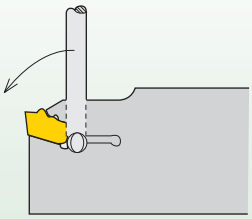
ProGroove System



To change the cutting insert, place the wrench into the blade recess.
The blade mouth is opened by turning through 90°.

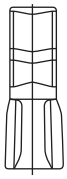


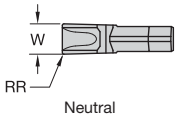
In this position, the wrench is self-locking, leaving both hands free for changing the cutting insert.



The cutting insert is pressed against the rear seat in the blade mouth, releasing the wrench. The insert is accurately positioned and securely clamped.







● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

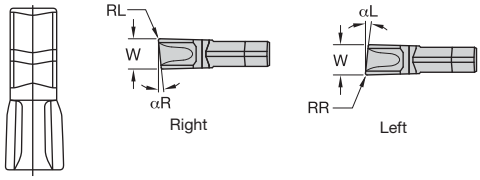
■ PGU

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567320	2	2,10	0,20	N - Neutral	2953289	2498725	2498713	2021804	2008876	-
123567330	3	3,10	0,30	N - Neutral	2953284	-	2498714	2017822	2008931	-
123567340	4	4,10	0,30	N - Neutral	2953286	2498727	2498715	-	2009080	-
123567350	5	5,10	0,30	N - Neutral	2953673	2498728	2498716	-	2021873	-
123567360	6	6,10	0,40	N - Neutral	2953674	2952333	2952350	-	2009385	-
123567380	8	8,15	0,60	N - Neutral	2953666	-	2952351	2009482	2009504	-

NOTE: W tolerance on all = ±0,05mm.

(continued)

(PGU — continued)



● first choice
○ alternate choice

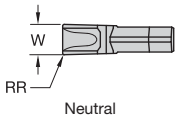
P	●	●	●	○		●
M	●	○	○	●		●
K	●	●	●		●	
N	○				●	
S	○				●	
H					●	

catalogue number	insert size	W	RR	αL	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567231	3	3,10	0,25	6	L - Left	2953672	2498730	2498718	-	-	-
123567241	4	4,10	0,25	6	L - Left	2953676	-	-	-	-	-

catalogue number	insert size	W	RL	αR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567230	3	3,10	0,25	6	R - Right	2953291	2498729	2498717	-	-	-
123567240	4	4,10	0,25	6	R - Right	2953667	2498731	2498719	-	-	-

NOTE: W tolerance on all = ±0,05mm.





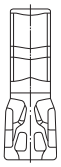
● first choice
○ alternate choice

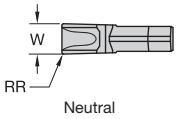
		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

PGM

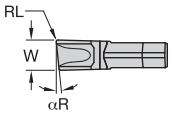
catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567420	2	2,10	0,20	N - Neutral	2953679	2498733	2498721	-	-	-
123567430	3	3,10	0,30	N - Neutral	2953678	2498734	2498722	-	-	-
123567440	4	4,10	0,30	N - Neutral	2953663	2498735	2498723	-	-	-
123567450	5	5,10	0,30	N - Neutral	2953671	2498736	2498724	-	-	-
123567460	6	6,10	0,40	N - Neutral	2953677	2952335	2952352	-	-	-
123567480	8	8,15	0,60	N - Neutral	2953675	2952336	2952353	-	-	-

NOTE: W tolerance on all = ±0,05mm.

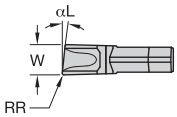




Neutral



Right



Left

● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

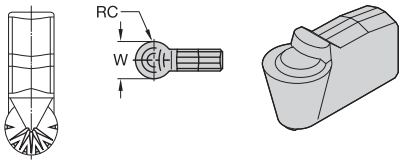
■ PGS

catalogue number	insert size	W	RR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567702	2	2,25	0,20	N - Neutral	'	'	2952354	'	'	'
123567703	3	3,25	0,20	N - Neutral	'	'	2952355	'	'	'
123567704	4	4,25	0,20	N - Neutral	'	'	2952356	'	'	'

catalogue number	insert size	W	RR	αL	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567721	2	2,25	0,20	6	L - Left	'	'	2952358	'	'	'
123567731	3	3,25	0,20	6	L - Left	'	'	2952360	'	'	'

catalogue number	insert size	W	RL	αR	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567720	2	2,25	0,20	6	R - Right	'	'	2952357	'	'	'
123567730	3	3,25	0,20	6	R - Right	'	'	2952359	2017912	'	'
123567740	4	4,25	0,20	6	R - Right	'	'	2952361	'	'	'

NOTE: W tolerance on all = ±0,05mm.



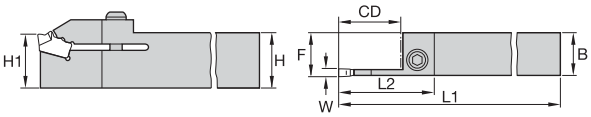
● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

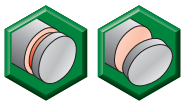
■ PGR

catalogue number	insert size	W	RC	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567803	3	3,00	1,50	I	2952337	I	I	I	I
123567804	4	4,00	2,00	I	2952338	I	I	I	I
123567805	5	5,00	2,50	I	2952339	I	I	I	I
123567806	6	6,00	3,00	I	2952340	I	I	I	I

NOTE: W tolerance on all = ±0,07mm.

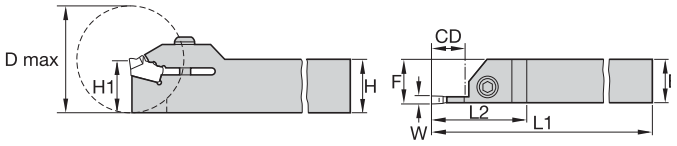


Right Hand Tool Shown

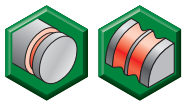


Grooving and Cut-Off

order number	catalogue number	seat size	W	CD	H	B	F	L1	L2	H1	cap screw	cap screw	wrench
right hand													
2007136	**12251782000**	2	2,10	16,0	16	16,0	16,2	100	27	16	–	**12146012600**	**12148041100**
2962743	**12250023000**	3	3,10	20,0	19	19,1	19,4	127	32	19	**12148596200**	–	–
2962745	**12250023200**	3	3,10	25,0	25	25,4	25,7	152	40	25	**12148596200**	–	–
2022560	**12251783000**	3	3,10	20,0	20	20,0	20,3	125	32	20	**12148596200**	–	–
2007142	**12251783200**	3	3,10	25,0	25	25,0	25,3	150	40	25	**12148596200**	–	–
2008153	**12251783600**	3	3,10	25,0	32	25,0	25,3	170	40	32	**12148596200**	–	–
2022562	**12251784000**	4	4,10	25,0	20	20,0	20,4	125	40	20	**12148596200**	–	–
2007148	**12251784200**	4	4,10	25,0	25	25,0	25,4	150	40	25	**12148596200**	–	–
2022564	**12251785200**	5	5,10	32,0	25	25,0	25,4	150	53	25	**12148596200**	–	–
2022566	**12251785400**	5	5,10	32,0	32	25,0	25,4	170	53	32	**12148596200**	–	–
2962751	**12250025200**	5	5,11	32,0	25	25,4	25,8	152	53	25	**12148596200**	–	–
2015814	**12251784400**	6	4,10	32,0	32	25,0	25,4	170	53	32	**12148596200**	–	–
2022568	**12251786400**	6	6,10	32,0	32	25,0	25,5	170	53	32	–	**12146012700**	**12148041300**
2022569	**12251788400**	8	8,10	40,0	32	25,0	25,6	170	66	32	–	**12146012700**	**12148041300**
left hand													
2007139	**12251782100**	2	2,10	16,0	16	16,0	16,2	100	27	16	–	**12146012600**	**12148041100**
2962744	**12250023100**	3	3,10	20,0	19	19,1	19,4	127	32	19	**12148596200**	–	–
2022561	**12251783100**	3	3,10	20,0	20	20,0	20,3	125	32	20	**12148596200**	–	–
2007145	**12251783300**	3	3,10	25,0	25	25,0	25,3	150	40	25	**12148596200**	–	–
2008150	**12251783700**	4	3,10	25,0	32	25,0	25,3	170	40	32	**12148596200**	–	–
2022563	**12251784100**	4	4,10	25,0	20	20,0	20,4	125	40	20	**12148596200**	–	–
2007151	**12251784300**	4	4,10	25,0	25	25,0	25,4	150	40	25	**12148596200**	–	–
2015816	**12251784500**	4	4,10	32,0	32	25,0	25,4	170	53	32	**12148596200**	–	–
2015839	**12251786500**	4	6,10	32,0	32	25,0	25,5	170	53	32	–	**12146012700**	**12148041300**
2022565	**12251785300**	5	5,10	32,0	25	25,0	25,4	150	53	25	**12148596200**	–	–
2022567	**12251785500**	5	5,10	32,0	32	25,0	25,4	170	53	32	**12148596200**	–	–
2015842	**12251788500**	8	8,10	40,0	32	25,0	25,6	170	66	32	–	**12146012700**	**12148041300**



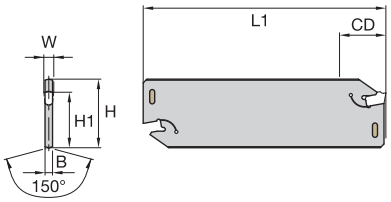
Right Hand Tool Shown



Grooving and Profiling

order number	catalogue number	seat size	W	CD	D max	H	B	F	L1	L2	H1	cap screw	cap screw	wrench
right hand														
2007105	**12251762000**	2	2,10	10,0	25,4	16	16,0	16,2	100	26	16	–	**12146012600**	**12148041100**
2021637	**12251762400**	2	2,10	10,0	25,4	25	25,0	25,2	150	26	25	–	**12146012600**	**12148041100**
2007111	**12251763200**	2	3,10	10,0	25,4	25	25,0	25,3	150	26	20	**12148596200**	–	–
2007127	**12251763400**	3	3,10	10,0	25,4	16	16,0	16,3	100	26	25	**12148596200**	–	–
2007130	**12251764200**	3	4,10	12,5	32,0	25	25,0	25,4	150	31	25	**12148596200**	–	–
2007832	**12251762200**	4	2,10	10,0	25,4	20	20,0	20,2	125	26	25	–	**12146012600**	**12148041100**
2022548	**12251764000**	4	4,10	12,5	32,0	20	20,0	20,4	125	31	20	**12148596200**	–	–
2022550	**12251764400**	4	4,10	12,5	32,0	32	25,0	25,4	170	31	32	**12148596200**	–	–
2022552	**12251765200**	5	5,10	12,5	–	25	25,0	25,5	150	31	25	**12148596200**	–	–
2015792	**12251768400**	5	8,10	16,0	–	32	25,0	25,7	170	36	32	–	**12146012700**	**12148041300**
2022555	**12251766200**	6	6,10	16,0	–	25	25,0	25,6	150	35	25	–	**12146012700**	**12148041300**
2022557	**12251766400**	6	6,10	16,0	–	32	25,0	25,6	170	35	32	–	**12146012700**	**12148041300**
2015754	**12251763000**	8	3,10	10,0	25,4	20	20,0	20,3	125	26	25	**12148596200**	–	–
left hand														
2007108	**12251762100**	2	2,10	10,0	25,4	16	16,0	16,2	100	26	16	–	**12146012600**	**12148041100**
2021636	**12251762500**	2	2,10	10,0	25,4	25	25,0	25,2	150	26	25	–	**12146012600**	**12148041100**
2007124	**12251763300**	2	3,10	10,0	25,4	25	25,0	25,3	150	26	20	**12148596200**	–	–
2021631	**12251762300**	3	2,10	10,0	25,4	20	20,0	20,2	125	26	16	–	**12146012600**	**12148041100**
2022547	**12251763100**	3	3,10	10,0	25,4	20	20,0	20,3	125	26	20	**12148596200**	–	–
2007133	**12251764300**	3	4,10	12,5	32,0	25	25,0	25,4	150	31	25	**12148596200**	–	–
2015782	**12251765500**	3	5,10	12,5	–	32	25,0	25,5	170	31	20	**12148596200**	–	–
2022549	**12251764100**	4	4,10	12,5	32,0	20	20,0	20,4	125	31	20	**12148596200**	–	–
2022551	**12251764500**	4	4,10	12,5	32,0	32	25,0	25,4	170	31	32	**12148596200**	–	–
2022553	**12251765300**	5	5,10	12,5	–	25	25,0	25,5	150	31	25	**12148596200**	–	–
2022556	**12251766300**	6	6,10	16,0	–	25	25,0	25,6	150	35	25	–	**12146012700**	**12148041300**
2022558	**12251766500**	6	6,10	16,0	–	32	25,0	25,6	170	35	32	–	**12146012700**	**12148041300**
2021627	**12251763500**	8	3,10	10,0	25,4	16	16,0	16,3	100	26	32	**12148596200**	–	–
2022559	**12251768500**	8	8,10	16,0	–	32	25,0	25,7	170	36	32	–	**12146012700**	**12148041300**

NOTE: Select shorter CD dimension for added stability.

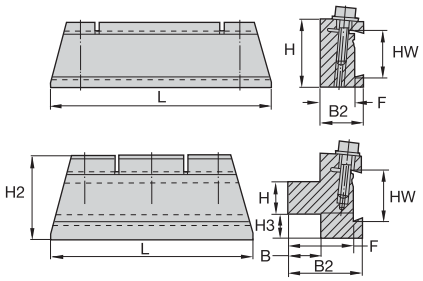


Cut-Off Blades

order number	catalogue number	seat size	W	H	H1	L1	B	CD	wrench
2021629	**12251332000**	2	2,1	19,0	15,7	90	1,7	20	**12146003800**
2021639	**12251342000**	2	2,1	26,0	21,4	110	1,7	25	**12146003800**
2008113	**12251352000**	2	2,1	32,0	25,0	150	1,7	25	**12146003800**
2021640	**12251343000**	3	3,1	26,0	21,4	110	2,4	40	**12146003800**
2008116	**12251353000**	3	3,1	32,0	25,0	150	2,4	50	**12146003800**
2021641	**12251344000**	4	4,1	26,0	21,4	110	3,2	40	**12146003800**
2008119	**12251354000**	4	4,1	32,0	25,0	150	3,2	50	**12146003800**
2008122	**12251355000**	5	5,1	32,0	25,0	150	4,2	60	**12146003800**
2008135	**12251356000**	6	6,1	32,0	25,0	150	5,0	60	**12146009500**
2008138	**12251358000**	8	8,1	32,0	25,0	150	6,8	60	**12146009500**
2021743	**12251368000**	8	8,1	52,5	45,0	250	6,8	100	**12146009500**

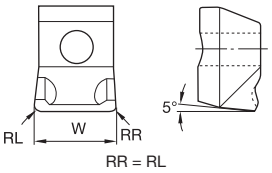
NOTE: Order wrench separately.

Blade Holders



Cut-Off Blade Holders

order number	catalogue number	HW	H	B	F	H2	B2	H3	L	cap screw	wrench
2021625	**12251221900**	19	16,0	16,0	28,3	30	30	4	100	**12148036000**	**12148041300**
2021634	**12251212500**	19	25,0	19,0	17,3	25	19	–	100	**12148036000**	**12148041300**
2021626	**12251221600**	26	16,0	16,0	31,0	40	36	12	100	**12148036000**	**12148041300**
2007826	**12251222000**	26	20,0	18,0	33,0	40	38	8	100	**12148036000**	**12148041300**
2008141	**12251213200**	26	32,0	20,0	15,0	32	20	–	125	**12148036000**	**12148041300**
2021635	**12251222500**	32	25,0	20,0	35,0	50	40	10	125	**12148036000**	**12148041300**
2008156	**12251223200**	32	32,0	25,0	40,0	50	45	3	125	**12148036000**	**12148041300**
2008159	**12251233200**	53	32,0	25,0	50,0	82	57	30	160	**12146013400**	**12148041400**
2021723	**12251234000**	53	40,0	40,0	58,0	82	65	22	160	**12146013400**	**12148041400**



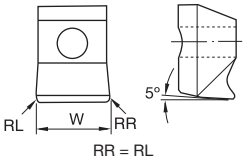
● first choice
○ alternate choice

		TN6030	TN7525	TN7535	TN8025	THM	TTM
P		●	●	●	○		●
M		●	○	○	●		●
K		●	●	●		●	
N		○				●	
S		○				●	
H						●	

LGN0

catalogue number	W	RR	TN6030	TN7525	TN7535	TN8025	THM	TTM
123568080	8,15	0,80	-	2952341	2952363	-	2017973	2009562
123568100	10,15	0,80	-	2952342	2952364	-	2017976	-
123568120	12,20	0,80	-	2952343	2952365	-	2017980	-
123568140	14,20	0,80	-	2952344	2952366	-	2022789	-
123568160	16,20	0,80	-	2952345	2952367	-	2022790	2021798

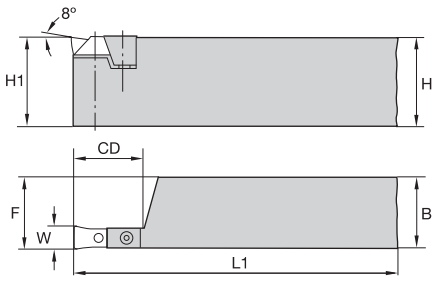
NOTE: W tolerance on all = ± 0,05mm.



LGN1

catalogue number	W	RR	TN6030	TN7525	TN7535	TN8025	THM	TTM
123568081	8,15	0,80	-	-	-	-	2022787	-
123568121	12,20	0,80	-	-	-	-	2017993	-
123568141	14,20	0,80	-	-	-	-	2017996	-
123568161	16,20	0,80	-	-	-	-	2022791	-

NOTE: W tolerance on all = ±0,05mm.



Right Hand Tool

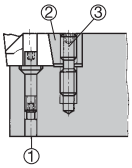


Grooving

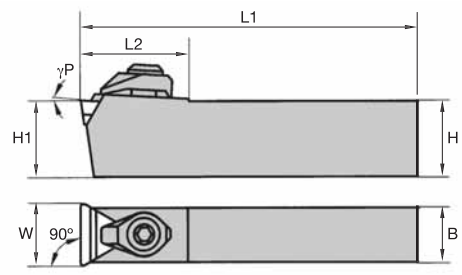
order number	catalogue number	seat size	W	CD	H	B	F	L1	H1
right hand									
2022446	**12250110100**	1	8,00	20,0	32	25,0	25,5	170	32
2008147	**12250110300**	1	10,00	20,0	32	25,0	25,5	170	32
2021719	**12250110500**	1	12,00	25,0	40	32,0	33,0	200	40
2021721	**12250110700**	1	14,00	28,0	40	32,0	33,0	200	40
2008521	**12250110900**	1	16,00	32,0	40	32,0	33,0	200	40
left hand									
2022447	**12250110200**	1	8,00	20,0	32	25,0	25,5	170	32
2008144	**12250110400**	1	10,00	20,0	32	25,0	25,5	170	32
2021718	**12250110600**	1	12,00	25,0	40	32,0	33,0	200	40
2021720	**12250110800**	–	14,00	28,0	40	32,0	33,0	200	40
2021722	**12250111000**	1	16,00	32,0	40	32,0	33,0	200	40

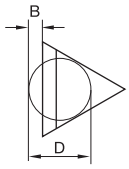
Spare Parts

catalogue number	clamping bolt	wedge clamp	clamping screw	wrench for clamp screw	wrench for clamp screw	wrench for clamping bolt
right hand						
12250110100	**12148060600**	**12148094300**	**12148574100**	**12148041000**	**–**	**12148046000**
12250110300	**12148060600**	**12148094400**	**12148574900**	**–**	**12148041100**	**12148046000**
12250110500	**12148060700**	**12148094500**	**12148574900**	**–**	**12148041100**	**12148040900**
12250110700	**12148060700**	**12148094600**	**12148574000**	**–**	**12148041200**	**12148040900**
12250110900	**12148060800**	**12148094700**	**12148574000**	**12148041000**	**12148041200**	**–**
left hand						
12250110200	**12148060600**	**12148094300**	**12148574100**	**12148041000**	**–**	**12148046000**
12250110400	**12148060600**	**12148094400**	**12148574900**	**–**	**12148041100**	**12148046000**
12250110600	**12148060700**	**12148094500**	**12148574900**	**–**	**12148041100**	**12148040900**
12250110800	**12148060700**	**12148094600**	**12148574000**	**–**	**12148041200**	**12148040900**
12250111000	**12148060800**	**12148094700**	**12148574000**	**12148041000**	**12148041200**	**–**



1. Clamping bolt
2. Wedge clamp
3. Clamping screw







Grooving

order number	W	H1	H	B	L1	L2	γP°	gage insert
2022921	10,40	20	20	9,5	125	21	3	TP..1103../TP..22..
2007414	15,30	20	20	13,0	150	27	3	TP..1603../TP..32..
2022922	15,30	25	25	13,0	150	27	3	TP..1603../TP..32..
2058066	20,20	25	25	18,0	150	35	3	TP..2204../TP..43..
2022923	20,20	32	32	18,0	180	35	3	TP..2204../TP..43..

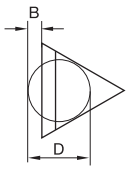
NOTE: Gage inserts listed are ISO-/ANSI-style inserts.
Holders are supplied without chipbreaker. For chipbreaker order numbers, see below.

For Grooving without Chipbreaker

catalogue number	clamp	clamp screw	clamp screw	shim	shim screw	shim screw	washer	wrench
12191061900	12148589200	12148589800	–	12148032586	–	12148021900	–	–
12191062086	12148586800	–	12148586000	12148031686	12148024100	–	12148024200	–
12191062586	12148586800	–	12148586000	12148031686	12148024100	–	12148024200	–
12191062686	12148586900	–	12148021100	12148032086	12148024500	–	12148024800	–
12191063286	12148586900	–	12148021100	12148032086	12148024500	–	12148024800	–

For Grooving with Chipbreaker (Order Additional Clamp and Chipbreaker)

inserts	clamp with chipbreaker	D	chipbreakers B – edge width 0,4mm	1,2mm	1,8mm	2,5mm	3,2mm	4,0mm
TP...1103...	12148589200	6,35	12148591011	12148588211	12148588311	12148588411	–	–
TP...1603...	12148589300	9,52	12148591111	12148586611	12148587011	12148587111	12148580011	435101
TP...2204...	12148586900	12,70	–	–	12148580411	12148580511PKG	12148580611	12148582511



Separator™ for Cut-Off

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

Separator



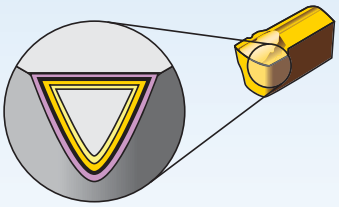
Features

- Insert widths 2–4mm.
- Toolholder shank sizes 10–31, 75mm.
- Cut-off up to 76mm bar capacity.

Benefits

- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.



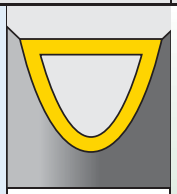
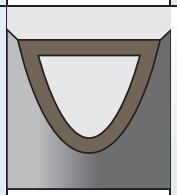
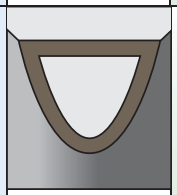
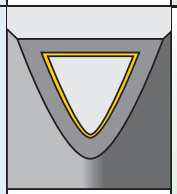
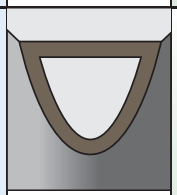


Coatings provide high-speed capability and are engineered for finishing to light roughing.

- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

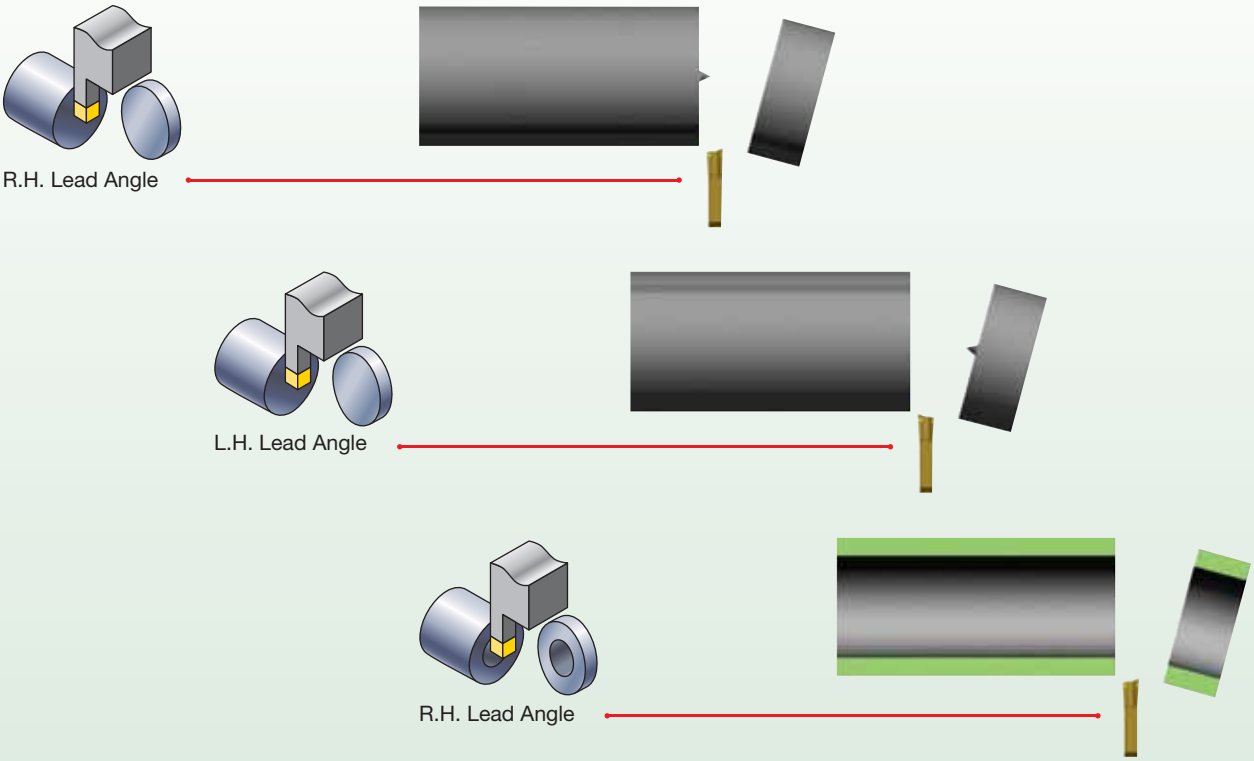
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
M40	 HC-P35	A premium, single-phase PVD TiN coating over a tough, specially formulated substrate that performs well under extremely low to moderate speed conditions found on screw machines. Ideal for carbon steels, alloy steels, most stainless steels, and many high-temperature alloys.	P						■	■	■	
			M							■	■	
			K							■	■	
			N						■	■	■	
			S							■	■	
M43	 HC-P25	PVD-TiAlN multilayer coating over a tough, shock-resistant, fine-grained carbide substrate with increased oxidation resistance. Recommended on low to medium cutting speeds when good toughness properties are required.	P				■	■	■	■		
			M					■	■	■		
			K					■	■	■		
			N					■	■	■		
			S					■	■	■		
M433B	 HC-M30	PVD-TiAlN single-layer coating over a superiorly tough, fine-grained carbide substrate. Outstanding temperature properties with excellent resistance to avoid built-up edges. Medium to high speeds and feeds. For stainless steels and high-temperature alloys.	P					■	■	■		
			M					■	■	■		
			N					■	■	■		
			S				■	■	■			
M45	 HC-P30	A premium PVD-TiCN coated, shock-resistant carbide designed for low to moderate speeds. Excellent resistance to welding and BUE, along with improved abrasion resistance make this an ideal grade for austenitic stainless steel, low carbon steel, and high-temperature alloys.	P					■	■	■	■	
			M						■	■	■	
			K						■	■	■	
			N						■	■	■	
			S						■	■	■	
M93	 HC-P20	PVD-TiAlN multilayer coating over a tough, fine-grained carbide substrate with increased resistance to heat. Recommended for medium to higher cutting speeds under moderate conditions.	P			■	■	■				
			M			■	■	■				
			K			■	■	■				
			N			■	■	■				
			S				■	■				

1 Choose the application to be performed:

Choose lead angle of insert for application.



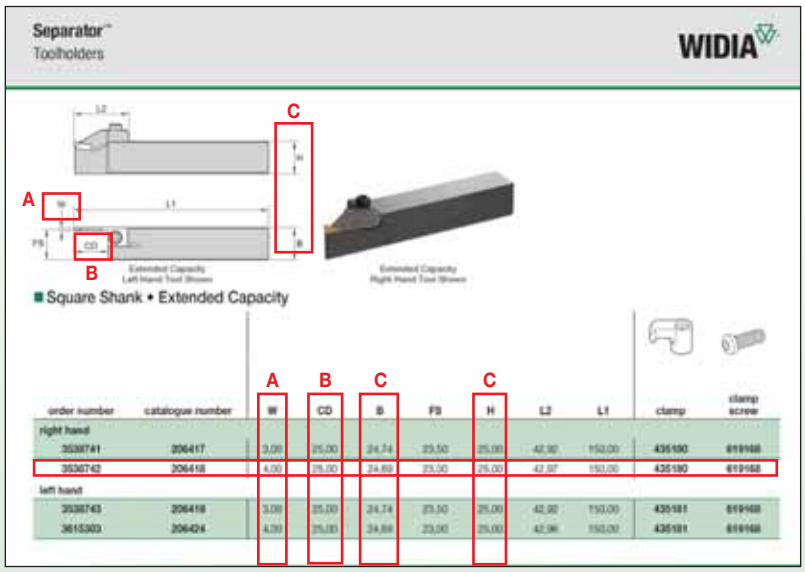
2 Identify the material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

3 Select your toolholder based on the application:

- **A** Choose the appropriate width of insert required for the application.
- **B** Choose the shortest cutting depth “CD” dimension for increased tool rigidity.
- **C** Select the largest toolholder shank “H” and “B” dimensions for maximum rigidity.



4 Select chipbreaker style for the application:

See the application guide on page E112
for a complete list of insert styles.

insert type	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
first choice	X²-Ultra (X² has wipers)	X²-Ultra	X²-Ultra	X²-Ultra	X²-Ultra	–
second choice	S²-Ultra	S²-Ultra	Classic	S²-Ultra	S²-Ultra	X²

5 Select grade:

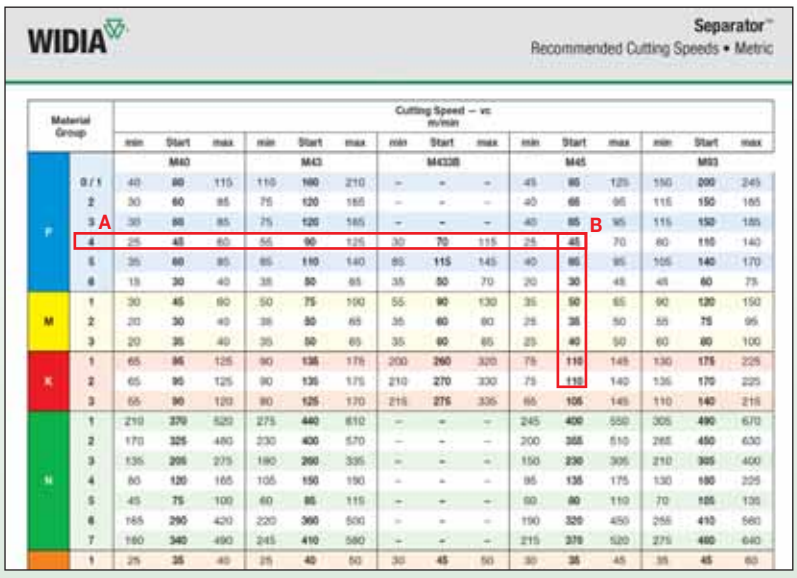
	Recommended Grades					
machining condition	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys	hardened materials
high performance for optimal conditions (clean cuts, good machine condition, higher speed capability)	M93	M433B	M93	M93	M433B	–
	–	M93	–	–	M93	–
general purpose (1st choice for general machining)	M43	M43	M43	M43	M43	M93
unfavourable conditions (interrupted cuts, low speeds, etc.)	M45	M45	M45	M45	M45	–
	M40	M40	M40	M40	M40	–

See page E109 for Grades and Grade Descriptions.

6 Determine cutting data:

A Based on material group and grade, identify starting speed (vc).
B First choice starting speed is in **bold**.

See page E113 for cutting data.



Separator • X^2 and X^2-Ultra



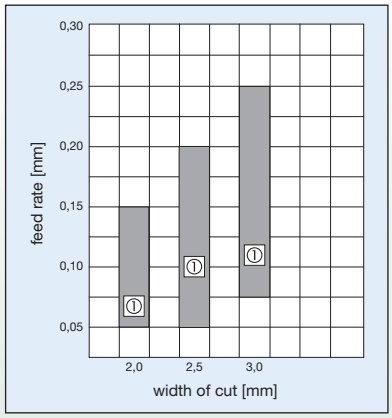
X^2

This insert has the same geometry as the WMT-SX™. Chip control geometry offers the widest range of speed and feed capabilities and provides excellent flatness and finish. This chipbreaker cuts with the least amount of tool pressure, extending tool life. The geometry also includes wipers and a corner radius. This geometry works well on a variety of materials.



X^2-Ultra

This insert has the same geometry as the WMT-SX-Ultra. The X^2-Ultra is an enhanced version of the X^2 and is ideal for stainless steels, nickel-based alloys, tool steel, INCONEL®, and titanium.



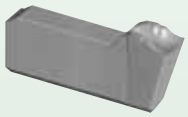
① Recommended Starting Feed

Separator • S^2 and S^2-Ultra



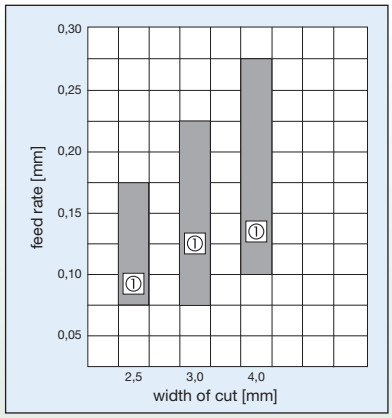
S^2

High positive rake with a more open chipbreaker enables increased speeds and feeds for moderate- to high-speed applications. The geometry includes wipers and a corner radius that provides superior flatness and finish. This insert is also available with sharp corners. Its greatest strengths can be seen on stainless steels and soft gummy steels.



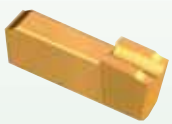
S^2-Ultra

The S^2-Ultra is an enhanced version of the S^2 and is ideal for 300 series stainless steels, nickel-based alloys, tool steel, INCONEL, and titanium at moderate to high speeds and feeds.



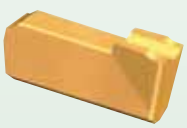
① Recommended Starting Feed

Separator • Classic and F^2



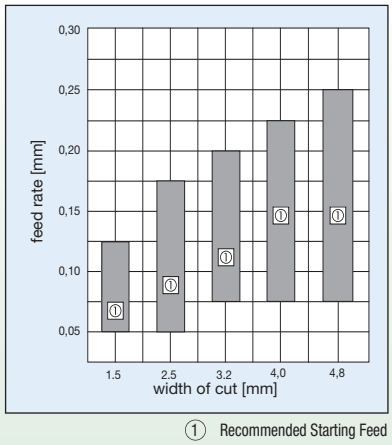
Classic

A good general-purpose insert for carbon steels, alloy steels, and most stainless steels. The Separator Classic chipbreaker is designed to perform well at moderate to slow speeds and feeds. The Classic provides standard high lead angles and sharp corners, making it the first choice when choosing an insert for nib-free cut-off.



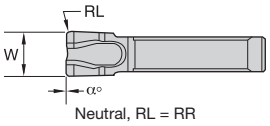
F^2

This insert provides superior flatness and finish on a wide variety of materials Ideal for thick wall parts or cutting off larger diameter parts to centre. The Separator F^2 performs well at slow to moderate speeds and feeds.

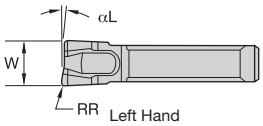


① Recommended Starting Feed

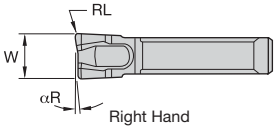
Material Group		Cutting Speed — vc m/min														
		M40			M43			M433B			M45			M93		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	0/1	40	**80**	115	110	**160**	210	–	**–**	–	45	**85**	125	150	**200**	245
	2	30	**60**	85	75	**120**	165	–	**–**	–	40	**65**	95	115	**150**	185
	3	30	**60**	85	75	**120**	165	–	**–**	–	40	**65**	95	115	**150**	185
	4	25	**45**	60	55	**90**	125	30	**70**	115	25	**45**	70	80	**110**	140
	5	35	**60**	85	85	**110**	140	85	**115**	145	40	**65**	95	105	**140**	170
	6	15	**30**	40	35	**50**	65	35	**50**	70	20	**30**	45	45	**60**	75
M	1	30	**45**	60	50	**75**	100	55	**90**	130	35	**50**	65	90	**120**	150
	2	20	**30**	40	35	**50**	65	35	**60**	80	25	**35**	50	55	**75**	95
	3	20	**35**	40	35	**50**	65	35	**60**	85	25	**40**	50	60	**80**	100
K	1	65	**95**	125	90	**135**	175	200	**260**	320	75	**110**	145	130	**175**	225
	2	65	**95**	125	90	**135**	175	210	**270**	330	75	**110**	140	135	**170**	225
	3	55	**90**	120	80	**125**	170	215	**275**	335	65	**105**	145	110	**140**	215
N	1	210	**370**	520	275	**440**	610	–	**–**	–	245	**400**	550	305	**490**	670
	2	170	**325**	480	230	**400**	570	–	**–**	–	200	**355**	510	265	**450**	630
	3	135	**205**	275	180	**260**	335	–	**–**	–	150	**230**	305	210	**305**	400
	4	80	**120**	165	105	**150**	190	–	**–**	–	95	**135**	175	130	**180**	225
	5	45	**75**	100	60	**85**	115	–	**–**	–	50	**80**	110	70	**105**	135
	6	165	**290**	420	220	**360**	500	–	**–**	–	190	**320**	450	255	**410**	560
	7	180	**340**	490	245	**410**	580	–	**–**	–	215	**370**	520	275	**460**	640
S	1	25	**35**	40	25	**40**	50	30	**45**	50	30	**35**	45	35	**45**	60
	2	10	**15**	20	15	**20**	25	15	**20**	25	10	**15**	20	20	**25**	30
	3	35	**45**	60	35	**50**	65	40	**55**	70	35	**50**	65	55	**65**	80
	4	15	**25**	30	25	**30**	35	25	**30**	40	20	**25**	35	30	**35**	45
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–



Neutral, RL = RR



Left Hand



Right Hand

● first choice
○ alternate choice

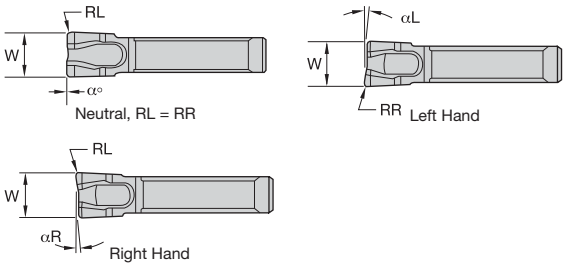
		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

X²

catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507305	2	2,39	0,14	N - Neutral	●	●	●	3540872	3540873
507308	3	3,20	0,17	N - Neutral	●	3540878	●	3540879	3540880

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507307	2	2,39	0,14	5	L - Left	●	●	●	3540876	3540877
507310	3	3,20	0,17	5	L - Left	●	●	●	3540884	3540885

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507306	2	2,39	0,14	5	R - Right	●	●	●	3540874	3540875
507309	3	3,20	0,17	5	R - Right	●	●	●	3540882	3540883



● first choice
○ alternate choice

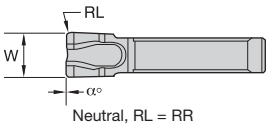
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

X² Ultra

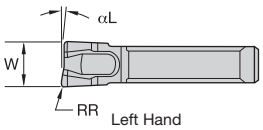
catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507354	2	2,39	0,15	N - Neutral	■	■	3540926	■	■
507357	3	3,20	0,15	N - Neutral	■	■	3540929	■	■

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507356	2	2,39	0,13	5	L - Left	■	■	3540928	■	■
507359	3	3,20	0,15	5	L - Left	■	■	3540931	■	■

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507355	2	2,39	0,13	5	R - Right	■	■	3540927	■	■
507358	3	3,20	0,15	5	R - Right	■	■	3540930	■	■



Neutral, RL = RR



Left Hand

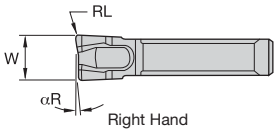
● first choice
○ alternate choice

P	●	●	●	●	●	
M	●	●	●	●	●	
K	○					
N		●	●			
S	○	●	●	●	○	
H					○	

■ S²

catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507275	2	2,39	0,20	N - Neutral	3540807	3540803	-	3540805	3540806
507295	3	3,00	0,25	N - Neutral	-	3540857	-	3540858	3540859
507278	3	3,20	0,25	N - Neutral	3540822	3540818	-	3540820	3540821
507378	4	4,00	0,25	N - Neutral	-	3540951	-	3540952	3540953
507281	5	4,78	0,25	N - Neutral	-	3540833	-	3540835	3540836

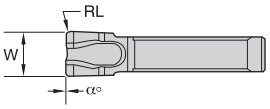
catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507277	2	2,39	0,20	5	L - Left	-	-	-	3540815	3540816
507297	3	3,00	0,20	5	L - Left	-	3540863	-	-	3540865
507280	3	3,20	0,20	5	L - Left	-	-	-	3540830	-
507283	5	4,78	0,20	5	L - Left	-	-	-	-	3540846



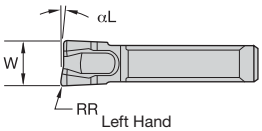
● first choice
○ alternate choice

P		●	●	●	●	●					
M		●	●	●	●	●					
K		○									
N			●	●							
S		○	●	●	●	○					
H						○					

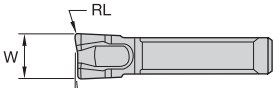
catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507276	2	2,39	0,20	5	R - Right	3540812	3540808	-	3540810	3540811
507301	2	2,39	–	5	R - Right	-	-	-	3540870	-
507296	3	3,00	0,20	5	R - Right	-	3540860	-	3540861	3540862
507279	3	3,20	0,20	5	R - Right	3540827	3540823	-	3540825	3540826
507298	3	3,20	–	5	R - Right	-	3540866	-	3540867	3540868
507379	4	4,00	0,25	5	R - Right	-	3540954	-	3540955	-
507282	5	4,78	0,20	5	R - Right	-	3540838	-	3540840	3540841



Neutral, RL = RR



Left Hand



Right Hand

● first choice
○ alternate choice

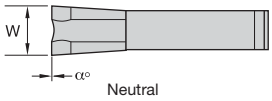
		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

S² Ultra

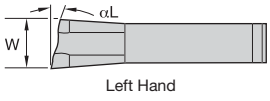
catalogue number	insert size	W	RR	hand	M40	M43	M433B	M45	M93
507329	2	2,39	0,15	N - Neutral	▮	▮	3540907	▮	▮
507332	3	3,18	0,15	N - Neutral	▮	▮	3540910	▮	▮

catalogue number	insert size	W	RR	αL	hand	M40	M43	M433B	M45	M93
507331	2	2,39	0,15	5	L - Left	▮	▮	3540909	▮	▮
507334	3	3,18	0,15	5	L - Left	▮	▮	3540912	▮	▮

catalogue number	insert size	W	RL	αR	hand	M40	M43	M433B	M45	M93
507330	2	2,39	0,15	5	R - Right	▮	▮	3540908	▮	▮
507333	3	3,18	0,15	5	R - Right	▮	▮	3540911	▮	▮



Neutral



Left Hand

● first choice
○ alternate choice

P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

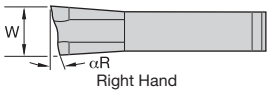
Classic

catalogue number	insert size	W	hand	M40	M43	M433B	M45	M93
507196	2	1,60	N - Neutral	3540664	ı	ı	3540663	ı
507140	2	2,39	N - Neutral	3540530	ı	ı	3540528	3540529
507117	3	3,20	N - Neutral	3540461	ı	ı	3540459	3540460
507116	5	4,78	N - Neutral	3540449	ı	ı	3540447	ı

catalogue number	insert size	W	αL	hand	M40	M43	M433B	M45	M93
507152	2	2,36	12	L - Left	3540594	ı	ı	ı	ı
507144	2	2,39	4	L - Left	3540554	ı	ı	3540553	ı
507154	3	3,15	12	L - Left	3540598	ı	ı	3540597	ı
507129	3	3,20	4	L - Left	3540510	ı	ı	3540509	ı
507125	5	4,78	4	L - Left	3540487	ı	ı	ı	ı

(continued)

(Classic — continued)

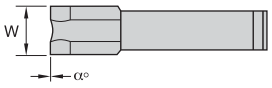


● first choice
○ alternate choice

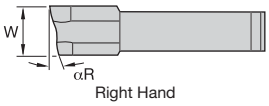
		M40	M43	M433B	M45	M93
P		●	●	●	●	●
M		●	●	●	●	●
K		○				
N			●	●		
S		○	●	●	●	○
H						○

catalogue number	insert size	W	αR	hand	M40	M43	M433B	M45	M93
507197	2	1,60	4	R - Right	3540666	-	-	-	-
507214	2	1,60	12	R - Right	3540692	-	-	3540691	-
507207	2	2,31	4	R - Right	-	-	-	3540685	-
507151	2	2,36	12	R - Right	3540589	3540585	-	3540587	-
507143	2	2,39	4	R - Right	3540544	-	-	3540542	3540543
507161	2	2,39	18	R - Right	3540613	-	-	3540612	-
507171	3	3,12	6	R - Right	3540628	-	-	-	-
507146	3	3,15	12	R - Right	3540562	-	-	3540560	-
507155	3	3,15	18	R - Right	3540603	-	-	3540602	-
507128	3	3,20	4	R - Right	3540498	-	-	3540496	3540497
507224	3	3,20	4	R - Right	3540700	-	-	3540698	-
507176	5	4,72	12	R - Right	3540634	-	-	3540633	-
507124	5	4,78	4	R - Right	3540479	-	-	3540477	3540478

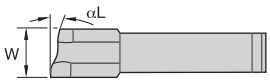
NOTE: 507207 and 507224 have a modified aggressive chip control design.



Neutral



Right Hand



Left Hand

● first choice
○ alternate choice

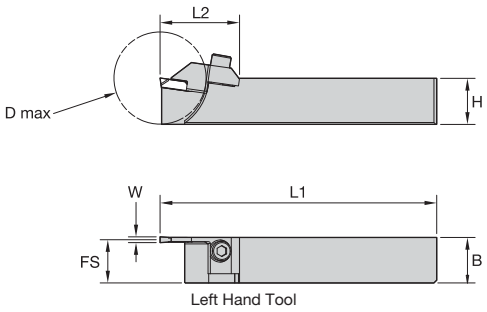
P	●	●	●	●	●	
M	●	●	●	●	●	
K	○					
N		●	●			
S	○	●	●	●	○	
H					○	

F²

catalogue number	insert size	W	hand	M40	M43	M433B	M45	M93
507240	2	2,39	N - Neutral	3540744	'	'	3540743	'
507244	3	3,20	N - Neutral	3540756	'	'	3540755	'

catalogue number	insert size	W	αL	hand	M40	M43	M433B	M45	M93
507255	2	2,39	12	L - Left	3540781	'	'	'	'
507257	3	3,18	4	L - Left	'	'	'	3540784	'

catalogue number	insert size	W	αR	hand	M40	M43	M433B	M45	M93
507241	2	2,39	4	R - Right	3540747	'	'	3540746	'
507242	2	2,39	12	R - Right	3540750	'	'	3540749	'
507243	2	2,39	18	R - Right	3540753	'	'	3540752	'
507245	3	3,18	4	R - Right	3540759	'	'	3540758	'
507246	3	3,18	12	R - Right	3540762	'	'	3540761	'
507247	3	3,18	18	R - Right	3540764	'	'	3540763	'
507252	5	4,75	4	R - Right	3540774	'	'	3540773	'
507253	5	4,78	12	R - Right	3540777	'	'	3540776	'



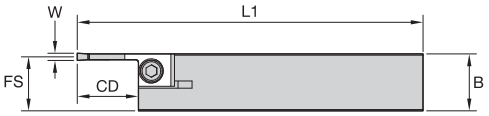


Square Shank

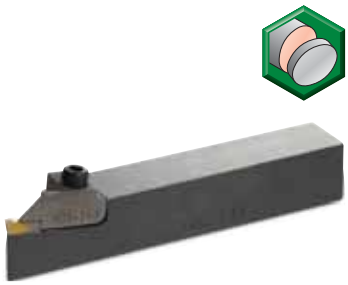
order number	catalogue number	W	D max	B	FS	H	L2	L1	clamp	clamp screw
right hand										
3614290	**206445**	2,00	20,00	9,86	9,00	10,00	21,55	75,00	**435200**	**MS318**
3538751	**206446**	2,00	20,00	11,86	11,00	12,00	21,55	90,00	**435200**	**MS318**
3538752	**206447**	2,00	26,00	9,86	9,00	10,00	24,83	150,00	**435201**	**MS318**
3587590	**206448**	2,00	26,00	11,86	11,00	12,00	24,83	150,00	**435201**	**MS318**
3615308	**206449**	2,00	38,00	15,86	15,00	16,00	32,83	100,00	**435202**	**MS412**
3538753	**206450**	2,00	38,00	19,86	19,00	20,00	32,84	125,00	**435202**	**MS412**
3538706	**206265**	2,50	20,00	11,74	10,81	12,00	21,51	89,95	**435170**	**MS318**
3538718	**206279**	2,50	26,00	9,75	8,81	10,00	24,80	150,00	**435152**	**MS318**
3538719	**206280**	2,50	26,00	11,73	10,80	12,00	24,80	150,00	**435152**	**MS318**
3538721	**206282**	2,50	38,00	15,75	14,81	16,00	32,80	100,00	**435140**	**MS412**
3538723	**206284**	2,50	38,00	19,74	18,80	20,00	32,80	125,00	**435140**	**MS412**
3538720	**206281**	3,00	26,00	11,68	10,39	12,00	23,62	150,00	**435130**	**MS318**
3538722	**206283**	3,00	38,00	15,70	14,40	16,00	32,85	100,00	**435126**	**MS412**
3565364	**206285**	3,00	38,00	19,68	18,39	20,00	32,85	125,00	**435126**	**MS412**
left hand										
3614291	**206451**	2,00	20,00	9,86	9,00	10,00	21,55	75,00	**435203**	**MS318**
3538754	**206452**	2,00	20,00	11,86	11,00	12,00	21,55	90,00	**435203**	**MS318**
3614292	**206453**	2,00	26,00	9,86	9,00	10,00	24,83	150,00	**435204**	**MS318**
3538755	**206454**	2,00	26,00	11,00	11,00	12,00	24,83	150,00	**435204**	**MS318**
3538756	**206455**	2,00	38,00	15,86	15,00	16,00	32,83	100,00	**435205**	**MS412**
3615309	**206456**	2,01	38,00	19,86	19,00	20,00	32,84	125,00	**435205**	**MS412**
3538705	**206264**	2,50	20,00	9,75	8,80	10,00	21,51	74,96	**435171**	**MS318**
3538707	**206266**	2,50	20,00	11,74	10,81	12,00	21,51	89,95	**435171**	**MS318**
3538711	**206272**	2,50	26,00	9,75	8,81	10,00	24,80	150,00	**435153**	**MS318**
3538712	**206273**	2,50	26,00	11,73	10,80	12,00	24,80	150,00	**435153**	**MS318**
3538714	**206275**	2,50	38,00	15,75	14,81	16,00	32,80	100,00	**435141**	**MS412**
3538716	**206277**	2,50	38,00	19,74	18,80	20,00	32,80	125,00	**435141**	**MS412**
3538713	**206274**	3,00	26,00	11,68	10,39	12,00	23,62	150,00	**435131**	**MS318**
3538715	**206276**	3,00	38,00	15,70	14,40	16,00	32,85	100,00	**435127**	**MS412**
3538717	**206278**	3,00	38,00	19,68	18,39	20,00	32,85	125,00	**435127**	**MS412**

NOTE: Above toolholders are supplied with clamp and clamp screw.





Extended Capacity
Left Hand Tool Shown

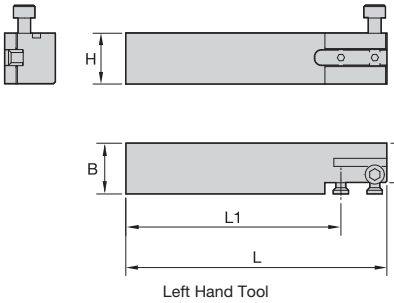


Extended Capacity
Right Hand Tool Shown

■ Square Shank • Extended Capacity

order number	catalogue number	W	CD	B	FS	H	L2	L1	clamp	clamp screw
right hand										
3538741	**206417**	3,00	25,00	24,74	23,50	25,00	42,92	150,00	**435180**	**619168**
3538742	**206418**	4,00	25,00	24,69	23,00	25,00	42,97	150,00	**435180**	**619168**
left hand										
3538743	**206419**	3,00	25,00	24,74	23,50	25,00	42,92	150,00	**435181**	**619168**
3615303	**206424**	4,00	25,00	24,69	23,00	25,00	42,96	150,00	**435181**	**619168**

NOTE: Above toolholders are supplied with clamp and clamp screw.



Left Hand Tool

Left Hand Tool



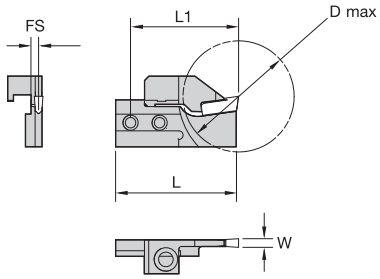
Right Hand Tool

12mm and 20mm Shank Toolholders

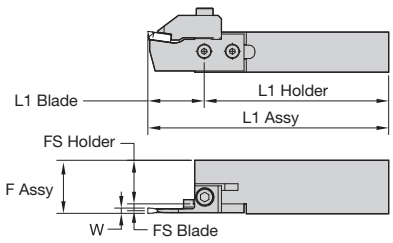



order number	catalogue number	H	B	B2	L	L1	H2	F	support blade screw	clamp screw
right hand										
3538772	**206518**	12,00	11,53	24,99	102,77	84,68	19,05	20,55	**606247**	**MS1495**
3614344	**206522**	20,00	20,00	—	102,77	84,68	—	15,55	**606247**	**MS1495**
left hand										
3538773	**206519**	12,00	11,53	24,99	102,77	84,68	19,05	20,55	**606247**	**MS1495**
3538774	**206523**	20,00	20,00	—	102,77	84,68	—	15,55	**606247**	**MS1495**

Support Blade Assembly



Right Hand Tool



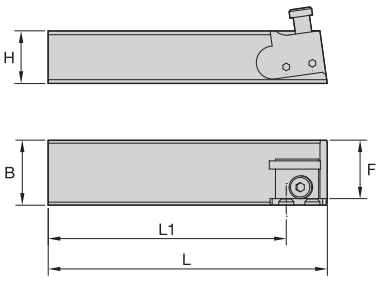
L1 Assy = L1 (Holder) + L1 (Blade)
F Assy = F (Holder) + FS (Blade) + W/2

12mm and 20mm Shank Blades

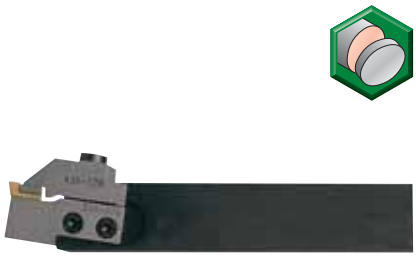


order number	catalogue number	W	D max	FS	L	L1	clamp
right hand							
3539515	**333101**	2,50	41,28	3,25	44,88	40,13	**435154**
3539516	**333102**	3,00	41,28	2,84	44,88	40,13	**435155**
3539522	**333111**	2,00	41,28	3,40	44,88	40,13	**435194**
left hand							
3539517	**333103**	2,50	41,28	3,25	44,88	40,13	**435156**
3539518	**333104**	3,00	41,28	2,84	44,88	40,13	**435157**

NOTE: Clamps do not ship with blades. Order clamps separately.



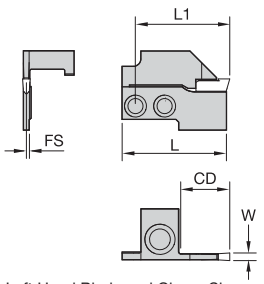
Left Hand Tool


Right Hand Tool

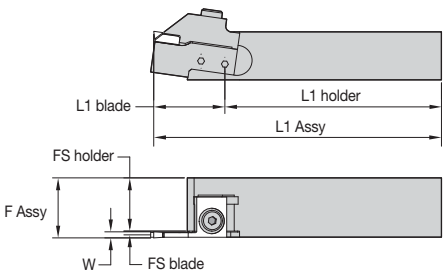
25mm and 32mm Shank Toolholders

order number	catalogue number	H	B	L	L1	F	support blade screw	clamp screw	clamp screw
right hand									
3538772	**206518**	12,00	11,53	102,77	84,68	20,55	**606247**	**–**	**MS1495**
3614344	**206522**	20,00	20,00	102,77	84,68	15,55	**606247**	**–**	**MS1495**
3538710	**206271**	25,00	24,61	131,90	112,16	21,41	**MS1073**	**MS1071**	**–**
left hand									
3538773	**206519**	12,00	11,53	102,77	84,68	20,55	**606247**	**–**	**MS1495**
3538774	**206523**	20,00	20,00	102,77	84,68	15,55	**606247**	**–**	**MS1495**
3615305	**206440**	32,00	31,60	132,03	112,18	28,42	**MS1073**	**MS1071**	**–**

Support Blade Assembly



Left Hand Blade and Clamp Shown

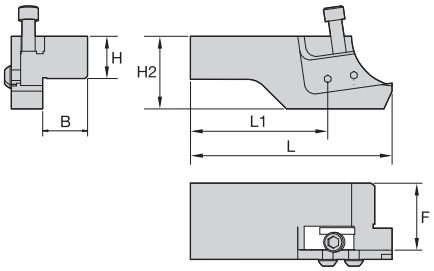


L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

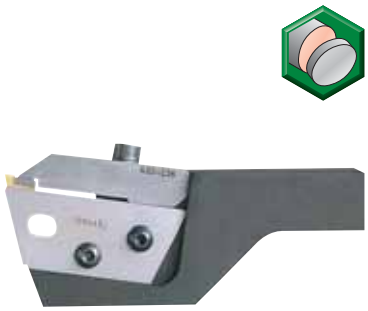
25mm and 32mm Shank Blades

order number	catalogue number	W	CD	FS	L	L1	clamp
right hand							
3563591	**331117**	2,50	12,70	2,39	36,03	29,60	**435142**
3539504	**331101**	3,00	20,64	1,98	43,80	37,63	**435128**
3539508	**331109**	4,00	20,64	1,98	43,80	37,63	**435128**
left hand							
3539510	**331118**	2,50	12,70	2,39	36,03	29,60	**435143**
3539505	**331102**	3,00	20,64	1,98	43,80	37,63	**435129**
3539509	**331110**	4,00	20,64	1,98	43,80	37,63	**435129**

NOTE: Clamps do not ship with blades. Order clamps separately.



Left Hand Tool


Right Hand Tool

Universal Style Toolholder • 56mm Bar Capacity

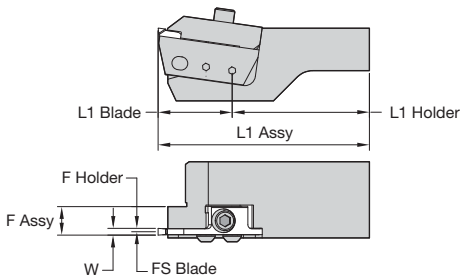
order number	catalogue number	B	H	H2	F	L1	L	clamp screw
right hand								
3614289	**206408**	26,97	25,00	43,66	40,16	105,46	144,14	**MS1294**

NOTE: Support blade requires two screws.
Order blades separately.

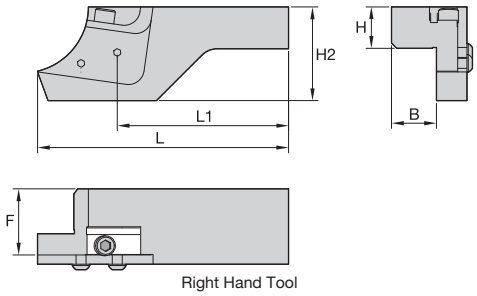
Components

W	L1	FS	left hand clamp for 206410	left hand clamp for 206442	support blade	right hand clamp for 206441	right hand clamp for 206408
2.5	44,50	0,91	**435149**	**435151**	**310109**	**435150**	**435148**
3.0	44,50	1,27	**435104**	**435110**	**310102**	**435116**	**435101**
4.0	44,50	1,84	**435105**	**435109**	**310108**	**435117**	**435102**

NOTE: All components ship separately.



L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2



Right Hand Tool



Universal Style Toolholder • 76mm Bar Capacity

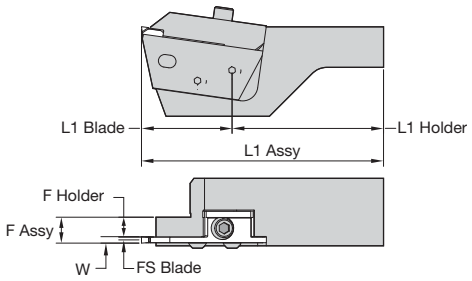
order number	catalogue number	B	H	H2	F	L1	L	support blade screw	clamp screw
right hand									
3538739	**206411**	27,00	25,00	56,36	39,78	102,96	150,85	**MS1072**	**MS352**
3615306	**206443**	27,00	32,00	56,36	39,78	102,96	150,85	**MS1072**	**MS1294**

NOTE: Support blade requires two screws.
Order blades separately.

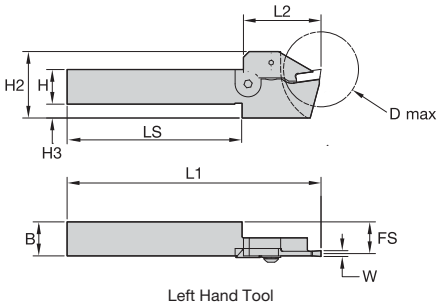
Components

W	L1	FS	left hand clamp	support blade	right hand clamp
3.0	57,05	1,27	**435137**	**309111**	**435136**
4.0	57,05	1,84	**435106**	**309105**	**435103**

NOTE: All components ship separately.



L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2



Left Hand Tool

Sub-Spindle

order number	catalogue number	W	D max	B	FS	H	H2	H3	L1	LS	L2	button-head cap screw	clamp	flat-head cap screw	washer
right hand															
3538766	**206506**	3,00	66,70	24,76	23,50	25,00	44,45	9,52	150,00	89,05	60,31	**MS518**	**409182**	**606243**	**613139**
left hand															
3538769	**206509**	2,50	42,00	19,75	18,80	20,00	37,65	7,62	140,00	96,57	42,66	**MS518**	**409185**	**606244**	**613139**
3538767	**206507**	3,00	66,70	24,76	23,50	25,00	44,45	9,52	150,00	89,05	60,32	**MS518**	**409183**	**606243**	**613139**

WIDIA™ Victory™ High-Temp Turning



The new -FS and -MS geometries from WIDIA are specifically designed for use in high-temperature alloys, nickel-based (INCONEL®, Udimet®, Rene) materials, cobalt-based (Haynes®), Fe-based (Airmet 100) materials, titanium and titanium alloys, as well as difficult-to-machine stainless (460SS, duplex, high-alloy stainless), cobalt-chrome, and stainless-based powdered metals.

..GG-FS Geometry

- All ..GG-FS inserts are periphery ground to provide a G tolerance. This is a critical in some applications, especially in the aerospace industry.
- Precision grinding provides a high quality cutting edge which reduces depth-of-cut notching and delivers consistent surface quality in finishing applications.
- Be more productive by utilising the higher speed capability provided by the latest in PVD coating technology and optimised post-coat treatment.
- Achieve better tool life through the high positive rake angle which reduces cutting forces and built-up edge.

..MG-MS Geometry

- High positive rake angle delivers improved tool life by reducing cutting forces and built-up edge when machining high-temp alloys.
- Improved chip control and reduced crater wear due to proprietary chipbreakers with varying shapes and distances.
- Reduced thermal wear and cracking due to near sharp cutting edge with optimised edge treatment.
- Improved chipbreaking at various depths of cut due to variable land width, which improves impact strength.
- All MG-MS inserts are moulded, which supports increased tool life due to the elimination of grinding stress.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™ VICTORY

Definitions and Guidelines

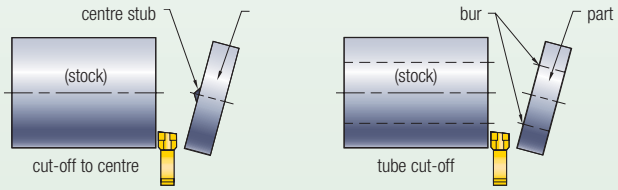
1. Width of cut (W) = width of the insert.
2. Lead angle = 0° (neutral); 4°, 5°, 12°, 18° (RH or LH).

Reduce bur of cut-off faces:

- Use lead angle-type inserts (Figures 1 and 2). Lead angle on a cut-off insert reduces the bur that remains on the part but decreases tool life and increases tool side deflection and possibly cycle time.

Figure 1

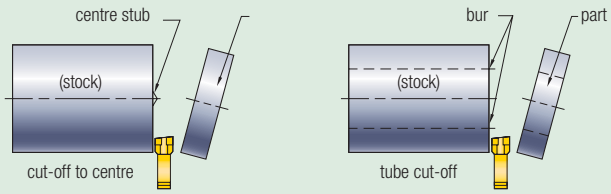
Insert selection **left-hand lead**



Left-hand lead insert leaves centre stub or bur on part and produces clean stock surface.

Figure 2

Insert selection **right-hand lead**

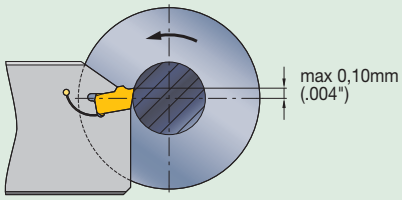


Right-hand lead insert leaves centre stub or bur on stock and produces clean part surface.

- Check total height and maintain on centre with part diameter.
- The cutting edge height should be within ±.0,1mm to the centre; recommended cutting position is 0,05mm above centre.

Figure 3

Above centre



- If 0° lead angle is mandatory, use the narrowest possible cut-off insert and blade. This will minimise the centre stub or cut-off bur length. Decrease the feed rate to maximum 0,05mm or less at the point where diameter equals insert width.
- On tubing-type parts that require a chamfer on the I.D., align I.D. chamfer tool with cut-off surface. This will enable the chamfering operation to actually separate the part from the bar (see Figure 4). Note the part may drop onto the chamfering bar, which, in this case, will act like a catcher for the part.

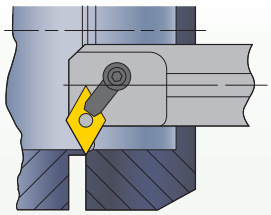


Figure 4

Internal chamfer line up

Improve surface finish of cut-off faces:

- Use insert with 0° lead angle.
- Increase coolant flow or improve application technique, as shown in Figure 5.
- Decrease the feed rate near the break-through point of the cut.
- Check that the grooving tool is set at the correct angle.
- Use blades with the greatest possible face height and smallest possible cutting width.
- Increase the speed.

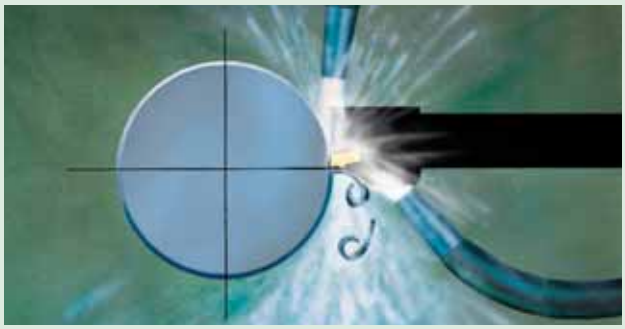


Figure 5

Preferred method for applying coolant

- Mount cut-off tool upside down. This enables gravity to remove chips and avoid cutting the chips twice. Another benefit of mounting the tool upside down is preventing chips from wedging between the tool insert and the groove side walls, which galls the side wall surfaces.

Improve chip control:

- Adjust feed rate up or down to accommodate chip formation.
- Use a 0° or smallest lead available.
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain sharp cutting edge and corners.

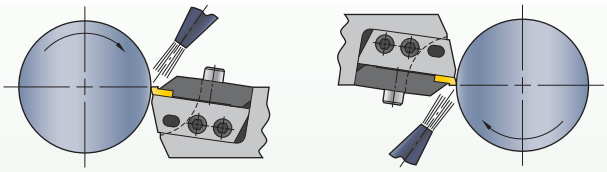
Improve flatness of cut-off surfaces:

- Maintain 90° position (perpendicular alignment) between cut-off tool and workpiece.
- For low to moderate speed (sfpm), use Separator F^2.
- For moderate to high speed (sfpm), use Separator S^2 or X^2.
- Use strongest toolholder system possible.
- Use 0° lead angle inserts when possible. If lead angle inserts are needed, reduce the feed rate.
- Check for minimum overhang of holder and blade.
- Set up for minimum workpiece overhang (distance out of chuck).
- Reduce feed rate.
- Maintain sharp edge and corners on cut-off insert.
- Increase speed (RPM).
- Use ample amounts of well-directed coolant (see Figure A).
- Maintain proper tool centre height 0–0,1mm above centre (see Figure B).

Improve surface finish:

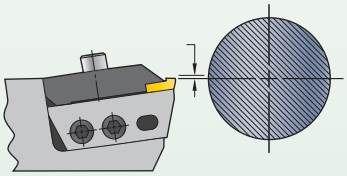
- For low to moderate speed (sfpm), use Separator F^2.
- For moderate to high speed (sfpm), use Separator S^2 or X^2.
- Avoid overly aggressive chip control.
- Increase speed.
- Reduce lead angle and feed rate.
- Determine if corner radius is too large or small.
- Use a coated grade.
- Use coolant (see Figure A).

Figure A



Coolant on cut-off tool | Preferred method of applying coolant

Figure B



Minimise edge chipping:

- Check to see if tool is significantly above or below centre.
- Reduce feed prior to part drop-off.
- Use Separator S^2 or X^2.
- Choose the proper speed associated with the insert grade used.
- Call Technical Support to see if a larger hone size is needed.
- Eliminate chatter.
- Avoid chip re-cutting.
- Check for these part and machine problems:
  - Slide is loose.
  - Slide travel is irregular.
  - Bar/tube I.D. and/or O.D. is out of round.
  - Bar/tube is bent.
  - Thin wall collapses (deforms) in the cut.
  - Part is unstable.
  - Cut-off through unturned stock.
  - Excessive tool overhang.
  - Bent or partly attached flash ring.

(continued)

(continued)

Eliminate chatter:

- Minimise tool blade and holder overhang.
- Minimise part overhang.
- Use strongest toolholder system.
- Use a more narrow width of insert.
- Chipbreaker might be too aggressive. (Call Technical Support.)
- Adjust speed and feed rate up or down.
- Hold workpiece rigidly.
- With a longer part, support with steady rest or live centre.
- Avoid machine dwell.
- Use S^2 or X^2 to reduce cutting forces.

Reduce cut-off nib on solid bar or I.D. bur on tubing:

- Check tool height. Insert cutting edge should be on centre to 0,05mm above centreline of workpiece.
- To reduce nib on part, use a high lead angle-type insert. Lead angle on a cut-off insert reduces the nib, which remains on the workpiece. CAUTION: the higher the lead, the more tool-side deflection.
- Use the narrowest possible cut-off insert to minimise the cut-off bur length.
- Reduce feed rate at the end of a cut.
- On most tubing-type parts, a 4° or 5° lead angle will be sufficient.
- Add support to a long slender-type part.
- Maintain proper sub-spindle alignment.
- If nib or bur persists, call Technical Support about reducing hone size.
- Use small- or no-corner radius.

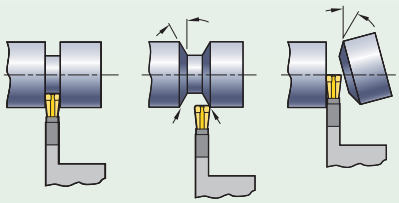
Eliminate built-up edge:

- Select proper grade for insert.
- Increase speed (RPM).
- Increase the feed rate.
- Use ample amounts of well-directed coolant (see Figure A on page E131).

Chamfer and cut-off operations:

- Use Separator S^2 or X^2.
- Groove or breakdown workpiece surface being machined.
- Machine the chamfer.
- For jobs requiring a chamfer on both ends of the part, begin by plunging to a depth just beyond the depth of the chamfers. Then, return to the part O.D. and profile each chamfer individually. Finish the cut-off after completion of the second chamfer.
- Cut off the workpiece (see Figure C).

Figure C



Modifications for Increased Depth of Cut

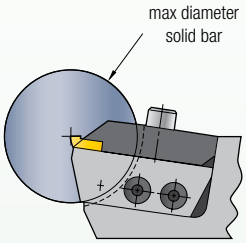


Figure 1
Standard bar capacity shown

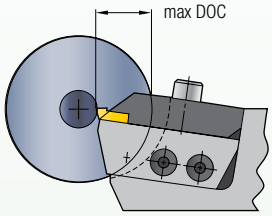


Figure 2
Larger bar diameter shown

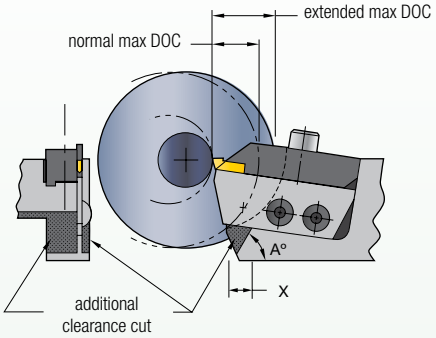


Figure 3
Modified toolholder with larger bar diameter shown

Capacity Chart for 57,15mm Diameter Bar Capacity Tooling								
bar diameter	63,50	76,20	88,90	101,60	114,30	127,00	152,40	**NOTE**
max DOC	23,88	19,05	15,75	14,22	12,70	11,94	11,18	**with no modification on toolholder**
	28,45	26,16	24,64	24,64	22,10	21,34	19,81	**with no modification on toolholder X = 10,16mm A = 1270mm**

Capacity Chart for 76,2mm Diameter Bar Capacity Tooling						
bar diameter	88,90	101,60	114,30	127,00	152,40	**NOTE**
max DOC	28,45	25,40	22,35	19,81	17,53	**with no modification on toolholder**
	36,58	34,80	33,27	31,75	28,45	**with no modification on toolholder X = 10,16mm A = 1270mm**



Turning • Threading

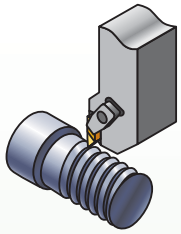
Threading Application Guide F2–F3

TopThread F4–F37

Laydown Threading F38–F78

Technical Information F79–F101

TopThread External Threading

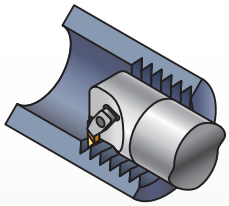


Square Shank Toolholder Sizes:
• Metric — 10–32mm

Cresting (Full Profile):
UN TPI of 32–7
ISO 1,5–3,0mm pitch

60° Partial Profile — Flat Top (NTF and NTK):
UN 44–4.5 TPI
ISO 0,6–5,5mm pitch

TopThread Internal Threading

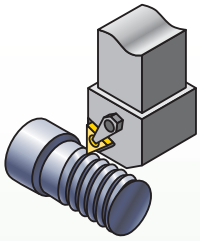


Boring Bar Diameters:
• Metric — 10–50mm
• Minimum bore —11,5mm
• Steel

Cresting (Full Profile):
UN 16–8 TPI
ISO 1,5–3,0mm pitch

60° Partial Profile — Flat Top (NT-1L, NTF, and NTK):
UN 24–4.5 TPI
ISO 1,0–5,5mm pitch

Laydown External Threading

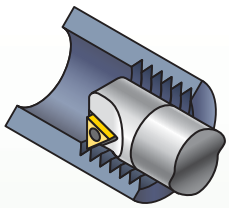


Square Shank Toolholder Sizes:
- Metric — 8–40mm

Cresting (Full Profile):
UN 48–8 TPI
ISO 0,5–5,0mm pitch

60° Partial Profile:
UN 48–4 TPI
ISO 0,5–6,0mm pitch

Laydown Internal Threading



Boring Bar Diameters:
- Metric — 12–50mm
- Minimum bore — (13mm)
- Steel and carbide

Cresting (Full Profile) and Partial Profile:
UN 48–8 TPI
ISO 0,5–5,0mm pitch

60° Partial Profile:
UN 48–4 TPI
ISO 0,5–6,0mm pitch

55° Partial Profile:
UN 48–5 TPI
ISO 0,5–5,0mm pitch

TopThread



High heat and high edge line load concentrated to a small nose radius, combined with high feed rates, places high demands on carbide threading inserts. The WIDIA TopThread system is the best solution for these problems.

The WIDIA TopThread system is the superior choice for high-demand applications like machining Acme, Buttress, and API threads.

TopThread Insert Technology

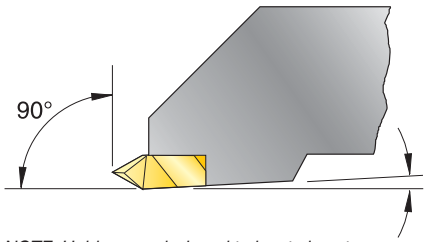
TopThread insert technology brings superior chip control to your threading operations. Unlike competitors' designs, the WIDIA recessed chip groove, when used according to our recommendations, will control the chip in most applications, bringing you better tool life and lower cutting pressures.

- Reduced inconsistencies and better workpiece finish.
- Superior chip control reduces the danger to operators.
- Increased productivity in all of your threading operations.
- Excellent choice for special thread forms and toolholder designs.

TopThread™ inserts are available in TN6010™ and TN6025™ grades to withstand the demands placed on the cutting edge of the threading insert.

The versatility of the TopThread steel enables you to use both threading and grooving inserts in the same toolholder.





NOTE: Holders are designed to locate inserts inclined to 3° to provide back clearance down open side.

The Simple Solution

With the WIDIA™ TopThread solution, there is no need to worry about costly setup mistakes. TopThread insert selection is easy, quick, and enables accurate indexing to keep your machine spindle turning.

- Rigid design for increased insert stability during threading applications.
- Good quality threads, improved tool life, and improved surface finishes.
- Locking forces in three directions for superior resistance to tangential force.
- Unique 3° insert relief angle for back clearance.
- Available in partial profile inserts for 60° thread forms.

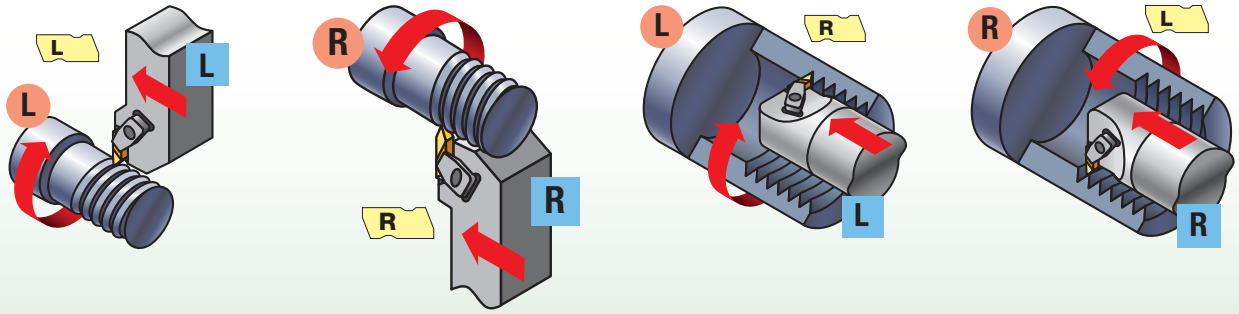
Step 1 • Select Threading Method and Hand of Tooling

Required Information:
- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.



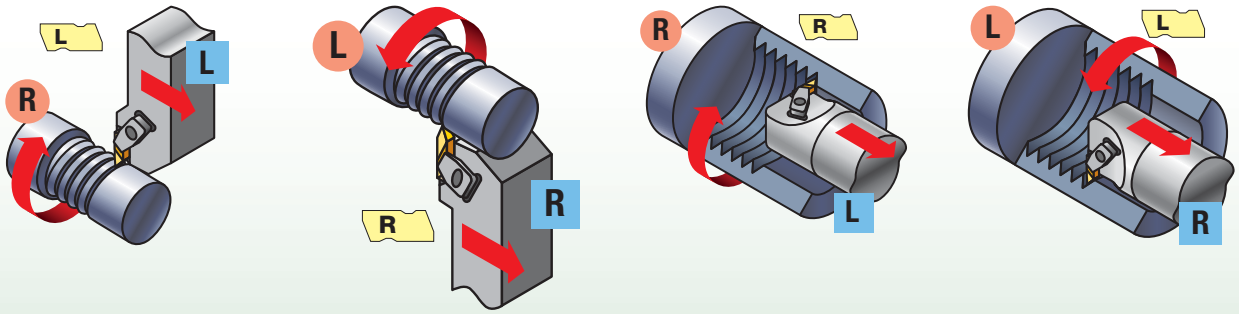
hand of thread | hand of toolholder | hand of insert

Feed direction toward the chuck • RECOMMENDED



external left-hand thread | external right-hand thread | internal left-hand thread | internal right-hand thread

Feed direction away from the chuck



external right-hand thread | external left-hand thread | internal right-hand thread | internal left-hand thread

Step 2 • Select Holder from Catalogue Page

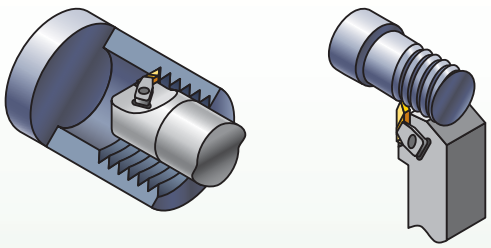
The insert size must match the gage insert size of your toolholder selection:

Required Information:
- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

catalogue number	gage insert
NSR-163D	N.3R
NSR-164D	N.4R

NOTE: TopThread toolholders and boring bars are listed with a gage insert to indicate the size and hand required. They are compatible with both grooving and threading inserts of the same size.

Select the appropriate holder for the insert size and hand:

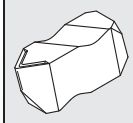


NOTE: Optimise your threading operation by using the proper infeed method and the recommended infeed values.

See the Technical section on pages F79–F101 of this catalogue.
For internal threading, minimum bore varies depending on thread type.
See page F92 for details.

Step 3 • Choose Insert for Application

- See threading insert overview on page F8.
- Select cresting inserts for fully controlled thread form including diameter control. Cresting inserts eliminate the need for deburring.
- Non-cresting partial profile inserts can cut a variety of thread pitches.
- Note insert size for toolholder selection.



insert size	catalogue number	TN6025	TN6010
2	**NT-2RK**	•	•
3	**NT-3RK**	•	•
4	**NT-4RK**	•	•

Step 4 • Select Grade and Speed

Recommendations for Grade and Speed Selection — m/min

workpiece material	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys
insert style	chip control or neutral	chip control or positive	neutral	positive	positive
optimum cutting conditions	**TN6010** 160–750	**TN6010** 160–600	**TN6010** 230–700	–	**TN6010** 65–400
first choice	**TN6025** 130–650	**TN6025** 130–450	**TN6025** 200–475	**TN6025** 160–1150	**TN6025** 35–330

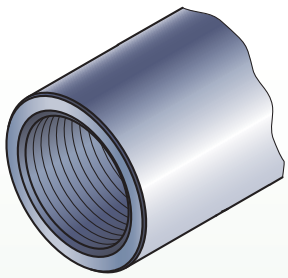
Examples:

Chip Control: *NT-K or NT-CK (partial profile only)*
Neutral: *NT, NT-C, NTF, NTC, NJ, NJF, NDC-V, NA, NDC, NTB-A/B*
Positive: *NTP, NTK, NJP, NJK*

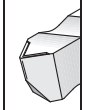
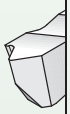
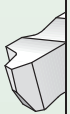
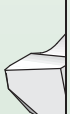
TopThread Threading Example:

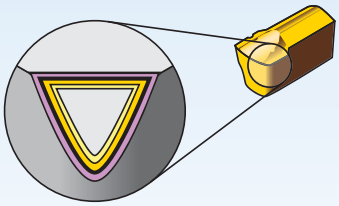
application: 8 TPI Acme internal right-hand thread
material: alloy steel
workpiece diameter: 114,3mm
good cutting conditions
feed towards the chuck

Recommendation:
insert: NA3L8
grade: TN6010
insert size: 3
boring bar: A40NER3
gage insert: N.3L
speed: 150 m/min
infeed passes*: 12 passes



** Infeed recommendations provided in technical data section on pages F88–F91.*

style						thread profile	standard	tolerance class	cresting	application	page(s)
chip control — K		neutral		positive							
NT-K		NT		NTP		Partial Profile 60°	–	–	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F13–F15**
NT-CK						Partial Profile 60° — coarse pitch	–	–	N	Coarse pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F15**
		NTF		NTK		Partial Profile 60° — fine pitch	–	–	N	Fine pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches — able to thread close to shoulders.	**F16**
		NTC				American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	**F17**
				NJP		UNJ	SAEA588791	3A/3B	N	Controlled root radius on external threads for military and aerospace industries.	**F18**
				NJK		UNJ — fine pitch	SAEA588790	3A/3B	N	Controlled root radius on external threads for military and aerospace industries — able to thread close to shoulders.	**F18**
		NDC-V				NPT	ANSI/ACME B1.201: 1983	Standard NPT	Y	National Pipe Thread standard forms for pipe fittings.	**F18**
		NDC-V-M				NPT — multi-tooth	ANSI/ACME B1.201: 1983	Standard NPT	Y	High-productivity multi-tooth threading inserts for NPT threads.	**F19**
		NWC-E				Whitworth, BSW, BSP	BS 84:1956, ISO 228/1: 1982, DIN 259	Medium Class A	Y	Widely used 55° form for gas and water connections.	**F19**
		NDC-RD				API Round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	**F20**
		NA				Acme	ANSI B1.5:1988	3G	N	29° truncated thread form for motion applications in a wide variety of industries.	**F21**
		NAS				Stub Acme	ANSI B1.8:1988	2G	N	Shallow depth 29° truncated thread form for motion applications in a wide variety of industries.	**F22**
		NTB-B				American Buttress — 45° clearance flank leading (Pull)	ANSI B1.9:1973	Class 2	N	Sawtooth form for axial load bearing applications in a variety of industries — use the “B” style when the 45° clearance flank is the leading flank.	**F22**

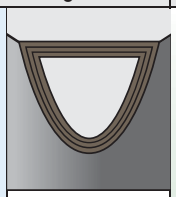
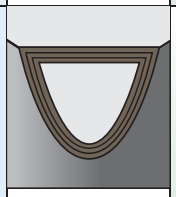
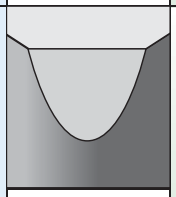


Coatings provide high-speed capability and are engineered for finishing to light roughing.

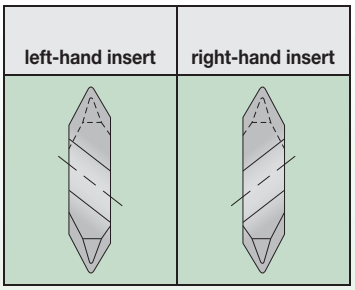
- Reduce cycle times — high speed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

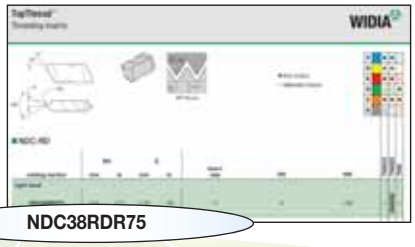
wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6010	 HC-P10	An advanced PVD TiAlN coating over a very deformation-resistant unalloyed carbide substrate. TN6010 is ideal for finishing to general machining of most workpiece materials at higher speeds. Excellent for machining most steels, stainless steels, cast irons, non-ferrous materials, and super alloys under stable conditions. It also performs well in machining hardened and short chipping materials.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■							
TN6025	 HC-P25	An advanced PVD TiAlN-coated grade with a tough, ultra-fine-grain unalloyed substrate. For general-purpose machining of most steels, stainless steels, high-temp alloys, titanium, irons, and non-ferrous materials. Speeds may vary from low to medium and will handle interruptions and high feed rates.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
THM	 HW-K15	Uncoated carbide for light and medium machining. For cast iron, all non-ferrous metals, and non-metals. Also capable of machining hardened materials at low cutting speeds.	K		■	■	■					
			N		■	■	■					
			S		■	■	■					

- All TopThread inserts are precision-ground to provide accurate edge location and secure locking of the insert in the toolholder pocket.
- TopThread inserts can be used in either toolholders or boring bars.
- All non-cresting-type threading inserts can be used for either external or internal applications. All cresting-type inserts are designated specifically for external or internal use.
- Right-hand TopThread toolholders use right-hand inserts. Left-hand TopThread toolholders use left-hand inserts.
- Right-hand TopThread boring bars use left-hand inserts. Left-hand TopThread boring bars use right-hand inserts.
- See this page for carbide grade selection and more technical information.

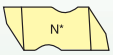


TopThread
Insert Identification System



N	D	C	3	8RD	R	75	
Type of Insert	Insert	Additional Information	Insert Size	Industry Thread Identification	Hand of Insert	Definition of Insert	Additional Information

N — TopThread™



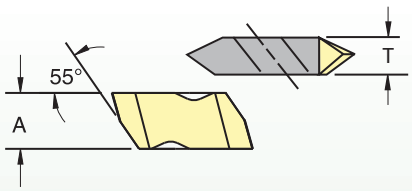
D

- **A** — Acme
- **D** — API or NPT
- **J** — UNJ thread
- **T** — 60° V thread
- **W** — 55° V Whitworth

C — Additional Information

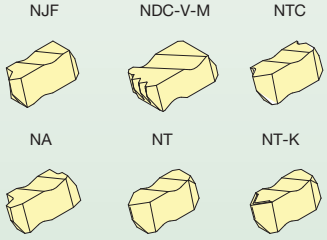
- **B** — Buttress
- **F** — Fine pitch
- **S** — Stub Acme
- **C** — Cresting
- **P** — Positive rake
- **K** — Fine pitch, positive

3 — Insert Size



TopThread insert dimensions

insert size	A mm	T mm
1	2,54	2,54
2	5,56	3,81
3	8,74	4,95
4	11,51	6,48
5	17,48	9,65
6	11,51	9,73
8	7,93	11,13



8RD — Industry Thread Identification

Indicates API or drilling industry form designation (e.g., 10RD, 8RD, .038)
or
controlled root radius threading inserts indicate the root radius in 0,025 increments (NJ, NJF, NJP, NJK)
or
M indicates metric ISO thread

R — Hand of Insert

- **R** — Right Hand
- **L** — Left Hand

75 — Definition of Insert

- Threads per inch or pitch (for metric)
- "A" or "B" type Buttress insert
- Taper per foot — API threads

- **I** — Internal thread
- **E** — External thread (used only if internal and external thread forms are different)
- **M** — Multiple tooth
- **K** — Standard chip control
- **C** — Coarse pitch
- **D** — Dryseal

Material Group		Cutting Speed — vc m/min								
		TN6010			TN6025			THM		
		min	Start	max	min	Start	max	min	Start	max
P	0/1	140	**175**	210	130	**140**	150	90	**95**	100
	2	115	**145**	175	110	**145**	175	75	**100**	125
	3	115	**145**	175	110	**145**	175	75	**100**	125
	4	75	**100**	120	75	**95**	115	55	**65**	80
	5	105	**140**	170	100	**125**	145	70	**85**	100
	6	45	**60**	75	40	**55**	65	30	**40**	45
M	1	90	**115**	140	60	**75**	90	60	**75**	90
	2	55	**70**	90	40	**50**	55	50	**60**	75
	3	60	**80**	95	40	**50**	60	40	**50**	55
K	1	120	**150**	180	60	**80**	90	70	**90**	100
	2	120	**150**	180	60	**75**	85	50	**65**	80
	3	110	**140**	170	60	**75**	90	60	**70**	80
N	1	600	**750**	900	600	**750**	900	600	**750**	900
	2	535	**685**	835	535	**685**	835	500	**650**	800
	3	230	**300**	370	230	**300**	370	600	**750**	900
	4	135	**180**	225	135	**180**	225	500	**650**	800
	5	70	**90**	110	70	**90**	110	230	**300**	370
	6	445	**565**	690	445	**565**	690	150	**200**	250
	7	550	**700**	850	550	**700**	850	150	**200**	250
S	1	35	**40**	50	25	**35**	40	25	**35**	45
	2	20	**20**	30	15	**20**	20	20	**30**	35
	3	60	**70**	80	40	**60**	70	15	**25**	30
	4	30	**35**	45	20	**30**	35	10	**15**	20
H	1	15	**30**	60	–	**–**	–	–	**–**	–
	2	15	**30**	60	–	**–**	–	–	**–**	–
	3	15	**30**	60	–	**–**	–	–	**–**	–
	4	15	**30**	60	–	–	–	–	**–**	–

The best solution for demanding threading applications



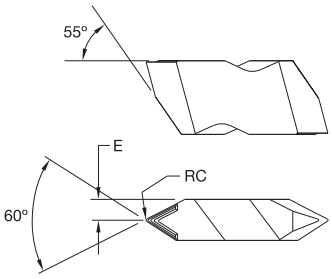
EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

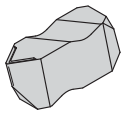
The WIDIA™ TopThread system is the best solution for demanding threading applications. With unmatched tooling technology, you can trust WIDIA TopThread tools for all of your threading and grooving needs.

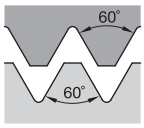
- Large selection of insert geometries and grades.
- Rigid insert clamping design ensures the best tool life, surface finish, and workpiece quality.
- Ensures accurate, high-quality threads. Excellent for internal threading operations.

To learn more, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™







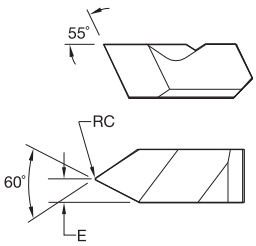
Partial Profile 60°

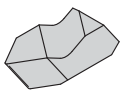
● first choice
○ alternate choice

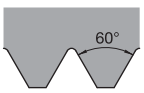
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NT-K

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT2RK	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607651	3607837	-
NT3RK	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607643	3607824	-
NT4RK	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607846	-
left hand										
NT2LK	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607674	3607833	-
NT3LK	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607645	3607828	-



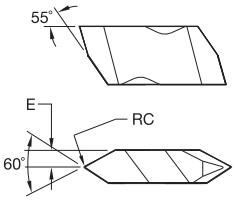


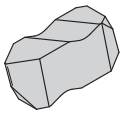


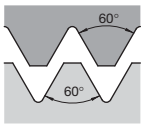
Partial Profile 60°
Internal

NT-1L

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
left hand										
NT1L	0,08	1,09	1	–	1,0-2,0	–	12-24	3636551	3636555	-







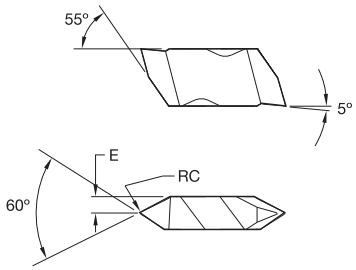
Partial Profile 60°

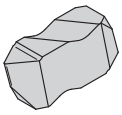
● first choice
○ alternate choice

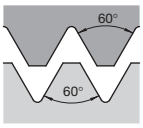
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

■ NT

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT2R	0,10	1,90	2	0,70-3,0	1,25-3,5	8-36	7-20	3607647	3607843	-
NT3R	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607530	3607825	-
NT4R	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	3607676	3607834	-
left hand										
NT2L	0,10	1,90	2	0,70-3,0	1,25-3,5	8-36	7-20	3607675	3607835	-
NT3L	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607532	3607826	-
NT4L	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607849	-







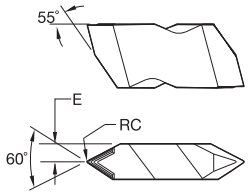
Partial Profile 60°

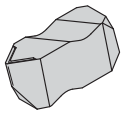
● first choice
○ alternate choice

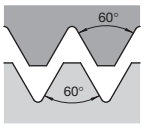
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

■ NTP

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTP2R	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607677	3607841	-
NTP3R	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607644	3607823	-
NTP4R	0,17	3,25	4	1,25-6,25	2,0-6,25	4-20	4-12	-	3607839	-
left hand										
NTP2L	0,10	1,91	2	0,70-3,0	1,25-3,5	8-36	7-20	3607678	3607840	-
NTP3L	0,17	2,49	3	1,25-4,0	2,0-5,0	6-20	5-12	3607650	3607831	-



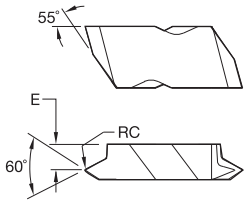


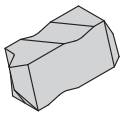


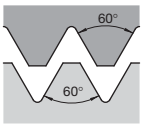
Partial Profile 60°

■ NT-CK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NT3RCK	0,34	2,46	3	2,5-4,0	4,0	6-11	6	3607649	3607838	-







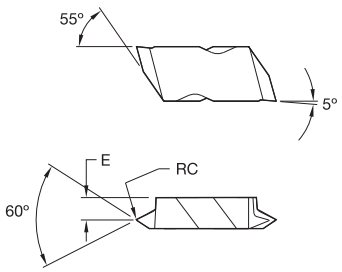
Partial Profile 60°

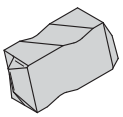
● first choice
○ alternate choice

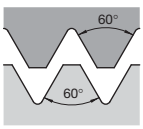
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

■ NTF

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTF2R	0,08	2,79	2	0,60-1,75	1,0-2,0	14-44	12-24	3607673	3607852	-
NTF3R	0,08	3,58	3	0,60-2,5	1,0-2,5	10-44	9-24	3607531	3607830	-
left hand										
NTF3L	0,08	3,58	3	0,60-2,5	1,0-2,5	10-44	9-24	3607652	3607832	-



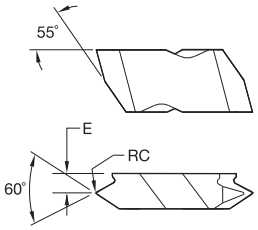


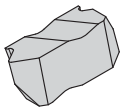


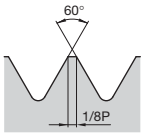
Partial Profile 60°

■ NTK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTK2R	0,08	2,79	2	0,60-1,75	1,0-2,0	14-44	12-24	3607646	3607836	-
NTK3R	0,08	3,58	3	0,60-2,50	1,0-2,5	10-44	9-24	3607528	3607827	-
left hand										
NTK3L	0,08	3,58	3	0,60-2,50	1,0-2,5	10-44	9-24	-	3607853	-







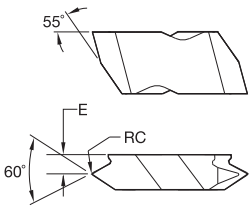
American
UN-External

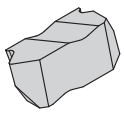
● first choice
○ alternate choice

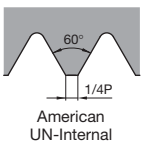
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NTC-E

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NTC3R16E	0,19	3,76	3	–	–	16	–	3636553	3636557	■
NTC3R14E	0,22	3,76	3	–	–	14	–	3636554	■	■
NTC3R12E	0,25	3,76	3	–	–	12	–	3636549	3636562	■



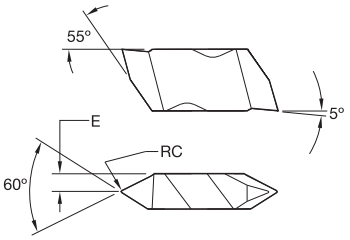


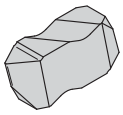


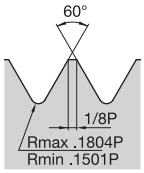
American
UN-Internal

NTC-I

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
left hand										
NTC3L12I	0,10	3,76	3	–	–	–	12	■	3636556	■







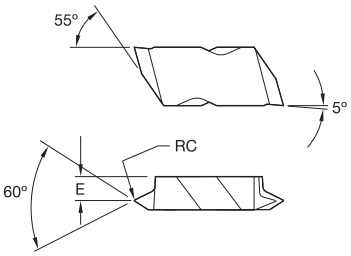
UNJ External

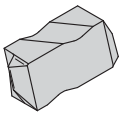
● first choice
○ alternate choice

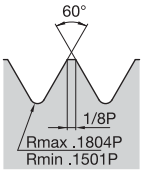
		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NJP

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NJP3014R12	0,33	2,49	3	–	–	12	–	'	3607850	'



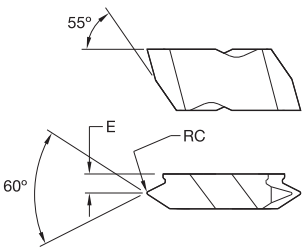


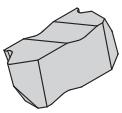


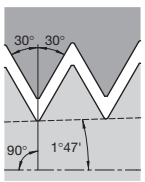
UNJ External

NJK

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
right hand										
NJK3008R20	0,20	3,58	3	–	–	20	–	3607648	'	'



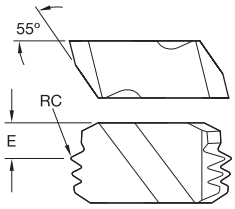


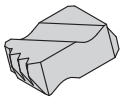


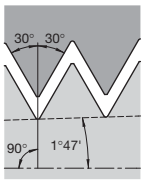
NPT

NDC-V

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC3115VR75	0,10	3,66	3	11.5	.750	3636550	'	'







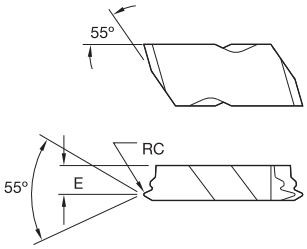
NPT

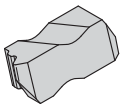
● first choice
○ alternate choice

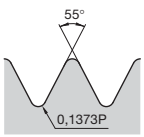
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

■ NDC-V-M

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC8115VR75M	0,10	2,59	8	11.5	.750	3636552	■	■
NDC88VR75M	0,13	2,41	8	8	.750	3636548	■	■



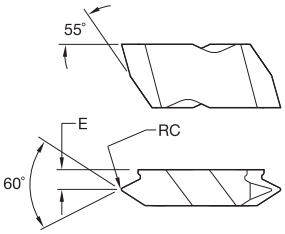


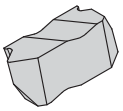


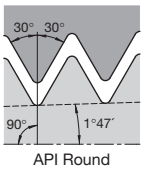
Whitworth BSW,
BSP-External

■ NWC-E

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NWC3R14E	0,24	3,43	3	14	–	■	3811638	■
NWC3R11E	0,30	3,43	3	11	–	■	3811639	■







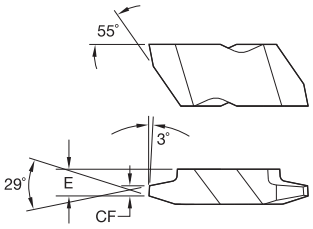
API Round

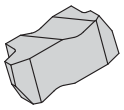
● first choice
○ alternate choice

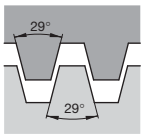
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

NDC-RD

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
right hand								
NDC38RDR75	0,43	3,18	3	8	.750	-	3636558	-
left hand								
NDC310RDL75	0,36	3,18	3	10	.750	-	3636565	-
NDC38RDL75	0,43	3,18	3	8	.750	-	3636559	-







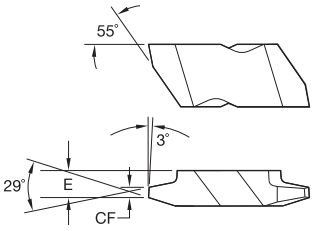
ACME

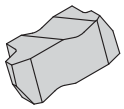
● first choice
○ alternate choice

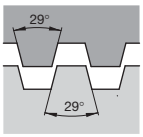
P	●	●	
M	●	●	
K	●	●	○
N	○	○	●
S	●	●	●
H	○		

NA

catalogue number	CF	E	insert size	TPI	TN6010	TN6025	THM
right hand							
NA3R8	1,04	3,79	3	8	-	3607854	-
NA3R6	1,44	3,79	3	6	-	3607851	-
NA3R4	2,22	3,38	3	4	-	3607848	-
NA4R4	2,22	5,13	4	4	-	3636566	-
NA6R3	3,01	7,19	6	3	-	3636564	-
NA6R2	4,58	7,19	6	2	-	3636567	-
left hand							
NA3L8	1,04	3,79	3	8	-	3607855	-
NA3L6	1,44	3,79	3	6	-	3607847	-
NA3L4	2,22	3,38	3	4	-	3607842	-
NA4L4	2,22	5,13	4	4	-	3636560	-
NA6L3	3,01	7,19	6	3	-	3636561	-
NA6L2	4,58	7,19	6	2	-	3636568	-







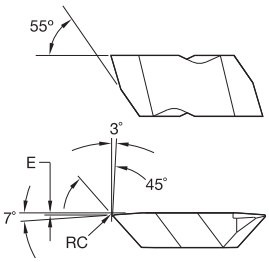
Stub ACME

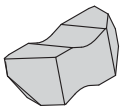
● first choice
○ alternate choice

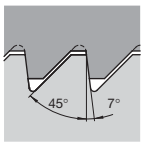
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NAS

catalogue number	CF	E	insert size	TPI	TN6010	TN6025	THM
right hand							
NAS3R8	1,21	3,79	3	8	–	3607856	–
left hand							
NAS3L12	0,83	3,79	3	12	–	3607844	–
NAS3L8	1,21	3,79	3	8	–	3607845	–
NAS3L6	1,66	3,79	3	6	–	3607829	–





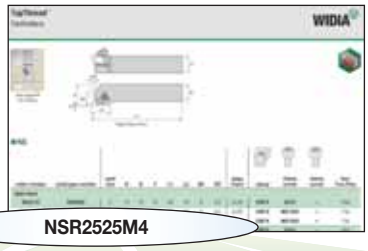


American Buttress-Pull

NTB-B

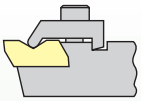
catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
left hand								
NTB3LB	0,17	0,31	3	8-16	–	–	3636563	–

TopThread
Holder Identification System



N	S	R		2525	M	4	
Insert Holding Method	Insert Mounting Location	Hand of Tool	Drop Head	Shank Size	Tool Length	Insert Size	Qualified Holder

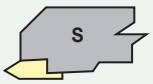
N – TopThread™



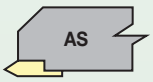
End mount



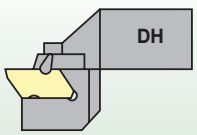
Side mount, offset



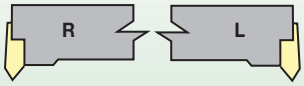
Side mount, no offset



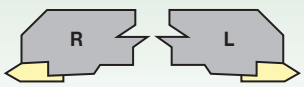
Shank height and width in mm and holder



End mount



Side mount

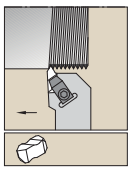


L1	ISO
32	A
40	B
50	C
60	D
70	E
80	F
90	G
100	H
110	J
125	K
140	L
150	M
160	N
170	P
180	Q
200	R
250	S
300	T
350	U
400	V
450	W
500	Y
special length	x

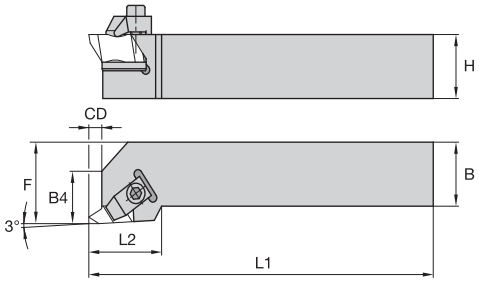


insert size	W1
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73
8	11,13

Q – Qualified holder



See page F8
for inserts.



Right Hand Tool

NS

order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand														
3632147	**NSR062**	2	10	10	14	64	19	9	3,5	N.2R	**CM74**	**S310**	–	7/64
3641682	**NSR1010E2**	2	10	10	14	70	19	9	3,5	N.2R	**CM74**	**MS1200**	–	T10
3641660	**NSR1212F2**	2	12	12	16	80	19	9	3,5	N.2R	**CM74**	**MS1200**	–	T10
3639035	**NSR082V**	2	13	13	19	89	19	9	3,5	N.2R	**CM74**	**S310**	–	7/64
3639044	**NSR102B**	2	16	16	22	114	19	9	3,5	N.2R	**CM74**	**S310**	–	7/64
3636542	**NSR1616H2**	2	16	16	20	100	19	9	3,5	N.2R	**CM74**	**MS1200**	–	T10
3639026	**NSR122B**	2	19	19	25	114	19	9	3,5	N.2R	**CM74**	**S310**	–	7/64
3638589	**NSR2020K2**	2	20	20	25	125	19	9	3,5	N.2R	**CM74**	**MS1200**	–	T10
3638590	**NSR2525M2**	2	25	25	32	150	19	9	3,5	N.2R	**CM74**	**MS1200**	–	T10
3639025	**NSR162C**	2	25	25	32	127	19	9	3,5	N.2R	**CM74**	**S310**	–	7/64
3639027	**NSR123A**	3	19	19	25	102	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3639023	**NSR123B**	3	19	19	25	114	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3638588	**NSR2020K3**	3	20	20	25	125	32	13	5,3	N.3R	**CM72LP**	–	**MS2111**	25 IP
3636536	**NSR2525M3**	3	25	25	32	150	32	13	5,3	N.3R	**CM72LP**	–	**MS2111**	25 IP
3638592	**NSR163C**	3	25	25	32	127	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3638591	**NSR163D**	3	25	25	32	152	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3637496	**NSR853D**	3	32	25	32	152	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3639028	**NSR203D**	3	32	32	38	152	32	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3641664	**NSR3225P3**	3	32	25	32	170	32	13	5,3	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641666	**NSR3232P3**	3	32	32	40	170	32	13	5,3	N.3R	**CM72LP**	–	**MS2111**	25 IP
3637506	**NSR243D**	3	38	38	51	152	35	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3637535	**NSR243E**	3	38	38	51	178	35	13	5,3	N.3R	**CM72LP**	–	**S2112**	25 IP
3636540	**NSR2525M4**	4	25	25	32	150	35	14	7,5	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641675	**NSR3225P4**	4	32	25	32	170	35	14	7,5	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641669	**NSR3232P4**	4	32	32	40	170	35	14	7,5	N.4R	**CM72LP**	–	**MS2111**	25 IP
3637509	**NSR205D**	5	32	32	38	152	51	15	10,5	N.5R	**CM80**	**S352**	–	1/4
3637540	**NSR245D**	5	38	38	51	152	51	16	10,5	N.5R	**CM80**	**S352**	–	1/4

NOTE: F dimension measured over sharp point of insert.

(continued)

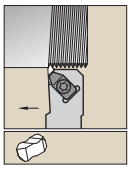
(NS — continued)



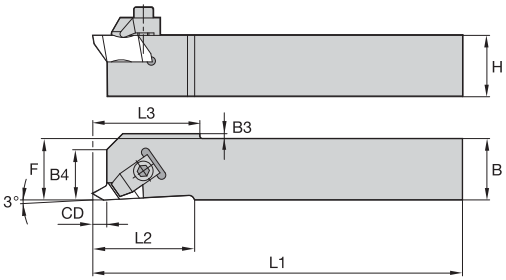


order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
left hand														
3632161	**NSL062**	2	10	10	14	64	19	9	3,5	N.2L	**CM75**	**S310**	**—**	7/64
3641683	**NSL1010E2**	2	10	10	14	70	19	9	3,5	N.2L	**CM75**	**MS1200**	**—**	T10
3641681	**NSL1212F2**	2	12	12	16	80	19	9	3,5	N.2L	**CM75**	**MS1200**	**—**	T10
3637485	**NSL082V**	2	13	13	19	89	19	9	3,5	N.2L	**CM75**	**S310**	**—**	7/64
3637510	**NSL102B**	2	16	16	22	114	19	9	3,5	N.2L	**CM75**	**S310**	**—**	7/64
3636545	**NSL1616H2**	2	16	16	20	100	19	9	3,5	N.2L	**CM75**	**MS1200**	**—**	T10
3632145	**NSL122B**	2	19	19	25	114	19	9	3,5	N.2L	**CM75**	**S310**	**—**	7/64
3639045	**NSL2020K2**	2	20	20	25	125	19	9	3,5	N.2L	**CM75**	**MS1200**	**—**	T10
3639047	**NSL2525M2**	2	25	25	32	150	19	9	3,5	N.2L	**CM75**	**MS1200**	**—**	T10
3632138	**NSL162C**	2	25	25	32	127	19	9	3,5	N.2L	**CM75**	**S310**	**—**	7/64
3632152	**NSL123A**	3	19	19	25	102	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3639032	**NSL123B**	3	19	19	25	114	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3639046	**NSL2020K3**	3	20	20	32	125	32	13	5,3	N.3L	**CM73LP**	**—**	**MS2111**	25 IP
3636539	**NSL2525M3**	3	25	25	32	150	32	13	5,3	N.3L	**CM73LP**	**—**	**MS2111**	25 IP
3639029	**NSL163C**	3	25	25	32	127	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3639024	**NSL163D**	3	25	25	32	152	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3637508	**NSL853D**	3	32	25	32	152	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3639037	**NSL203D**	3	32	32	38	152	32	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3641670	**NSL3225P3**	3	32	25	32	170	32	13	5,3	N.3L	**CM73LP**	**—**	**MS2111**	25 IP
3641671	**NSL3232P3**	3	32	32	40	170	32	13	5,3	N.3L	**CM73LP**	**—**	**MS2111**	25 IP
3637515	**NSL243D**	3	38	38	51	152	35	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3637548	**NSL243E**	3	38	38	51	178	35	13	5,3	N.3L	**CM73LP**	**—**	**S2112**	25 IP
3636544	**NSL2525M4**	4	25	25	32	150	35	14	7,5	N.4L	**CM73LP**	**—**	**MS2111**	25 IP
3641678	**NSL3225P4**	4	32	25	32	170	35	14	7,5	N.4L	**CM73LP**	**—**	**MS2111**	25 IP
3641679	**NSL3232P4**	4	32	32	40	170	35	14	7,5	N.4L	**CM73LP**	**—**	**MS2111**	25 IP
3637536	**NSL205D**	5	32	32	38	152	51	15	10,5	N.5L	**CM81**	**S352**	**—**	1/4
3641688	**NSL3232P5**	5	32	32	40	170	51	16	10,5	N.5L	**CM81**	**MS352**	**—**	6 mm

NOTE: F dimension measured over sharp point of insert.

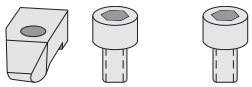


See page F8
for inserts.



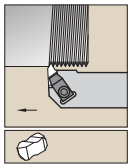
Right Hand Tool

NAS

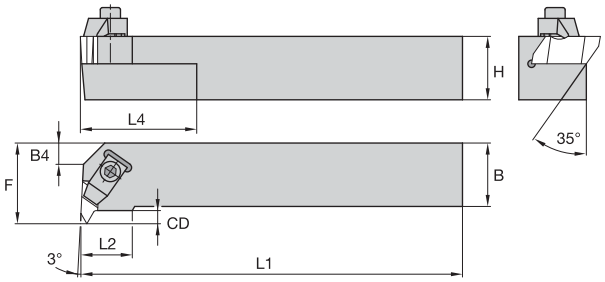


order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand																
3641667	**NASR1010M2Q**	2	10	10	10	150	19	9	3,5	2,03	19	N.2R	**CM182**	**MS1200**	**–**	T10
3641662	**NASR1212M2Q**	2	12	12	12	150	19	9	3,5	–	–	N.2R	**CM182**	**MS1200**	**–**	T10
3639048	**NASR1616K3Q**	3	16	16	16	125	32	12	5,3	–	–	N.3R	**CM184LP**	**–**	**MS2111**	25 IP
left hand																
3641691	**NASL1010M2Q**	2	10	10	10	150	19	9	3,5	2,03	19	N.2L	**CM183**	**MS1200**	**–**	T10
3641686	**NASL1212M2Q**	2	12	12	12	150	19	9	3,5	–	–	N.2L	**CM183**	**MS1200**	**–**	T10
3641687	**NASL1616K3Q**	3	16	16	16	125	32	12	5,3	–	–	N.3L	**CM185LP**	**–**	**MS2111**	25 IP

NOTE: F dimension measured over sharp point of insert.



See page F8 for inserts.



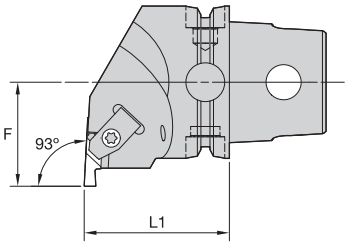
Right Hand Tool

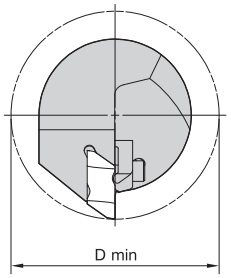
NE

order number	catalogue number	seat size	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand														
3641674	**NER1616H2**	2	16	16	20	100	15	–	3,5	N.2L	**CM75**	**MS1200**	–	T10
3641658	**NER2020K2**	2	20	20	25	125	15	6	3,5	N.2L	**CM75**	**MS1200**	–	T10
3641665	**NER2525M2**	2	25	25	32	150	15	12	3,5	N.2L	**CM75**	**MS1200**	–	T10
3636541	**NER2525M3**	3	25	25	32	150	22	–	5,3	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641680	**NER3225P3**	3	32	25	32	170	22	–	3,8	N.3L	**CM73LP**	–	**MS2111**	25 IP
3641672	**NER2525M4**	4	25	25	35	150	24	–	7,5	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641689	**NER3225P4**	4	32	25	35	170	24	–	7,5	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641693	**NER3232P4**	4	32	32	40	170	24	–	6,4	N.4L	**CM73LP**	–	**MS2111**	25 IP
3641692	**NER3232P5**	5	32	32	50	170	35	–	10,5	N.5L	**CM81**	**MS352**	–	6 mm
left hand														
3641684	**NEL1616H2**	2	16	16	20	100	15	–	3,5	N.2R	**CM74**	**MS1200**	–	T10
3641677	**NEL2020K2**	2	20	20	25	125	15	6	3,5	N.2R	**CM74**	**MS1200**	–	T10
3641676	**NEL2525M2**	2	25	25	32	150	15	12	3,5	N.2R	**CM74**	**MS1200**	–	T10
3636543	**NEL2525M3**	3	25	25	32	150	22	–	5,3	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641685	**NEL3225P3**	3	32	25	32	170	22	–	3,8	N.3R	**CM72LP**	–	**MS2111**	25 IP
3641668	**NEL2525M4**	4	25	25	35	150	24	–	7,5	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641694	**NEL3225P4**	4	32	25	35	170	24	–	7,5	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641696	**NEL3232P4**	4	32	32	40	170	24	–	6,4	N.4R	**CM72LP**	–	**MS2111**	25 IP
3641695	**NEL3232P5**	5	32	32	50	170	35	–	10,5	N.5R	**CM80**	**MS352**	–	6 mm

NOTE: F dimension measured over sharp point of insert.



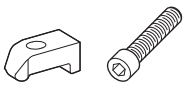






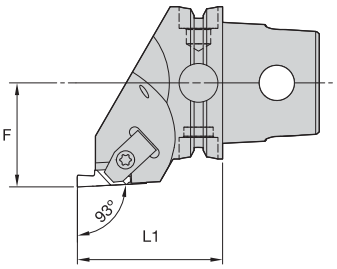
KM QUICK CHANGE

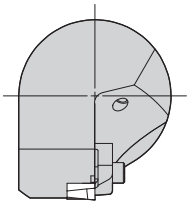
■ NE 93°



order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	clamp	clamp screw	kg	lbs
right hand												
3902285	**KM40TSNER2**	40	1.575	27	1.063	54	2.126	NG2L	**CM75**	**MS1488**	0,30	.66
3902286	**KM40TSNER3**	40	1.575	27	1.063	54	2.126	NG3L	**CM73**	**MS1489**	0,30	.67
3902287	**KM40TSNER4**	40	1.575	27	1.063	54	2.126	NG4L	**CM73**	**MS1489**	0,30	.65
left hand												
3902132	**KM40TSNEL2**	40	1.575	27	1.063	54	2.126	NG2R	**CM74**	**MS1488**	0,30	.66
3902283	**KM40TSNEL3**	40	1.575	27	1.063	54	2.126	NG3R	**CM-72**	**MS1489**	0,30	.67
3902284	**KM40TSNEL4**	40	1.575	27	1.063	54	2.126	NG4R	**CM-72**	**MS1489**	0,30	.65



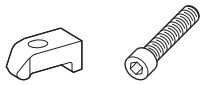






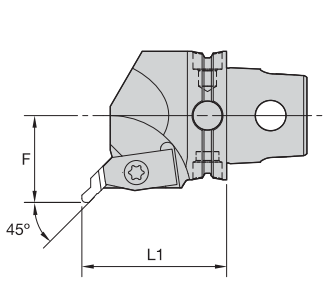
KM QUICK CHANGE

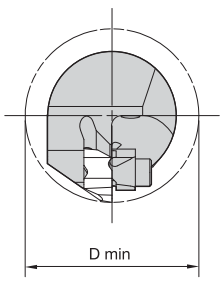
NS 93°

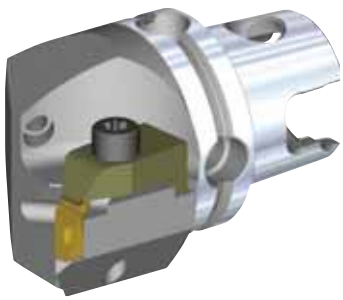


order number	catalogue number	L1 mm	L1 in	F mm	F in	gage insert	clamp	clamp screw	kg	lbs
right hand										
3902293	**KM40TSNSR2**	40	1.575	27	1.063	NG2R	**CM74**	**MS1488**	0,32	.70
3902294	**KM40TSNSR3**	47	1.850	27	1.063	NG3R	**CM-72**	**MS1489**	0,32	.71
3902295	**KM40TSNSR4**	47	1.850	27	1.063	NG4R	**CM-72**	**MS1489**	0,30	.66
left hand										
3902290	**KM40TSNSL2**	40	1.575	27	1.063	NG2L	**CM75**	**MS1488**	0,32	.70
3902291	**KM40TSNSL3**	47	1.850	27	1.063	NG3L	**CM73**	**MS1489**	0,33	.72
3902292	**KM40TSNSL4**	47	1.850	27	1.063	NG4L	**CM73**	**MS1489**	0,30	.66



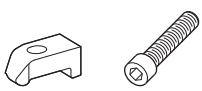






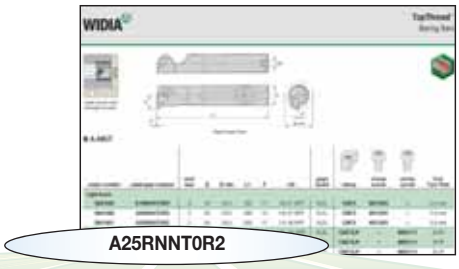
KM QUICK CHANGE

NR 45°



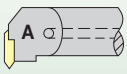
order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	clamp	clamp screw	kg	lbs
right hand												
3902289	**KM40TSNRR3045M**	45	1.772	27	1.063	54	2.126	NU3L	**CM73**	**MS1489**	0,34	.75
left hand												
3902288	**KM40TSNRL3045M**	45	1.772	27	1.063	54	2.126	NU3R	**CM-72**	**MS1489**	0,33	.74

TopThread
Boring Bar Identification System

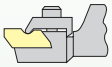


A	25	R	N	N	T	0	R	2
Bar Type	Bar Diameter	Bar Length	Insert Holding Method	Insert Shape	Insert Location	Rake Angle 0 = 0°	Hand of Tool	Insert Size

A — Steel with coolant



N — TopThread*

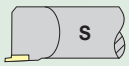


*Proprietary standard only.

End mount



Side mount

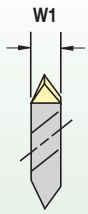


Right hand



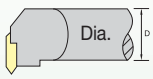
Left hand





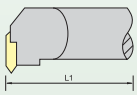
insert size	W1
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73
8	11,13

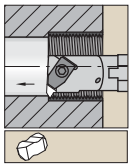
Bar in millimetres



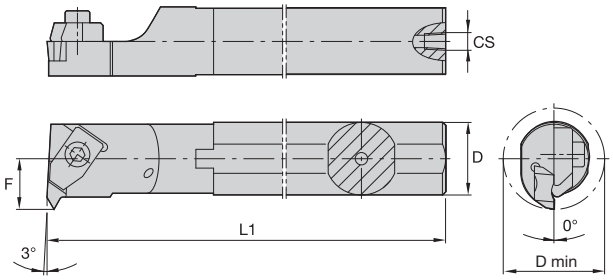
Bars

K = 125,0mm
M = 150,0mm
Q = 180,0mm
R = 200,0mm
S = 250,0mm
T = 300,0mm
U = 350,0mm





Steel shank with through coolant. See page F8 for inserts.



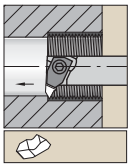
Right Hand Tool



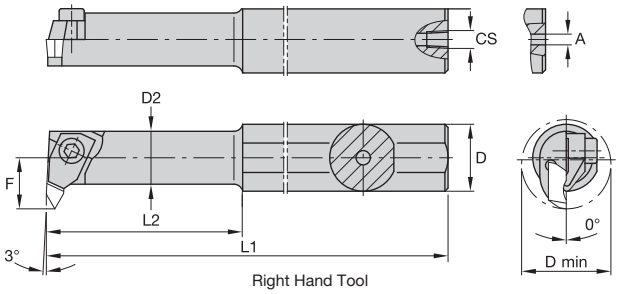
A-NNT

order number	catalogue number	seat size	D	D min	L1	F	CS	gage insert	clamp	clamp screw	clamp screw	hex/ Torx Plus
right hand												
3641643	**A16MNNTOR2**	2	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641645	**A20QNNTOR2**	2	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641651	**A25RNNTOR2**	2	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	**–**	2.5 mm
3641622	**A25RNNTOR3**	3	25	34,0	200	17	1/8 - 27 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641646	**A32SNNTOR3**	3	32	44,0	250	22	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641653	**A40TNNTOR3**	3	40	54,0	300	27	1/4-18 NPT	N.3L	**CM73LP**	**–**	**MS2111**	25 IP
3641654	**A40TNNTOR4**	4	40	54,0	300	27	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641661	**A50UNNTOR4**	4	50	70,0	350	35	1/4-18 NPT	N.4L	**CM73LP**	**–**	**MS2111**	25 IP
3641644	**A12MNNTOR2**	2	12	18,5	150	11	1/16-27 NPT	NG2L	**CM147**	**MS1200**	**–**	2.5 mm
left hand												
3641649	**A16MNNTOL2**	2	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641652	**A20QNNTOL2**	2	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641657	**A25RNNTOL2**	2	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	**–**	2.5 mm
3641650	**A25RNNTOL3**	3	25	34,0	200	17	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641656	**A32SNNTOL3**	3	32	44,0	250	22	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641659	**A40TNNTOL3**	3	40	54,0	300	27	1/4-18 NPT	N.3R	**CM72LP**	**–**	**MS2111**	25 IP
3641663	**A40TNNTOL4**	4	40	54,0	300	27	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641690	**A50UNNTOL4**	4	50	70,0	350	35	1/4-18 NPT	N.4R	**CM72LP**	**–**	**MS2111**	25 IP
3641655	**A12MNNTOL2**	2	12	18,5	150	11	1/16-27 NPT	NG2R	**CM146**	**MS1200**	**–**	2.5 mm

NOTE: F dimension measured over sharp point of insert.



Necked steel shank with through coolant. See page F8 for inserts.



Right Hand Tool



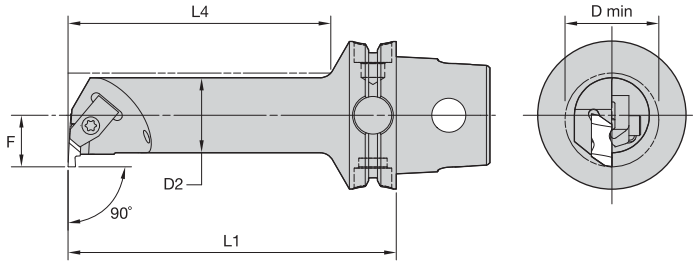
A-NNT-1




order number	catalogue number	seat size	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
right hand														
3641647	**A12MNNTOR1**	1	12	11,5	8,7	150	31	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5 mm
3641648	**A10KNNTOR1**	1	10	11,5	10,0	125	—	7	3,2	—	NG1L	**CM109**	**MS1034**	1.5 mm

NOTE: F dimension measured over sharp point of insert.







KM QUICK CHANGE

NE 90° • Steel

order number	catalogue number	D2 mm	D2 in	D min mm	D min in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3955481	**KM40TSS12ENER2**	12	.472	19	.73	11	.433	42	1.655	70	2.756	NG2L	0,27	.58
3955483	**KM40TSS16FNER2**	16	.630	20	.79	11	.433	56	2.209	80	3.150	NG2L	0,28	.62
3955485	**KM40TSS20GNER2**	20	.787	25	.98	13	.512	70	2.757	90	3.543	NG2L	0,35	.76
3955487	**KM40TSS25ENER2**	25	.984	32	1.26	17	.669	55	2.169	70	2.756	NG2L	0,34	.75
3955491	**KM40TSS25ENER3**	25	.984	34	1.34	17	.669	55	2.169	70	2.756	NG3L	0,35	.77
3955489	**KM40TSS25HNER2**	25	.984	32	1.26	17	.669	75	2.954	100	3.937	NG2L	0,49	1.08
3955493	**KM40TSS25HNER3**	25	.984	34	1.34	17	.669	75	2.954	100	3.937	NG3L	0,49	1.09
3955497	**KM40TSS32GNER3**	32	1.260	40	1.57	22	.866	76	2.993	90	3.543	NG3L	0,55	1.21
3955495	**KM40TSS32JNER3**	32	1.260	40	1.57	22	.866	96	3.780	110	4.331	NG3L	0,67	1.48
left hand														
3955480	**KM40TSS12ENEL2**	12	.472	19	.73	11	.433	42	1.655	70	2.756	NG2R	0,27	.59
3955482	**KM40TSS16FNEL2**	16	.630	20	.79	11	.433	56	2.209	80	3.150	NG2R	0,28	.62
3955484	**KM40TSS20GNEL2**	20	.787	25	.98	13	.512	70	2.757	90	3.543	NG2R	0,35	.76
3955486	**KM40TSS25ENEL2**	25	.984	32	1.26	17	.669	55	2.169	70	2.756	NG2R	0,34	.75
3955490	**KM40TSS25ENEL3**	25	.984	34	1.34	17	.669	55	2.169	70	2.756	NG3R	0,35	.77
3955488	**KM40TSS25HNEL2**	25	.984	32	1.26	17	.669	75	2.954	100	3.937	NG2R	0,49	1.08
3955492	**KM40TSS25HNEL3**	25	.984	34	1.34	17	.669	75	2.954	100	3.937	NG3R	0,49	1.09
3955496	**KM40TSS32GNEL3**	32	1.260	40	1.57	22	.866	76	2.993	90	3.543	NG3R	0,55	1.21
3955494	**KM40TSS32JNEL3**	32	1.260	40	1.57	22	.866	96	3.780	110	4.331	NG3R	0,67	1.48

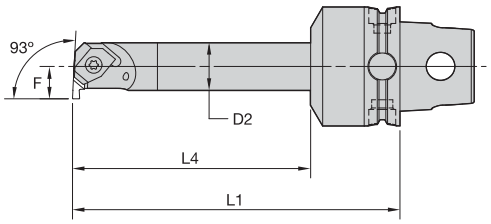
(continued)

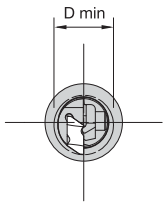
(NE 90° • Steel — continued)

Spare Parts

catalogue number	 clamp	 clamp screw
right hand		
KM40TSS12ENER2	CM147	MS1488
KM40TSS16FNER2	CM147	MS1488
KM40TSS20GNER2	CM75	MS1488
KM40TSS25ENER2	CM75	MS1488
KM40TSS25ENER3	CM73	MS1489
KM40TSS25HNER2	CM75	MS1488
KM40TSS25HNER3	CM73	MS1489
KM40TSS32GNER3	CM73	MS1489
KM40TSS32JNER3	CM73	MS1489
left hand		
KM40TSS12ENEL2	CM146	MS1488
KM40TSS16FNEL2	CM146	MS1488
KM40TSS20GNEL2	CM74	MS1488
KM40TSS25ENEL2	CM74	MS1488
KM40TSS25ENEL3	CM-72	MS1489
KM40TSS25HNEL2	CM74	MS1488
KM40TSS25HNEL3	CM-72	MS1489
KM40TSS32GNEL3	CM-72	MS1489
KM40TSS32JNEL3	CM-72	MS1489









KM QUICK CHANGE

NE 90° • Carbide

order number	catalogue number	D2 mm	D2 in	D min mm	D min in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3951836	**KM40TSE16JNER2**	16	.630	20	.79	11	.433	80	3.15	110	4.331	NG2L	0,41	.90
left hand														
3951835	**KM40TSE16JNEL2**	16	.630	20	.79	11	.433	80	3.15	110	4.331	NG2R	0,41	.90

Spare Parts

catalogue number	clamp	clamp screw
right hand		
KM40TSE16JNER2	**CM146**	**MS1488**
left hand		
KM40TSE16JNEL2	**CM147**	**MS1488**

The WIDIA™ high-performance carbide grades, coupled with our rigid TopThread clamping design, offer the metalworking industry optimum threading productivity.

When the large inventory of WIDIA standard products does not completely satisfy your productivity requirements, consider having TopThread inserts custom ground to meet your unique application needs.

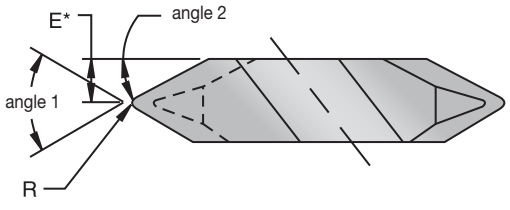
The large variety of TopThread blank sizes allows maximum flexibility in threading endform design, especially for extra wide or oil field applications.

Common examples of special forms are shown here. Please contact your local WIDIA representative for recommendations on satisfying your special threading needs.

Features and Benefits:

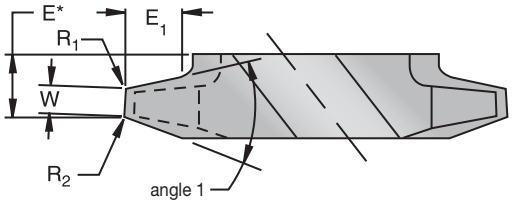
- Quotes are handled quickly and efficiently using state-of-the-art CAD design software and electronic database software.
- Our Carbide Custom Solutions Design Team is your link to one of the industry's largest electronic databases. They can solve your most challenging design problems.
- Where necessary or required, concept drawings are available to facilitate your engineering development.
- A large number of high-performance carbide grades are available to optimise your productivity. The option of producing standard insert styles in non-standard carbide grades allows you to optimise tool life performance.

style C2 RH shown



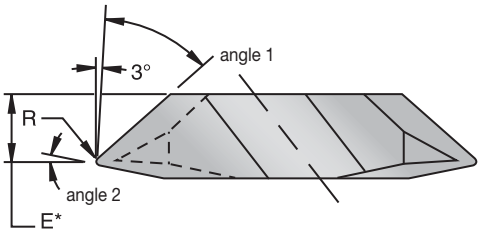
*to theoretical sharp point

style C3 RH shown



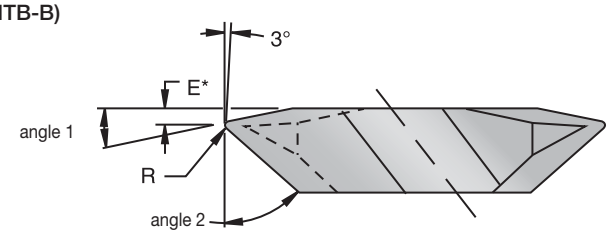
*to theoretical sharp point

style C4 (NTB-A) RH shown



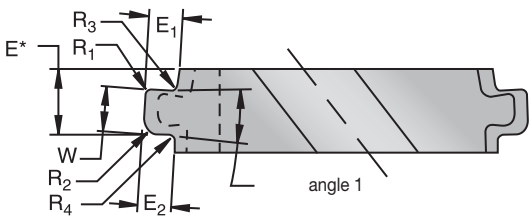
*to theoretical sharp point

style C5 (NTB-B) RH shown



*to theoretical sharp point

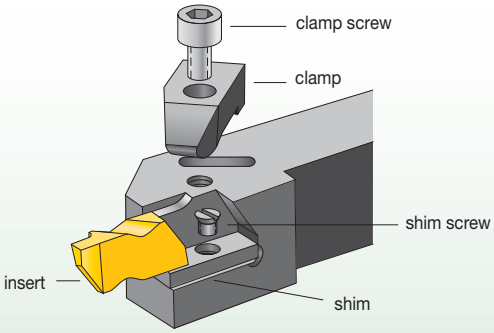
style C6 RH shown



*to theoretical sharp point

NOTE: Right-hand inserts shown; left-hand inserts are also available.

TopThread and TopGroove Toolholders and Boring Bars



insert size and style	clamp	clamp screw	shim	shim screw
NG-1L	CM-109	S-304	–	–
NG-2R	CM-182	S-310	–	–
NG-2L	CM-183	S-310	–	–
NG-2R	CM-74	S-310	–	–
NG-2L	CM-75	S-310	–	–
NG-3R	CM-184	S-412	–	–
NG-3L	CM-185	S-412	–	–
NG-3R	CM-72	S-412	–	–
NG-3L	CM-73	S-412	–	–
NG-3R*	CM-78	S-412	–	–
NG-3L*	CM-70	S-412	–	–
NG-4R	CM-72	S-412	SM-420	SL-344
NG-4L	CM-73	S-412	SM-420	SL-344
NG-5R	CM-80	S-352	–	–
NG-5L	CM-81	S-352	–	–
NG-6R	CM-120	S-412	SM-416	S-111
NG-6L	CM-121	S-412	SM-416	S-111
NG-8R	CM-144	S-422	SM-419	S-112
NG-8L	CM-145	S-422	SM-419	S-112
NG-8R**	CM-144	S-422	SM-427	S-111
NG-8L**	CM-145	S-422	SM-427	S-111
TopGroove relief grooving				
NU-3125R	CM-72	S-412	–	–
NU-3125L	CM-73	S-412	–	–
NU-3125R**	CM-72	S-618	–	–
NU-3125L**	CM-73	S-618	–	–

**25mm diameter boring head.*
***Boring head.*

WIDIA™ Laydown Threading

For increased reliability and productivity, look no further than the WIDIA Laydown Threading System for all of your I.D. and O.D. threading applications. The Laydown Threading System maximises tool life and thread quality.

Laydown



This specially engineered system meets all modern production standards. With an extensive range of inserts and toolholders available, the Laydown Threading platform is ideal for all of your threading requirements.

Laydown Insert Technology

Laydown insert technology, with its wide range of available tools and inserts, guarantees increased tool life, minimised built-up edges, and precise cuts of most common materials.

- TN6025™ premium PVD TiAlN-coated grade outperforms conventional PVD grades.
- Enables superior chip control and reduced cutting forces.
- Partial and full profile insert options available for all common thread forms.

The Laydown Threading Solution

With the WIDIA™ Laydown Threading System, you experience reliable countersunk screw locking for unhindered chip flow and precise insert positioning accuracy.

- Industry-leading thread quality.
- Four insert sizes available to cover a wide range of thread-making operations.
- Ideal for high-helix/multi-start threads and single-point threading in small-diameter bores.
- Maximised tool life and low-profile design for unhindered chip flow and superior performance.

Reliable TopClamp™ locking guarantees precise insert positioning accuracy.

Get more parts per insert with the economy of the Laydown Threading insert's three cutting edges.

Choose from both steel and carbide boring bars to satisfy all machining application needs.



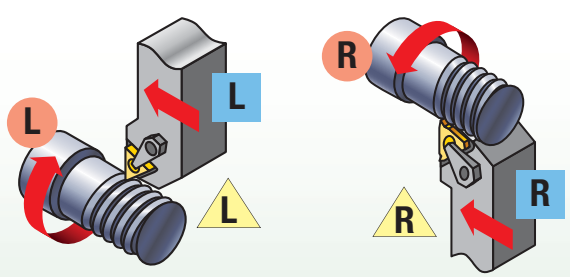
Step 1 • Select Threading Method and Hand of Tooling

Required Information:
- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.



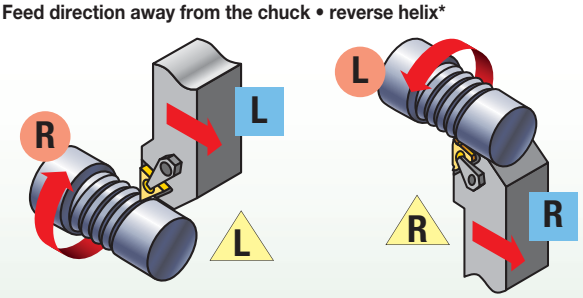
hand of thread | hand of toolholder | hand of insert

Feed direction toward the chuck • standard helix • RECOMMENDED



external left-hand thread | external right-hand thread | internal left-hand thread | internal right-hand thread

Feed direction away from the chuck • reverse helix*



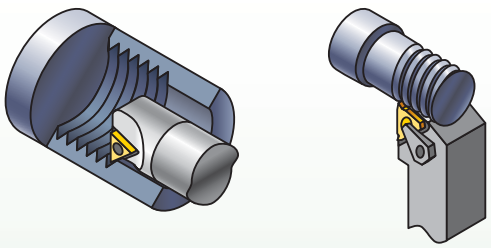
external right-hand thread | external left-hand thread | internal right-hand thread | internal left-hand thread

**Negative shim required*

Step 2 • Select Holder from Catalogue Page

Required Information:
- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

Select the appropriate holder for the insert size and hand:

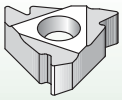


The insert size must match the gage insert size of your toolholder selection:

catalogue number	gage insert	minimum bore diameter	shim
S0812LSER2	2IRA60	16,5mm	–
S2020LSER3	3IR...	36,8mm	SM-YI3

Step 3 • Choose Insert for Application

- Select cresting inserts for fully controlled thread form including diameter.
- Cresting inserts eliminate the need for deburring and are optimised for the best tool life at that pitch.
- Non-cresting partial profile inserts offer the flexibility to cut a variety of thread pitches with one insert.
- Note insert size for toolholder selection.



insert size	catalogue number	TN6025
11	2IRA60	•
16	3IRAG60	•

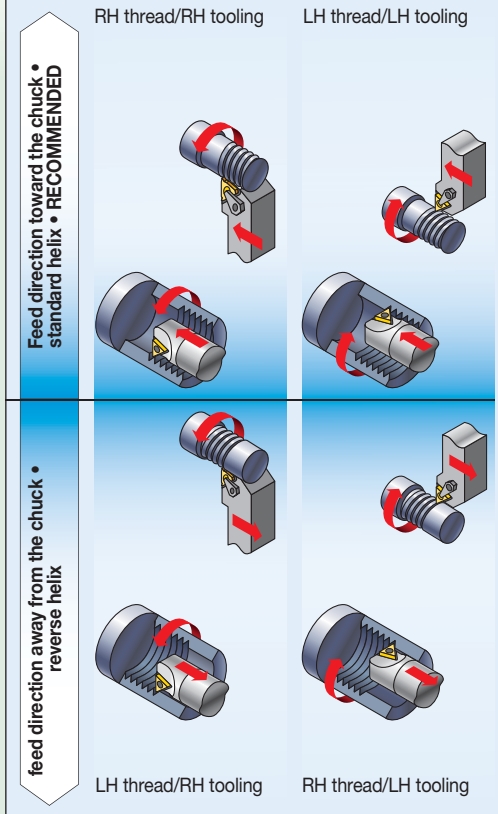
See threading insert overview on page F42.

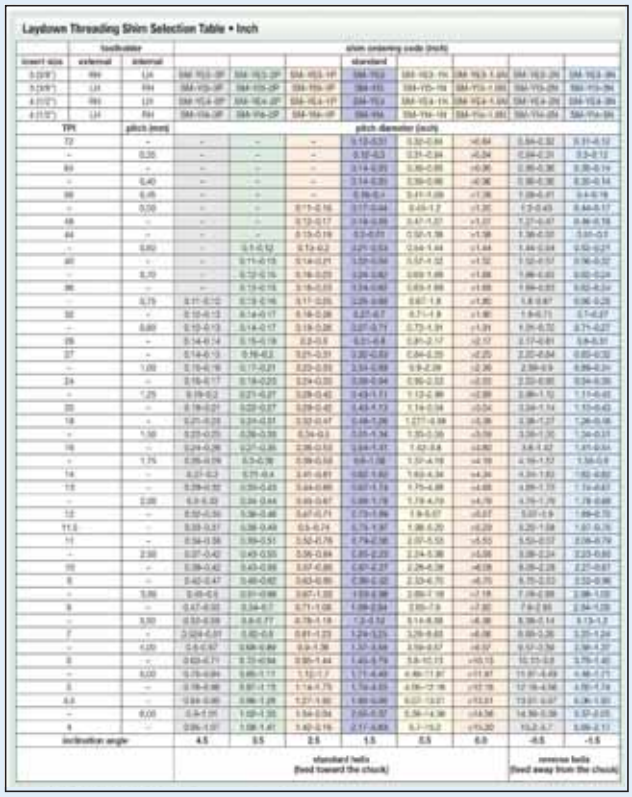
Step 4 • Select Appropriate Shim

Required Information:

- Thread form (TPI or pitch).
- Pitch diameter.
- Helix method (hand of tool, feed direction, hand of thread).
- Number of starts.

Select the proper shim: SMYE... for external RH or internal LH
SMYI... for internal RH or external LH



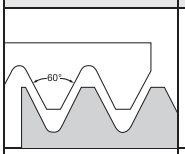
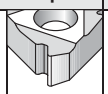
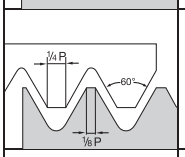
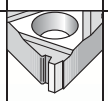
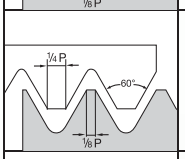
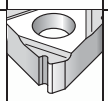
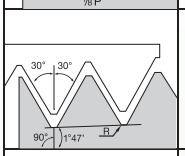
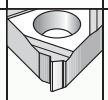
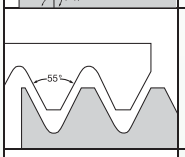
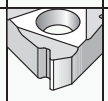
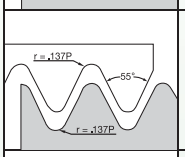
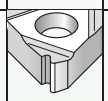
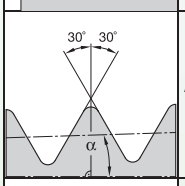
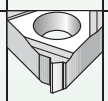
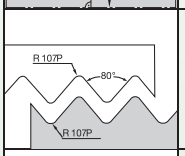
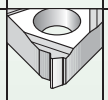
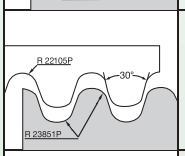
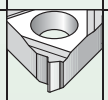
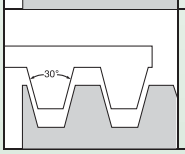
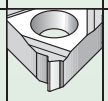


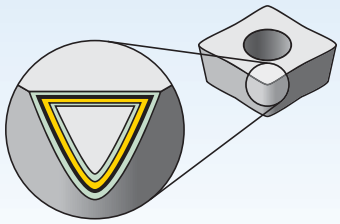
If recommended shim is different from shim supplied with toolholder, order shim separately.
NOTE: Optimise your threading operation by using the proper infeed angle and the recommended infeed values. See the Technical Section on pages F83–F105. Also see detailed shim selection information on pages F104–F105.

Step 5 • Select Grade and Speed

Recommendations for Grade and Speed Selection — m/min

workpiece material	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys
insert style	 precision ground				
first choice	TN6025	TN6025	TN6025	TN6025	TN6025
	40–200 (130–650)	40–135 (130–450)	60–145 (200–475)	50–360 (160–1150)	10–100 (35–330)

style			thread profile	standard	tolerance class	cresting	application	page(s)
	flat top							
	60		Partial profile 60°	—	—	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**F46—F47**
	ISO		Metric ISO	ISO R262, DIN 13	6g/6H	Y	Widely used metric 60° V-form for all industries.	**F48—F53**
	UN		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	**F54—F57**
	NPT		NPT	ANSI/ASME B1.20.1S1983	Standard NPT	N	National Pipe Thread standard 60° thread form for pipe fittings.	**F58—F59**
	55		Partial profile 55°	—	—	N	General use for 55° thread forms such as Whitworth, BSW, and BSP where non-cresting inserts are desired to cut a variety of pitches.	**F60—F61**
	W		Whitworth, BSW, BSF, BSP	BS 84:1956, ISO 228/1:1982, DIN 259	Medium Class A	Y	Widely used 55° form for gas and water connections.	**F62—F63**
	API-RD		API round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	**F64**
	PG		PG	DIN 404B0		Y	80° steel conduit thread.	**F65**
	RD		Round	DIN 405	7e/7H	Y	Round thread form for tube fittings in the chemical and food industries.	**F65—F66**
	TR		Trapez	DIN 103	7e/7H	N	30° truncated metric thread form for motion applications.	**F67—F68**

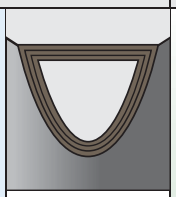


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

- Reduce cycle times — high speed capability.
- Longer tool life — new multilayer coating provides better wear resistance.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

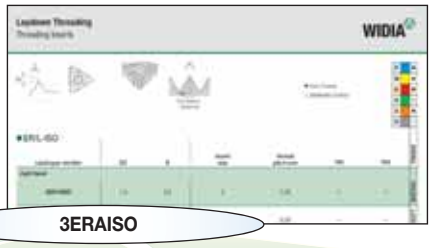
wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6025	 HC-P25	PVD-TiAlN Nano-multilayer coated carbide. General-purpose machining for steels, stainless steels, cast irons, non-ferrous materials, and difficult-to-machine materials. Recommended at low to medium cutting speeds when higher toughness is required.	P									
			M									
			K									
			N									
			S									

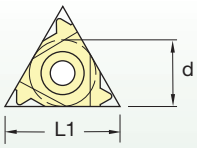
Laydown Threading Thread Form Guide

- All Laydown Threading inserts are precision ground to provide accurate thread forms and indexing.
- Both cresting and non-cresting partial profile inserts are specifically designed for either external or internal threading operations.
- Cresting inserts provide a fully controlled thread form, including diameter for a given pitch. The need for deburring is eliminated and the inserts are optimised for the best tool life at that pitch.
- Non-cresting partial profile inserts offer the flexibility to cut a variety of thread pitches with one insert.
- Right-hand Laydown Threading toolholders use right-hand inserts. Left-hand Laydown Threading toolholders use left-hand inserts.
- Right-hand Laydown Threading boring bars use right-hand inserts. Left-hand Laydown Threading boring bars use left-hand inserts.

Laydown Threading
Insert Identification System



3	E	R	A	ISO	
Insert Size	Insert Type	Hand of Insert	Thread Pitch	Thread Profile	Number of Teeth
	E – External thread **I** – Internal thread	**R** – Right-hand thread **L** – Left-hand thread			Single tooth profile – No symbol Multi-tooth profile – Number of teeth (cutting edge and symbol) Multi-tooth profile with two teeth – 2M



symbol	d	L1
2	0.250	11
3	0.375	16
4	0.500	22
5	0.625	27

Partial profile inserts

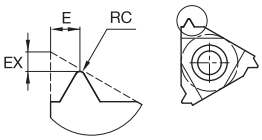
symbol	mm
A	0,5–1,5
AG	0,5–3,0
G	1,7–3,0
N	3,5–5,0
Q	5,5–6,0

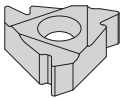
Full profile inserts

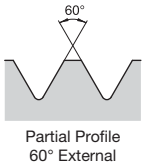
symbol	mm
Actual TPI	0,5–0,4

55	Partial Profile 55°
60	Partial Profile 60°
ISO	ISO Metric 60°
TR	ISO Metric 60°
UN	ISO Inch/American UN 60°
W	Whitworth 55°
NPT	American National Pipe Thread 60°
RD	Round
PG	Steel Conduit
APIRD	API Round

Material Group		Cutting Speed — vc m/min		
		TN6025		
		min	Start	max
P	0/1	130	**140**	150
	2	110	**145**	175
	3	110	**145**	175
	4	75	**95**	115
	5	100	**125**	145
	6	40	**55**	65
M	1	60	**75**	90
	2	40	**50**	55
	3	40	**50**	60
K	1	60	**80**	90
	2	60	**75**	85
	3	60	**75**	90
N	1	600	**750**	900
	2	535	**685**	835
	3	230	**300**	370
	4	135	**180**	225
	5	70	**90**	110
	6	445	**565**	690
	7	550	**700**	850
S	1	25	**35**	40
	2	15	**20**	20
	3	40	**60**	70
	4	20	**30**	35







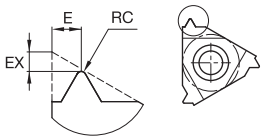
Partial Profile
60° External

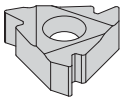
● first choice
○ alternate choice

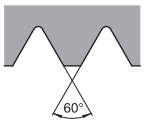
P		●
M		●
K		●
N		○
S		●
H		

ER/L-60

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2ERA60	0,05	0,9	0,8	2	0,50-1,5	48-16	–	2007404
3ERA60	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018214
3ERAG60	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2018246
3ERG60	0,28	1,2	1,7	3	1,75-3,0	14-8	–	2018222
4ERN60	0,53	1,7	2,5	4	3,5-5,0	7-5	–	2018252
5ERQ60	0,64	2,1	3,1	5	5,5-6,0	4.5-4	–	2018256
left hand								
3ELAG60	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2071904
3ELG60	0,28	1,2	1,7	3	1,75-3,0	14-8	–	2018236







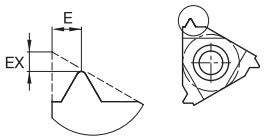
Partial Profile
60° Internal

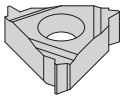
● first choice
○ alternate choice

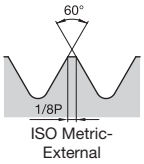
P		●
M		●
K		●
N		○
S		●
H		

IR/L-60

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2IRA60	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2018262
3IRA60	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018272
3IRAG60	0,05	1,2	1,7	3	0,50-3,0	48-8	–	2018284
3IRG60	0,15	1,2	1,7	3	1,75-3,0	14-8	–	2018278
4IRN60	0,31	1,7	2,5	4	3,5-5,0	7-5	–	2018290
5IRQ60	0,30	1,8	2,7	5	5,5-6,0	4.5-4	–	2018295
left hand								
2ILA60	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2021656
3ILAG60	0,05	1,2	1,7	3	0,50-3,0	48-8	–	2008275
3ILG60	0,15	1,2	1,7	3	1,75-3,0	14-8	–	2007419
4ILN60	0,31	1,7	2,5	4	3,5-5,0	7-5	–	2100489







● first choice
○ alternate choice

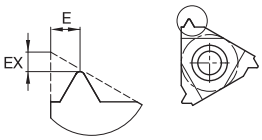
P		●
M		●
K		●
N		○
S		●
H		

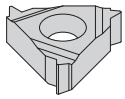
ER/L-ISO

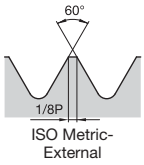
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2ER15ISO	1,0	0,8	2	1,50	–	–	2007542
3ER05ISO	0,6	0,4	3	0,50	–	–	2018377
3ER07ISO	0,6	0,6	3	0,70	–	–	2018389
3ER075ISO	0,6	0,6	3	0,75	–	–	2018395
3ER08ISO	0,6	0,6	3	0,80	–	–	2018403
3ER10ISO	0,7	0,7	3	1,00	–	–	2018411
3ER125ISO	0,8	0,9	3	1,25	–	–	2018421
3ER15ISO	0,8	1,0	3	1,50	–	–	2018429
3ER175ISO	0,9	1,2	3	1,75	–	–	2018445
3ER20ISO	1,0	1,3	3	2,00	–	–	2018460
3ER25ISO	1,1	1,5	3	2,50	–	–	2018472
3ER30ISO	1,2	1,6	3	3,00	–	–	2008256
4ER40ISO	1,6	2,3	4	4,00	–	–	2018501
4ER35ISO	1,6	2,3	4	4,50	–	–	2018495
4ER45ISO	1,7	2,4	4	4,50	–	–	2018508

(continued)

(ER/L-ISO — continued)





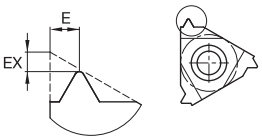


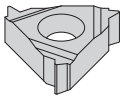
● first choice
○ alternate choice

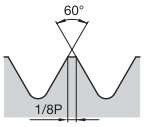
P	●
M	●
K	●
N	○
S	●
H	

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
4ER50ISO	1,7	2,5	4	5,00	–	–	2018517
5ER55ISO	2,7	1,9	5	5,50	–	–	2018522
5ER60ISO	2,9	2,0	5	6,00	–	–	2018528
left hand							
2EL05ISO	0,6	0,4	2	0,50	–	–	3118234
2EL06ISO	0,6	0,6	2	0,60	–	–	3118236
2EL07ISO	0,6	0,6	2	0,70	–	–	3118240
2EL075ISO	0,6	0,6	2	0,75	–	–	3118238
2EL08ISO	0,6	0,6	2	0,80	–	–	3118242
2EL10ISO	0,7	0,7	2	1,00	–	–	3118374
2EL125ISO	0,8	0,9	2	1,25	–	–	3118376
2EL15ISO	0,8	1,0	2	1,50	–	–	3118378
2EL175ISO	0,8	1,1	2	1,75	–	–	3118380
3EL035ISO	0,8	0,4	3	0,35	–	–	3122015
3EL04ISO	0,7	0,4	3	0,40	–	–	3122018
3EL045ISO	0,7	0,4	3	0,45	–	–	3122017

(ER/L-ISO — continued)



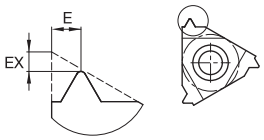


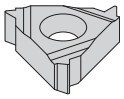


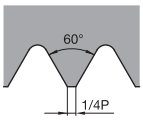
● first choice
○ alternate choice

P	●
M	●
K	●
N	○
S	●
H	

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3EL06ISO	0,6	0,6	3	0,60	–	–	3122021
3EL10ISO	0,7	0,7	3	1,00	–	–	2008187
3EL15ISO	0,8	1,0	3	1,50	–	–	2018435
3EL175ISO	0,9	1,2	3	1,75	–	–	2018447
3EL20ISO	1,3	1,0	3	2,00	–	–	2018466
3EL30ISO	1,2	1,6	3	3,00	–	–	2018489
4EL40ISO	1,6	2,3	4	4,00	–	–	2101539
4EL50ISO	1,7	2,5	4	5,00	–	–	2101597







ISO Metric-Internal

● first choice
○ alternate choice

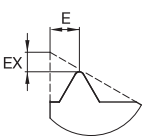
P		●
M		●
K		●
N		○
S		●
H		

IR/L-ISO

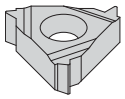
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR075ISO	0,6	0,3	2	0,75	–	–	2007585
2IR10ISO	0,6	0,7	2	1,00	–	–	2007613
2IR125ISO	0,6	0,7	2	1,25	–	–	2007622
2IR15ISO	0,8	1,0	2	1,50	–	–	2018550
2IR175ISO	0,9	1,1	2	1,75	–	–	2018564
3IR05ISO	0,6	0,6	3	0,50	–	–	2018582
3IR075ISO	0,6	0,6	3	0,75	–	–	2018596
3IR10ISO	0,6	0,7	3	1,00	–	–	2018612
3IR125ISO	0,8	0,9	3	1,25	–	–	2018626
3IR15ISO	0,8	1,0	3	1,50	–	–	2018636
3IR175ISO	0,9	1,2	3	1,75	–	–	2018652
3IR20ISO	1,0	1,3	3	2,00	–	–	2018663
3IR25ISO	1,1	1,5	3	2,50	–	–	2018674
3IR30ISO	1,1	1,5	3	3,00	–	–	2018684
4IR35ISO	1,6	2,3	4	3,50	–	–	2018695

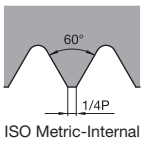
(continued)

(IR/L-ISO — continued)









ISO Metric-Internal

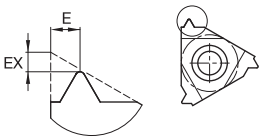
● first choice
○ alternate choice

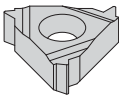
P		●
M		●
K		●
N		○
S		●
H		

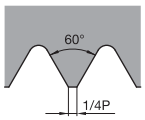
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
4IR40ISO	1,6	2,3	4	4,00	–	–	2018702
4IR45ISO	1,6	2,4	4	4,50	–	–	2018708
4IR50ISO	1,6	2,3	4	5,00	–	–	2018714
5IR55ISO	1,6	2,3	5	5,50	–	–	2021597
5IR60ISO	1,8	2,5	5	6,00	–	–	2018720
left hand							
2IL035ISO	0,8	0,4	2	0,35	–	–	3118382
2IL04ISO	0,7	0,4	2	0,40	–	–	3118384
2IL05ISO	0,6	0,4	2	0,50	–	–	3118386
2IL06ISO	0,6	0,6	2	0,60	–	–	3118387
2IL07ISO	0,6	0,6	2	0,70	–	–	3118390
2IL075ISO	0,6	0,6	2	0,75	–	–	3118389
2IL08ISO	0,6	0,6	2	0,80	–	–	3118392
2IL125ISO	0,8	0,9	2	1,25	–	–	3123198
2IL15ISO	0,8	1,0	2	1,50	–	–	2018557
2IL20ISO	0,9	1,1	2	2,00	–	–	2071923

(continued)

(IR/L-ISO — continued)





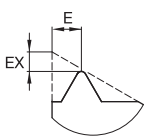


ISO Metric-Internal

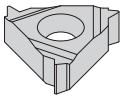
● first choice
○ alternate choice

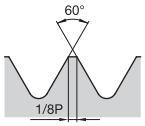
P		●
M		●
K		●
N		○
S		●
H		

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3IL035ISO	0,8	0,3	3	0,35	–	–	3124269
3IL04ISO	0,8	0,4	3	0,40	–	–	3124271
3IL05ISO	0,6	0,4	3	0,50	–	–	3124272
3IL06ISO	0,6	0,6	3	0,60	–	–	3124274
3IL07ISO	0,6	0,6	3	0,70	–	–	3124276
3IL075ISO	0,6	0,6	3	0,75	–	–	2018598
3IL15ISO	0,8	1,0	3	1,50	–	–	2018642
3IL20ISO	1,0	1,3	3	2,00	–	–	2018667
3IL25ISO	1,1	1,5	3	2,50	–	–	2018678
3IL30ISO	1,1	1,5	3	3,00	–	–	2018688
4IL40ISO	1,6	2,3	4	4,00	–	–	2102322
4IL45ISO	1,6	2,4	4	4,50	–	–	2102347
4IL50ISO	1,6	2,3	4	5,00	–	–	2076776
5IL55ISO	1,6	2,3	5	5,50	–	–	2642318
5IL60ISO	1,8	2,5	5	6,00	–	–	2642319









American
UN-External

● first choice
○ alternate choice

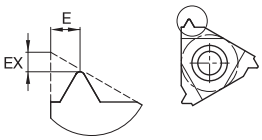
P		●
M		●
K		●
N		○
S		●
H		

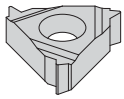
ER/L-UN

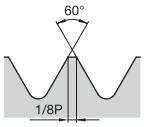
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER48UN	0,6	0,6	3	–	48	–	2018736
3ER40UN	0,6	0,6	3	–	40	–	2018744
3ER36UN	0,6	0,6	3	–	36	–	2018748
3ER32UN	0,6	0,6	3	–	32	–	2018752
3ER28UN	0,6	0,7	3	–	28	–	2018756
3ER27UN	0,8	0,7	3	–	27	–	2018760
3ER24UN	0,7	0,8	3	–	24	–	2018766
3ER20UN	0,8	0,9	3	–	20	–	2018772
3ER18UN	0,8	1,0	3	–	18	–	2018778
3ER16UN	0,9	1,1	3	–	16	–	2018782
3ER14UN	1,0	1,2	3	–	14	–	2018790

(continued)

(ER/L-UN — continued)





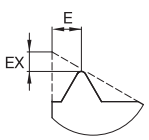


American
UN-External

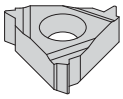
● first choice
○ alternate choice

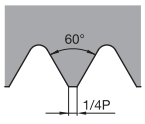
P	●	
M	●	
K	●	
N	○	
S	●	
H		

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3ER13UN	1,3	1,0	3	–	13	–	2018796
3ER12UN	1,1	1,4	3	–	12	–	2018802
3ER11UN	1,1	1,5	3	–	11	–	2018808
3ER10UN	1,1	1,5	3	–	10	–	2018814
3ER8UN	1,2	1,6	3	–	8	–	2018824
left hand							
3EL13UN	1,0	1,3	3	–	13	–	3122039
3EL12UN	1,1	1,4	3	–	12	–	2192607
3EL11UN	1,1	1,5	3	–	11	–	3122032
3EL10UN	1,1	1,5	3	–	10	–	3122028









American
UN-Internal

● first choice
○ alternate choice

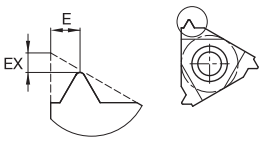
P		●
M		●
K		●
N		○
S		●
H		

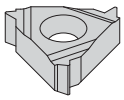
IR/L-UN

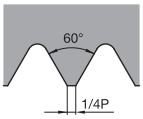
catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR32UN	0,6	0,6	2	–	32	–	2018860
3IR32UN	0,6	0,6	3	–	32	–	2018918
3IR28UN	0,6	0,7	3	–	28	–	2018922
3IR24UN	0,7	0,8	3	–	24	–	2018932
3IR20UN	0,8	0,9	3	–	20	–	2018938
2IR20UN	0,8	0,9	2	–	20	–	2018876
3IR18UN	0,8	1,0	3	–	18	–	2018944
2IR18UN	0,8	1,0	2	–	18	–	2018882
3IR16UN	0,9	1,1	3	–	16	–	2018950
2IR16UN	0,9	1,1	2	–	16	–	2018886
3IR14UN	0,9	1,2	3	–	14	–	2018955

(continued)

(IR/L-UN — continued)





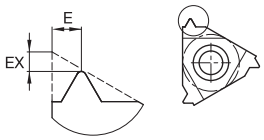


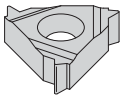
American
UN-Internal

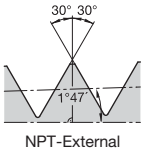
● first choice
○ alternate choice

P	●	
M	●	
K	●	
N	○	
S	●	
H		

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
3IR12UN	1,1	1,4	3	–	12	–	2018966
3IR10UN	1,1	1,5	3	–	10	–	2018979
3IR8UN	1,1	1,5	3	–	8	–	2018990
left hand							
3IL64UN	0,8	0,4	3	–	64	–	3122416
3IL56UN	0,7	0,4	3	–	56	–	3122414
2IL32UN	0,6	0,6	2	–	32	–	2102653
3IL12UN	1,1	1,4	3	–	12	–	2102749
3IL9UN	1,2	1,7	3	–	9	–	3122446
3IL8UN	1,1	1,5	3	–	8	–	3122444







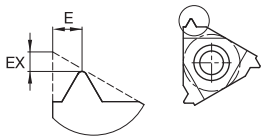
NPT-External

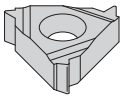
● first choice
○ alternate choice

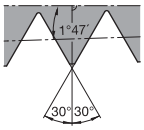
P		●
M		●
K		●
N		○
S		●
H		

ER/L-NPT

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER115NPT	1,1	1,5	3	–	11.5	.7500	2019298
3ER14NPT	0,9	1,2	3	–	14	.7500	2019288
3ER18NPT	0,8	1,0	3	–	18	.7500	2019278
3ER8NPT	1,3	1,8	3	–	8	.7500	2019305







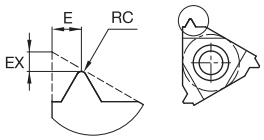
NPT-Internal

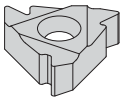
● first choice
○ alternate choice

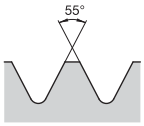
P		●
M		●
K		●
N		○
S		●
H		

IR/L-NPT

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3IR115NPT	1,1	1,5	3	–	11.5	.7500	2019335
3IR14NPT	0,9	1,2	3	–	14	.7500	2019329
3IR18NPT	0,8	1,0	3	–	18	.7500	2019323
3IR8NPT	1,3	1,8	3	–	8	.7500	2019339







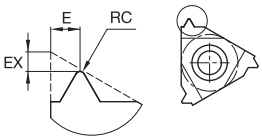
Partial Profile
55° External

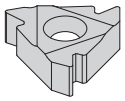
● first choice
○ alternate choice

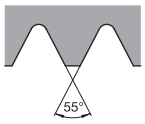
P		●
M		●
K		●
N		○
S		●
H		

ER/L-55

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ERA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018301
3ERAG55	0,08	1,2	1,7	3	0,50-3,0	48-8	–	2018314
3ERG55	0,20	1,2	1,7	3	1,75-3,0	14-8	–	2018308
4ERN55	0,43	1,7	2,5	4	3,5-5,0	7-5	–	2018320
left hand								
3ELG55	0,20	1,2	1,7	3	1,75-3,0	14-8	–	2008190







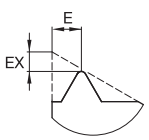
Partial Profile
55° Internal

● first choice
○ alternate choice

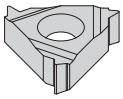
P		●
M		●
K		●
N		○
S		●
H		

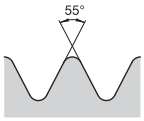
IR/L-55

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
2IRA55	0,05	0,8	0,9	2	0,50-1,5	48-16	–	2018328
3IRA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	2018334
3IRAG55	0,07	1,2	1,7	3	0,50-3,0	48-8	–	2018346
3IRG55	0,21	1,2	1,7	3	1,75-3,0	14-8	–	2018340
4IRN55	0,43	1,7	2,5	4	3,5-5,0	7-5	–	2018354
left hand								
3ILA55	0,05	0,8	0,9	3	0,50-1,5	48-16	–	3122449
3ILAG55	0,07	1,2	1,7	3	0,50-3,0	48-8	–	2018348









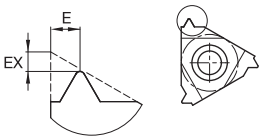
Whitworth BSW,
BSF, BSP-External

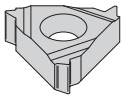
● first choice
○ alternate choice

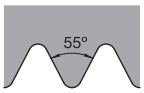
P		●
M		●
K		●
N		○
S		●
H		

ER/L-W

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER32W	0,6	0,6	3	–	32	–	2019023
3ER28W	0,6	0,7	3	–	28	–	2019029
3ER19W	0,8	1,0	3	–	19	–	2019055
3ER18W	0,8	1,0	3	–	18	–	2021677
3ER16W	0,9	1,1	3	–	16	–	2019061
3ER14W	1,0	1,2	3	–	14	–	2019071
3ER12W	1,1	1,4	3	–	12	–	2019077
3ER11W	1,1	1,5	3	–	11	–	2019083
3ER10W	1,1	1,5	3	–	10	–	2019089
3ER8W	1,2	1,5	3	–	8	–	2019101
4ER6W	1,6	2,3	4	–	6	–	2021725
left hand							
3EL11W	1,1	1,5	3	–	11	–	2065289
3EL8W	1,2	1,5	3	–	8	–	2103046







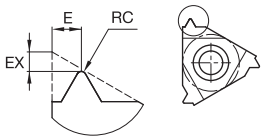
Whitworth
BSW, BSF,
BSP-Internal

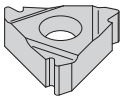
● first choice
○ alternate choice

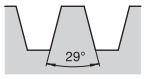
P		●
M		●
K		●
N		○
S		●
H		

IR/L-W

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
2IR19W	0,8	1,0	2	–	19	–	2019121
2IR14W	0,9	1,1	2	–	14	–	2019136
3IR19W	0,8	0,9	3	–	19	–	2019172
3IR16W	0,9	1,1	3	–	16	–	2019178
3IR14W	1,0	1,2	3	–	14	–	2019189
3IR12W	1,1	1,4	3	–	12	–	2019195
3IR11W	1,1	1,5	3	–	11	–	2019205
3IR8W	1,2	1,5	3	–	8	–	2019224
4IR6W	1,6	2,3	4	–	6	–	2019234







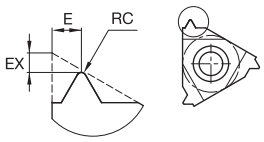
API Round-External

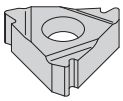
● first choice
○ alternate choice

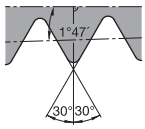
P		●
M		●
K		●
N		○
S		●
H		

■ ER-APIRD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ER10APIRD	0,34	1,2	1,4	3	–	10	.750	2019608



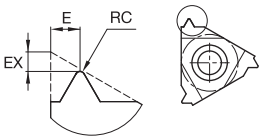


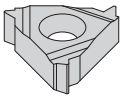


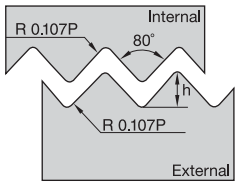
API Round-Internal

■ IR-APIRD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR10APIRD	0,34	1,2	1,4	3	–	10	.750	2019618
3IR8APIRD	0,40	1,3	1,5	3	–	8	.750	2019622







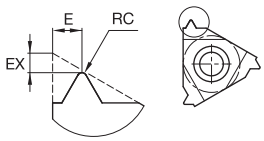
Defined by: DIN 40430

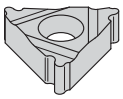
● first choice
○ alternate choice

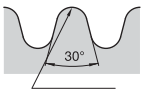
P		●
M		●
K		●
N		○
S		●
H		

IR-PG

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR16PG	0,11	1,1	0,8	3	–	16	–	2019441



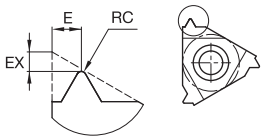


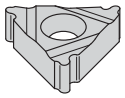


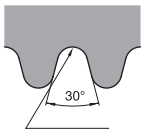
Round External

ER/L-RD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3ER8RD	0,76	1,4	1,3	3	–	8	–	2019347
4ER6RD	1,01	1,5	1,7	4	–	6	–	2019359
left hand								
3EL8RD	0,76	1,4	1,3	3	–	8	–	2071943







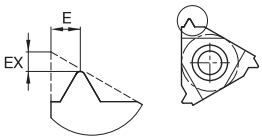
Round-Internal
R = 0,221P

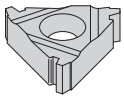
● first choice
○ alternate choice

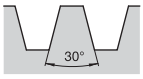
P		●
M		●
K		●
N		○
S		●
H		

IR/L-RD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand								
3IR10RD	0,70	1,1	1,2	3	–	10	–	2019375
3IR8RD	0,70	1,4	1,4	3	–	8	–	2019381
4IR6RD	0,93	1,5	1,7	4	–	6	–	2019394
4IR4RD	1,40	2,3	2,2	4	–	4	–	2019400
left hand								
3IL8RD	0,06	1,4	1,4	3	–	8	–	3122422







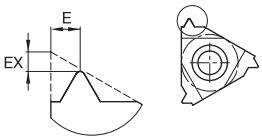
Trapez-External

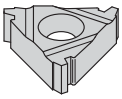
● first choice
○ alternate choice

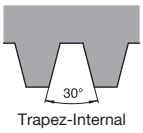
P		●
M		●
K		●
N		○
S		●
H		

ER/L-TR

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3ER2TR	1,1	1,3	3	2,00	–	–	2019453
3ER3TR	1,3	1,5	3	3,00	–	–	2019461
4ER4TR	1,7	1,9	4	4,00	–	–	2019469
4ER5TR	2,1	2,5	4	5,00	–	–	2019479
5ER6TR	2,3	2,7	5	6,00	–	–	2019487
left hand							
3EL3TR	1,3	1,5	3	3,00	–	–	2019463
4EL4TR	1,7	1,9	4	4,00	–	–	2019471







Trapez-Internal

● first choice
○ alternate choice

P		●
M		●
K		●
N		○
S		●
H		

IR/L-TR

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
right hand							
3IR3TR	1,3	1,5	3	3,00	–	–	2019511
4IR4TR	1,7	1,9	4	4,00	–	–	2019520
4IR5TR	2,1	2,5	4	5,00	–	–	2019528
5IR6TR	2,3	2,7	5	6,00	–	–	2019534

Laydown Threading
Toolholder Identification System



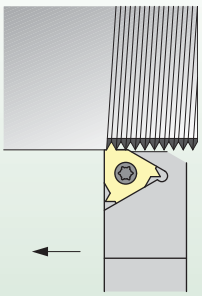
AL253R

A	L	25	3	R
Toolholder Construction	Tool Type	Shank Size	Insert Size	Hand of Tool

A —
Shim required

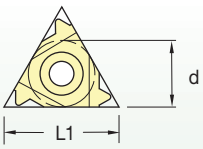
N —
Without shim

L — External Thread



Toolholders

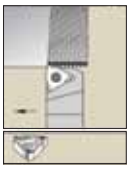
- First two numbers are shank height in mm.



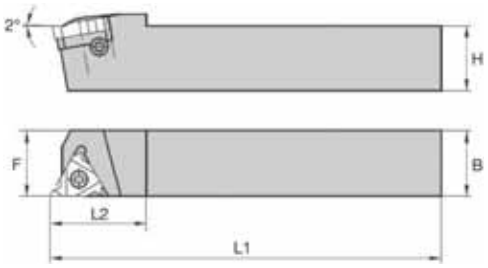
symbol	d	L1
2	6,35	11
3	9,52	16
4	12,7	22
5	15,88	27

RH —
Thread symbol R

LH —
Thread symbol L



See page F42
for inserts.

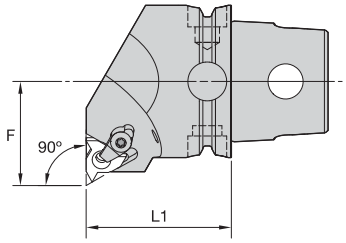


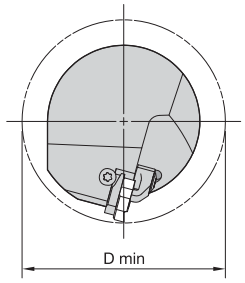
Right Hand Tool

■ N/A

order number	catalogue number	insert size	H	B	F	L1	L2	shim	shim screw	Torx	insert screw	Torx
right hand												
2022340	**NL82R**	2	8	8	11	136	18	**–**	**–**	–	**SSN2T**	T8
2009587	**AL163R**	3	16	16	16	100	25	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009591	**AL203R**	3	20	20	20	128	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009594	**AL253R**	3	25	25	25	153	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009597	**AL254R**	4	25	25	25	155	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009600	**AL323R**	3	32	32	32	173	30	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009603	**AL324R**	4	32	32	32	175	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2022589	**AL325R**	5	32	32	32	176	40	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
2016118	**AL404R**	4	40	40	40	205	36	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2016122	**AL405R**	5	40	40	40	206	40	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
left hand												
2071294	**AL163L**	3	16	16	16	100	25	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2071295	**AL203L**	3	20	20	20	125	30	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2114772	**AL254L**	4	25	25	25	150	36	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20



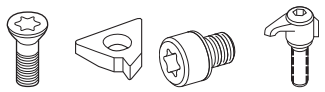






KM QUICK CHANGE

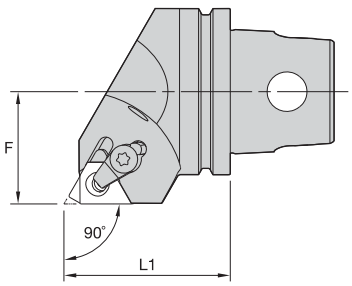
■ LSE-N 90° • Internal Only

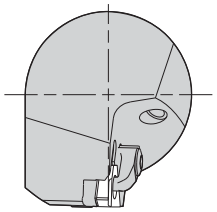


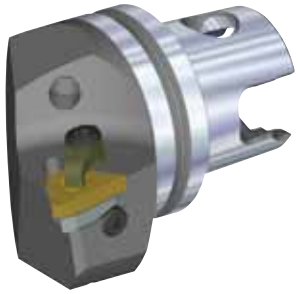
order number	catalogue number	L1 mm	L1 in	F mm	F in	D min mm	D min in	gage insert	insert screw	shim	shim screw	clamp assembly	kg	lbs
right hand														
3950832	**KM40TSLSER16N**	40	1.575	27	1.063	54	2.126	LT16NR	**SSA3T**	**SMYI3**	**SSY3T**	**CKC3**	0,35	.77
3950854	**KM40TSLSER22N**	40	1.575	27	1.063	54	2.126	LT22NR	**SSA4T**	**SMYI4**	**SSY4T**	**CKC4**	0,35	.77
3959399	**KM40TSLSER27N**	45	1.772	27	1.063	54	2.126	LT27NR	**SSA5T**	**SMYI5**	**SSY5T**	**CKC5**	0,39	.86
left hand														
3950831	**KM40TSLSEL16N**	40	1.575	27	1.063	54	2.126	LT16NL	**SSA3T**	**SMYE3**	**SSY3T**	**CKC3**	0,35	.77
3950853	**KM40TSLSEL22N**	40	1.575	27	1.063	54	2.126	LT22NL	**SSA4T**	**SMYE4**	**SSY4T**	**CKC4**	0,35	.77
3959398	**KM40TSLSEL27N**	45	1.772	27	1.063	54	2.126	LT27NL	**SSA5T**	**SMYE5**	**SSY5T**	**CKC5**	0,39	.86

NOTE: Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.



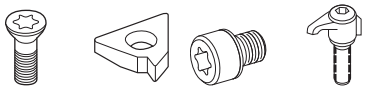






KM QUICK CHANGE

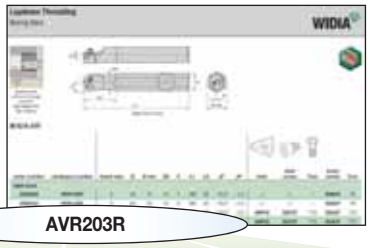
LSS 90°



order number	catalogue number	L1 mm	L1 in	F mm	F in	gage insert	insert screw	shim	shim screw	clamp assembly	kg	lbs
right hand												
3950857	**KM40TSLSSR16**	40	1.575	27	1.063	LT16ER	**SSA3T**	**SMYE3**	**SSY3T**	**CKC3**	0,31	.68
3950858	**KM40TSLSSR22**	40	1.575	27	1.063	LT22ER	**SSA4T**	**SMYE4**	**SSY4T**	**CKC4**	0,30	.66
3959401	**KM40TSLSSR27**	45	1.772	27	1.063	LT27ER	**SSA5T**	**SMYE5**	**SSY5T**	**CKC5**	0,37	.82
left hand												
3950855	**KM40TSLSSL16**	40	1.575	27	1.063	LT16EL	**SSA3T**	**SMYI3**	**SSY3T**	**CKC3**	0,32	.70
3950856	**KM40TSLSSL22**	40	1.575	27	1.063	LT22EL	**SSA4T**	**SMYI4**	**SSY4T**	**CKC4**	0,31	.68
3959400	**KM40TSLSSL27**	45	1.772	27	1.063	LT27EL	**SSA5T**	**SMYI5**	**SSY5T**	**CKC5**	0,37	.82

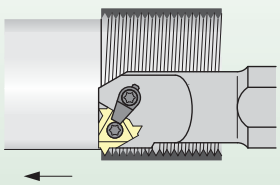
NOTE: Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.

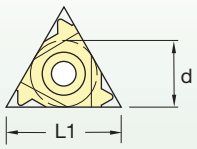
Laydown Threading
Boring Bar Identification System



A	VR		20	3	R
Shim Requirement	Tool Type	Coolant Capability	Shank Head Diameter	Insert Size	Hand of Tool
A – Shim required **N** – No shim required **O** – Miniature holder		**C** – With coolant	10, 12, 13, 16, 20, 25, 32, 40, 50 6.2 (Mini adjust) 8.0 (Mini adjust)		**RH** – Thread symbol R **LH** – Thread symbol L

VR – Internal round shank

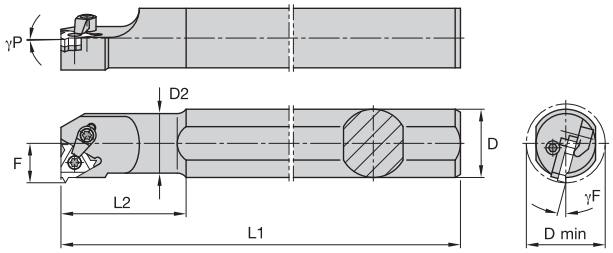




symbol	d	L1
2	6,35	11
3	9,52	16
4	12,7	22
5	15,88	27

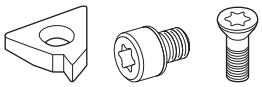


Steel shank without through coolant.
See page F42 for inserts.



Right Hand Tool

N/A-VR

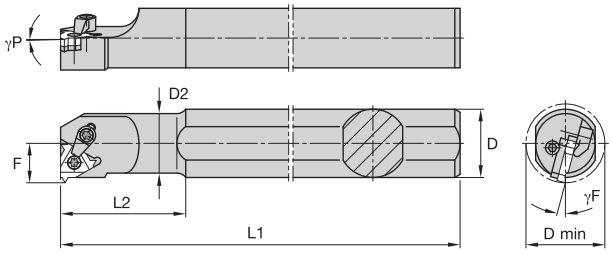


order number	catalogue number	insert size	D	D min	D2	F	L1	L2	γF°	γP°	shim	shim screw	Torx	insert screw	Torx
right hand															
2025828	**NVR102R**	2	20	13	10	7	180	25	-15,0°	-1,5	**–**	**–**	–	**SSN2T**	T8
2022342	**NVR132R**	2	20	16	13	9	180	32	-15,0°	-1,5	**–**	**–**	–	**SSN2T**	T8
2012307	**NVR163R**	3	20	20	16	12	180	40	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009609	**AVR203R**	3	20	24	20	13	180	50	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2022343	**NVR204R**	4	20	27	20	16	180	50	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009628	**AVR25D3R**	3	25	29	25	16	200	45	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009631	**AVR25D4R**	4	25	32	25	17	200	45	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009612	**AVR253R**	3	32	29	25	16	250	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009625	**AVR254R**	4	32	32	25	17	250	60	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009640	**AVR32D3R**	3	32	36	32	20	250	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009634	**AVR324R**	4	32	39	32	22	250	60	-15,0°	-1,5	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20
2009637	**AVR325R**	5	32	40	32	22	250	60	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
2009643	**AVR403R**	3	40	44	40	24	300	60	-15,0°	-1,5	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2009646	**AVR405R**	5	40	48	40	26	300	60	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
2009649	**AVR505R**	5	50	58	50	31	350	75	-15,0°	-1,5	**SMYI5**	**SSY5T**	T25	**SSA5T**	T25
left hand															
2071317	**NVR163L**	3	20	20	16	12	180	40	-15,0°	-1,5	**SMYE3**	**SSY3T**	–	**SSA3T**	T10
2071318	**AVR203L**	3	20	24	20	13	180	40	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2065134	**AVR25D3L**	3	25	29	25	16	200	45	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2065135	**AVR25D4L**	4	25	32	25	17	200	45	-15,0°	-1,5	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2114832	**AVR253L**	3	32	29	25	16	250	60	-15,0°	-1,5	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10

NOTE: Items listed without a shim are designed for a 1,5° inclination angle.



See page F42
for inserts.

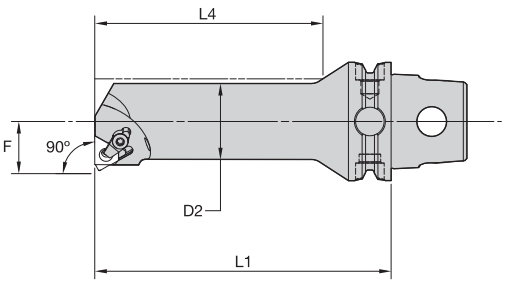


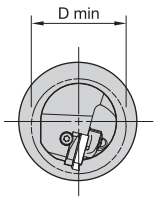
OVR

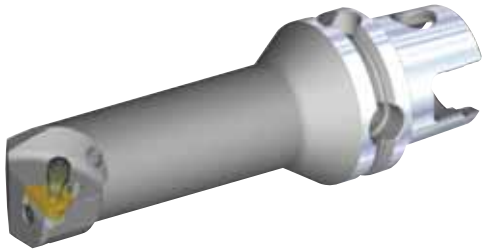
order number	catalogue number	insert size	D	D min	D2	F	L1	L2	γF°	γP°	screw	Torx driver	Torx
right hand													
2012325	**OVR122R**	2	12	13	10	7	100	25	-15,0°	-0,5	**12147789100**	**12148001100**	T8
2022345	**OVR152R**	2	15	16	13	9	100	32	-15,0°	-0,5	**12147789100**	**12148001100**	T8

NOTE: WIDIA™ miniature holders are for use on automatic machines as used in the optical and precision mechanics industries. The shank dimensions correspond to conventional hardmetal or HSS tools. Holders with round or square shanks are available. An internal RH tool can also be used for external LH threads in the same way an internal LH tool can be used for external RH threads. Please use correct inserts. The inclination angle on this tool is 0,5°. Tools are always clamped with the shank parallel to the part.









KM QUICK CHANGE

LSE 90°

order number	catalogue number	D min mm	D min in	D 2 mm	D 2 in	F mm	F in	L4 mm	L4 in	L1 mm	L1 in	gage insert	kg	lbs
right hand														
3955464	**KM40TSS10DLSER11**	13	.51	10	.39	7	.276	35	1.38	60	2.362	LT11NR	0,22	.49
3955466	**KM40TSS12ELSER11**	16	.63	12	.47	9	.354	42	1.66	70	2.756	LT11NR	0,25	.56
3955468	**KM40TSS16FLSER16**	20	.79	16	.63	11	.433	56	2.21	80	3.150	LT16NR	0,28	.61
3955470	**KM40TSS20GLSER16**	25	.98	20	.79	13	.512	70	2.76	90	3.543	LT16NR	0,34	.75
3955472	**KM40TSS25HLSER16**	32	1.26	25	.98	17	.669	75	2.95	100	3.937	LT16NR	0,50	1.11
3955474	**KM40TSS32JLSER16**	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT16NR	0,72	1.58
3955476	**KM40TSS32JLSER22**	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT22NR	0,71	1.56
left hand														
3955463	**KM40TSS10DLSEL11**	13	.51	10	.39	7	.276	35	1.38	60	2.362	LT11NL	0,22	.49
3955465	**KM40TSS12ELSEL11**	16	.63	12	.47	9	.354	42	1.65	70	2.756	LT11NL	0,25	.55
3955467	**KM40TSS16FLSEL16**	20	.79	16	.63	11	.433	56	2.21	80	3.150	LT16NL	0,28	.61
3955469	**KM40TSS20GLSEL16**	25	.98	20	.79	13	.512	70	2.76	90	3.543	LT16NL	0,34	.75
3955471	**KM40TSS25HLSEL16**	32	1.26	25	.98	17	.669	75	2.95	100	3.937	LT16NL	0,50	1.11
3955473	**KM40TSS32JLSEL16**	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT16NL	0,72	1.58
3955475	**KM40TSS32JLSEL22**	40	1.57	32	1.26	22	.866	96	3.78	110	4.331	LT22NL	0,71	1.56

(continued)

(LSE 90° — continued)

Spare Parts

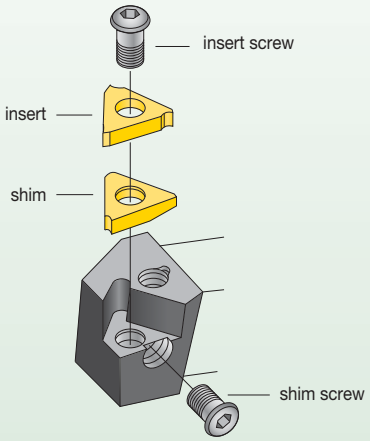
catalogue number	 insert screw	 shim	 shim screw	 clamp assembly
right hand				
KM40TSS10DLSER11	SSN2T	–	–	–
KM40TSS12ELSER11	SSN2T	–	–	–
KM40TSS16FLSER16	SN3TPKG	–	–	–
KM40TSS20GLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS25HLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS32JLSER16	SSA3T	SMYI3	SSY3T	CKC3
KM40TSS32JLSER22	SSA4T	SMYI4	SSY4T	CKC4
left hand				
KM40TSS10DLSEL11	SSN2T	–	–	–
KM40TSS12ELSEL11	SSN2T	–	–	–
KM40TSS16FLSEL16	SN3TPKG	–	–	–
KM40TSS20GLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS25HLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS32JLSEL16	SSA3T	SMYE3	SSY3T	CKC3
KM40TSS32JLSEL22	SSA4T	SMYE4	SSY4T	CKC4

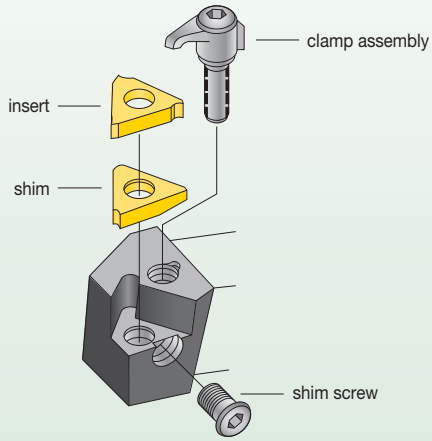
NOTE: Items listed without a shim are designed for a 1,5° inclination angle.
Cutting units are supplied with insert screw and clamp assembly. However, tools are designed to use either the insert screw or the clamp assembly, not both.

Laydown Threading Toolholders

In all cases, the proper shim selection is important.

WIDIA™ toolholders are supplied with a shim for a 1,5° lead angle. Change the shim if your thread is more than 1° different. For more details on proper shim selections, see pages F100–F101.





insert size and screw		insert screw	shim	shim screw and washer	clamp assembly
3ER		S-SA3T	SM-YIE3	S-SY3T	CK-C3
3EL		S-SA3T	SM-YI3	S-SY3T	CK-C3
4ER		S-SA4T	SM-YIE4	S-SY4T	CK-C4
4EL		S-SA4T	SM-YI4	S-SY4T	CK-C4
Laydown Threading boring bars					
2IR		S-SN2T	–	–	–
2IL		S-SN2T	–	–	–
3IR		S-SA3T	SM-YI3	S-SY3T	CK-C3
3IL		S-SA3T	SM-YIE3	S-SY3T	CK-C3
4IR		S-SA4T	SM-YI4	S-SY4T	CK-C4
4IL		S-SA4T	SM-YIE4	S-SY4T	CK-C4

SM	—	Y	E	3	—	2N
Shim		Y-shim for Laydown standard inserts	**E** — External **I** — Internal	**iC** — 16mm		Shim Angle

2P	2° positive
1P	1° positive
–	0°
1N	1° negative
2N	2° negative
3N	3° negative

resultant angle		3.5º	2.5º	1.5º	0.5º	-0.5º	-1.5º
insert size (iC)	toolholder	shim ordering code					
16mm	ex. RH/in. LH ex. LH/in. RH	SM-YE3-2P SM-YI3-2P	SM-YE3-1P SM-YI3-1P	SM-YE3 SM-YI3	SM-YE3-1N SM-YI3-1N	SM-YE3-2N SM-YI3-2N	SM-YE3-3N SM-YI3-3N
22mm	ex. RH/in. LH ex. LH/in. RH	SM-YE4-2P SM-YI4-2P	SM-YE4-1P SM-YI4-1P	SM-YE4 SM-YI4	SM-YE4-1N SM-YI4-1N	SM-YE4-2N SM-YI4-2N	SM-YE4-3N SM-YI4-3N

Slanted Shim Kit

Because you might occasionally need different shims than those supplied with our standard toolholders, we strongly recommend that shim kits be readily available in every tool shop.

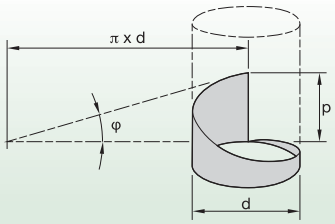
insert size	shim size (D)	ordering code	contains slanted shims
3x	16mm	ABY3	SM-YE3-2P, 1P, 1N, 2N, 3N SM-YI3-2P, 1P, 1N, 2N, 3N
4x	22mm	ABY4	SM-YE4-2P, 1P, 1N, 2N, 3N SM-YI4-2P, 1P, 1N, 2N, 3N

The Helix Angle

Example:
d = 48,06mm (1.892")
p = 3,175mm (.125")

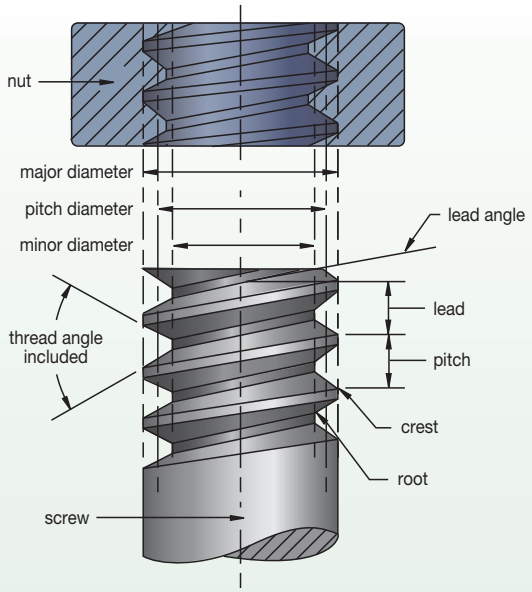
ϕ = Helix angle
p = pitch
d = pitch diameter

$$\phi = \arctan\left(\frac{p * starts}{\pi * \varnothing}\right) = 1.13°$$



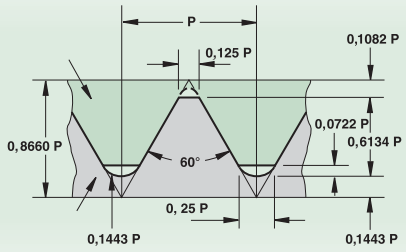
Screw Thread Definitions

1. Major diameter — The largest diameter of a straight screw thread. This applies to both internal and external threads.
2. Pitch diameter — On a straight thread, it is the diameter which passes through the thread profiles at such points which make the thread width of the groove equal to one-half of the basic pitch. On a "perfect thread," this occurs at the point where the widths of the thread and groove are equal.
3. Thread angle (included) — The included angle between the individual flanks of the thread form.
4. Minor diameter — The smallest diameter of a straight screw thread. This applies to both internal and external threads.
5. Lead angle — On a straight thread, the lead angle is the angle created by the helix of the thread at the pitch diameter with a plane perpendicular to the axis.
6. Lead — The distance a screw thread advances axially in one revolution. On a single start, the pitch and lead are identical. The lead is equal to the pitch times the number of starts.
7. Pitch — The distance from a point on a screw thread to a corresponding point on the next thread measured parallel to the thread axis.
8. Crest — The outer most surface of the thread form which joins the flanks.
9. Root — The inner most surface of the thread form which joins the flanks.



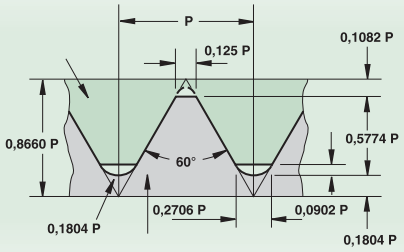
NOTE: Threads per inch (TPI) not shown:
The number of threads per inch measured axially.
The terms pitch and TPI are often used interchangeably. TPI = 1/pitch

ISO M (Metric) and UN (Unified National)



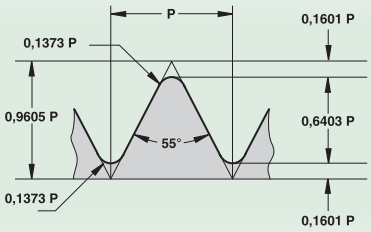
Use: All branches of mechanical industry.

UNJ (controlled root radius)



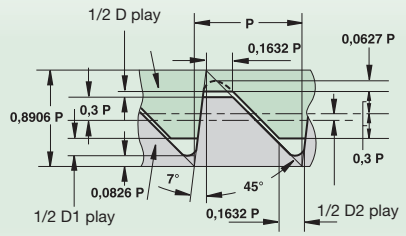
Use: Aircraft and space industry.

Whitworth (BSW)



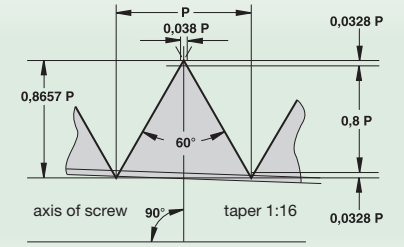
Use: Fittings and pipe couplings for gas, water, and sewer lines (replaced by ISO).

American Buttress



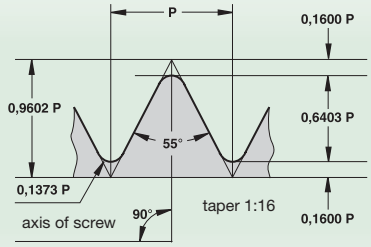
Use: Fittings and pipe couplings.

NPT (American National Pipe Thread)



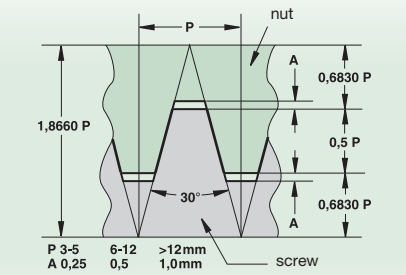
Use: Fittings and pipe couplings.

BSPT (British Standard Pipe Thread)



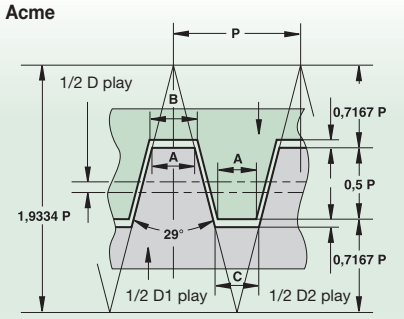
Use: Pipe thread for steam, gas, and water lines.

TR DIN 103



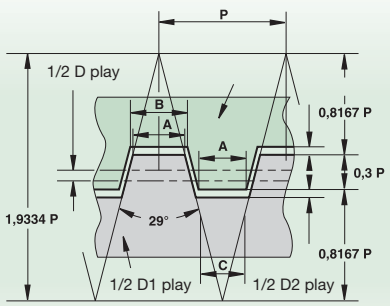
Use: Mechanical industry for motion transmission screws.

Acme



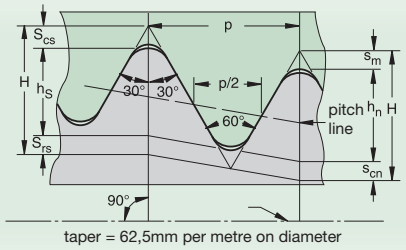
A = 0,0307 P
B = 0,3707 P—x D play
C = 0,3707 P—(D1 play—D2 play)
Use: Acme-General is used in mechanical industry for motion transmission screws.

Acme, truncated (Stub)



A = 0,4224 P
B = 0,4224 P—x D play
C = 0,4224 P—(D1 play—D2 play)
Use: Where normal Acme is too deep.

API Casing and Tubing Round Thread Form



NOTE: Taper shown exaggerated.

Suggested Grades and Speeds for Threading Various Workpiece Materials

workpiece group	workpiece material	recommended surface speed — SFM		
		uncoated	PVD coated	
		THM	TN6010	TN6025
free-machining carbon steel	10L18, 10L45, 1213, 12L13, 12L14, 1140, 1141, 11L44, 1151, 10L50	—	91–98	45–198
plain carbon steel	10063, 1008, 1010, 1015, 1018, 1020, 1025, 1026, 1108, 1117	—	76–198	45–175
alloy steels/tool steels 150–325 HB (up to 35 HRC)	1042, 1045, 1070, 1080, 1085, 1090, 1095, 1541, 1561, 1572, 5140, 8620, W1, O1, S1, P20, H13, D2, A6, H13, L6	—	76–198	38–167
alloy steels/tool steels 330–450 HB (36–47 HRC)		—	61–160	—
martensitic/ferritic stainless/precipitation hardening	416, 420F, 440F, 405, 409, 429, 430, 434, 436, 442, PH	—	45–160	30–120
austenitic stainless steel	201, 202, 301, 302, 303, 304, 304, 305, 321, 347, 348, 310, 314, 316, 316L, 330	61–106	61–198	46–137
grey cast iron 135–270 HB	class 20, 30, 35, 45	61–91	61–237	46–122
grey cast iron 275–450 HB	class 50, 55, 60	45–76	45–175	15–76
alloy/ductile iron	A536, J434C, 60-40-18, 80-55-06, 100-70-03	45–76	45–650	100–525
free-machining aluminium alloys	2024-T4, 2014-T6, 6061-T6 2011-T3, 3003-H18, A2, Alcan, Alcoa 510, Duralumin	122—244	122—265	—
high-silicon aluminium alloys	A380, A390, A380-1, A390-1, A380-2	—	—	—
copper/zinc/brass		76–183	76–304	46–236
non-metallics	Graphite, Nylon, Plastics, Rubbers, Phenolics, Carbon	122–457	122–396	46–305
high-temperature alloys 125–269 HB (up to 27 HRC)	Nickel 200, Monel, R405, Monel K500, INCONEL 600, INCONEL® 625/901x750/718, Waspaloy, Hastelloy C	24–37	24–122	13–76
high-temperature alloys 260–450 HB (26–47 HRC)	Rene 95, Waspaloy A286, Incoloy 800, Haynes 188, Stellite F, Haynes 25	24–30	30–76	6—61
titanium alloys	Ti-6Al-4V, TI-5Al-2.5Sn	34–55	34–99	—

NOTE: When workpiece hardness levels are at the top of a range, starting m/min should be at the lower end. Regularly inspect insert clamps for worn flats.

Edge preparation:
Uncoated — sharp
PVD coated — light hone except positive top rake, top rake-sharp

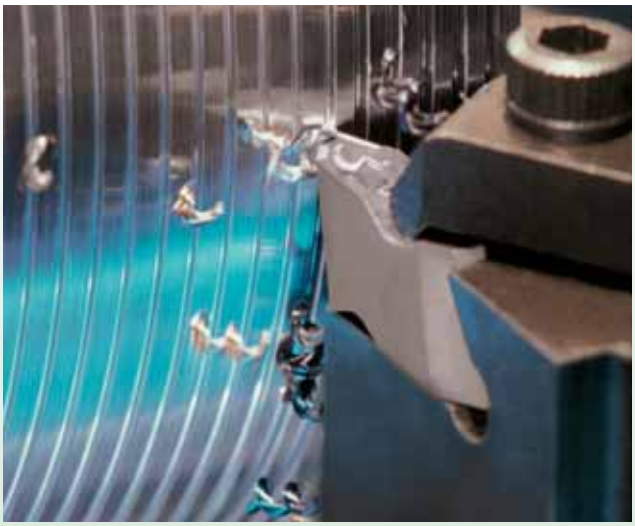
problem	cause	possible solution
thread with torn finish 	• Burs. • Torn finish. • Steps. • Improper shim. • Improper infeed.	• Use modified flank infeed. • Use full profile insert. • Increase coolant concentration. • Increases m/min. • Check machine “Z” travel axis. • Check insert form. • Check for correct shim in LT system. • Calculate flank clearance.
chatter 	• Poor rigidity. • Insert movement. • Improper infeed. • Off centreline.	• Use modified flank infeed. • Minimise tool overhang. • Check for workpiece deflection. • Check insert and clamp. • Verify that tool cutting position is at workpiece centreline. • Adjust number of passes. Fewer passes reduce chatter.
built-up edge 	• Speed too low. • Insufficient coolant. • Chip load.	• Increase m/min. • Increase coolant concentration and/or flow. • Adjust infeed angle. • Increase depth of cut per pass.
deformation 	• Wrong grade. • Speed too high. • Improper infeed angle. • Insufficient coolant.	• Use modified flank infeed. • Use a more wear-resistant grade (e.g., TN6010™). • Reduce m/min. • Increase coolant flow.
chipping 	• Improper infeed. • Chip load. • Wrong grade. • Incorrect speed. • Poor rigidity.	• Use modified flank infeed. • Increase or decrease number of passes. • Eliminate spring passes. • Use tougher grade (e.g., TN6025™). • Increase m/min if chipping on trailing edge. • Decrease m/min if chipping on leading edge. • Minimise tool overhang. • Check for insert movement/check clamp. Torque screw or clamp to correct value. • Check for possible part deflection. • Calculate flank clearance. • Ensure correct shim.
broken nose 	• Heavy chip load. • Small nose radius. • Wrong grade. • Improper infeed.	• Use modified flank infeed. • Decrease chip load. • Use large nose radius if possible. • Use tougher grade (e.g., TN6025).
flank wear 	• Improper shim. • Wrong grade. • Insufficient coolant. • Off centreline. • Insufficient flank clearance. • Improper infeed angle.	• Ensure correct shim. • Use a more wear-resistant grade (e.g., TN6025). • Increase coolant flow. • Check the centreline height of the tool. (The smaller the diameter, the more critical the need for centreline accuracy.) • Calculate flank clearance and change shim to increase clearance on worn flank. • If wear is on trailing flank, increase infeed angle clearance.

problem	possible solution																
	increase m/min	reduce m/min	increase chip load	decrease chip load where failure occurs	use tougher carbide grade	use harder carbide grade	apply coolant	use coated carbide	use topping insert	change infeed angle	check for insert movement and reseat	reduce tool overhang	reselect shim	apply chipbreaker style	reduce DOC	adjust centre height	begin cutting threads 12mm before workpiece	change infeed method
chatter	•			•							•	•				•		•
bur on crest	•								•									•
short tool life		•	•	•		•		•										•
chipped leading edge			•	•	•													
chipped trailing edge					•					•								
broken nose (first pass)	•														•	•		
broken nose (after first pass)				•	•					•			•					•
built-up on cutting edge	•		•				•	•										•
premature topping													•					
splitting threads																	•	
poor chip evacuation														•				•

WIDIA™ insert technology brings chip control to your threading operations with the TopThread™ platform. The proprietary WIDIA recessed chip groove, when used according to our recommendations, controls the chip in most applications. Our positive rake design lowers cutting pressures, which in turn lowers damaging heat generation thus providing better tool life. Long, stringy chips no longer mar the workpiece surface finish. The danger to operators when removing long chips from the workpiece and chuck is eliminated. All of these benefits combine to improve the productivity of your threading operations.

The Last Pass

Some CNC controls require the last pass to be at a 0° infeed angle because the chip will not break on the last pass. On most carbon and alloy steels, the last pass can remain at 0,127mm depth of cut and produce an acceptable finish. For some materials, a 0,025mm to 0,076mm (spring) pass may be used to improve surface finish, however, chipbreaking action may be compromised.

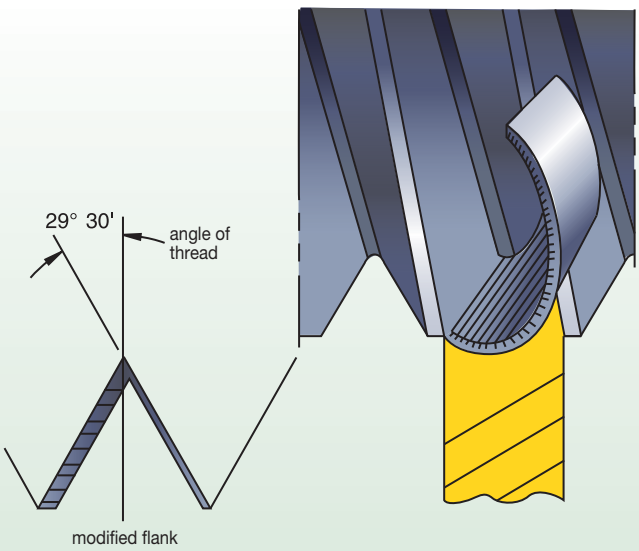


Machine Programming

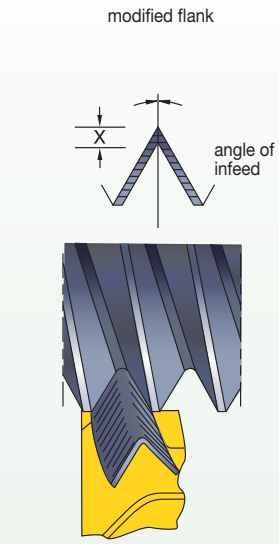
Modern CNC controls allow the programmer to easily adjust infeed angle, the number of passes, and depth of cut for each pass. The chip control threading insert performs best at an infeed angle of 29° 30', although 15° to 30° is acceptable. Also, it is important to maintain a minimum of 0,127mm depth of cut on every pass. In most applications, use of CNC canned cycles produce only marginally successful results. Custom written programmes are better and are recommended.

Infeed Angle

In order to effectively and consistently break the chip, it is important to use an infeed angle between 28° and 29° 30'. Do not apply chip control inserts at infeed angles less than 15°.



Radial



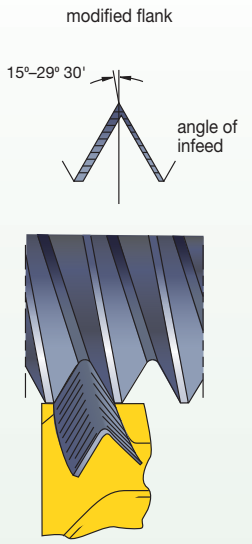
Advantage —

- Cutting on both sides of the thread form places all of the cutting edge in the cut and protects edge from chipping.
- Even wear on the insert.

Disadvantage —

- Tool develops a channel chip that may be difficult to handle.
- Tip chipping occurs when cutting high-tensile materials.
- Bur condition is increased.
- Entire cutting edge is engaged at finish of thread, causing increased tendency to chatter.

Modified flank



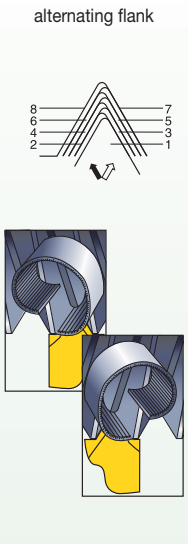
Advantage —

- Tool cuts both sides of thread form, so it is protected from chipping similar to 0° infeed. Channel-type chip develops, but uneven chip thickness helps remove the chip similar to flank infeed.
- This is the preferred method, especially when used with a chip control insert.
- Combined radial and/or alternating flank infeed.
- Results in good tool life, with wear evenly distributed over both flanks.

Disadvantage —

- Similar disadvantages as with 0° infeed, although reduced somewhat in magnitude as cutting forces are better equalised and chip flow is much less of a problem.

Alternating flank



Advantage —

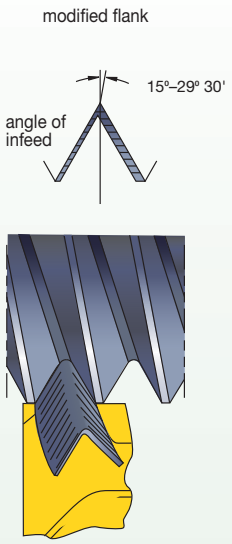
- Increased tool life because both edges are used equally.

NOTE: Some machine tools may require special programming techniques to achieve this method of infeed.

Disadvantage —

- Difficult to cut on conventional machinery.

Reversed modified flank



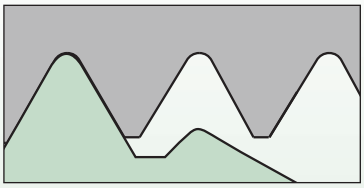
Advantage —

- Tool cuts both sides of thread form, so it is protected from chipping similar to 0° infeed. Channel-type chip develops, but uneven chip thickness helps remove the chip similar to flank infeed.
- This is the preferred method, especially when used with a chip control insert.
- Combined radial and/or alternating flank infeed.
- Results in good tool life, with wear evenly distributed over both flanks.
- As chip flow is the reversed feed direction, it is an excellent choice for internal threading.

Disadvantage —

- Programming needs to be done line by line.

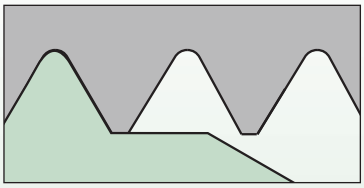
Partial Profile



Tooth profile with universal profile shape:

- 55° or 60° without cutting edges for the tooth tapers.
- Reduced inventory.
- For various pitches in a limited range.
- Preferably one time production.
- Major/minor diameters must be accurately pre-turned.

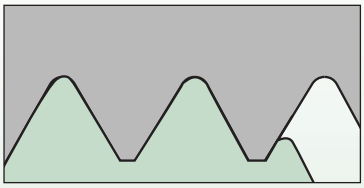
Full Profile



Tooth profile with full profile shape including tooth height:

- For bur-free, precise threads in the specified pitch.
- General application.
- Machining allowance for outside/core diameter around 0,1–0,15mm.

Multi-Tooth Profile



Multi-tooth full profile generally with 2–3 teeth:

- Highly productive threading with fewer passes and longer tool life.
- Requires a rigid setup and long thread pass through.
- Minimum clearance width approximately 1.25 x E as per indexable insert dimensions table.

Formulas

Metric Formula		
to find	**given**	**formula**
m/min	D (mm) RPM	$m/min = \frac{\pi \times D}{1000} \times RPM$
RPM	D (mm) m/min	$RPM = \frac{m/min \times 1000}{D \times \pi}$

Legend

m/min	=	metres per minute
RPM	=	revolutions per minute
D	=	part diameter
π	=	3.1416

Maximum Cutting Speeds

On older machines, cutting speed is often limited by the maximum travel speed mm/min of the tool allowed by the machine.

Check your maximum speed with the following formulas:

metric formula: maximum cutting speed (m/min) =
part diameter (mm) x 3.14 x (1/pitch) x $\frac{\text{max mm/min}}{1000\text{mm}}$

Flank clearance

γ = arctan (sin (β/2) * tan(α))
γ = side (flank) clearance
β = included angle of thread form
α = radial inclination angle

Thread	Angle	External	Internal
UN & ISO	60	5.3	8
BSW	55	4.8	7.3
TR	30	2.6	4
ACME	29	2.6	3.9
AMBUT	7	.6	.9
AMBUT	45	4	6

Recommendation for Threading Infeed Passes

TPI	48–32	28–24	20–16	14–12	11.5–9	8–6	5–4	3–2
metric pitch (mm)	0,50–0,75	0,80–1	1,25–1,5	1,75–2	2,5–3	3,5–4	4,5–6	8
Thread Type	**recommended number of passes**							
Common V-thread forms ISO, UN, UNJ, NPT, Whitworth, BSPT, API Rotary Shoulder	4–5	5–6	6–8	8–10	9–12	12–15	14–16	15–25
Acme, Trapez, Round, API Round	–	–	5–6	7–8	10–11	12–13	13–15	18–20
Stub Acme, API Buttress	–	–	5	5–6	7–8	8–10	10–12	14–16
American Buttress	–	–	7–8	9–10	11–12	13–15	17–19	22–24

Maintain minimum 0,05mm infeed on last passes to avoid work hardening and excessive abrasion of the threading tool.

Constant Volume Infeed Values for Threading Operations

In most applications, use of CNC canned cycles produces only marginally successful results. For example, an 8-pitch external thread has a depth of 2mm (.0789").

$$\Delta ap_x = \frac{ap}{\sqrt{nap-1}} * \sqrt{\phi}$$

Formula for constant chip load infeed

Δap	=	radial infeed
x	=	actual pass (from 1 to the nap)
nap	=	number of passes
ϕ	=	1st pass, 0.3
		2nd pass, 1
		3rd pass and up, x-1

Using Radial Infeed

Bending stress on the cutting edge caused by V-shaped chips from long-chipping steel workpiece materials.

High cutting forces with small cutting thicknesses require sharp edges with high strength.

Using Flank Infeed

Lower bending stress and stabilised cutting edges produce more favourable chip shapes and larger cutting thicknesses.

Carbides with high hardness, good wear resistance, and temperature stability are advantageous.

Guidelines for Infeeds – How to Determine the Number and the Size of Passes

The number of passes “s” per thread is decisive for successful threading and crest turning. The following tables give standard values for the application condition when machining steel. The proper number of passes must be determined empirically.

If insert breakage occurs, the number of passes must be increased. With increased wear, we recommend decreasing the number of passes. The chip thickness should not be less than 0,05mm. The allowance at the diameter should not exceed 0,2mm.

Metric ISO, External Thread Cutting

pitch (mm)	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,50	3,00	3,50	4,00	4,50	5,00
T Ap (mm)	0,305	0,457	0,610	0,762	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073
N Ap	4	4	5	6	6	8	8	10	12	14	15	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,096	0,145	0,167	0,187	0,224	0,221	0,252	0,278	0,302	0,328	0,361	0,405	0,435
2	0,080	0,119	0,138	0,154	0,185	0,182	0,208	0,230	0,249	0,271	0,298	0,335	0,359
3	0,073	0,109	0,126	0,141	0,169	0,167	0,191	0,210	0,228	0,248	0,273	0,306	0,329
4	0,056	0,084	0,097	0,108	0,130	0,128	0,146	0,161	0,175	0,190	0,209	0,235	0,252
5			0,082	0,091	0,110	0,108	0,123	0,136	0,148	0,160	0,176	0,198	0,213
6				0,080	0,097	0,095	0,109	0,120	0,130	0,141	0,155	0,175	0,187
7						0,086	0,098	0,108	0,118	0,128	0,141	0,158	0,169
8						0,079	0,090	0,100	0,108	0,118	0,129	0,145	0,156
9								0,093	0,101	0,109	0,120	0,135	0,145
10								0,087	0,095	0,103	0,113	0,127	0,136
11									0,089	0,097	0,107	0,120	0,129
12									0,085	0,092	0,102	0,114	0,122
13										0,088	0,097	0,109	0,117
14										0,085	0,093	0,105	0,112
15											0,090	0,101	0,108
16													0,104
T Ap (mm)	0,305	0,457	0,610	0,762	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Metric ISO, Internal Thread Cutting

thread pitch P (mm)	0,50	0,75	1,00	1,25	1,50	1,75	2,00	2,50	3,00	3,50	4,00	4,50	5,00
T Ap (mm)	0,279	0,406	0,533	0,686	0,813	0,940	1,092	1,346	1,626	1,905	2,159	2,438	2,718
N Ap	4	4	5	6	6	8	8	10	11	12	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,088	0,129	0,146	0,168	0,199	0,195	0,226	0,246	0,282	0,315	0,328	0,357	0,384
2	0,073	0,106	0,121	0,139	0,164	0,161	0,187	0,203	0,232	0,260	0,271	0,295	0,317
3	0,067	0,097	0,110	0,127	0,151	0,147	0,171	0,186	0,213	0,238	0,248	0,270	0,291
4	0,051	0,075	0,085	0,097	0,116	0,113	0,131	0,143	0,163	0,183	0,190	0,207	0,223
5			0,071	0,082	0,097	0,095	0,111	0,120	0,138	0,154	0,160	0,175	0,188
6				0,072	0,086	0,084	0,097	0,106	0,121	0,136	0,141	0,154	0,166
7						0,076	0,088	0,096	0,110	0,123	0,128	0,139	0,150
8						0,070	0,081	0,088	0,101	0,113	0,118	0,128	0,138
9								0,082	0,094	0,105	0,109	0,119	0,128
10								0,077	0,088	0,099	0,103	0,112	0,120
11									0,083	0,093	0,097	0,106	0,114
12									0,000	0,089	0,092	0,101	0,108
13										0,000	0,088	0,096	0,103
14										0,000	0,085	0,092	0,099
15											0,000	0,089	0,096
16													0,092
T Ap (mm)	0,279	0,406	0,533	0,686	0,813	0,940	1,092	1,346	1,626	1,905	2,159	2,438	2,718

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

UN Thread, External Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,660	0,787	0,864	0,965	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073
N Ap	5	6	6	7	9	9	10	11	12	13	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,181	0,193	0,212	0,216	0,177	0,207	0,223	0,264	0,302	0,341	0,374	0,405	0,435
2	0,149	0,159	0,175	0,178	0,146	0,171	0,184	0,218	0,249	0,282	0,309	0,335	0,359
3	0,137	0,146	0,160	0,163	0,134	0,156	0,168	0,200	0,228	0,258	0,283	0,306	0,329
4	0,105	0,112	0,123	0,125	0,103	0,120	0,129	0,153	0,175	0,198	0,217	0,235	0,252
5	0,088	0,094	0,103	0,106	0,087	0,101	0,109	0,129	0,148	0,167	0,183	0,198	0,213
6		0,083	0,091	0,093	0,076	0,089	0,096	0,114	0,130	0,147	0,161	0,175	0,187
7				0,084	0,069	0,080	0,087	0,103	0,118	0,133	0,146	0,158	0,169
8					0,063	0,074	0,080	0,095	0,108	0,122	0,134	0,145	0,156
9					0,059	0,069	0,074	0,088	0,101	0,114	0,125	0,135	0,145
10							0,070	0,083	0,095	0,107	0,117	0,127	0,136
11								0,078	0,089	0,101	0,111	0,120	0,129
12									0,085	0,096	0,105	0,114	0,122
13										0,092	0,101	0,109	0,117
14											0,097	0,105	0,112
15												0,101	0,108
16													0,104
T Ap (mm)	0,660	0,787	0,864	0,965	0,914	1,067	1,219	1,524	1,829	2,159	2,464	2,769	3,073

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

UN Thread, Internal Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,584	0,686	0,762	0,864	0,991	1,143	1,245	1,372	1,524	1,727	1,956	2,286	2,743
N Ap	5	6	6	7	8	9	9	10	11	12	13	14	15
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,160	0,168	0,187	0,193	0,205	0,221	0,241	0,250	0,264	0,285	0,309	0,347	0,402
2	0,132	0,139	0,154	0,159	0,169	0,183	0,199	0,207	0,218	0,236	0,255	0,287	0,332
3	0,121	0,127	0,141	0,146	0,155	0,167	0,182	0,189	0,200	0,216	0,234	0,263	0,304
4	0,093	0,097	0,108	0,112	0,119	0,128	0,140	0,145	0,153	0,166	0,179	0,202	0,233
5	0,078	0,082	0,091	0,094	0,100	0,108	0,118	0,123	0,129	0,140	0,151	0,170	0,196
6		0,072	0,080	0,083	0,088	0,095	0,104	0,108	0,114	0,123	0,133	0,150	0,173
7				0,075	0,080	0,086	0,094	0,098	0,103	0,111	0,120	0,135	0,156
8					0,073	0,079	0,086	0,090	0,095	0,102	0,111	0,124	0,144
9						0,074	0,080	0,084	0,088	0,095	0,103	0,116	0,134
10								0,078	0,083	0,089	0,097	0,109	0,126
11									0,078	0,085	0,092	0,103	0,119
12										0,080	0,087	0,098	0,113
13											0,083	0,094	0,108
14											0,080	0,090	0,104
15													0,100
16													
T Ap (mm)	0,584	0,686	0,762	0,864	0,991	1,143	1,245	1,372	1,524	1,727	2,036	2,286	2,743

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

NPT Thread, External, and Internal Machining

TPI	27	18	14	11,5	8
T Ap (mm)	0,762	1,118	1,422	1,727	2,489
N Ap	6	8	10	12	14
	values for flank infeed (X/Z)				
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,187	0,231	0,260	0,285	0,378
2	0,154	0,191	0,214	0,236	0,312
3	0,141	0,175	0,196	0,216	0,286
4	0,108	0,134	0,151	0,166	0,219
5	0,091	0,113	0,127	0,140	0,185
6	0,080	0,100	0,112	0,123	0,163
7		0,090	0,101	0,111	0,147
8		0,083	0,093	0,102	0,135
9			0,087	0,095	0,126
10			0,081	0,089	0,118
11				0,085	0,112
12				0,080	0,107
13					0,102
14					0,098
15					
16					
T Ap (mm)	0,762	1,118	1,422	1,727	2,489

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

BSPT Thread, External, and Internal Machining

TPI	28	19	14	11
T Ap (mm)	0,584	0,864	1,168	1,448
N Ap	5	8	10	12
	values for flank infeed (X/Z)			
order of passes	X/Z	X/Z	X/Z	X/Z
1	0,160	0,179	0,213	0,239
2	0,132	0,148	0,176	0,197
3	0,121	0,135	0,161	0,181
4	0,093	0,104	0,124	0,139
5	0,078	0,087	0,104	0,117
6		0,077	0,092	0,103
7		0,070	0,083	0,093
8		0,064	0,076	0,086
9			0,071	0,080
10			0,067	0,075
11				0,071
12				0,067
13				
14				
15				
16				
T Ap (mm)	0,584	0,864	1,168	1,448

Trapezoid Thread to DIN 103, External, and Internal Machining

pitch	1,5	2	3	4	5
T Ap (mm)	1,016	1,245	1,753	2,261	2,743
N Ap	6	8	10	12	14
	values for flank infeed (X/Z)				
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,249	0,258	0,320	0,373	0,417
2	0,206	0,213	0,264	0,308	0,344
3	0,188	0,195	0,242	0,282	0,315
4	0,144	0,150	0,186	0,217	0,242
5	0,122	0,126	0,157	0,183	0,204
6	0,107	0,111	0,138	0,161	0,180
7		0,100	0,125	0,145	0,162
8		0,092	0,115	0,134	0,149
9			0,107	0,125	0,139
10			0,100	0,117	0,131
11				0,111	0,123
12				0,105	0,117
13					0,112
14					0,108
15					
16					
T Ap (mm)	1,016	1,245	1,753	2,261	2,743

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Round Thread to DIN 405, External, and Internal Machining

pitch	10	8	6
T Ap (mm)	1,321	1,626	2,159
N Ap	8	10	12
	values for flank infeed (X/Z)		
order of passes	X/Z	X/Z	X/Z
1	0,273	0,297	0,357
2	0,226	0,245	0,294
3	0,207	0,224	0,270
4	0,159	0,172	0,207
5	0,134	0,145	0,174
6	0,118	0,128	0,154
7	0,107	0,116	0,139
8	0,098	0,106	0,128
9		0,099	0,119
10		0,093	0,112
11			0,106
12			0,100
13			
14			
15			
16			
T Ap (mm)	1,321	1,626	2,159

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Whitworth, External, and Internal Thread Cutting

TPI	28	20	19	16	14	12	11	10	9	8	7	6	5
T Ap (mm)	0,584	0,813	0,813	0,864	1,016	1,346	1,473	1,626	1,803	2,032	2,311	2,718	3,251
N Ap	5	6	6	8	8	9	9	10	11	12	14	15	16
	values for flank infeed (X/Z)												
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0,160	0,199	0,199	0,179	0,210	0,261	0,285	0,297	0,312	0,336	0,351	0,398	0,460
2	0,132	0,164	0,164	0,148	0,174	0,215	0,236	0,245	0,258	0,277	0,290	0,329	0,380
3	0,121	0,151	0,151	0,135	0,159	0,197	0,216	0,224	0,236	0,254	0,266	0,301	0,348
4	0,093	0,116	0,116	0,104	0,122	0,151	0,166	0,172	0,181	0,195	0,204	0,231	0,267
5	0,078	0,097	0,097	0,087	0,103	0,128	0,140	0,145	0,153	0,164	0,172	0,195	0,225
6		0,086	0,086	0,077	0,091	0,112	0,123	0,128	0,135	0,145	0,151	0,171	0,198
7				0,070	0,082	0,102	0,111	0,116	0,122	0,131	0,137	0,155	0,179
8				0,064	0,075	0,093	0,102	0,106	0,112	0,120	0,126	0,143	0,165
9						0,087	0,095	0,099	0,104	0,112	0,117	0,133	0,153
10								0,093	0,098	0,105	0,110	0,125	0,144
11									0,093	0,099	0,104	0,118	0,136
12										0,095	0,099	0,112	0,130
13											0,095	0,107	0,124
14											0,091	0,103	0,119
15												0,099	0,114
16													0,110
T Ap (mm)	0,584	0,813	0,813	0,864	1,016	1,346	1,473	1,626	1,803	2,032	2,311	2,718	3,251

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

Multi-Tooth Threads, Internal

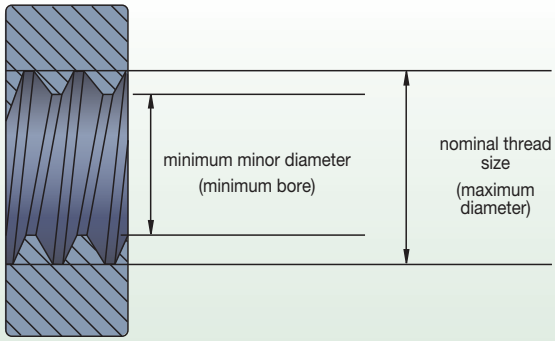
	ISO metric						ISO UN					Whitworth	NPT		
type	3M	2M	3M	2M	3M	2M	2M	3M	2M	3M	2M	2M	2M	3M	2M
pitch (mm)	1,0	1,5	1,5	2,0	2,0	3,0	–	–	–	–	–	–	–	–	–
TPI	–	–	–	–	–	–	16	16	12	12	8	11	11.5	11.5	8
total depth (mm)	0,609	0,838	0,838	1,168	1,168	1,778	0,939	0,939	1,245	1,245	1,880	1,575	1,753	1,753	2,540
pass 10mm	0,330	0,381	0,508	0,508	0,711	0,558	0,431	0,558	0,558	0,762	0,584	0,736	0,584	0,812	0,889
2	0,279	0,254	0,330	0,381	0,457	0,482	0,304	0,381	0,406	0,482	0,508	0,482	0,508	0,558	0,635
3	–	0,203	–	0,279	–	0,431	0,203	–	0,279	–	0,431	0,355	0,355	0,381	0,558
4	–	–	–	–	–	0,304	–	–	–	–	0,355	–	0,304	–	0,457

Recommendations for Steel Workpieces (<300 BHN)

			total depth – on radius		
catalogue number	insert size	TPI profile	1st pass	2nd pass	3rd pass
NTC-8R/L8EM	8	8 UN	1,21	1,63	2,00
NTC-8R/L8IM	8	8 UN	1,19	1,55	1,88
NTC-8R/L10EM	8	10 UN	0,92	1,27	1,60
NTC-8R/L10IM	8	10 UN	0,90	1,22	1,52
NTC-8R/L12EM	8	12 UN	0,76	1,04	1,32
NTC-8R/L12IM	8	12 UN	0,76	0,93	1,20
NTC-8R/L14EM	8	14 UN	0,68	0,95	1,12
NTC-8R/L14IM	8	14 UN	0,60	0,78	1,04
NTC-8R/L16EM 8	8	16 UN	0,58	0,81	0,96
NTC-8R/L16IM	8	16 UN	0,50	0,68	0,93
NTC-8R/L18EM	8	18 UN	0,48	0,66	0,86
NTC-8R/L18IM	8	18 UN	0,48	0,60	0,83
NDC-68RDR/L-75M	8	8 round	1,47	1,65	1,85
NDC-61RDR/L-75M	8	10 round	1,11	1,29	1,45
NDC-88RDRD/L-75M	8	8 round	1,29	1,75	1,85
NDC-88VR/L-75M	8	8 NPT	1,01	1,72	2,45
NDC-8115VR/L-75M	8	11.5 NPT	0,96	1,37	1,70
NDN-814VR/L-75M	8	14 NPT	0,96	1,22	1,36

NOTE: Always allow 0,08–0,13mm extra stock for full profile inserts.

The following charts list the largest thread pitch that can be applied on internal applications using TopThread threading inserts for 60° V-threading and Acme threading.



Metric-sized 60° V-Threading Limits

internal threading limitations
NT-1, NT-2 60° V-threading inserts

TPI	nominal thread size		minimum thread diameter (mm)	
	NT-1	NT-2	NT-1	NT-2
4,00	M48 x 4.00	–	43,67	–
3,00	M42 x 3.00	–	38,75	–
2,50	M39 x 2.50	M24 x 2,50	36,29	21,29
2,00	M33 x 2.00	M15 x 2,00	30,84	12,84
1,75	M32 x 1.75	M15 x 1,75	30,11	13,11
1,50	M32 x 1.50	M15 x 1,50	30,38	13,38
1,25	M29 x 1.29	M14 x 1,25	27,65	12,65
1,00*	M27 x 1.00	M14 x 1,00	25,92	12,92
0,75	M22 x 0.75	M12 x 0,75	21,19	11,19

**Thread pitch of 1mm and less can be cut with an NT-2 insert provided the core thread diameter is 25mm or larger (11mm or larger with NT-1).*

internal threading limitations
NT-3 and NT-4 60° V-threading inserts

TPI	nominal thread size	minimum thread diameter (mm)
6,00**	M76 x 6.00	69,50
5,50**	M73 x 5.50	67,05
5,00	M70 x 5.00	64,59
4,00	M64 x 4.00	59,67
3,00	M52 x 3.00	48,75
2,50	M48 x 2.50	45,29
2,00	M42 x 2.00	39,84
1,75	M40 x 1.75	38,11
1,50*	M38 x 1.50	36,38

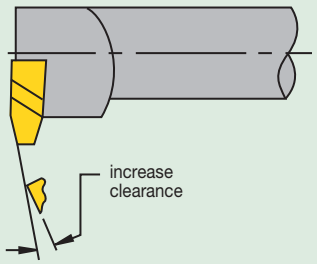
**Thread pitch of 1,5mm and less can be cut provided core thread diameter is 35mm or larger.*
***NT-4-insert only.*

Acme Threading Limits

internal threading limitations
NA and NAS-2, -3, -4, and -6 Acme threading inserts

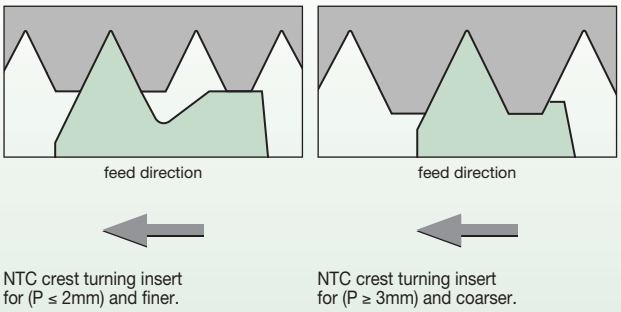
TPI	nominal thread size	minimum thread diameter (mm)	
	NT-1	NT-1	NT-2
2**	5	4.500	114.3
2-1/2**	4-1/2	4.100	104.1
3**	4	3.665	93.1
4	3-1/2	3.250	82.6
5	3	2.800	71.1
6	2-1/2	2.333	59.3
8	2-1/4	2.125	54.0
10	2	1.900	48.3
12	1-3/4	1.667	42.4
14	1-5/8	1.554	39.5
16*	1-1/2	1.438	36.5

**Sixteen threads per inch and finer can be cut provided minor diameter is 36,5mm or larger.*
***NA-6 insert only.*



Additional secondary clearance can be ground on leading edge of insert to provide sufficient helical clearance for machining coarser threads and multiple start threads. Modified standard inserts may be furnished for machining threads outside of the limits shown.

60° V-Thread Crest Turning Application Data



NTC crest turning insert for (P ≤ 2mm) and finer.

NTC crest turning insert for (P ≥ 3mm) and coarser.

NOTE: NTC inserts automatically control root to crest dimensions. Therefore, in setting up threading operations with NTC inserts, check the O.D. or I.D. at the thread crest for correct dimensions.

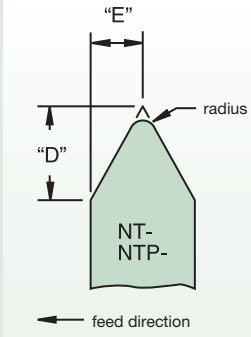
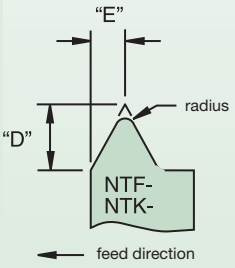
60° V-Thread Crest Turning Application Data

insert catalogue number	nose radius on insert (mm)	thread radius per MIL-S-8879A (mm)
NJ-3014R/L12	0,317/0,342	0,317/0,381
NJK-3008R/L20	0,190/0,215	0,190/0,0228

"J" thread note for catalogue

The controlled root radius thread form (SAE8879C) is defined for the external thread only. To machine the corresponding internal thread, choose any insert that will cut a unified class 2B thread, then bore the minor diameter to size. Refer to SAE8879C and MIL-S-8879C and SAEAS8879D for the correct "J" thread minor diameter values.

60° V-Thread Application Data

insert description	insert	D (mm)	E (mm)	recommended TPI*		recommended TP*	
				external	internal	external	internal
	NT-1	1,90	1,11	–	24–12	–	1,00–2,00
	NT-2	28,70	1,90	36–8	20–7	0,70–3,00	1,25–3,50
	NT-2-K	28,70	1,90	36–8	20–7	0,70–3,00	1,25–3,50
	NTF-2	15,75	1,01	44–14	24–12	0,60–1,75	1,00–2,00
	NTK-2	15,75	1,01	44–14	24–12	0,60–1,75	1,00–2,00
	NTP-2	28,70	1,90	36–8	20–7	0,70–3,0	1,25–3,50
	NT-3	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-K	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-C	37,59	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
	NT-3-CK	37,59	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
	NTF-3	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTK-3	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTP-3	37,59	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-4	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25
	NT-4-K	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25
	NT-4-C	49,78	3,22	11–4 1/2	6–4 1/2	2,50–5,50	4,00–5,50
	NT-4-CK	49,78	3,22	11–4 1/2	6–4 1/2	2,50–5,50	4,00–5,50
	NTF-4	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTK-4	21,08	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTP-4	49,78	3,22	20–4	12–4	1,25–6,25	2,00–6,25

**Based on maximum insert radius size and class 2A and 2B thread specifications.*

API Thread Forms • Insert Applications Chart for API Rotary Shouldered Connections

thread form	WIDIA™ insert		tool joint application	minimum box size*
	cresting	non-cresting		
V-.038R 2" TPF 4 TPI	NDC-4038R/L2 4-E/IR4API382	ND-3038R/L	2-3/8 API internal flush 2-7/8 API internal flush 3-1/2 API internal flush 4 API internal flush 4-1/2 API internal flush 5-1/2 API internal flush 6-5/8 API internal flush 4 API full hole API #23, API #26, API #31, API #35, API #38, API #40, API #44, API #46, API #50	API #31 2-7/8 IF
V-.038R 3" TPF 4 TPI	NDC-4038R/L3 4-E/IR4API383	ND-3038R/L	API #56 API #61 API #70 API #77	API #56
V-.050 2" TPF 4 TPI	NDC-4050R/L2 4-E/IRAPI502	ND-4050R/L	5-1/2 API full hole 6-5/8 API regular 6-5/8 API full hole	5-1/2 API full hole
V-.050 3" TPF 4 TPI	NDC-4050R/L3 4-E/IR4API503	ND-4050R/L	5-1/2 API regular 7-5/8 API regular 8-5/8 API regular	5-1/2 API regular
V-.040 3" TPF 5 TPI	NDC-3040R/L3 NDC-4040R/L3 4-E/IR5API403	ND-3040R/L ND-4040R/L	2-3/8 API regular 2-7/8 API regular 3-1/2 API regular 4-1/2 API regular	3-1/2 API regular

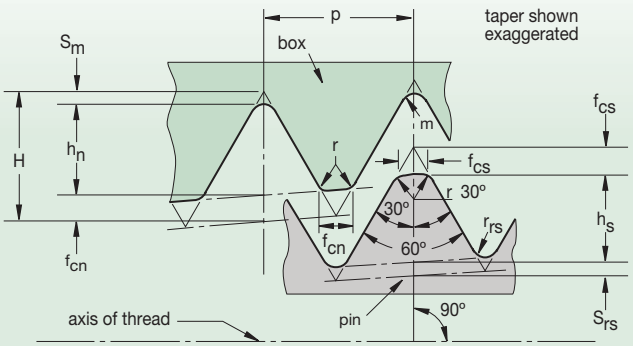
**Minimum box size that can be threaded with a standard TopThread insert due to minimum bore equipment.*

API Thread Forms
Product Thread Dimensions • Rotary Shouldered Connections (Inch)

threadform	taper inch per ft.	thread height, not truncated H	thread height, truncated $h_n=h_s$	root truncation $S_m=S_{rs}$ $f_m=f_{rs}$	crest truncation $f_{cn}=f_{cs}$	width of flat		root radius $r_m=r_{rs}$	radius at thread corners r	pitch p
						crest $f_{cn}=f_{cs}$	crest $f_m=f_{rs}$			
V-.038R	2	.216005	.121844	.038000	.056161	.065	—	.038	.015	.250
V-.038R	3	.215379	.121381	.038000	.055998	.065	—	.038	.015	
V-.040	3	.172303	.117842	.020000	.034461	.040	—	.020	.015	.250
V-.050	3	.215379	.147303	.025000	.043076	.050	—	.025	.015	
V-.050	2	.216005	.147804	.025000	.043201	.050	—	.025	.015	.250

NOTE: All dimensions in inches.

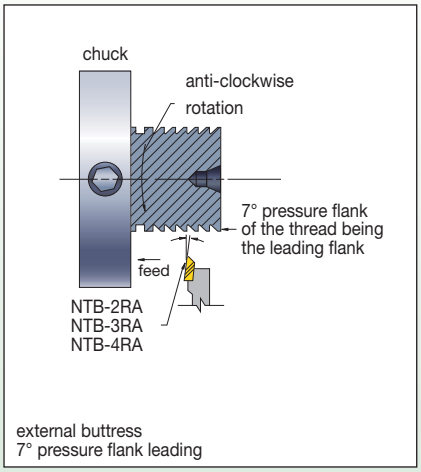
V-.040 and V-.050 Product Thread Form

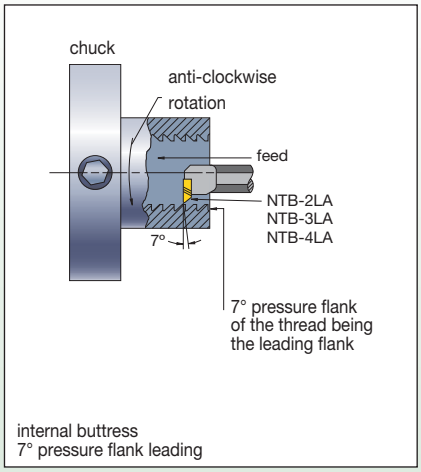


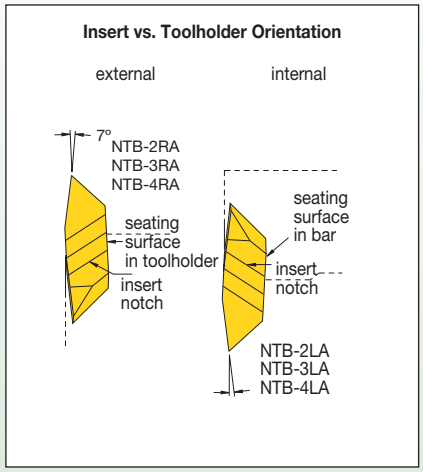
Casing and Tubing Round Thread (Height Dimensions)

thread element		10 TPI p= .1000	8 TPI p= .1250
H	= .866p	.08660	.10825
$H_s = h_n$	= .626p - .007	.05560	.07125
$S_{rs} = S_m$	= .120p + .002	.01400	.01700
$S_{cs} = S_{cn}$	= .120p + .005	.01700	.02000

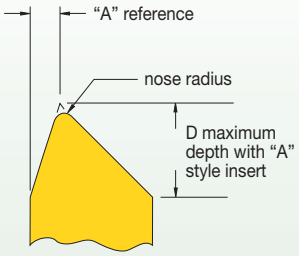
American Buttress (7° Pressure Flank Leading) NTB-A Inserts • Push Type



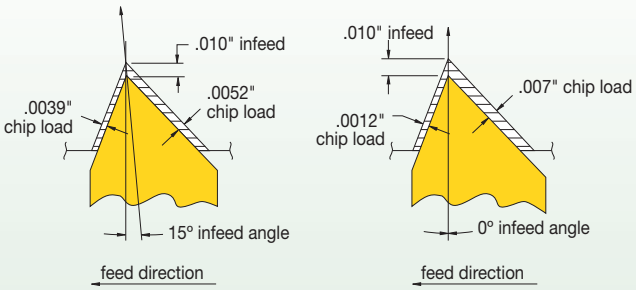




Reference Dimensions



Infeed Angle vs. Chip Load: 7° Pressure Flank Leading



NTB-A insert

insert	D (inch)	"A" ref. (inch)	nose radius (inch)	pitch based on maximum radius
NTB-2A	.133	.024	.002–.004	16–20 TPI
NTB-3A	.171	.031	.005–.008	8–16 TPI
NTB-4A	.218	.049	.008–.012	4–6 TPI

NOTE: For balanced chip load, 15° infeed angle is suggested.

Internal Threading Limitations

internal threading limitations
NTB-2A Buttress threading inserts

TPI	nominal thread size	minimum minor diameter (inch)
8	1-3/4	1.600
10	1-5/8	1.505
12	1-1/2	1.400
16	1-1/4	1.175
20	1-1/16	1.002

internal threading limitations
NTB-3 and NTB-4A Buttress threading inserts

TPI	nominal thread size	minimum minor diameter (inch)
4*	2-1/2	2.200
5	2-1/4	2.010
6	2	1.800
8	1-3/4	1.600
10	1-5/8	1.505
12**	1-1/2	1.400

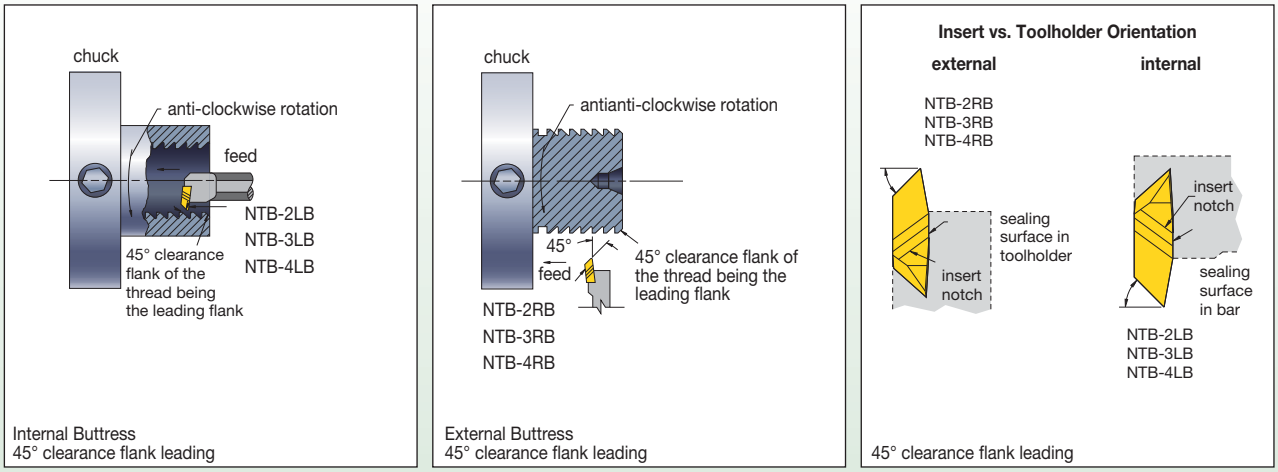
**NTB-4A insert only.*
***Can cut 16 or 20 threads per inch provided minor diameter is 1.375" or larger.*

Threads per Inch vs. Maximum Root Radius Chart (Inch)

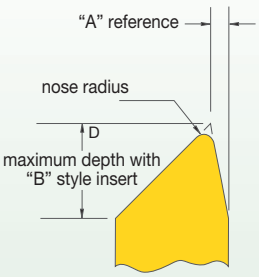
TPI	20	16	12	10	8	6	5	4	3	2-1/2	2	1-1/2	1-1/4	1
maximum root radius	.0036	.0045	.0059	.0071	.0089	.0119	.0143	.0179	.0238	.0268	.0375	.0476	.0572	.0714

NOTE: Special Buttress forms are available upon request.

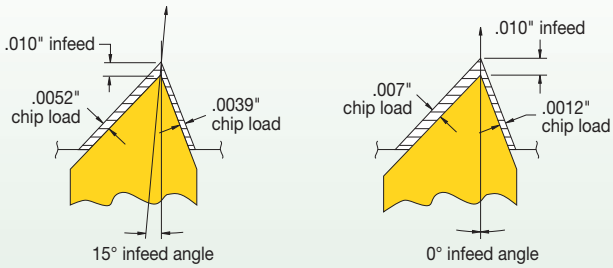
American Buttress (45° Clearance Flank Leading): NTB-B Inserts • PULL-type



Reference Dimensions



Infeed Angle vs. Chip Load: 45° Clearance Flank Leading



NTB-B insert

insert	D (inch)	"A" reference (inch)	nose radius (inch)	pitch based on maximum radius
NTB-3B	.171	.031	.005–.004	8–16 TPI

NOTE: For balanced chip load, a reverse 15° infeed angle is suggested.

Internal Threading Limitations

internal threading limitations NTB-2B Buttress threading inserts		
TPI	**nominal thread size**	**minimum minor diameter (inch)**
8	1-3/4	1.600
10	1-5/8	1.505
12	1-1/2	1.400
16	1-1/4	1.175
20	1-1/16	1.002

internal threading limitations NTB-3 and NTB-4B Buttress threading inserts		
TPI	**nominal thread size**	**minimum minor diameter (inch)**
4*	2-7/8	2.575
5	2-3/4	2.510
6	2-3/8	2.175
8	2-1/8	1.975
10	1-7/8	1.755
12	1-5/8	1.525
16	1-1/2	1.407
20	1-7/16	1.378

**NTB-4B insert only.*

Laydown Threading System



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

The specially engineered WIDIA™ Laydown Threading System ensures the highest accuracy and quality available to meet all modern production standards. With an extensive range of inserts and toolholders available, the Laydown Threading platform is ideal for all of your internal and external threading applications.

- Low-profile design enables unrestricted chip flow.
- Precision-ground thread forms for industry-leading thread quality.
- Ideal choice for high-helix/multi-start threads and single-point threading in small-diameter bores.

To learn more, contact your local Authorised Distributor or visit **widia.com.**

WIDIA™

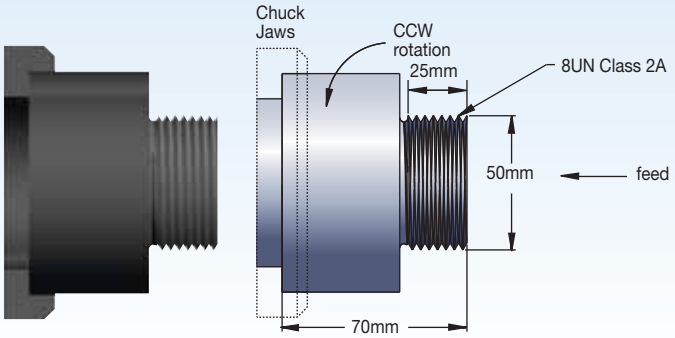
Required Information

From Part Drawing:

material: 316SS, 200 HB
thread form: 8UN
tolerance: class 2A
operation: external threading
pitch diameter: 50mm x 25mm deep

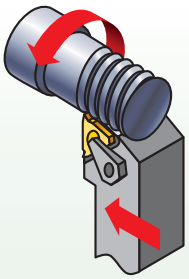
From Machine Setup Data:

tooling: 20mm x 20mm
spindle rotation: anti-clockwise
feed: toward chuck



Steps for a Successful Threading Operation

Step 1 • Determine Threading Method



Need to Know:

- Operation (external).
- Spindle rotation (CCW).
  Anti-clockwise rotation.
- Feed direction (toward chuck).
- Right-hand toolholder.
- Right-hand insert (ER).
- Standard helix method.

Step 2 • Select Insert



Need to Know:

- Thread form (ISO R262 1mm pitch).
- Hand of insert (right hand — ER).

Choose the High-Performance Solution

catalogue number	insert size	TN6025
3ER10ISO	3	•

High-Performance Selection

NOTE: Use insert with largest insert size available.

insert: 3ER10ISO
grade: TN6025
speed: 150 m/min

Step 3 • Select the Grade and Speed

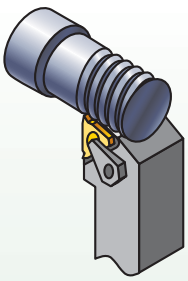
Need to Know:

- Workpiece material (316SS-200HB).
- Operation (external).

Options: Grade and Speed Selection Guidelines

threading operation	stainless steel
external	general purpose and high performance
	TN6025
	50–360 m/min

Step 4 • Select Toolholder



Need to Know:

- External or internal operation (external).
- Pitch diameter to determine minimum bore diameter (N/A).
- Type of tooling — toolholder, boring bar (toolholder).
- Hand of tool (right hand).
- Insert size (16).

Options:

catalogue number	insert size	shim
AL203R	3	SM-YE3

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (8 TPI).
- Pitch diameter (50mm).
- Helix method (standard).
  See Laydown Threading (LT) shim selection chart.

Select SM-YE3 shim

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YE3.

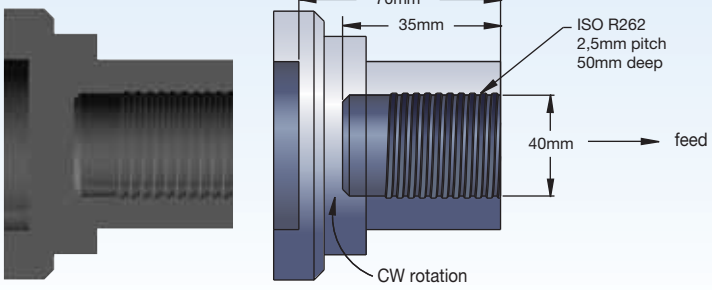
Required Information

From Part Drawing:

material: 4140 steel
thread form: ISO R262 2,5mm pitch
tolerance: ISO Metric Class 6G/6H
operation: internal threading
pitch diameter: 40mm x 35mm deep

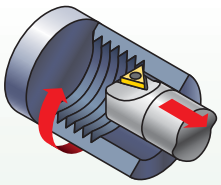
From Machine Setup Data:

tooling: 20mm boring bar
spindle rotation: clockwise
feed: away from chuck



Steps for a Successful Threading Operation

Step 1 • Determine Threading Method



Need to Know:

- Operation (internal).
- Spindle rotation (CW). *Clockwise rotation.*
- Feed direction (away from chuck).
- Left-hand toolholder.
- Left-hand insert (NL).
- Reverse helix method.

Step 2 • Select Insert



Need to Know:

- Thread form (ISO Metric Class 6G/6H).
- Hand of insert (left hand — NL).

Choose the High-Performance Solution

catalogue number	insert size	TN6025
3IL25ISO	3	•

High-Performance Selection

NOTE: Use insert with largest possible insert size to go into the bore.
insert: 3IL25ISO
grade: TN6025
speed: 130 m/min

Step 3 • Select the Grade and Speed

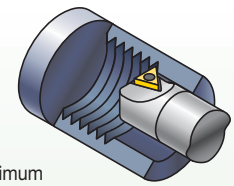
Need to Know:

- Workpiece material (4010 steel).
- Operation (internal).

Options: Grade and Speed Selection Guidelines

threading operation	steel
internal	general purpose and high performance
	TN6025
	40–200 m/min

Step 4 • Select Toolholder



Need to Know:

- External or internal operation (internal).
- Pitch diameter to determine minimum bore diameter for internal operations (40mm).
- Type of tooling — toolholder, boring bar (boring bar).
- Hand of tool (left hand).
- Insert size (16).

Options:

catalogue number	insert size	shim
AVR32D3R	3	SM-YE3

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (2,5mm pitch).
- Pitch diameter (40mm).
- Helix method (reverse). See Laydown Threading (LT) shim selection chart.

Select SM-YE3

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YE3.

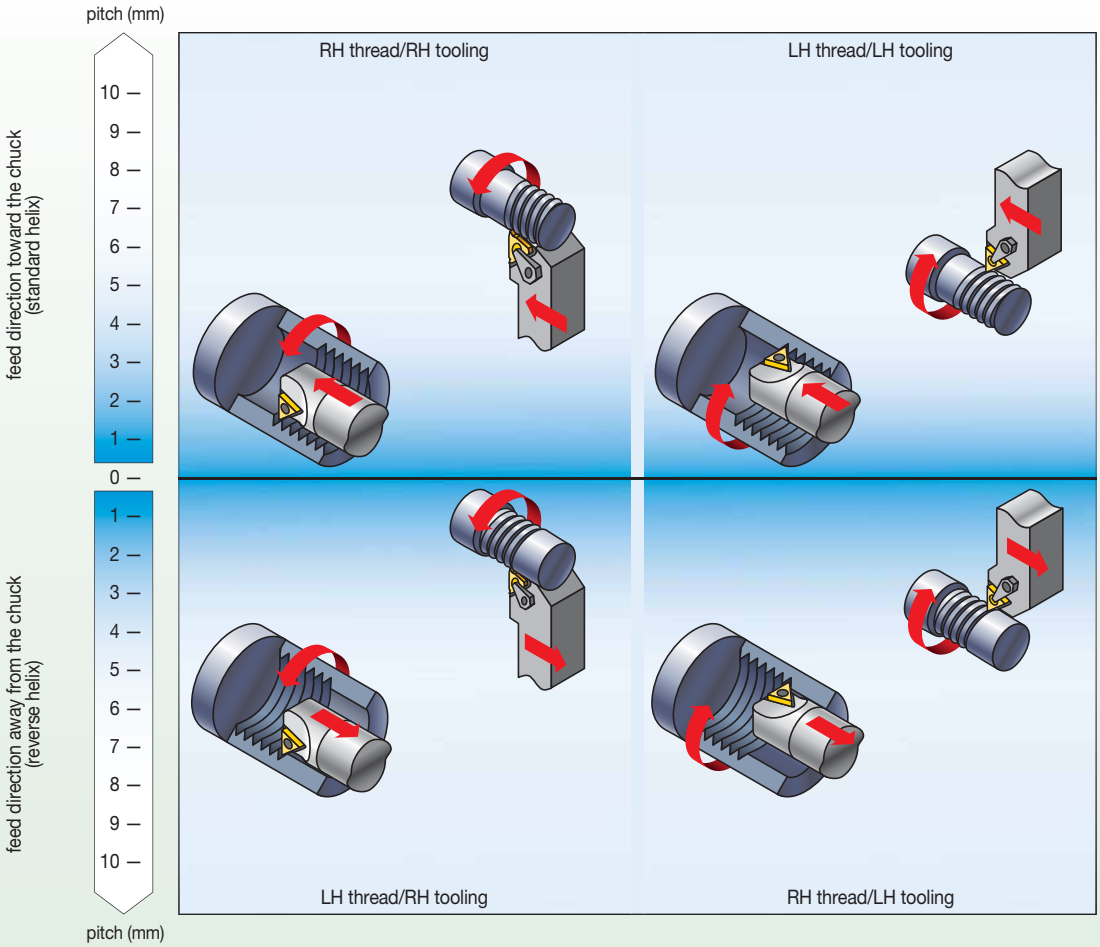
Laydown Threading Shim Selection Guidelines

It is essential to select the correct shim to ensure thread quality and maximum tool life. These parameters are needed:

- Pitch
- Pitch diameter
- Number of starts
- Feed direction

NOTE: When considering method of thread cutting, the part's shape and stability and the flow of chips are determining factors in your decision.

Laydown Selection Chart



NOTE: For multi-start threads, use the lead value instead of the pitch.

Diagram of Thread Lead Angles

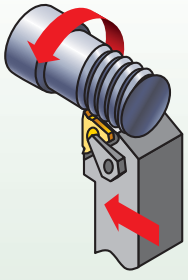
To calculate the lead angle of a given thread, use this formula:

$$\beta = \text{Arctan} \frac{P \bullet S}{\pi D_e}$$

ß = thread lead angle
De = effective pitch diameter of thread wear
P = 1/TPI
TPI = threads per inch
S = number of starts
single-start, lead = pitch
multiple-start, lead = pitch (x) number of starts

All toolholders are designed with an inclination angle = 1.5°. When turning standard threads with a lead angle of 1–2°, this guarantees adequate clearance at the flanks of the insert's thread tooth. The thread lead angle and the required inclination angle of the insert are given by ß.

Cutting edge height is constant at every shim and insert combination. All toolholders are supplied with 1-1/2° lead angle.

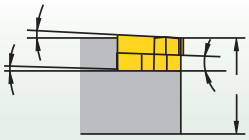


Laydown Threading Shim Selection Table • Metric

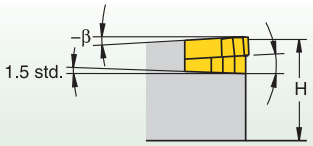
insert size	toolholder external	toolholder internal	shim ordering code (mm)							
						standard				
3 (9,52)	RH	LH	SM–YE3–3P	SM–YE3–2P	SM–YE3–1P	SM–YE3	SM–YE3–1N	SM–YE3–1.5N	SM–YE3–2N	SM–YE3–3N
3 (9,52)	LH	RH	SM–YI3–3P	SM–YI3–2P	SM–YI3–1P	SM–YI3	SM–YI3–1N	SM–YI3–1.5N	SM–YI3–2N	SM–YI3–3N
4 (12,7)	RH	LH	SM–YE4–3P	SM–YE4–2P	SM–YE4–1P	SM–YE4	SM–YE4–1N	SM–YE4–1.5N	SM–YE4–2N	SM–YE4–3N
4 (12,7)	LH	RH	SM–YI4–3P	SM–YI4–2P	SM–YI4–1P	SM–YI4	SM–YI4–1N	SM–YI4–1.5N	SM–YI4–2N	SM–YI4–3N
TPI		**pitch (mm)**	**pitch diameter (mm)**							
72		–	–	–	–	3,1–8	8–21,4	>21,4	21,4–8	8–3,1
–		0,35	–	–	–	3,0–8	8–21,3	>21,3	21,3–8	3–8
64		–	–	–	–	3,4–9	9–24,1	>24,1	24,1–9	9–3,4
–		0,40	–	–	–	3,5–9,1	9,1–24,3	>24,3	24,3–9,1	9,1–3,5
56		0,45	–	–	–	3,9–10,3	10,3–27,6	>27,6	27,6–10,3	10,3–3,9
–		0,50	–	–	2,8–4,3	4,3–11,4	11,4–30,4	>30,4	30,4–11,4	11,4–4,3
48		–	–	–	3–4,6	4,6–12,1	12,1–32,2	>32,2	32,2–12,1	12,1–4,6
44		–	–	–	3,3–5	5–13,2	13,2–35,1	>35,1	35,1–13,2	13,2–5
–		0,60	–	2,6–3,4	3,4–5,2	5,2–13,7	13,7–36,5	>36,5	36,5–13,7	13,7–5,2
40		–	–	2,8–3,6	3,6–5,5	5,5–14,5	14,5–38,6	>38,6	38,6–14,5	14,5–5,5
–		0,70	–	3,0–4	4–6,1	6,1–16	16–42,6	>42,6	42,6–16	16–6,1
36		–	–	3,1–4	4–6,1	6,1–16,1	16,1–42,9	>42,9	42,9–16,1	16,1–6,1
–		0,75	2,8–3,2	3,3–4,3	4,3–6,5	6,5–17,1	17,1–45,6	>45,6	45,6–17,1	17,1–6,5
32		–	3–3,4	3,4–4,5	4,5–6,9	6,9–18,1	18,1–48,3	>48,3	48,3–18,1	18,1–6,9
–		0,80	3–3,5	3,5–4,6	4,6–6,9	6,9–18,2	18,2–48,6	>48,6	48,6–18,2	18,2–6,9
28		–	3,4–3,9	3,9–5,2	5,2–7,9	7,9–20,7	20,7–55,1	>55,1	55,1–20,7	20,7–7,9
27		–	3,6–4,1	4,1–5,4	5,4–8,2	8,2–21,4	21,4–57,2	>57,2	57,2–21,4	21,4–8,2
–		1,00	3,8–4,3	4,3–5,7	5,7–8,7	8,7–22,8	22,8–60,8	>60,8	60,8–22,8	22,8–8,7
24		–	4–4,6	4,6–6	6–9,2	9,2–24,1	24,1–64,3	>64,3	64,3–24,1	24,1–9,2
–		1,25	4,7–5,4	5,4–7,1	7,1–10,8	10,9–28,5	28,5–76	>76,0	76–28,5	28,5–10,8
20		–	4,8–5,5	5,5–7,2	7,2–11	11–28,9	29–77,2	>77,2	77,2–28,9	29–11
18		–	5,3–6,1	6,1–8	8–12,2	12,2–32,2	32,2–85,8	>85,8	85,8–32,2	32,2–12,2
–		1,50	5,7–6,5	6,5–8,5	8,5–13	13–34,2	34,2–91,2	>91,2	91,2–34,2	34,2–13
16		–	6–6,9	6,9–9	9–13,8	13,8–36,2	36,2–96,5	>96,5	96,5–36,2	36,2–13,8
–		1,75	6,6–7,96	7,6–10	10–15,2	15,2–39,9	39,9–106,4	>106,4	106,4–39,9	39,9–15,2
14		–	6,9–7,9	7,9–10,3	10,3–15,7	15,7–41,4	41,4–110,3	>110,3	110,3–41,4	41,4–15,7
13		–	7,4–8,5	8,5–11,1	11,1–17	17–44,5	44,5–118,8	>118,8	118,8–44,5	44,5–17
–		2,00	7,6–8,7	8,7–11,4	11,4–17,4	17,4–45,6	45,6–121,6	>121,6	121,6–45,6	45,6–17,4
12		–	8–9,2	9,2–12	12,1–18,4	18,4–48,2	48,3–128,7	>128,7	128,7–48,2	48,2–18,4
11.5		–	8,4–9,6	9,6–12,6	12,6–19,2	19,2–50,3	50,3–134,3	>134,3	134,3–50,3	50,3–19,2
11		–	8,8–10	10–13,1	13,1–20	20–52,6	52,6–140,4	>140,4	140,4–52,6	52,6–20
–		2,50	9,5–10,8	10,8–14,2	14,2–21,7	21,7–57	57–152	>152,0	152–57	57–21,7
10		–	9,6–11	11–14,5	14,5–22	22–57,9	57,9–154,4	>154,4	154,4–57,9	57,9–22
9		–	10,7–12,2	12,2–16,1	16,1–24,5	24,5–64,3	64,3–171,6	>171,6	171,6–64,3	64,3–24,5
–		3,00	11,4–13	13–17,1	17,1–26	26–68,4	68,4–182,4	>182,4	182,4–68,4	68,4–26
8		–	12–13,8	13,8–18,1	18,1–27,6	27,6–72,4	72,4–193	>193,0	193–72,4	72,4–27,6
–		3,50	13,3–15,2	15,2–19,9	19,9–30,4	30,4–79,8	79,8–212,8	>212,8	212,8–79,8	79,8–30,4
7		–	13,8–15,7	15,7–20,7	20,7–31,5	31,5–82,7	82,7–220,6	>220,6	220,6–82,7	82,7–31,5
–		4,00	15,2–17,3	17,3–22,8	22,8–34,7	34,7–91,2	91,2–243,2	>243,2	243,2–91,2	91,2–34,7
6		–	16–18,3	18,3–24,1	24,1–36,7	36,7–96,5	96,5–257,4	>257,4	257,4–96,5	96,5–36,7
–		5,00	19–21,7	21,7–28,5	28,5–43,4	43,4–114	114–304	>304,0	304–114	114–43,4
5		–	19,3–22	22–28,9	28,9–44,1	44,1–115,8	115,8–308,8	>308,8	308,8–115,8	115,8–44,1
4,5		–	21,4–24,5	24,5–32,1	32,1–49	49–128,7	128,7–343,1	>343,1	343,1–128,7	128,7–49
–		6,00	22,7–26	26–34,2	34,2–52,1	52,1–136,8	136,8–364,8	>364,8	364,8–136,8	136,8–52,1
4		–	24,1–27,5	27,5–36,2	36,2–55,1	55,1–144,8	144,8–386	>386	386–144,8	144,8–55,1
inclination angle			4.5	3.5	2.5	1.5	0.5	0.0	-0.5	-1.5
			standard helix (feed toward the chuck)						**reverse helix (feed away from the chuck)**	

1. Select TPI or pitch from the left-hand columns.
2. Follow row to specified pitch diameter and the correct feed direction.
3. Follow the column to the top for the required shim based on the toolholder and insert size.

standard helix method:
Used when RH thread is cut with RH tool or LH thread with LH tool.



reverse helix method:
Used when RH thread is cut with LH tool or when LH thread is cut with RH tool.





Indexable Milling

Indexable Milling Introduction.....G2–G19
Face Mills.....H1–H74
Chamfer Mills.....I1–I10
90° Shoulder Mills.....J1–J51
Helical Mills.....K1–K9
Slotting Mills.....L1–L33
Copy Mills.....M1–M130





NEW PRODUCTS

Our latest metalcutting innovations are designed to deliver higher productivity, longer tool life, and increased application versatility.

For more information about the latest products and services from WIDIA™, please contact your WIDIA Representative or Authorised WIDIA Distributor, or visit widia.com.

Victory™ Milling Grades

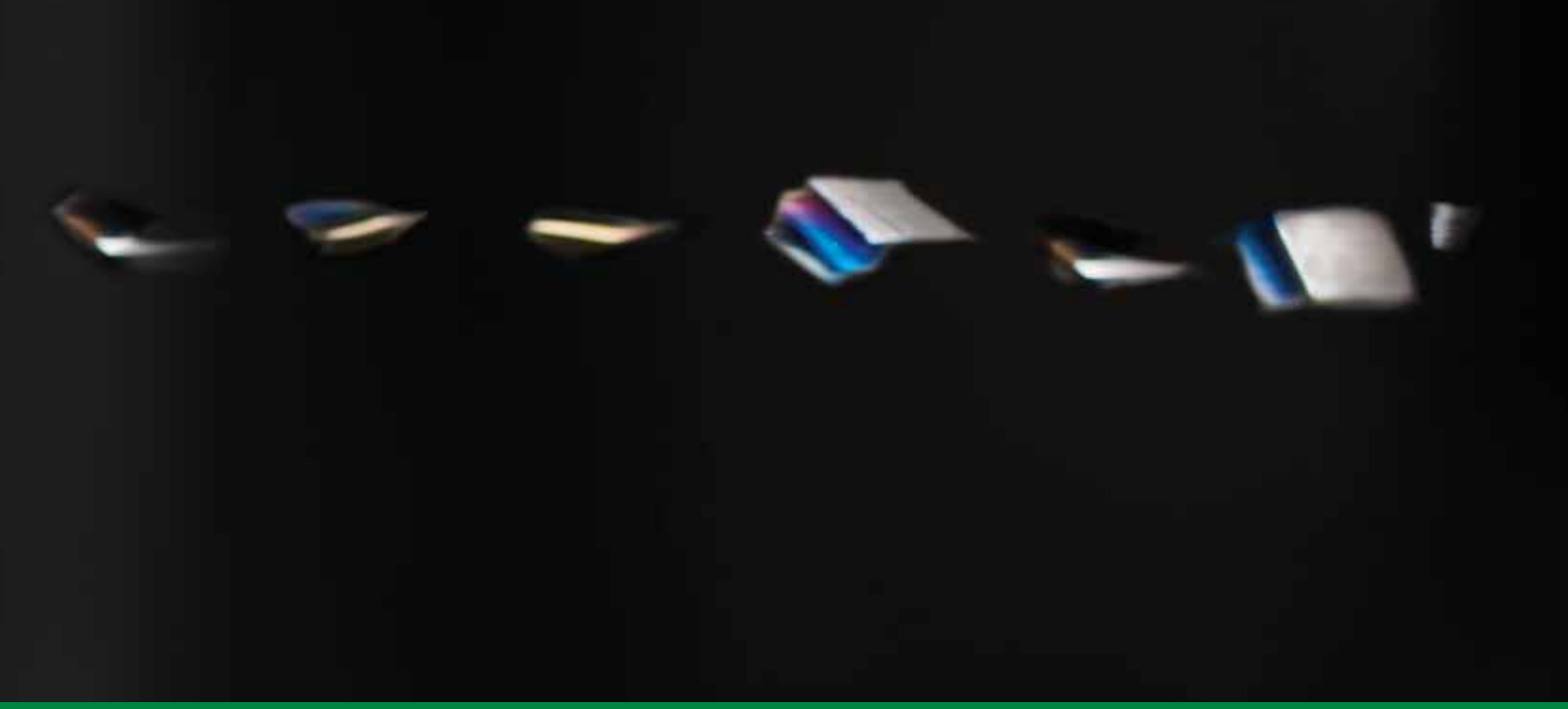
- WP40PM™ — New best-in-class Victory milling grade for machining steel materials in ISO material group P40 in rough milling applications.
- WK15CM™ — New milling grade for cast irons for higher tool life and increased productivity.
- WS30PM™ — A new high-performance milling grade for machining titanium and stainless steels.

VSM11™

- Step down capabilities.
- Effective internal coolant supply for screw-on, end mill, and shell mill cutters.
- The max ramp angle for VSM11 is 10°.







VSM490™

- Four cutting edges on a double-sided strong insert.
- Lower cutting forces; high-positive geometry.
- Excellent wall and surface finish capabilities.
- When using multiple steps, this is a “stepless” solution.



VSM17™

- Depth-of-cut capabilities up to 16,3mm.
- Step down capabilities.
- Effective internal coolant supply for screw-on, end mill, and shell mill cutters.



SuperFeed™

- Protective cutter body.
- Increased flexibility with five PCD cartridge options.
- User-friendly axial adjustment.
- Reconditioning options reduce overall cost.



The Most Advanced Milling Solutions in the Industry

For unsurpassed quality, value, and performance, you can trust WIDIA™ to provide the most comprehensive line of reliable metalcutting tools. Whatever your indexable milling product requirements, be assured that you will find the appropriate solution in this all-inclusive, easy-to-use guide.

For every milling application, workpiece, or equipment need, we offer the best tools on the market, designed to reduce your machining time, provide superior surface finishes, and outperform the competition.

NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit **widia.com/novo**.

1. Choose your application:

- Face Mills
- Shoulder Mills
- Helical Mills
- Slotting Mills
- Copy Mills
- Chamfer Mills

2. Identify material to be machined:

Each tool has a material grid marked with a letter indicating the materials that can be machined.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Tool name

Face Mills



Victory™ M1200 45°

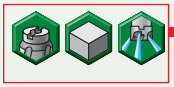
Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37

P M K N S H





Product photo

Informational icons (Connection type and possible operations)

3. Select tool based on maximum depth of cut and diameter required:

Information is given in this area to provide specific detail as a quick reference.

Location of introduction detail, tool bodies, inserts, and cutting data

Selecting Tool Body, Insert, and Cutting Data

4. Choose the tool body:

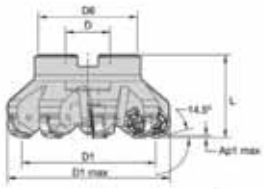
Choose diameter (D1) and pitch (Z) of tool body.

NOTE: Make sure you select the correct shank style for your toolholder. For toolholders, visit **widia.com**.

Face Mills • Victory™ M1200 Series
Victory M1200 HF • Shell Mills

- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.







■ Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3750370	M1200HF050Z04HN09	50	67,9	22	36	40	2,2	4	11400	Yes	0,65

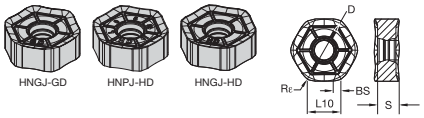
5. Choose the inserts with the WIDIA™ insert selection guide:

A Determine light machining, general purpose, or heavy machining according to workpiece material. See the Material Overview at the end of the catalogue for material descriptions.

B Select the grade given in the insert selection guide. Use the six digit order number to easily place your order.

■ Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade 5A	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM



● first choice
○ alternate choice

	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P			●	●	●		●		●
M			○	●	○		●	○	●
K	●	○	○	○	○	●	○		
N									
S				●			●	●	○
H							○		

5B

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	3110541	3614650	3037596	3093721	5427370	–	5528874	5895349	5895350
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10									

6. Determine cutting data — with the WIDIA Recommended Speeds and Feeds tables:

A Choose the recommended speed value according to the workpiece material and grade.

B Choose the recommended starting feed rate according to the insert geometry and % of radial engagement ae.

Starting values are given in **bold**.

■ Recommended Starting Speeds [SFM]

6A

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	–	–	355	**310**	295	–	–	–	–	–	–
	2	330	**290**	240	335	**305**	275	–	–	–	300	**260**	215	–	–	–	–	–	–
	3	305	**260**	210	305	**275**	245	–	–	–	275	**235**	190	–	–	–	–	–	–
	4	270	**220**	180	230	**210**	190	–	–	–	245	**205**	160	–	–	–	–	–	–
	5	220	**205**	180	310	**275**	250	–	–	–	205	**185**	160	–	–	–	–	–	–
	6	200	**150**	120	190	**160**	130	–	–	–	180	**140**	110	–	–	–	–	–	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	–	–	–	–	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	–	–	–	–	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	–	–	–	–	–
K	1	275	**245**	220	355	**320**	290	–	–	–	–	–	–	–	–	–	–	–	–
	2	215	**190**	180	280	**250**	230	–	–	–	–	–	–	–	–	–	–	–	–
	3	180	**160**	145	235	**210**	190	–	–	–	–	–	–	–	–	–	–	–	–

6A 6A

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,17	**0,32**	0,65	0,13	**0,23**	0,47	0,09	**0,17**	0,35	0,08	**0,15**	0,31	0,08	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,50**	1,00	0,13	**0,36**	0,72	0,09	**0,27**	0,54	0,08	**0,23**	0,47	0,08	**0,21**	0,43	.E..LD
.S..GD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD

6B 6B

NOTE: Use "Light Machining" value as starting feed rate.

Face Mills

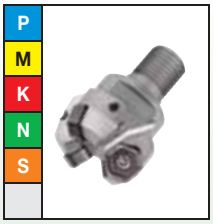


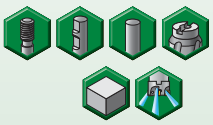
Victory™ M1200 Mini HF 15°

Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: H5–H11



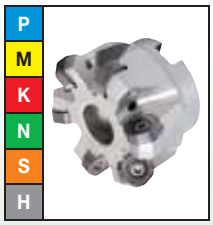


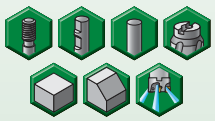
Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: H12–H19





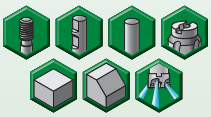
Victory™ M1200 Mini HD 59°

Max depth of cut: 4,7mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

Pages: H20–H23



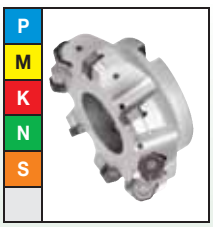


Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H26–H29



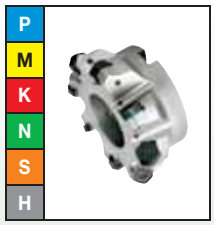


Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37





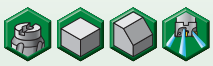
Victory™ M1200 HD 59°

Max depth of cut: 6mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H38–H41





(continued)

Face Mills
(continued)



M640

Max depth of cut: 4,8mm

Lead angle: 58°
Indexes per insert: 6
Diameter: 32–125mm

Pages: H44–H49



M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 20–160mm

Pages: H52–H57



M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 100mm

Pages: H58–H60



SuperFeed™

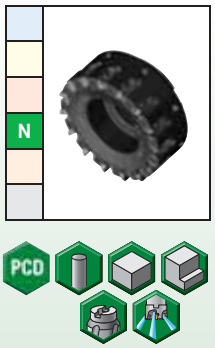
Max depth of cut: 6,35mm
(can be less depending on the cartridge)

Lead angle: 90°

Indexes per insert:
1 edge per PCD cartridge

Diameter: Standard Platform
63–200mm

Pages: H64–H68



M4000
Cartridge Milling System

All front line insert styles available.

Diameter: 125–315mm

Pages: H72–H74



Chamfer Mills



M25™ SD0903..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 25–40mm

Pages: I4–I6, I8, I10





M25 SP1204..

Max depth of cut: 8,3mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 50–63mm

Pages: I7, I9–I10





90° Shoulder Mills



VSM11™

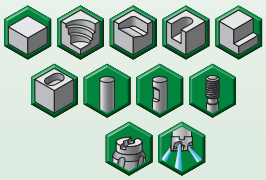
Max depth of cut: 11,7mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 16–125mm

Pages: J4–J16

P M K N S H





VSM490™-15

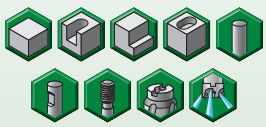
Max depth of cut: 15mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 25–160mm

Pages: J32–J40

P M K S





VSM17™

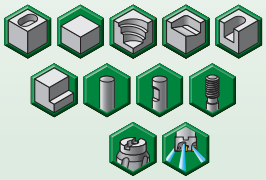
Max depth of cut: 16,33mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25–160mm

Pages: J20–J29

P M K N S





M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: J44–J47

P M K S H





M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: J48–J51

P M K S H





Helical Mills

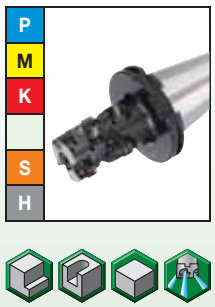


M390 SD1204...

Max depth of cut: 17mm

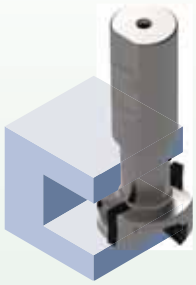
Lead angle: 90°
Indexes per insert: 4
Diameter: 50–80mm

Pages: K4–K9





Slotting Mills

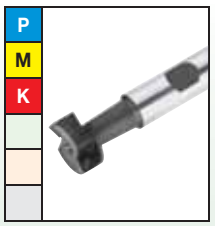


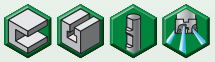
M16

Slot Width Range: 11–21,9mm

Indexes per insert: 2
Diameter: 25–50mm

Pages: L4–L7





M94

Slot Width Range: 1,93–5,23mm

Indexes per insert: 3
Diameter: 25–80mm

Pages: L10–L14



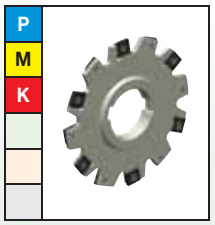


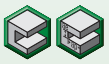
M95

Slot Width Range: 4–10mm

Indexes per insert: 4
Diameter: 100–200mm

Pages: L18–L21





M900™

Slot Width Range: 12–22mm

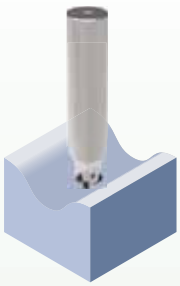
Indexes per insert: 2
Diameter: 100–315mm

Pages: L24–L30, L32–L33





Copy Mills



M370™

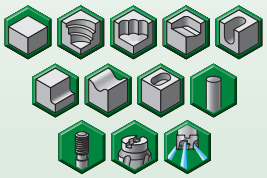
Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: M4–M16

P M K S H





M200™

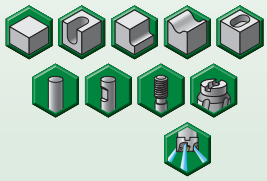
Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: M20–M39

P M K S H





M170™

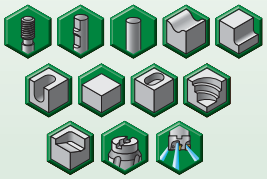
Max depth of cut: 8mm

Diameter: 12–125mm

Pages: M42–M70

P M K S H





M100™

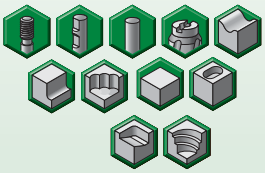
Max depth of cut: 6mm

Diameter: 24–125mm

Pages: M74–M99

P M K S H





M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: M102–M117

P M K S H





M270 Toroidal

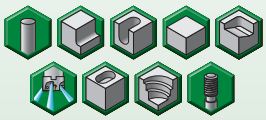
Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: M118–M123

P M K S H





M270 High Feed

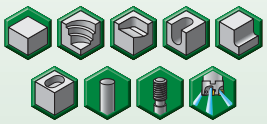
Max depth of cut: 0,6–1,1mm

Diameter: 10–20mm

Pages: M124–M130

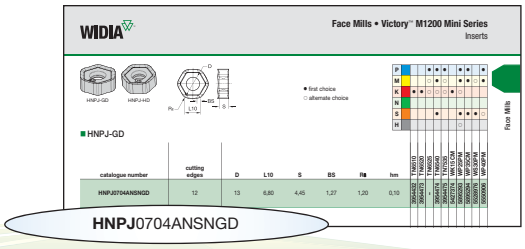
P M K S H



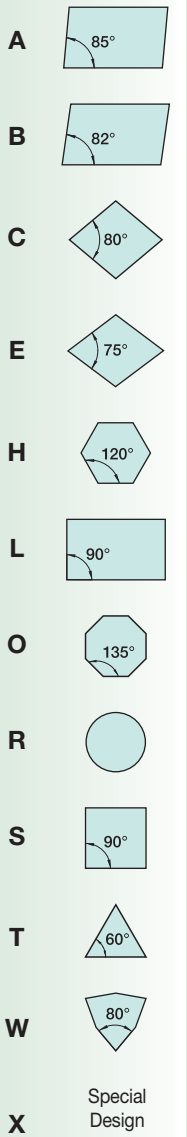


How Do Catalogue Numbers Work?

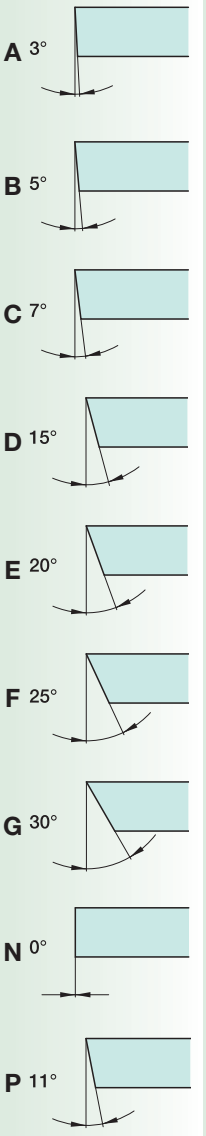
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



H — Insert Shape



N — Insert Clearance Angle

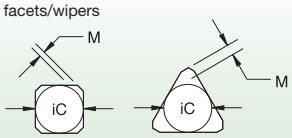


P — Tolerance Class

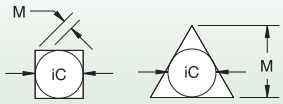
J — Geometry and Clamping Type

symbol	hole	shape of hole	chipbreaker	shape of insert's section
N	without		without	
R			single-sided	
F			double-sided	
A	with	cylindrical hole	without	
M			single-sided	
G			double-sided	
W	with	partly cylindrical hole, 40–60° countersink	without	
T			single-sided	
Q	with	partly cylindrical hole, 40–60° double countersink	without	
U			double-sided	
B	with	partly cylindrical hole, 70–90° countersink	without	
H			single-sided	
C	with	partly cylindrical hole, 70–90° double countersink	without	
J			double-sided	
X	special design			

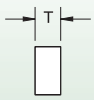
indexable inserts with facets/wipers



indexable inserts with corner radii



insert thickness

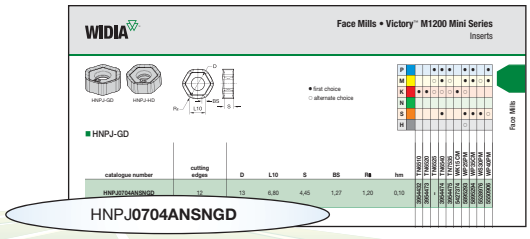


iC	tolerances on "iC"		tolerances on "M"	
	classes J, K, L, M, N (+/–)	class U (+/–)	classes M & N (+/–)	class U (+/–)
4,76–10,00	0,051	0,076	0,076	0,127
11,11–14,29	0,076	0,127	0,127	0,203
15,00–20,64	0,102	0,178	0,152	0,279
22,00–31,16	0,127	0,254	0,178	0,381
31,75–35,00	0,152	0,254	0,2	0,381

	iC (+/–)	M (+/–)	T (+/–)		iC (+/–)	M (+/–)	T (+/–)
A	0,025	0,005	0,025	J	0,05–0,15*	0,005	0,025
B	0,025	0,005	0,013	K	0,05–0,15*	0,013	0,025
C	0,025	0,013	0,025	L	0,05–0,15*	0,025	0,025
D	0,025	0,013	0,013	M	0,05–0,15*	0,08–0,20*	0,013
E	0,025	0,025	0,025	N	0,05–0,15*	0,08–0,20*	0,025
F	0,013	0,005	0,025	P**	0,038	0,038	0,038
G	0,025	0,025	0,013	U	0,08–0,25*	0,13–0,30*	0,013
H	0,013	0,013	0,025				

**See table above for tolerances according to insert size and class.*
***WIDIA standard only.*

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.

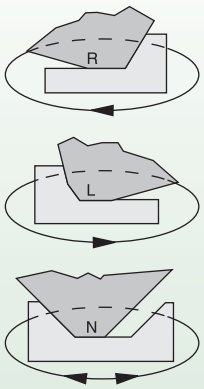


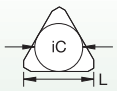
07	04	AN	S	N	GD
Size (Cutting Edge Length)	Insert Thickness	Corner Configuration	Cutting Edge Form	Insert Hand	Edge Geometry

symbol	thickness
T1	1,98
02	2,38
03	3,18
T3	3,97
04	4,76
05	5,56
06	6,35
07	7,94

F sharp
E honed
T T-land
S honed + T-land

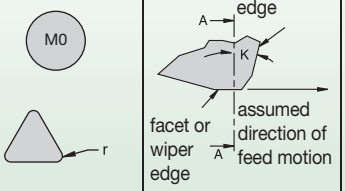
direction of cutter rotation

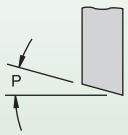




inscribed circle "iC" versus cutting edge length "L"
For shapes A, L, and X, see position #1; use length of leading cutting edge.

	"L" for shapes						
iC	S	T	R	O	C	H	E
6,00	–	–	06	–	–	–	–
6,35	06	11	06	02	06	03	06
8,00	–	–	08	–	–	–	–
9,52	09	16	09	04	09	05	09
10,00	–	–	10	–	–	–	–
12,00	–	–	12	–	–	–	–
12,70	12	22	12	05	12	07	13
15,88	15	27	15	06	16	09	16
16,00	–	–	16	–	–	–	–
19,05	19	33	19	07	19	11	19
20,00	–	–	20	–	–	–	–
25,00	–	–	25	–	–	–	–
25,40	25	4					

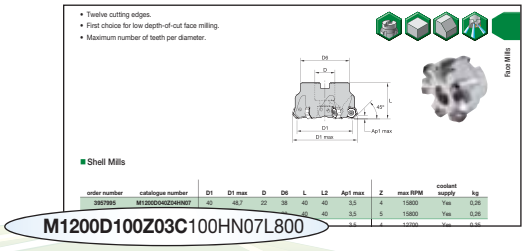




radius				wiper edge clearance P	
MO	round insert				
01	0,1mm				
02	0,2mm			A	3°
04	0,4mm			B	5°
05	0,5mm			C	7°
08	0,8mm	If letter is replaced by number(s), refer to table for radius "r."		D	15°
10	1,0mm			E	20°
12	1,2mm	lead angle K		F	25°
15	1,5mm	A	45°	G	30°
16	1,6mm	D	60°	N	0°
24	2,4mm	E	75°	P	11°
32	3,2mm	P	90°		

How Do Catalogue Numbers Work?

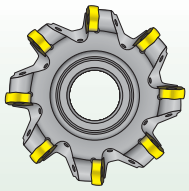
Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



Indexable Milling Tool Bodies

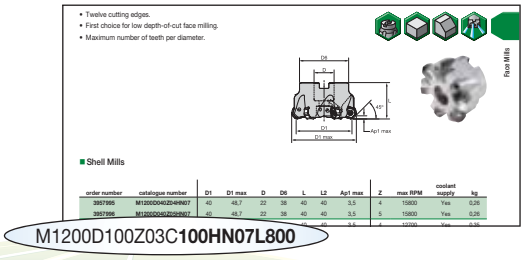
M1200	D	100	Z	03	C
Series	Cutting Diameter		Number of Flutes		Shank Form

Z = Number of effective flutes



C = Cylindrical
W = Weldon®
M = Modular
S = Shell Mill

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



Indexable Milling Tool Bodies

100	H	N	07	L	800
Shank/Pilot Diameter	Insert Shape	Insert Clearance Angle	Insert Size (Cutting Edge Length)	Overall Length of Tool Used for all cylindrical shank and long version Weldon® if required (standard Weldon without)	

Insert Shape

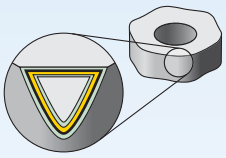
A	85°	M	86°
B	82°	O	135°
C	80°	P	108°
D	55°	R	
E	75°	S	90°
H	120°	T	60°
K	55°	V	35°
L	90°	W	80°
		X	Special Design

Insert Clearance Angle

C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°

Optional uses as required

LH	Left Hand
C	Carbide Shank
HM	Heavy Metal Shank

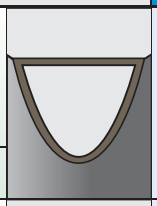
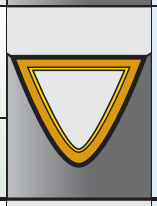
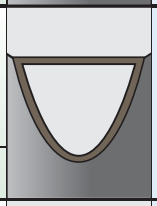
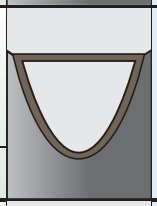
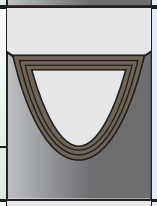
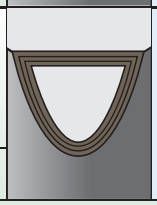


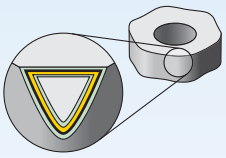
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	∇∇∇	Light (finishing)
▼▼	Medium	∇∇	Medium
▼	Heavy (roughing)	∇	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
TN2505 HC-H05 • PVD-TiAlN		∇∇∇		▼▼▼			▼▼▼	•	
TN2510 HC-H10 • MT-CVD/CVD-TiN-TiCN-(ZrO_2-Al_2O_3-TiOx)		∇∇		▼▼			▼▼	•	
TN2525 HC-H20 • PVD-TiAlN		▼▼		∇∇			▼▼	•	
TN6501 HC-N03 • PVD-TiB_2					▼▼▼			•	•
TN6510 HC-K10 • PVD-TiAlN Nanolayer				▼▼				•	
TN6520 HC-K20 • PVD-TiAlN Nanolayer				▼▼				•	•

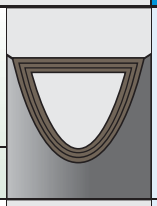
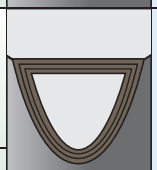
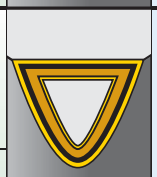
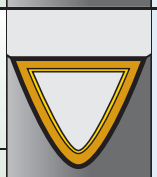
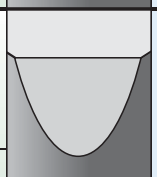
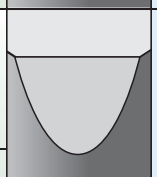


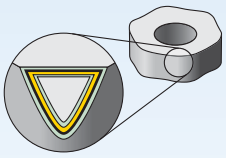
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	∇∇∇	Light (finishing)
▼▼	Medium	∇∇	Medium
▼	Heavy (roughing)	∇	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
TN6525 HC-P25 • PVD-TiAlN Nanolayer		▼▼	∇∇	∇∇				•	
TN6540 HC-P40 • PVD-TiAlN Nanolayer		▼	▼	∇		▼▼		•	•
TN7525 HC-P25 • MT-CVD/CVD-TiN-TiCN-Al_2O_3-TiN		▼▼	∇∇					•	
TN7535 HC-P35 • MT-CVD/CVD-TiN-TiCN-Al_2O_3		▼	∇	∇				•	
TTI25 HT-P15 • Cermet		▼▼▼	∇∇∇					•	•
THM HW-K15 • Uncoated				∇	▼	∇		•	•

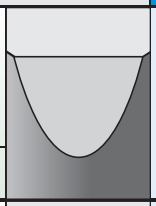
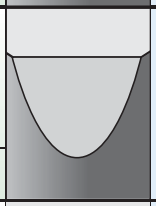
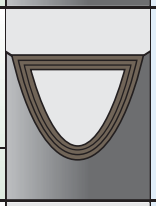
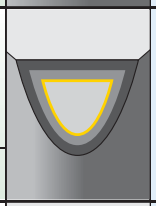
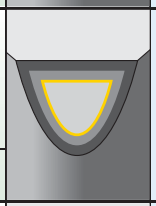
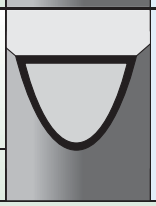


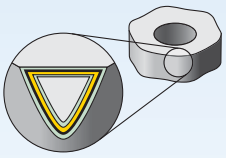
Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	∇∇∇	Light (finishing)
▼▼	Medium	∇∇	Medium
▼	Heavy (roughing)	∇	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
THM-U HF-N05 • Uncoated					▼▼▼			•	•
TTM/TTM08 HW-P25 • Uncoated		▼▼	∇∇	∇∇				•	•
WK15PM PVD-TiAlN Nanolayer				▼▼				•	•
WK15CM™ MT-CVD/TiN-TiCN-Al_2O_3				▼▼				•	
WP20CM MT-CVD/TiN-TiCN-Al_2O_3		▼▼		∇∇					
WP25PM PVD-AlTiN Multilayer		▼▼	▼▼	∇∇		▼▼	∇∇	•	•

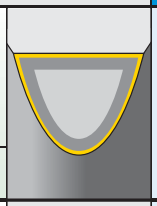
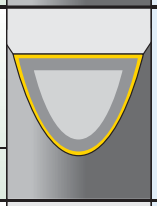
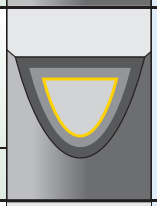
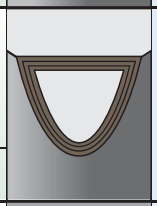
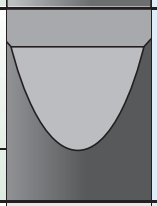
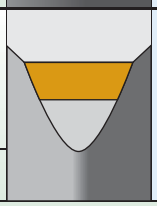


Modern coating technologies provide higher speed capabilities, greater productivity, and longer tool life.

Each insert has a material grid indicating primary and alternate uses for that tool, as well as whether it can be operated dry or with coolant.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

primary use		alternate use	
▼▼▼	Light (finishing)	∇∇∇	Light (finishing)
▼▼	Medium	∇∇	Medium
▼	Heavy (roughing)	∇	Heavy (roughing)

Grade		P	M	K	N	S	H	dry	with coolant
WS30PM™ PVD-AlTiN Multilayer		∇∇	▼▼			▼▼		•	•
WU35PM PVD-AlTiN Multilayer		▼	▼			▼		•	•
WP35CM MT-CVD/TiN-TiCN-Al_2O_3		▼	∇	▼				•	
WP40PM™ PVD TiAlN-AlCrN Multilayer		▼	▼			∇		•	•
WK25YM Silicon Nitride				▼▼				•	
WDN00U™ Ultra-fine grain PCD					▼▼▼ ▼▼ ▼				•

WIDIA

Indexable Milling • Face Mills

M1200 Mini • First Choice for Taper 40 Spindle Machines H2–H23

M1200 • First Choice for Taper 50 Spindle Machines H24–H41

M640 • High Positive Geometries for Low Power Machines H42–H49

M660 • Heavy-Duty Applications H50–H60

SuperFeed • PCD Face Milling & End Milling Platform H62–H68

M4000 • Flexible Cartridge Milling System H70–H74



One Series Meets Every Face Milling Need •

WIDIA™ Victory™ M1200 Mini

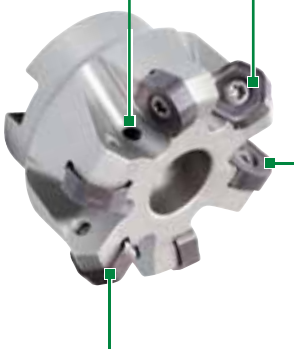
For consistent performance, look no further than the WIDIA Victory™ M1200 Mini. This easy-to-use product ensures great tool life, reduced machining time, and maximum productivity.



M1200 Mini

- Low cost per edge and high productivity.
- Reduced cutting forces due to soft cutting action.
- Significantly increased Metal Removal Rates (MRR).
- Victory™ M1200 Mini available in 15°, 45°, and 59° lead.
- WIDIA premium milling grades.
- Excellent tool life in light to heavy machining.
- Shorter machining cycle times.

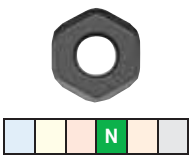
Best-in-class face milling platform to boost productivity on taper 40 spindle milling machines and driven tools.



Comprehensive standard offering for coarse, medium, and fine pitch cutter bodies to match all shop floor needs.

Latest soft cutting edge insert design for all material groups

-FNLDJ



Machining Aluminium

-ENLD



Light Machining

-SNGD



General Purpose

-SNHD



Heavy Machining

Face Mills

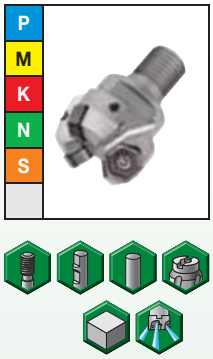


Victory™ M1200 Mini HF 15°

Max depth of cut: 1,7mm

Lead angle: 15°
Indexes per insert: 12
Diameter: 25–80mm

Pages: H5–H11

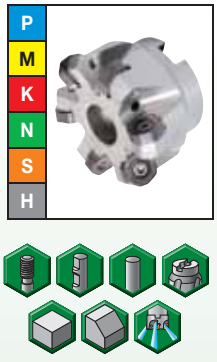


Victory™ M1200 Mini 45°

Max depth of cut: 3,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 25–120mm

Pages: H12–H19

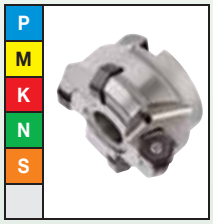


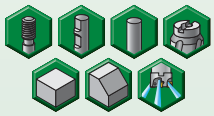
Victory™ M1200 Mini HD 59°

Max depth of cut: 4,7mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 40–125mm

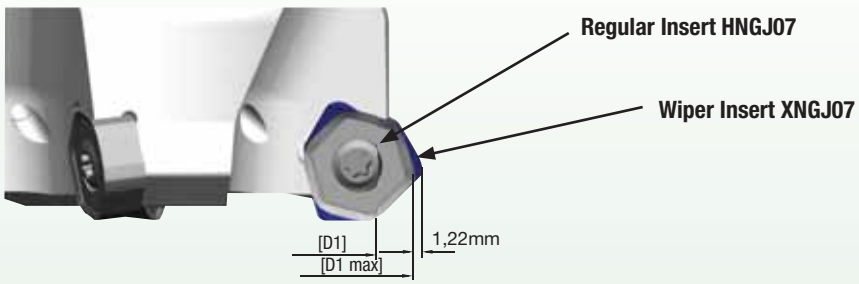
Pages: H20–H23





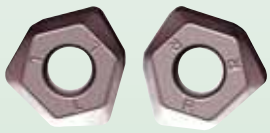
Easy-to-use wiper insert setup to achieve excellent surface floor finish

Wiper insert overlapping vs. regular insert



D1 max wiper = D1 max + 2,44mm

- Wiper inserts only applied with 45° lead angle cutter bodies.
- Easy to use. Regular and wiper inserts are loaded into fixed pockets. No adjustment required.
- Please have D1 max wiper in mind in case of limited working area.
- Use wiper inserts only in combination with periphery ground regular inserts HNGJ07.
- Up to cutting diameter D1=100mm load one wiper insert.
- For cutting diameter D1=125mm and above load two wiper inserts.
- Each wiper insert XNGJ07 can be applied with three right hand R and three left hand L cutting edges.



Victory™ M1200 Mini Series

Victory™ M1200 Mini HF High-Feed 15°



12 True Cutting Edges



15° Lead

Insert HNGJ0704
HNPJ0704

Ap1 max = 1,7mm

M1200 Mini HF can be loaded with all M1200 Mini standard inserts, except wiper inserts.

Victory™ M1200 Mini HF High-Feed



First choice for long reach face milling applications or light fixtures.

Chip thinning effect due to lead angle 15°. Tremendous enlargement of feed rate and MRR.

Up to 40% shorter machining cycle time.

Victory™ M1200 Mini 45°



12 True Cutting Edges



45° Lead

Insert HNGJ0704
HNPJ0704

Ap1 max = 3,5mm

Best-in-class leader in face milling up to Ap1 max = 3,5mm. Excellent choice for near net shape strategies and driven tools.

Victory™ M1200 Mini HD 59°



12 True Cutting Edges



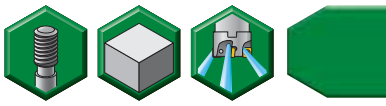
59° Lead

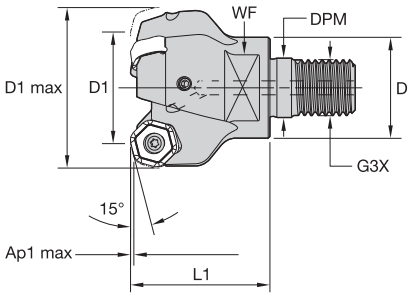
Insert HNGJ0704
HNPJ0704

Ap1 max = 4,7mm

Achieve a higher axial depth-of-cut capability up to Ap1 = 4,7mm with standard M1200 Mini inserts.

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.







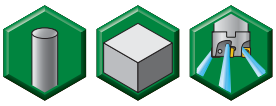
Screw-On End Mills

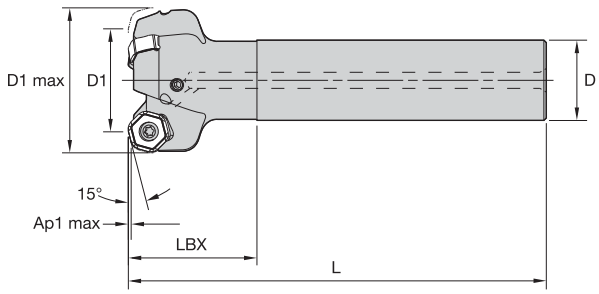
order number	catalogue number	D1	D1 max	D	DPM	G3X	L1	WF	Ap1 max	Z	max RPM	coolant supply	kg
4136874	**M1200HF025Z02M16HN07**	25	39	29	17,0	M16	32	22	1,7	2	20000	Yes	0,2
4136875	**M1200HF025Z03M16HN07**	25	39	29	17,0	M16	32	22	1,7	3	20000	Yes	0,2
4136876	**M1200HF032Z03M16HN07**	32	46	29	17,0	M16	40	22	1,7	3	17600	Yes	0,3
4136877	**M1200HF032Z04M16HN07**	32	46	29	17,0	M16	40	22	1,7	4	17600	Yes	0,3
4136878	**M1200HF040Z04M16HN07**	40	54	29	17,0	M16	40	22	1,7	4	15800	Yes	0,3
4136879	**M1200HF040Z05M16HN07**	40	54	29	17,0	M16	40	22	1,7	5	15800	Yes	0,3

Spare Parts

D1	 insert screw	 Nm	 Torx wrench
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**
40	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.







Cylindrical Shanks

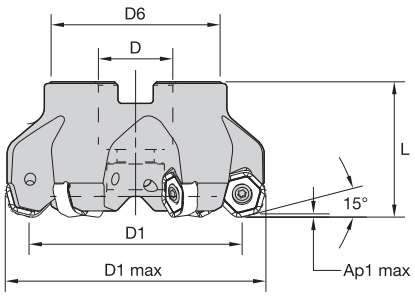
order number	catalogue number	D1	D1 max	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4136880	**M1200HF025Z02A20HN07L120**	25	39,1	20	120	32	1,7	2	20000	Yes	0,33
4136881	**M1200HF025Z03A20HN07L120**	25	39,1	20	120	32	1,7	3	20000	Yes	0,31
4136882	**M1200HF032Z03A25HN07L130**	32	46,1	25	130	40	1,7	3	17600	Yes	0,52
4136883	**M1200HF032Z04A25HN07L130**	32	46,1	25	130	40	1,7	4	17600	Yes	0,53

Spare Parts

D1	 insert screw	 Nm	 Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- High-feed capability.







Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4136884	**M1200HF040Z05HN07**	40	54,1	22	38	40	1,7	5	15800	Yes	0,29
4136885	**M1200HF050Z05HN07**	50	64,1	22	38	40	1,7	5	12700	Yes	0,40
4136886	**M1200HF063Z06HN07**	63	77,1	22	50	40	1,7	6	10100	Yes	0,67
4136887	**M1200HF080Z08HN07**	80	94,1	27	60	50	1,7	8	7900	Yes	1,26

Spare Parts

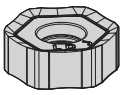


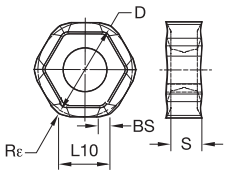



D1	insert screw	Nm	Torx driver	socket-head cap screw
40	**12146034500**	3,5	**12148082400**	**12146120500**
50	**12146034500**	3,5	**12148082400**	**12146120500**
63	**12146034500**	3,5	**12148082400**	**12146120500**
80	**12146034500**	3,5	**12148082400**	**12748701000**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–


HNGJ-LDJ

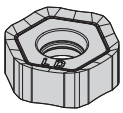


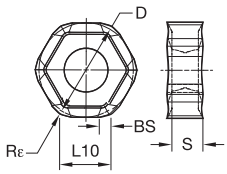
● first choice
○ alternate choice

P												
M												
K												
N											●	●
S												
H												

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332


HNGJ-LD

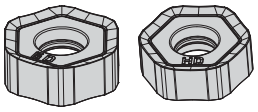


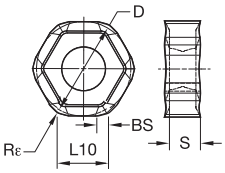
● first choice
○ alternate choice

P					●	●	●		●	●		●				
M					○	●	○		●	●	○	●				
K	●	●	○	○	○	●	○									
N																
S					●				●	●	●	○				
H									○							

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	–	–	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	–	3,20	0,08	3954428	–	3954429	3954430	–	–	–	–	–	–


HNPJ-GD HNPJ-HD



● first choice
○ alternate choice

		TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
P				●	●	●		●	●		●
M				○	●	○		●	●	○	●
K		●	●	○	○	○	●	○			
N											
S					●			●	●	●	○
H								○			

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm										
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm										
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	–	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297

Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	**–**	–	355	**310**	295	–	**–**	–	–	**–**	–
	2	330	**290**	240	335	**305**	275	–	**–**	–	300	**260**	215	–	**–**	–	–	**–**	–
	3	305	**260**	210	305	**275**	245	–	**–**	–	275	**235**	190	–	**–**	–	–	**–**	–
	4	270	**220**	180	230	**210**	190	–	**–**	–	245	**205**	160	–	**–**	–	–	**–**	–
	5	220	**205**	180	310	**275**	250	–	**–**	–	205	**185**	160	–	**–**	–	–	**–**	–
	6	200	**150**	120	190	**160**	130	–	**–**	–	180	**140**	110	–	**–**	–	–	**–**	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	**–**	–	–	**–**	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	**–**	–	–	**–**	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	**–**	–	–	**–**	–
K	1	275	**245**	220	355	**320**	290	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	215	**190**	180	280	**250**	230	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	180	**160**	145	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	1640	**980**	800	1640	**980**	800
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	2	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	3	60	**50**	30	–	**–**	–	65	**55**	35	60	**50**	35	–	**–**	–	–	**–**	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	**–**	–	–	**–**	–
H	1	145	**110**	85	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

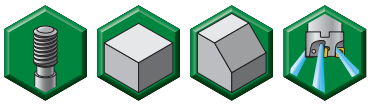
Recommended Starting Feeds [mm]

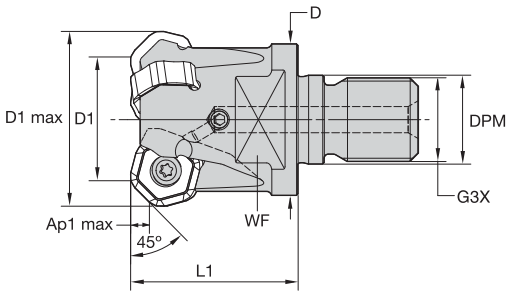
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,48	**0,89**	1,81	0,34	**0,64**	1,29	0,26	**0,48**	0,96	0,22	**0,42**	0,83	0,21	**0,38**	0,76	.F..LDJ
.E..LD	0,48	**1,38**	2,85	0,34	**0,99**	2,00	0,26	**0,74**	1,48	0,22	**0,64**	1,28	0,21	**0,59**	1,17	.E..LD
.S..GD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..GD
.S..HD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.







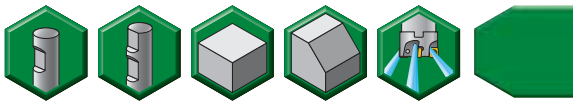
Screw-On End Mills

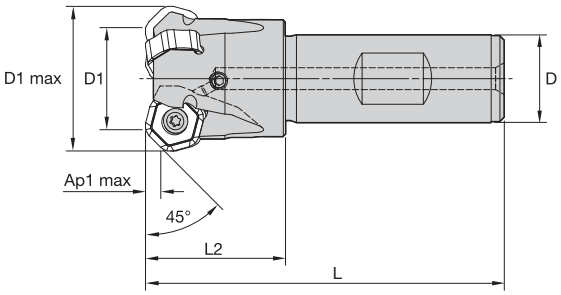
order number	catalogue number	D1	D1 max	D	DPM	G3X	L1	WF	Ap1 max	Z	max RPM	coolant supply	kg
3957839	**M1200D025Z02M16HN07**	25	33,7	29	17,0	M16	32	22	3,5	2	20000	Yes	0,13
3957840	**M1200D025Z03M16HN07**	25	33,7	29	17,0	M16	32	22	3,5	3	20000	Yes	0,13
3957841	**M1200D032Z03M16HN07**	32	40,7	29	17,0	M16	40	22	3,5	3	17600	Yes	0,20
3957842	**M1200D032Z04M16HN07**	32	40,7	29	17,0	M16	40	22	3,5	4	17600	Yes	0,20
3957963	**M1200D040Z04M16HN07**	40	48,7	29	17,0	M16	40	22	3,5	4	15800	Yes	0,24
3957964	**M1200D040Z05M16HN07**	40	48,7	29	17,0	M16	40	22	3,5	5	15800	Yes	0,25

Spare Parts

D1	 insert screw	 Nm	 Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**
40	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.







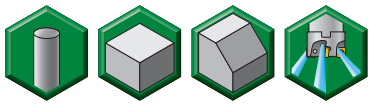
Weldon Shanks

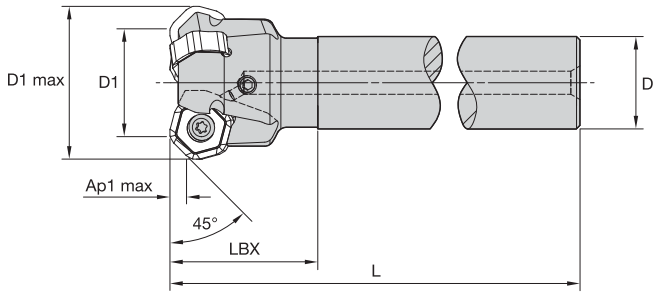
order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3958011	**M1200D025Z02B20HN07**	25	33,7	20	82	32	3,5	2	20000	Yes	0,22
3958012	**M1200D025Z03B20HN07**	25	33,7	20	82	32	3,5	3	20000	Yes	0,21
3958023	**M1200D032Z03B25HN07**	32	40,7	25	97	40	3,5	3	17600	Yes	0,39
3958024	**M1200D032Z04B25HN07**	32	40,7	25	97	40	3,5	4	17600	Yes	0,40

Spare Parts

D1	 insert screw	 Nm	 Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.







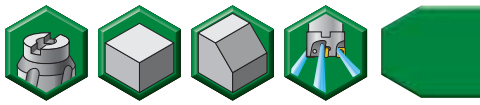
Cylindrical Shanks

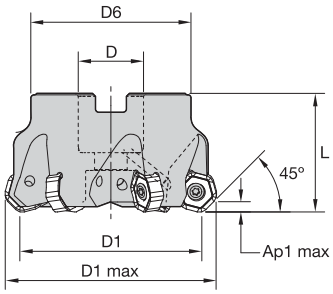
order number	catalogue number	D1	D1 max	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
3958025	**M1200D025Z02A20HN07L120**	25	33,7	20	120	32	3,5	2	20000	Yes	0,29
3958026	**M1200D025Z03A20HN07L120**	25	33,7	20	120	32	3,5	3	20000	Yes	0,28
3958029	**M1200D025Z02A25HN07L200**	25	33,7	25	200	32	3,5	2	20000	Yes	0,72
3958030	**M1200D025Z03A25HN07L200**	25	33,7	25	200	32	3,5	3	20000	Yes	0,71
3958027	**M1200D032Z03A25HN07L130**	32	40,7	25	130	40	3,5	3	17600	Yes	0,49
3958028	**M1200D032Z04A25HN07L130**	32	40,7	25	130	40	3,5	4	17600	Yes	0,50

Spare Parts

D1	 insert screw	 Nm	 Torx driver
25	**12146034500**	3,5	**12148082400**
32	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for low depth-of-cut face milling.
- Maximum number of teeth per diameter.







Shell Mills

order number	catalogue number	D1	D1 max	D	D6	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3957995	M1200D040Z04HN07	40	48,7	22	38	40	40	3,5	4	15800	Yes	0,26
3957996	M1200D040Z05HN07	40	48,7	22	38	40	40	3,5	5	15800	Yes	0,26
3957997	M1200D050Z04HN07	50	58,7	22	38	40	40	3,5	4	12700	Yes	0,35
3957998	M1200D050Z05HN07	50	58,7	22	38	40	40	3,5	5	12700	Yes	0,36
3957999	M1200D050Z06HN07	50	58,7	22	38	40	40	3,5	6	12700	Yes	0,35
3958000	M1200D063Z04HN07	63	71,7	22	50	40	40	3,5	4	10100	Yes	0,58
3958001	M1200D063Z06HN07	63	71,7	22	50	40	40	3,5	6	10100	Yes	0,65
3958002	M1200D063Z08HN07	63	71,7	22	50	40	40	3,5	8	10100	Yes	0,62
3958003	M1200D080Z05HN07	80	88,7	27	60	50	50	3,5	5	7900	Yes	1,11
3958004	M1200D080Z08HN07	80	88,7	27	60	50	50	3,5	8	7900	Yes	1,24
3958005	M1200D080Z10HN07	80	88,7	27	60	50	50	3,5	10	7900	Yes	1,17
3958006	M1200D100Z06HN07	100	108,7	32	80	50	50	3,5	6	6300	Yes	1,71
3958007	M1200D100Z09HN07	100	108,7	32	80	50	50	3,5	9	6300	Yes	1,82
3958008	M1200D100Z12HN07	100	108,7	32	80	50	50	3,5	12	6300	Yes	1,82
4138470	M1200D125Z08HN07	125	133,7	40	90	63	–	3,5	8	5050	Yes	2,84
4138471	M1200D125Z12HN07	125	133,7	40	90	63	–	3,5	12	5050	Yes	2,96
4138472	M1200D125Z16HN07	125	133,7	40	90	63	–	3,5	16	5050	Yes	3,02

Spare Parts

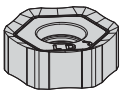


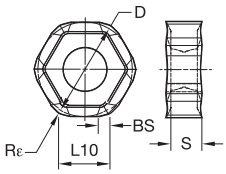
D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	12146034500	3,5	12148082400	–	12146109200	–	–	–
50	12146034500	3,5	12148082400	12146120500	–	–	–	–
63	12146034500	3,5	12148082400	12146120500	–	–	–	–
80	12146034500	3,5	12148082400	12748701000	–	–	–	–
100	12146034500	3,5	12148082400	–	–	12146109400	–	–
125	12146034500	3,5	12148082400	–	–	–	12146107000	12146111000

NOTE: Mounting screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–


HNGJ-LDJ

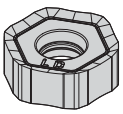


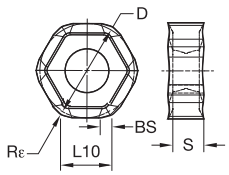
● first choice
○ alternate choice

P			
M			
K			
N	●	●	
S			
H			

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332


HNGJ-LD

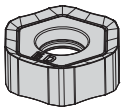


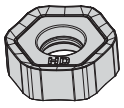
● first choice
○ alternate choice

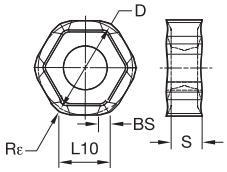
P				●	●	●		●	●		●
M				○	●	○		●	●	○	●
K	●	●	○	○	○	●	○				
N											
S				●			●	●	●	○	
H							○				

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	–	–	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	–	3,20	0,08	3954428	–	3954429	3954430	–	–	–	–	–	–


HNPJ-GD


HNPJ-HD



● first choice
○ alternate choice

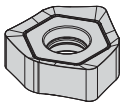
P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

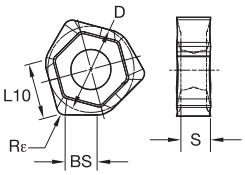
■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	–	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297


XNGJ-LD3
Wiper



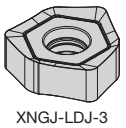
● first choice
○ alternate choice

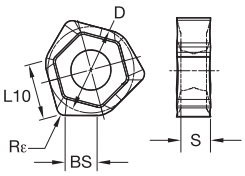
P			
M			
K			
N	●	●	
S			
H			

■ XNGJ-LDJ-3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
XNGJ0704ANFNLDJ3W	3	13	6,78	4,47	6,78	1,30	0,08	3954416	3954433

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.


XNGJ-LDJ-3
Wiper



● first choice
○ alternate choice

P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

■ XNGJ-LD3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
XNGJ0704ANENLD3W	3	13	6,78	4,47	6,78	1,30	0,08	3954424	3954425	3954426	3954427	-	5427373	5895298	-	-	5895299

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.

Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	**–**	–	355	**310**	295	–	**–**	–	–	**–**	–
	2	330	**290**	240	335	**305**	275	–	**–**	–	300	**260**	215	–	**–**	–	–	**–**	–
	3	305	**260**	210	305	**275**	245	–	**–**	–	275	**235**	190	–	**–**	–	–	**–**	–
	4	270	**220**	180	230	**210**	190	–	**–**	–	245	**205**	160	–	**–**	–	–	**–**	–
	5	220	**205**	180	310	**275**	250	–	**–**	–	205	**185**	160	–	**–**	–	–	**–**	–
	6	200	**150**	120	190	**160**	130	–	**–**	–	180	**140**	110	–	**–**	–	–	**–**	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	**–**	–	–	**–**	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	**–**	–	–	**–**	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	**–**	–	–	**–**	–
K	1	275	**245**	220	355	**320**	290	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	215	**190**	180	280	**250**	230	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	180	**160**	145	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	1640	**980**	800	1640	**980**	800
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	2	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	3	60	**50**	30	–	**–**	–	65	**55**	35	60	**50**	35	–	**–**	–	–	**–**	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	**–**	–	–	**–**	–
H	1	145	**110**	85	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

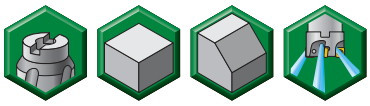
Recommended Starting Feeds [mm]

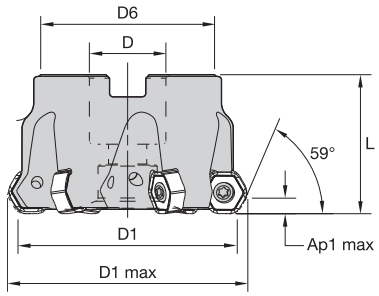
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,17	**0,32**	0,65	0,13	**0,23**	0,47	0,09	**0,17**	0,35	0,08	**0,15**	0,31	0,08	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,50**	1,00	0,13	**0,36**	0,72	0,09	**0,27**	0,54	0,08	**0,23**	0,47	0,08	**0,21**	0,43	.E..LD
.S..GD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- Higher axial depth-of-cut capability with 59° lead angle.







Shell Mills

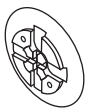
order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4136482	**M1200HD040Z04HN07**	40	46,8	22	38	40	4,7	4	15800	Yes	0,22
4136863	**M1200HD040Z05HN07**	40	46,8	22	38	40	4,7	5	15800	Yes	0,22
4136864	**M1200HD050Z04HN07**	50	56,8	22	38	40	4,7	4	12700	Yes	0,34
4136865	**M1200HD050Z05HN07**	50	56,8	22	38	40	4,7	5	12700	Yes	0,34
4136866	**M1200HD063Z04HN07**	63	69,8	22	50	40	4,7	4	10100	Yes	0,58
4136867	**M1200HD063Z06HN07**	63	69,8	22	50	40	4,7	6	10100	Yes	0,60
4136868	**M1200HD080Z05HN07**	80	86,8	27	60	50	4,7	5	7900	Yes	1,11
4136869	**M1200HD080Z08HN07**	80	86,8	27	60	50	4,7	8	7900	Yes	1,17
4136870	**M1200HD100Z06HN07**	100	106,7	32	80	50	4,7	6	6300	Yes	1,74
4136871	**M1200HD100Z09HN07**	100	106,7	32	80	50	4,7	9	6300	Yes	1,74
4136872	**M1200HD125Z08HN07**	125	131,7	40	90	63	4,7	8	5050	Yes	2,86
4136873	**M1200HD125Z12HN07**	125	131,7	40	90	63	4,7	12	5050	Yes	2,90

Spare Parts







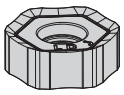


D1	insert screw	Nm	Torx driver	socket-head cap screw	mounting screw with coolant grooves	coolant screw assembly	coolant lock screw	coolant cap
40	**12146034500**	3,5	**12148082400**	–	**12146109200**	–	–	–
50	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–	–
63	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	–	–	–	–
100	**12146034500**	3,5	**12148082400**	–	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111000**

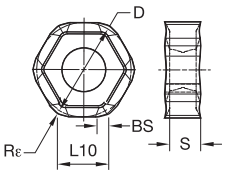
NOTE: Mounting screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6510	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..GD	WS30PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–



HNGJ-LDJ

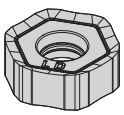


● first choice
○ alternate choice

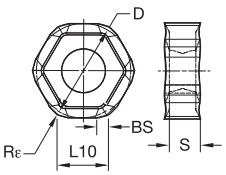
P	
M	
K	
N	● ●
S	
H	

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0704ANFNLDJ	12	13	6,80	4,48	1,60	1,20	0,08	3954414	3954332



HNGJ-LD

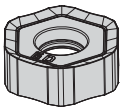


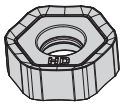
● first choice
○ alternate choice

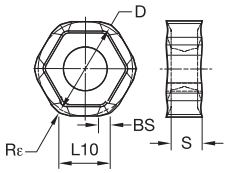
P				●	●	●		●	●		●			
M				○	●	○		●	●	○	●			
K	●	●	○	○	○	●	○							
N														
S					●			●	●	●	○			
H							○							

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNGJ0704ANENLD	12	13	6,80	4,48	1,60	1,20	0,08	3954419	3954420	3954421	3954422	'	'	5895291	5895292	5528975	5550905
HNGJ070432ANENLD	12	13	6,80	4,48	–	3,20	0,08	3954428	'	3954429	3954430	'	'	'	'	'	'


HNPJ-GD


HNPJ-HD



● first choice
○ alternate choice

P			●	●	●		●	●		●
M			○	●	○		●	●	○	●
K	●	●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNGD	12	13	6,80	4,45	1,27	1,20	0,10	3954432	3954473	-	3954474	3954475	5427374	5895293	5895294	5528976	5550906

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6510	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WP35CM	WS30PM	WP40PM
HNPJ0704ANSNHD	12	13	6,80	4,41	1,25	1,20	0,14	3954477	3954478	-	3954479	3954480	5427375	5895295	5895296	-	5550907
HNPJ070432ANSNHD	12	13	6,80	4,42	–	3,20	0,14	3954481	3954482	-	3954483	3954484	-	-	-	-	5895297

Recommended Starting Speeds

■ Recommended Starting Speeds [m/min]

Material Group		TN6510			TN6520			TN6525			TN6540			TN7535			WK15CM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–
K	1	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410
	2	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330
	3	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WP35CM			WS30PM			WP40PM			TN6501			THM-U		
P	1	395	**340**	325	545	**475**	445	–	**–**	–	355	**310**	295	–	**–**	–	–	**–**	–
	2	330	**290**	240	335	**305**	275	–	**–**	–	300	**260**	215	–	**–**	–	–	**–**	–
	3	305	**260**	210	305	**275**	245	–	**–**	–	275	**235**	190	–	**–**	–	–	**–**	–
	4	270	**220**	180	230	**210**	190	–	**–**	–	245	**205**	160	–	**–**	–	–	**–**	–
	5	220	**205**	180	310	**275**	250	–	**–**	–	205	**185**	160	–	**–**	–	–	**–**	–
	6	200	**150**	120	190	**160**	130	–	**–**	–	180	**140**	110	–	**–**	–	–	**–**	–
M	1	245	**215**	200	245	**220**	185	270	**240**	220	235	**205**	185	–	**–**	–	–	**–**	–
	2	220	**190**	155	220	**190**	170	245	**215**	175	210	**180**	150	–	**–**	–	–	**–**	–
	3	170	**145**	115	175	**155**	140	185	**160**	125	155	**140**	110	–	**–**	–	–	**–**	–
K	1	275	**245**	220	355	**320**	290	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	215	**190**	180	280	**250**	230	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	180	**160**	145	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	1640	**980**	800	1640	**980**	800
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	960	**600**	480	960	**600**	480
S	1	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	2	50	**40**	30	–	**–**	–	55	**50**	35	50	**40**	35	–	**–**	–	–	**–**	–
	3	60	**50**	30	–	**–**	–	65	**55**	35	60	**50**	35	–	**–**	–	–	**–**	–
	4	85	**60**	40	80	**60**	40	100	**70**	50	80	**60**	40	–	**–**	–	–	**–**	–
H	1	145	**110**	85	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,14	**0,26**	0,53	0,10	**0,19**	0,38	0,08	**0,14**	0,29	0,07	**0,12**	0,25	0,06	**0,11**	0,23	.F..LDJ
.E..LD	0,14	**0,41**	0,82	0,10	**0,29**	0,59	0,08	**0,22**	0,44	0,07	**0,19**	0,38	0,06	**0,18**	0,35	.E..LD
.S..GD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47	.S..GD
.S..HD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

One Series Meets Every Face Milling Need •

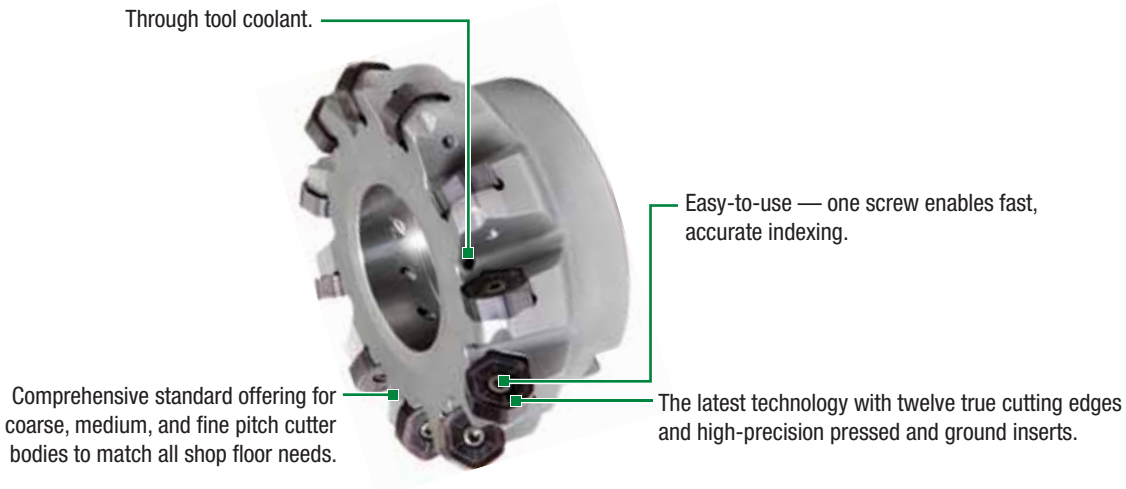
WIDIA™ Victory™ M1200 Series

M1200



- Low cost per edge; high productivity.
- 14.5–59° lead angles.
- One series meets every face milling need.
- Available in WIDIA premium milling grades.
- Better tool life in light to heavy machining.

Best-in-class face milling platform to boost productivity on taper 50 spindle milling machines.



Face Mills

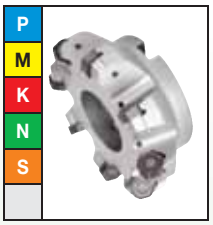


Victory™ M1200 HF 14.5°

Max depth of cut: 2,2mm

Lead angle: 14.5°
Indexes per insert: 12
Diameter: 50–160mm

Pages: H26–H29



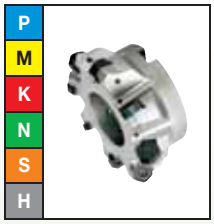


Victory™ M1200 45°

Max depth of cut: 4,5mm

Lead angle: 45°
Indexes per insert: 12
Diameter: 40–315mm

Pages: H30–H37





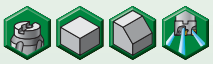
Victory™ M1200 HD 59°

Max depth of cut: 6mm

Lead angle: 59°
Indexes per insert: 12
Diameter: 50–160mm

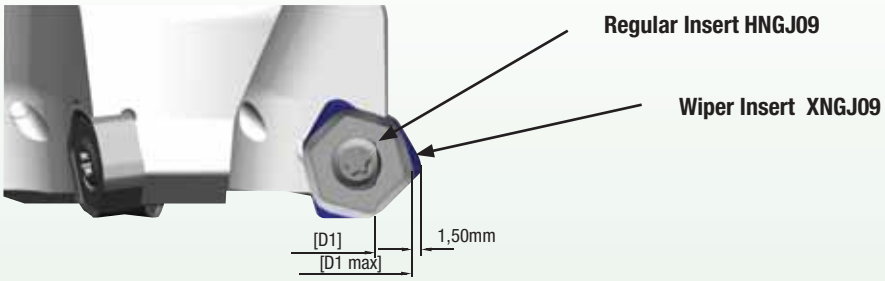
Pages: H38–H41





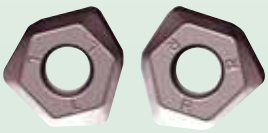
Easy-to-use wiper insert setup to achieve excellent surface floor finish

Wiper insert overlapping vs. regular insert

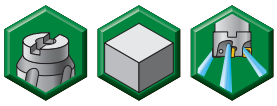


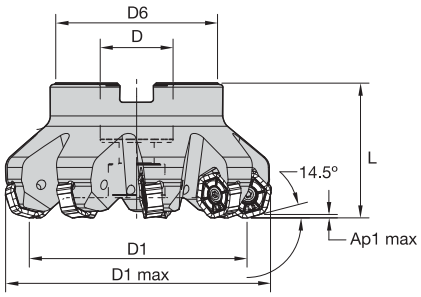
D1 max Wiper = D1 max + 3,00mm

- Wiper inserts only applied with 45° lead angle cutter bodies.
- Easy to use. Regular and wiper inserts are loaded into fixed pockets. No adjustment required.
- Please have D1 max wiper in mind in case of limited working area.
- Use wiper inserts only in combination with periphery ground regular inserts HNGJ09.
- Up to cutting diameter D1=100mm load one wiper insert.
- For cutting diameter D1=125mm and above load two wiper inserts.
- Each wiper insert XNGJ09 can be applied with three right hand R and three left hand L cutting edges.



- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.
- Do not load wiper inserts.







Shell Mills

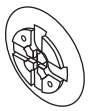
order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3750370	**M1200HF050Z04HN09**	50	67,9	22	38	40	2,2	4	11400	Yes	0,65
3750372	**M1200HF063Z05HN09**	63	80,9	22	50	40	2,2	5	8950	Yes	0,65
3750434	**M1200HF080Z06HN09**	80	97,9	27	60	50	2,2	6	7300	Yes	1,24
3750435	**M1200HF100Z08HN09**	100	117,9	32	80	50	2,2	8	5900	Yes	1,89
3750436	**M1200HF125Z09HN09**	125	142,9	40	90	63	2,2	9	4800	Yes	3,23
3957969	**M1200HF160Z12HN09**	160	177,9	40	110	63	2,2	12	3900	Yes	5,14

Spare Parts







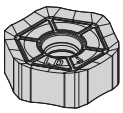



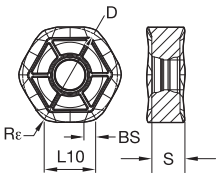
D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant cap
50	**12146034500**	3,5	**12148082400**	**12146120500**	**12146101000**	–	–	–
63	**12146034500**	3,5	**12148082400**	**12146120500**	**12146101000**	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	**12146101800**	–	–	–
100	**12146034500**	3,5	**12148082400**	–	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111000**
160	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111100**

NOTE: Socket-head cap screw with coolant groove, coolant lock screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–


HNGJ-LDJ

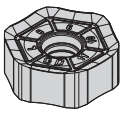


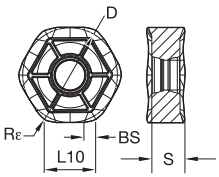
● first choice
○ alternate choice

P	
M	
K	
N	● ●
S	
H	

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383


HNPJ-GD

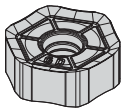


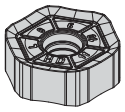
● first choice
○ alternate choice

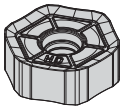
P		●	●	●		●		●	●
M		○	●	○		●	○	●	●
K	●	○	○	○	●	○			
N									
S			●			●	●	●	○
H						○			

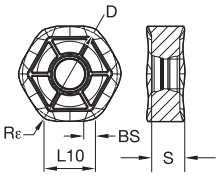
HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	–	3761187	3761188	5427372	5895374	–	5895375	5550908


HNGJ-GD


HNPJ-HD


HNGJ-HD



● first choice
○ alternate choice

P			●	●	●		●		●	●				
M			○	●	○		●	○	●	●				
K		●	○	○	○	●	○							
N														
S				●			●	●	●	○				
H							○							

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	–	5528974	5895349	5895350

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	–	4,34	0,13	3670866	–	3670865	–	–	5895378	–	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	–	3670842	–	5427371	5895376	–	5895377	5550909

■ HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	–	4,35	0,20	3564083	3564084	3564085	–	–	–	–	–	–
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	–	–	5895371	–	5895372	5895373

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7535			WK15CM			WP25PM		
P	1	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–	395	**340**	325
	2	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–	330	**290**	240
	3	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–	305	**260**	210
	4	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–	270	**220**	180
	5	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–	220	**205**	180
	6	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–	200	**150**	120
M	1	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–	245	**215**	200
	2	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–	220	**190**	155
	3	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–	170	**145**	115
K	1	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410	275	**245**	220
	2	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330	215	**190**	180
	3	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275	180	**160**	145
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–	50	**40**	30
	2	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–	50	**40**	30
	3	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–	60	**50**	30
	4	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–	85	**60**	40
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	145	**110**	85
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		WS30PM			WP35CM			WP40PM			TN6501			THM-U		
P	1	–	–	–	545	**475**	445	355	**310**	295	–	–	–	–	–	–
	2	–	–	–	335	**305**	275	300	**260**	215	–	–	–	–	–	–
	3	–	–	–	305	**275**	245	275	**235**	190	–	–	–	–	–	–
	4	–	–	–	230	**210**	190	245	**205**	160	–	–	–	–	–	–
	5	–	–	–	310	**275**	250	205	**185**	160	–	–	–	–	–	–
	6	–	–	–	190	**160**	130	180	**140**	110	–	–	–	–	–	–
M	1	270	**240**	220	245	**220**	185	235	**205**	185	–	–	–	–	–	–
	2	245	**215**	175	220	**190**	170	210	**180**	150	–	–	–	–	–	–
	3	185	**160**	125	175	**155**	140	155	**140**	110	–	–	–	–	–	–
K	1	–	–	–	355	**320**	290	–	–	–	–	–	–	–	–	–
	2	–	–	–	280	**250**	230	–	–	–	–	–	–	–	–	–
	3	–	–	–	235	**210**	190	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	2	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	3	65	**55**	35	–	–	–	60	**50**	35	–	–	–	–	–	–
	4	100	**70**	50	80	**60**	40	80	**60**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

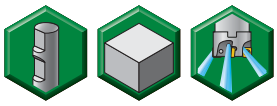
Recommended Starting Feeds [mm]

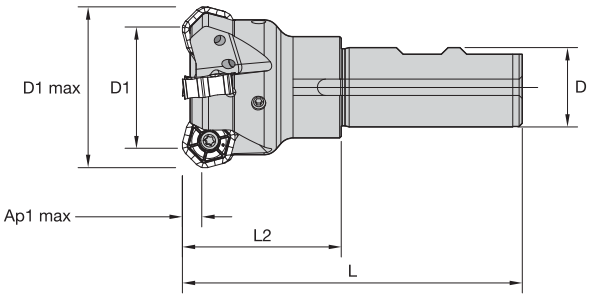
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,45	**0,90**	1,84	0,33	**0,65**	1,31	0,25	**0,48**	0,97	0,21	**0,42**	0,84	0,20	**0,39**	0,77	.F..LDJ
.E..LD	0,45	**1,36**	2,81	0,33	**0,98**	1,97	0,25	**0,73**	1,46	0,21	**0,63**	1,27	0,20	**0,58**	1,16	.E..LD
.S..GD	0,72	**2,35**	3,89	0,52	**1,67**	2,70	0,39	**1,23**	1,98	0,34	**1,07**	1,72	0,31	**0,98**	1,57	.S..GD
.S..HD	0,92	**2,35**	3,89	0,66	**1,67**	2,70	0,49	**1,23**	1,98	0,43	**1,07**	1,72	0,39	**0,98**	1,57	.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- First choice for general face milling.
- Low cutting forces for maximum productivity.







Weldon Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
3325311	**M1200D040Z04B25HN09**	40	51,0	25	107	50	4,5	4	15800	Yes	0,52
3325310	**M1200D040Z03B25HN09**	40	51,0	25	107	50	4,5	3	15800	Yes	0,53

Spare Parts



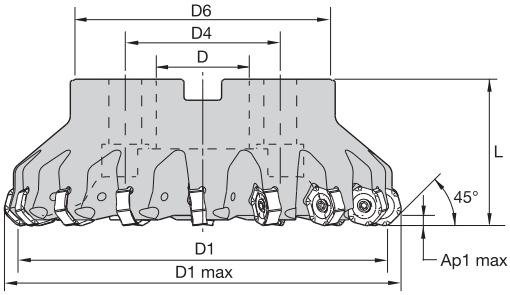




D1	insert screw	Nm	Torx driver
40	**12146034500**	3,5	**12148082400**

- Twelve cutting edges.
- First choice for general face milling.
- Low cutting forces for maximum productivity.







Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
3957970	**M1200D040Z03HN09**	40	51,0	22	–	39	40	4,4	3	15800	Yes	0,26
3957971	**M1200D040Z04HN09**	40	51,0	22	–	39	40	4,4	4	15800	Yes	0,25
3325312	**M1200D050Z04HN09**	50	61,0	22	–	38	40	4,5	4	12700	Yes	0,32
3325693	**M1200D050Z05HN09**	50	61,0	22	–	38	40	4,5	5	12700	Yes	0,33
3650535	**M1200D063Z04HN09**	63	74,0	22	–	50	40	4,5	4	10100	Yes	0,59
3093594	**M1200D063Z06HN09**	63	74,0	22	–	50	40	4,5	6	10100	Yes	0,56
3025376	**M1200D063Z07HN09**	63	74,0	22	–	50	40	4,5	7	10100	Yes	0,57
3650536	**M1200D080Z05HN09**	80	91,0	27	–	60	50	4,5	5	7900	Yes	1,12
3081507	**M1200D080Z06HN09**	80	91,0	27	–	60	50	4,5	6	7900	Yes	1,07
3025377	**M1200D080Z09HN09**	80	91,0	27	–	60	50	4,5	9	7900	Yes	1,11
3650537	**M1200D100Z06HN09**	100	111,0	32	–	80	50	4,5	6	6300	Yes	1,73
3325694	**M1200D100Z08HN09**	100	111,0	32	–	80	50	4,5	8	6300	Yes	1,68
3025378	**M1200D100Z11HN09**	100	111,0	32	–	80	50	4,5	11	6300	Yes	1,73
3650538	**M1200D125Z08HN09**	125	135,9	40	–	90	63	4,5	8	5050	Yes	2,84
3081508	**M1200D125Z10HN09**	125	135,9	40	–	90	63	4,5	10	5050	Yes	2,77
3093593	**M1200D125Z14HN09**	125	136,0	40	–	90	63	4,5	14	5050	Yes	2,86
3066118	**M1200D160Z12HN09**	160	171,0	40	66,7	110	63	4,5	12	3900	Yes	4,56
3066119	**M1200D160Z16HN09**	160	171,0	40	66,7	110	63	4,5	16	3900	Yes	4,70
3957972	**M1200D200Z16HN09**	200	211,0	60	101,6	130	63	4,5	16	3180	Yes	6,43
3957993	**M1200D250Z20HN09**	250	261,0	60	101,6	130	63	4,5	20	2550	Yes	9,93
3957994	**M1200D315Z24HN09**	315	326,0	60	101,6	230	80	4,5	24	2020	Yes	22,90

(continued)

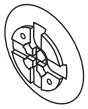
(Shell Mills — continued)

Spare Parts







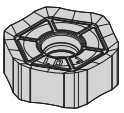



D1	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove	coolant screw assembly	coolant lock screw	coolant cap
40	**12146034500**	3,5	**12148082400**	–	**12146109200**	–	–	–
50	**12146034500**	3,5	**12148082400**	–	–	–	–	–
63	**12146034500**	3,5	**12148082400**	–	–	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	–	–	–	–
100	**12146034500**	3,5	**12148082400**	–	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111000**
160	**12146034500**	3,5	**12148082400**	–	–	–	**12146107000**	**12146111100**
200	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111200**
250	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111300**
315	**12146034500**	3,5	**12148082400**	–	–	–	–	**12146111400**

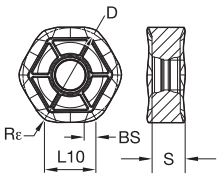
NOTE: Socket-head cap screw with coolant groove, coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–



HNGJ-LDJ

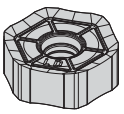


● first choice
○ alternate choice

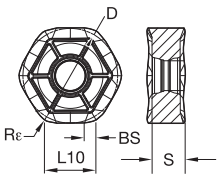
P	●
M	
K	
N	● ●
S	
H	

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383



HNGJ-LD

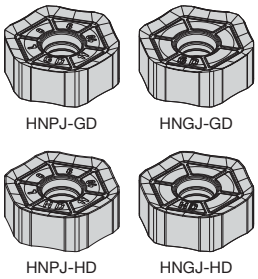


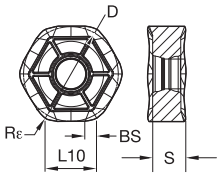
● first choice
○ alternate choice

P			●	●	●		●		●	●
M			○	●	○		●	○	●	●
K		●	○	○	○	●	○			
N										
S				●			●	●	●	○
H							○			

HNGJ-LD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANENLD	12	16	8,58	5,56	1,80	1,20	0,05	3093559	3330950	3030034	3030017	I	5895346	5528973	5895347	5895348





● first choice
○ alternate choice

P			●	●	●		●		●	●	●
M			○	●	○		●	○	●	●	
K	●	○	○	○	●	○					
N											
S				●			●	●	●	○	
H							○				

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	I	3761187	3761188	5427372	5895374	I	5895375	5550908

■ HNGJ-GD

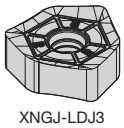
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	5427370	I	5528974	5895349	5895350

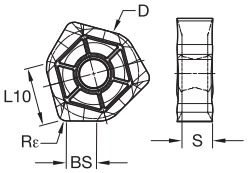
■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	–	4,34	0,13	3670866	I	3670865	I	I	5895378	I	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	I	3670842	I	5427371	5895376	I	5895377	5550909

■ HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	–	4,35	0,20	3564083	3564084	3564085	I	I	I	I	I	I
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	I	I	5895371	I	5895372	5895373


XNGJ-LDJ3
Wiper



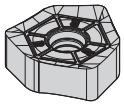
● first choice
○ alternate choice

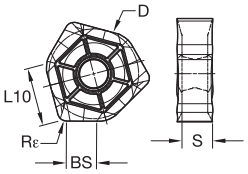
P	
M	
K	
N	● ●
S	
H	

XNGJ-LDJ3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
XNGJ0905ANFNLDJ3W	3	16	9,60	5,51	6,00	1,60	0,02	3865375	3865358

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.


XNGJ-GD3
Wiper



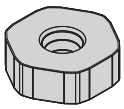
● first choice
○ alternate choice

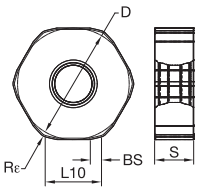
P		●	●	●		●		●	●
M		○	●	○		●	○	●	●
K	●	○	○	○	●	○			
N									
S			●			●	●	●	○
H						○			

XNGJ-GD3 Wiper

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
XNGJ0905ANSNGD3W	3	16	9,60	5,51	6,00	1,60	0,09	3524707	3523620	3066479	I	5622622	5895381	I	I	5895382

NOTE: Inserts have 3 right-hand and 3 left-hand cutting edges.


HNEC535ANSN
Ceramic



● first choice
○ alternate choice

P	
M	
K	●
N	
S	
H	

HNEC535ANSN Ceramic

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	WK25YM
HNEC0905ANSN	12	16	9,17	5,56	1,95	1,20	0,19	5910033

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7535			WK15CM			WP25PM		
P	1	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	–	–	–	395	**340**	325
	2	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	–	–	–	330	**290**	240
	3	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	–	–	–	305	**260**	210
	4	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	–	–	–	270	**220**	180
	5	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	–	–	–	220	**205**	180
	6	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	–	–	–	200	**150**	120
M	1	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	–	–	–	245	**215**	200
	2	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	–	–	–	220	**190**	155
	3	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	–	–	–	170	**145**	115
K	1	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	505	**460**	410	275	**245**	220
	2	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	400	**355**	330	215	**190**	180
	3	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	335	**300**	275	180	**160**	145
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**35**	30	–	–	–	–	–	–	50	**40**	30
	2	–	–	–	–	–	–	25	**20**	10	–	–	–	–	–	–	50	**40**	30
	3	–	–	–	–	–	–	70	**40**	30	–	–	–	–	–	–	60	**50**	30
	4	–	–	–	–	–	–	60	**30**	25	–	–	–	–	–	–	85	**60**	40
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	145	**110**	85
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WS30PM			WP35CM			WP40PM			WK25YM			TN6501			THM-U		
P	1	–	–	–	545	**475**	445	355	**310**	295	–	–	–	–	–	–	–	–	–
	2	–	–	–	335	**305**	275	300	**260**	215	–	–	–	–	–	–	–	–	–
	3	–	–	–	305	**275**	245	275	**235**	190	–	–	–	–	–	–	–	–	–
	4	–	–	–	230	**210**	190	245	**205**	160	–	–	–	–	–	–	–	–	–
	5	–	–	–	310	**275**	250	205	**185**	160	–	–	–	–	–	–	–	–	–
	6	–	–	–	190	**160**	130	180	**140**	110	–	–	–	–	–	–	–	–	–
M	1	270	**240**	220	245	**220**	185	235	**205**	185	–	–	–	–	–	–	–	–	–
	2	245	**215**	175	220	**190**	170	210	**180**	150	–	–	–	–	–	–	–	–	–
	3	185	**160**	125	175	**155**	140	155	**140**	110	–	–	–	–	–	–	–	–	–
K	1	–	–	–	355	**320**	290	–	–	–	965	**880**	780	–	–	–	–	–	–
	2	–	–	–	280	**250**	230	–	–	–	765	**685**	635	–	–	–	–	–	–
	3	–	–	–	235	**210**	190	–	–	–	645	**570**	525	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–	–	–	–
	2	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–	–	–	–
	3	65	**55**	35	–	–	–	60	**50**	35	–	–	–	–	–	–	–	–	–
	4	100	**70**	50	80	**60**	40	80	**60**	40	–	–	–	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

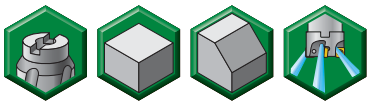
Recommended Starting Feeds [mm]

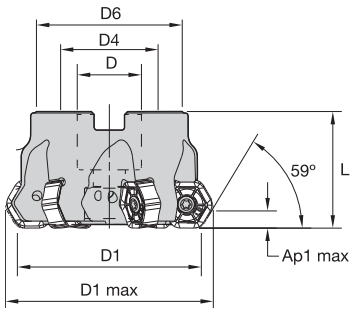
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDJ	0,17	**0,33**	0,66	0,12	**0,24**	0,47	0,09	**0,18**	0,35	0,08	**0,15**	0,31	0,07	**0,14**	0,28	.F..LDJ
.E..LD	0,17	**0,49**	0,99	0,12	**0,35**	0,71	0,09	**0,27**	0,53	0,08	**0,23**	0,46	0,07	**0,21**	0,42	.E..LD
.S..GD	0,26	**0,84**	1,35	0,19	**0,60**	0,97	0,14	**0,45**	0,72	0,12	**0,39**	0,63	0,11	**0,36**	0,57	.S..GD
.S..HD	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	.S..HD
.S..Ceramic	0,17	**0,33**	0,49	0,12	**0,24**	0,35	0,09	**0,18**	0,27	0,08	**0,15**	0,23	0,07	**0,14**	0,21	.S..Ceramic

NOTE: Use "Light Machining" value as starting feed rate.

- Twelve cutting edges.
- Higher Ap1 max with standard insert.



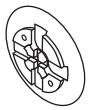




Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4152113	**M1200HD050Z04HN09**	50	58,6	22	–	38	40	6,0	4	12700	Yes	0,29
4152114	**M1200HD050Z05HN09**	50	58,6	22	–	38	40	6,0	5	12700	Yes	0,28
4152115	**M1200HD063Z04HN09**	63	71,5	22	–	50	40	6,0	4	10100	Yes	0,54
4152116	**M1200HD063Z06HN09**	63	71,5	22	–	50	40	6,0	6	10100	Yes	0,55
4152117	**M1200HD080Z05HN09**	80	88,5	27	–	60	50	6,0	5	7900	Yes	1,05
4152118	**M1200HD080Z08HN09**	80	88,5	27	–	60	50	6,0	8	7900	Yes	1,10
4152119	**M1200HD100Z06HN09**	100	108,5	32	–	80	50	6,0	6	6300	Yes	1,61
4152120	**M1200HD100Z08HN09**	100	108,5	32	–	80	50	6,0	8	6300	Yes	1,63
4152121	**M1200HD125Z08HN09**	125	133,5	40	–	90	63	6,0	8	5050	Yes	2,88
4152122	**M1200HD125Z10HN09**	125	133,5	40	–	90	63	6,0	10	5050	Yes	2,85
4152123	**M1200HD160Z09HN09**	160	168,5	40	66,7	110	63	6,0	9	3900	Yes	4,62
4152124	**M1200HD160Z12HN09**	160	168,5	40	66,7	110	63	6,0	12	3900	Yes	4,75

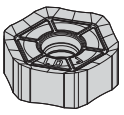
Spare Parts

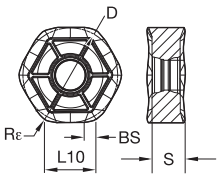
D1	 insert screw	 Nm	 Torx driver	 socket-head cap screw	 coolant screw assembly	 coolant lock screw	 coolant cap
50	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–
63	**12146034500**	3,5	**12148082400**	**12146120500**	–	–	–
80	**12146034500**	3,5	**12148082400**	**12748701000**	–	–	–
100	**12146034500**	3,5	**12148082400**	–	**12146109400**	–	–
125	**12146034500**	3,5	**12148082400**	–	–	**12146107000**	**12146111000**
160	**12146034500**	3,5	**12148082400**	–	–	**12146107000**	**12146111100**

NOTE: Coolant screw assembly, coolant lock screw, and coolant cap must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.S..GD**	**WP40PM**	.S..HD	WP40PM
P3–P4	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
P5–P6	.E..LD	WP25PM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
M1–M2	.E..LD	WP25PM	**.S..GD**	**WP25PM**	.S..HD	WP25PM
M3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
K1–K2	.E..LD	TN6520	**.S..GD**	**WK15CM**	.S..HD	WK15CM
K3	.E..LD	WP35CM	**.S..GD**	**WP35CM**	.S..HD	WP35CM
N1–N2	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
N3	.F..LDJ	TN6501	**.F..LDJ**	**TN6501**	.F..LDJ	TN6501
S1–S2	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP25PM
S3	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
S4	.E..LD	WS30PM	**.S..GD**	**WS30PM**	.S..HD	WP40PM
H1	–	–	**–**	**–**	–	–


HNGJ-LDJ

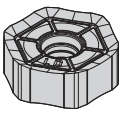


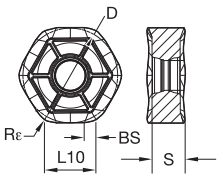
● first choice
○ alternate choice

P	
M	
K	
N	● ●
S	
H	

HNGJ-LDJ

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6501	THM-U
HNGJ0905ANFNLDJ	12	16	8,58	5,56	1,80	1,20	0,02	3865373	3606383


HNGJ-LD

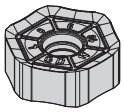


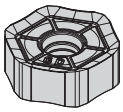
● first choice
○ alternate choice

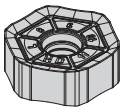
P		●	●	●	●			●	●	
M		○	●	○	●		○	●	●	
K	●	○	○	○	○	●				
N										
S			●		●		●	●	○	
H					○					

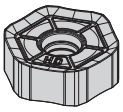
HNGJ-LD

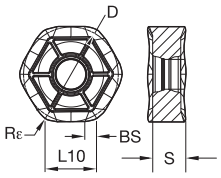
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ0905ANENLD	12	16	8,58	5,56	1,80	1,20	0,05	3093559	3330950	3030034	3030017	5895346	I	5528973	5895347	5895348


HNPJ-GD


HNGJ-GD


HNPJ-HD


HNGJ-HD



● first choice
○ alternate choice

P			●	●	●	●			●	●
M			○	●	○	●		○	●	●
K	●	○	○	○	○	●				
N										
S				●		●		●	●	○
H						○				

■ HNPJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNPJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3761185	I	3761187	3761188	5895374	5427372	I	5895375	5550908

■ HNGJ-GD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ0905ANSNGD	12	16	8,58	5,56	1,80	1,20	0,10	3119541	3614650	3037596	3093721	I	5427370	5528974	5895349	5895350

■ HNPJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNPJ090543ANSNHD	12	16	8,50	5,44	–	4,34	0,13	3670866	I	3670865	I	5895378	I	I	5895379	5895380
HNPJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,18	3670864	I	3670842	I	5895376	5427371	I	5895377	5550909

■ HNGJ-HD

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7535	WP25PM	WK15CM	WS30PM	WP35CM	WP40PM
HNGJ090543ANSNHD	12	16	8,50	5,44	–	4,35	0,20	3564083	3564084	3564085	I	I	I	I	I	I
HNGJ0905ANSNHD	12	16	8,59	5,46	1,66	1,20	0,17	3563900	3563901	3563902	I	5895371	I	I	5895372	5895373

Recommended Starting Speeds [m/min]

Material Group		TN6501			TN6520			TN6525			TN6540			TN7535			WP25PM		
P	1	–	–	–	–	–	–	410	**320**	280	360	**280**	240	545	**475**	445	1295	**1120**	1060
	2	–	–	–	–	–	–	320	**250**	215	250	**190**	170	335	**305**	275	1080	**940**	785
	3	–	–	–	–	–	–	280	**215**	185	215	**170**	140	305	**275**	245	1000	**845**	690
	4	–	–	–	–	–	–	235	**170**	145	180	**130**	110	230	**210**	190	890	**725**	590
	5	–	–	–	–	–	–	310	**235**	200	240	**180**	150	310	**275**	250	725	**670**	590
	6	–	–	–	–	–	–	205	**160**	130	160	**120**	100	190	**160**	130	650	**490**	395
M	1	–	–	–	–	–	–	190	**120**	80	130	**80**	60	245	**220**	185	805	**710**	650
	2	–	–	–	–	–	–	120	**80**	50	80	**50**	40	220	**190**	170	725	**630**	510
	3	–	–	–	–	–	–	125	**80**	55	85	**50**	40	175	**155**	140	550	**475**	370
K	1	–	–	–	450	**320**	230	275	**245**	220	220	**205**	180	355	**320**	290	905	**805**	725
	2	–	–	–	390	**250**	190	215	**190**	180	175	**155**	140	280	**250**	230	710	**630**	590
	3	–	–	–	300	**230**	160	180	**160**	145	155	**145**	125	235	**210**	190	590	**535**	475
N	1	2400	**1440**	1200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	1640	**980**	800	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	960	**600**	480	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**35**	30	–	–	–	155	**140**	95
	2	–	–	–	–	–	–	–	–	–	25	**20**	10	–	–	–	155	**140**	95
	3	–	–	–	–	–	–	–	–	–	70	**40**	30	–	–	–	200	**155**	95
	4	–	–	–	–	–	–	–	–	–	60	**30**	25	–	–	–	275	**200**	140
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	475	**355**	275
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		WK15CM			WS30PM			WP35CM			WP40PM			TN6501			THM-U		
P	1	–	–	–	–	–	–	545	**475**	445	355	**310**	295	–	–	–	–	–	–
	2	–	–	–	–	–	–	335	**305**	275	300	**260**	215	–	–	–	–	–	–
	3	–	–	–	–	–	–	305	**275**	245	275	**235**	190	–	–	–	–	–	–
	4	–	–	–	–	–	–	230	**210**	190	245	**205**	160	–	–	–	–	–	–
	5	–	–	–	–	–	–	310	**275**	250	205	**185**	160	–	–	–	–	–	–
	6	–	–	–	–	–	–	190	**160**	130	180	**140**	110	–	–	–	–	–	–
M	1	–	–	–	270	**240**	220	245	**220**	185	235	**205**	185	–	–	–	–	–	–
	2	–	–	–	245	**215**	175	220	**190**	170	210	**180**	150	–	–	–	–	–	–
	3	–	–	–	185	**160**	125	175	**155**	140	155	**140**	110	–	–	–	–	–	–
K	1	505	**460**	410	–	–	–	355	**320**	290	–	–	–	–	–	–	–	–	–
	2	400	**355**	330	–	–	–	280	**250**	230	–	–	–	–	–	–	–	–	–
	3	335	**300**	275	–	–	–	235	**210**	190	–	–	–	–	–	–	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2400	**1440**	1200	2400	**1440**	1200
	2	–	–	–	–	–	–	–	–	–	–	–	–	1640	**980**	800	1640	**980**	800
	3	–	–	–	–	–	–	–	–	–	–	–	–	960	**600**	480	960	**600**	480
S	1	–	–	–	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	2	–	–	–	55	**50**	35	–	–	–	50	**40**	35	–	–	–	–	–	–
	3	–	–	–	65	**55**	35	–	–	–	60	**50**	35	–	–	–	–	–	–
	4	–	–	–	100	**70**	50	80	**60**	40	80	**60**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)																Insert Geometry
	5%			10%			20%			30%			40–100%				
.F..LDJ	0,13	**0,27**	0,54	0,10	**0,19**	0,39	0,07	**0,14**	0,29	0,06	**0,13**	0,25	0,06	**0,12**	0,23		.F..LDJ
.E..LD	0,13	**0,40**	0,81	0,10	**0,29**	0,58	0,07	**0,22**	0,43	0,06	**0,19**	0,38	0,06	**0,17**	0,35		.E..LD
.S..GD	0,21	**0,68**	1,10	0,15	**0,49**	0,79	0,12	**0,37**	0,59	0,10	**0,32**	0,51	0,09	**0,29**	0,47		.S..GD
.S..HD	0,27	**0,68**	1,10	0,20	**0,49**	0,79	0,15	**0,37**	0,59	0,13	**0,32**	0,51	0,12	**0,29**	0,47		.S..HD

NOTE: Use "Light Machining" value as starting feed rate.

When Low Cutting Forces Are Required •
M640 Series

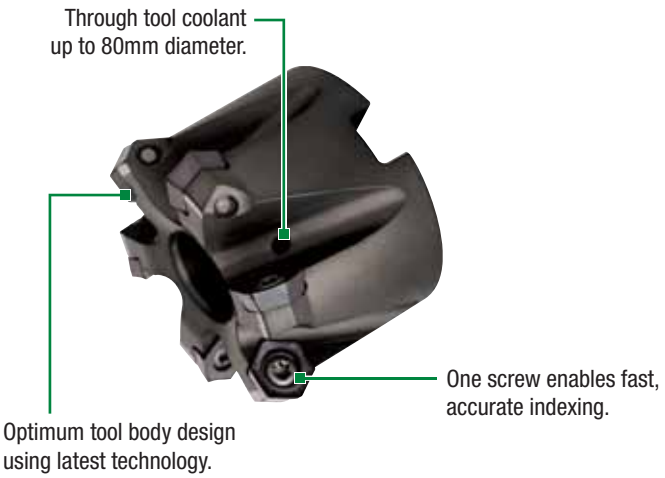
M640



The M640 platform is the first choice when high productivity, superior finish operations, and soft cutting performance are a priority. With six effective cutting edges and a streamlined body design, this easy-to-use tool is ideal, even for low-power machines.

- Highly positive rake angle means extremely low cutting forces.
- Available in geometries and grades for all applications.
- Easy-to-use for fast, accurate indexing.

All pockets are machined into preheated material for excellent runout and pocket strength.



Face Mills



M640

Max depth of cut: 4,8mm

Lead angle: 58°
Indexes per insert: 6
Diameter: 32–125mm

Pages: H44–H49



Insert Offering



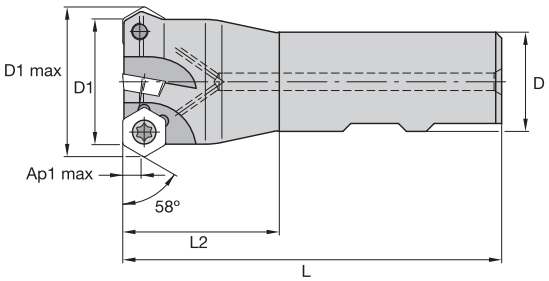
Low cutting force wiper inserts: Special wiper design for very soft cutting in finishing operations with high productivity.



Six effective cutting edges.

Highly positive rake:
- Extremely low cutting forces.
- For low-power machines, driven units, and light fixtures.
- Chipbreaker and grades for all applications.
- Through tool coolant up to 80mm diameter.

- Six cutting edges.
- Highly positive rake for low-power machines or light fixtures.
- Geometries and grades for all applications.





Weldon Shanks

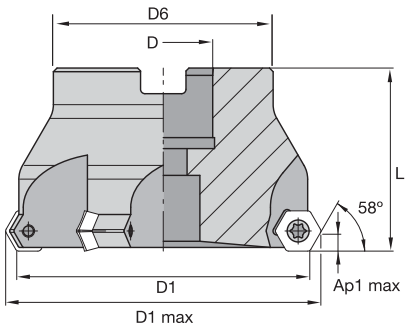
order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2263165	**12395405200**	32	38,4	32	100	40	4,8	4	29500	Yes	0,35

Spare Parts

D1	insert screw	Nm	Torx driver
32	**12148038800**	4,0	**12148000600**

- Six cutting edges.
- Highly positive rake for low-power machines or light fixtures.
- Geometries and grades for all applications.







Shell Mills

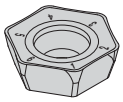
order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2263132	**12395410200**	50	56,4	22	47	40	4,8	4	19000	Yes	0,40
2263154	**12395410400**	63	69,4	22	50	40	4,8	5	15000	Yes	0,55
2263156	**12395410600**	80	86,4	27	60	50	4,8	6	11500	Yes	1,05
2263158	**12395410800**	100	106,4	32	78	50	4,8	7	9500	No	1,50
2263159	**12395415800**	100	106,4	32	78	50	4,8	10	9500	No	1,65
2263160	**12395411000**	125	131,4	40	89	63	4,8	8	7500	No	2,90

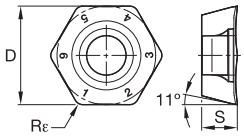
Spare Parts

D1	 insert screw	 Nm	 Torx driver
50	**12148038800**	4,0	**12148000600**
63	**12148038800**	4,0	**12148000600**
80	**12148038800**	4,0	**12148000600**
100	**12148038800**	4,0	**12148000600**
125	**12148038800**	4,0	**12148000600**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..LD	WP40PM	**.E..GD**	**WP40PM**	.E..GD	WP40PM
P3–P4	.E..LD	WP25PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
P5–P6	.E..LD	WP25PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
M1–M2	.E..LD	WP25PM	**.E..GD**	**WP25PM**	.E..GD	WP25PM
M3	.E..LD	WP40PM	**.E..GD**	**WP35CM**	.E..GD	WP35CM
K1–K2	.E..LD	TN6510	**.E..GD**	**WK15CM**	.E..GD	WK15CM
K3	.E..LD	TN6520	**.E..GD**	**WP35CM**	.E..GD	WP35CM
N1–N2	.F..LDAL	TN6501	**.F..LDAL**	**TN6501**	.F..LDAL	TN6501
N3	.F..LDAL	TN6501	**.F..LDAL**	**TN6501**	.F..LDAL	TN6501
S1–S2	.E..LD	WP25PM	**.E..GD**	**WP25PM**	.E..GD	WP25PM
S3	.E..GD	WS30PM	**.E..GD**	**WS30PM**	.E..GD	WP40PM
S4	.E..GD	WS30PM	**.E..GD**	**WS30PM**	.E..GD	WP40PM
H1	.E..LD	TN2510	**.E..GD**	**TN2510**	–	–


HPGT-LDAL



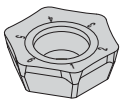
● first choice
○ alternate choice

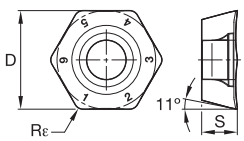
	TN6501	THM-U	THM
P			
M			
K			○
N	●	●	●
S			○
H			

HPGT-LDAL

catalogue number	cutting edges	D	S	Rε	hm	2957548	2288107	2288106
HPGT06T3DZFRLDAL	6	11	4,00	0,90	0,08			

NOTE: Ap1 max = 3,2mm with this geometry.


HPGT-LD



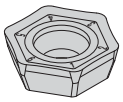
● first choice
○ alternate choice

	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P	○			●	●	●	●		●		●	●
M				○	●	○	○		●	○	●	●
K	●	●	●	○	○		○	●	○			
N												
S					●				●	●	●	○
H	●								○			

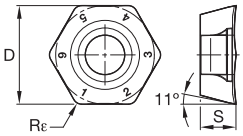
HPGT-LD

catalogue number	cutting edges	D	S	Rε	hm	2288072	I	2957585	2957547	2957587	2288070	I	I	5895784	I	I	5895785
HPGT06T3DZERLD	6	11	3,99	0,98	0,08												

NOTE: Ap1 max = 3mm with this geometry.



HPPT-GD
HPGT-GD



● first choice
○ alternate choice

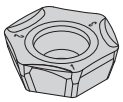
		TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P		○			●	●	●	●		●		●	●
M					○	●	○	○		●	○	●	●
K		●	●	●	○	○		○	●	○			
N													
S						●				●	●	●	○
H		●								○			

HPPT-GD

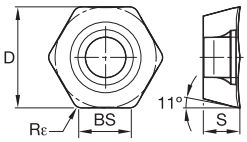
catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPPT06T3DZENGD	6	11	3,97	0,98	0,10	I	I	2957583	2957586	2957552	2271760	2271759	I	5895788	I	5895790	5895789

HPGT-GD

catalogue number	cutting edges	D	S	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPGT06T3DZENGD	6	11	3,97	0,98	0,10	2288069	2957589	I	2957588	2957546	2288067	2288066	5427387	5895782	5528978	I	5895783



HPGT-GD
Wiper



● first choice
○ alternate choice

		TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
P		○			●	●	●	●		●		●	●
M					○	●	○	○		●	○	●	●
K		●	●	●	○	○		○	●	○			
N													
S						●				●	●	●	○
H		●								○			

HPGT-GD Wiper

catalogue number	cutting edges	D	S	BS	Rε	hm	TN2510	TN6510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WS30PM	WP35CM	WP40PM
HPGT06T3DZERGD3W	3	11	4,00	2,88	0,98	0,10	I	2957549	I	2957584	I	2288103	I	5427388	5895786	I	I	5895787

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6510			TN6520			TN6525			TN6540			TN7525		
P	1	660	**580**	540	–	**–**	–	–	**–**	–	410	**320**	280	360	**280**	240	410	**310**	280
	2	410	**370**	330	–	**–**	–	–	**–**	–	320	**250**	215	250	**190**	170	310	**250**	215
	3	370	**330**	305	–	**–**	–	–	**–**	–	280	**215**	185	215	**170**	140	280	**215**	185
	4	275	**260**	230	–	**–**	–	–	**–**	–	235	**170**	145	180	**130**	110	235	**170**	145
	5	330	**300**	275	–	**–**	–	–	**–**	–	310	**235**	200	240	**180**	150	310	**235**	200
	6	230	**205**	175	–	**–**	–	–	**–**	–	205	**160**	130	160	**120**	100	205	**160**	130
M	1	270	**240**	210	–	**–**	–	–	**–**	–	190	**120**	80	130	**80**	60	245	**220**	185
	2	245	**210**	190	–	**–**	–	–	**–**	–	120	**80**	50	80	**50**	40	220	**190**	170
	3	190	**175**	150	–	**–**	–	–	**–**	–	125	**80**	55	85	**50**	40	175	**155**	140
K	1	420	**360**	300	480	**350**	260	450	**320**	230	275	**245**	220	220	**205**	180	380	**280**	240
	2	360	**300**	250	420	**280**	205	390	**250**	190	215	**190**	180	175	**155**	140	325	**240**	200
	3	300	**250**	200	335	**260**	200	300	**230**	160	180	**160**	145	155	**145**	125	240	**200**	170
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		TN7535			WK15CM			WP25PM			WS30PM			WP35CM			WP40PM		
P	1	545	**475**	445	–	**–**	–	395	**340**	325	–	**–**	–	545	**475**	445	355	**310**	295
	2	335	**305**	275	–	**–**	–	330	**290**	240	–	**–**	–	335	**305**	275	300	**260**	215
	3	305	**275**	245	–	**–**	–	305	**260**	210	–	**–**	–	305	**275**	245	275	**235**	190
	4	230	**210**	190	–	**–**	–	270	**220**	180	–	**–**	–	230	**210**	190	245	**205**	160
	5	310	**275**	250	–	**–**	–	220	**205**	180	–	**–**	–	310	**275**	250	205	**185**	160
	6	190	**160**	130	–	**–**	–	200	**150**	120	–	**–**	–	190	**160**	130	180	**140**	110
M	1	245	**220**	185	–	**–**	–	245	**215**	200	270	**240**	220	245	**220**	185	235	**205**	185
	2	220	**190**	170	–	**–**	–	220	**190**	155	245	**215**	175	220	**190**	170	210	**180**	150
	3	175	**155**	140	–	**–**	–	170	**145**	115	185	**160**	125	175	**155**	140	155	**140**	110
K	1	355	**320**	290	505	**460**	410	275	**245**	220	–	**–**	–	355	**320**	290	–	**–**	–
	2	280	**250**	230	400	**355**	330	215	**190**	180	–	**–**	–	280	**250**	230	–	**–**	–
	3	235	**210**	190	335	**300**	275	180	**160**	145	–	**–**	–	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35	–	**–**	–	50	**40**	35
	2	–	**–**	–	–	**–**	–	50	**40**	30	55	**50**	35	–	**–**	–	50	**40**	35
	3	–	**–**	–	–	**–**	–	60	**50**	30	65	**55**	35	–	**–**	–	60	**50**	35
	4	–	**–**	–	–	**–**	–	85	**60**	40	100	**70**	50	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		TN6501			THM-U			THM		
P	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
	5	–	–	–	–	–	–	–	–	–
	6	–	–	–	–	–	–	–	–	–
M	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
K	1	–	–	–	230	**205**	180	145	**110**	90
	2	–	–	–	–	–	–	150	**120**	85
	3	–	–	–	–	–	–	155	**115**	70
N	1	2400	**1440**	1200	2400	**1440**	1200	1080	**720**	600
	2	1640	**980**	800	1640	**980**	800	820	**560**	460
	3	960	**600**	480	960	**600**	480	540	**335**	240
S	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..LDAL	0,13	**0,34**	0,47	0,10	**0,25**	0,34	0,07	**0,18**	0,25	0,06	**0,16**	0,22	0,06	**0,15**	0,20	.F..LDAL
.E..LD	0,13	**0,34**	0,47	0,10	**0,25**	0,34	0,07	**0,18**	0,25	0,06	**0,16**	0,22	0,06	**0,15**	0,20	.E..LD
.E..GD	0,13	**0,48**	0,54	0,10	**0,35**	0,39	0,07	**0,26**	0,29	0,06	**0,23**	0,25	0,06	**0,21**	0,23	.E..GD

NOTE: Use "Light Machining" value as starting feed rate.

The Ideal Heavy-Duty Face Milling Platform •
M660 Series

M660



The M660 Series heavy-duty face milling platform, with its strong tool body design and perfect axial and radial runout, is the ultimate high-performance booster in the heavy machining of steel and cast iron.

- Three tailor-made chipbreakers with large chip gash ensures excellent chip evacuation.
- Easy, safe, and stable clamping ensures accurate indexing.
- Thick inserts for reliability and high MRR capability.



Face Mills



M660 SN1205..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 20–160mm

Pages: H52–H57



M660 SN1505..

Max depth of cut: 8,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 100mm

Pages: H58–H60





Insert Offering



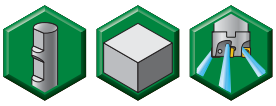
Three tailor-made chipbreakers (-20, -21, -31) for all heavy-duty applications in steel and cast iron.

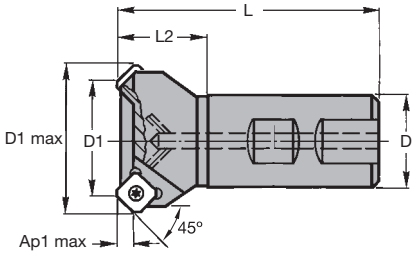
Thick inserts for reliability and high MRR capability.

Integrated wiper facet: Good surface finish in heavy roughing applications.

Positive rake angle:
- Soft cutting action.
- Less spindle power requirement.
- Less chipping on workpiece in cast iron.
- Less burs on workpiece in steel.
- High feed rate capability.

- Four cutting edges.
- Strong tool body design.
- Excellent chip evacuation.







Weldon Shanks

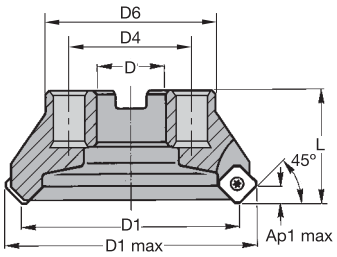
order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	max RPM	coolant supply	kg
2002367	**12396202200**	20	33,8	25	86	30	6,4	2	17000	Yes	0,30
2002370	**12396202600**	25	38,7	25	91	35	6,4	2	15000	Yes	0,35

Spare Parts

D1	 insert screw	 Nm	 Torx driver
20	**12148007200**	3,5	**12148007500**
25	**12148007200**	3,5	**12148007500**

- Four cutting edges.
- Strong tool body design.
- Excellent chip evacuation.







Shell Mills

order number	catalogue number	D1	D1 max	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003541	**12396203800**	50	63,5	22	–	50	40	6,4	4	12500	Yes	0,45
2003558	**12396204200**	63	76,5	22	–	50	40	6,4	5	11000	Yes	0,60
2003575	**12396204600**	80	94,3	27	–	60	50	6,4	6	9900	Yes	1,15
2003582	**12396205000**	100	113,4	32	–	78	50	6,4	7	8900	No	1,60
2003679	**12396205400**	125	138,3	40	–	89	63	6,4	8	7900	No	2,80
2003780	**12396205800**	160	173,3	40	66,7	90	63	6,4	10	7000	No	4,10

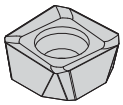
Spare Parts

D1	 insert screw	 Nm	 Torx driver
50	**12148007200**	3,5	**12148007500**
63	**12148007200**	3,5	**12148007500**
80	**12148007200**	3,5	**12148007500**
100	**12148007200**	3,5	**12148007500**
125	**12148007200**	3,5	**12148007500**
160	**12148007200**	3,5	**12148007500**

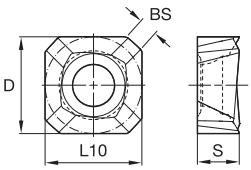
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	…20	TN6540	**…31**	**WP40PM**	…31	WP40PM
P3–P4	…20	TN7535	**…31**	**WP35CM**	…31	WP35CM
P5–P6	…20	TN7535	**…31**	**WP35CM**	…31	WP35CM
M1–M2	…20	TN6540	**…31**	**WP25PM**	…31	WP25PM
M3	...20	TN7535	**…31**	**WP35CM**	…31	WP35CM
K1–K2	...21	WK15CM	**…31**	**WK15CM**	…31	WK15CM
K3	...21	WK15CM	**…31**	**WP35CM**	…31	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	...20	TN6540	**…31**	**WP25PM**	…31	WP25PM
S3	–	–	**–**	**–**	–	–
S4	...20	TN6540	**…31**	**WP40PM**	…31	WP40PM
H1	–	–	**–**	**–**	–	–

Inserts • SN1205..



SNKT-20
SNKT-21



● first choice
○ alternate choice

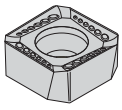
P		●	●	●		●	●					
M		●	○	○		●	○					
K		○		○	●			○				
N								●				
S		●				○		○				
H												

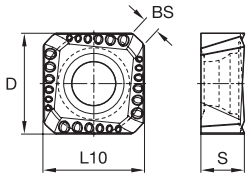
SNKT-20

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	THM
SNKT1205AZER20	4	12,70	12,70	5,51	2,00	0,10	2964201	2022370	2020691	-	-	2022371	-

SNKT-21

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TT125	THM
SNKT1205AZR21	4	12,70	12,70	5,56	1,54	0,15	-	2022373	-	5427383	-	2022374	2022375


SNMT-31

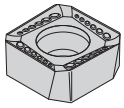


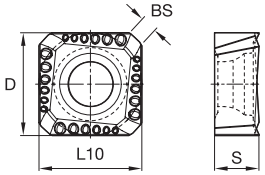
● first choice
○ alternate choice

		TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	TTI25	THM
P		●	●	●	●		●	●	●	●	
M		○	●	○	○		●	●	●	○	
K		○	○		○	●	○				○
N							●				●
S			●					●	○		○
H							○				

■ SNMT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN6525	TN6540	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM	TTI25	THM
SNMT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	2964206	2964204	2020673	2020663	5427382	5895536	5895537	5551088	-	-


SNKT-31

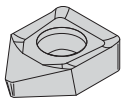


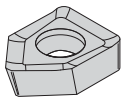
● first choice
○ alternate choice

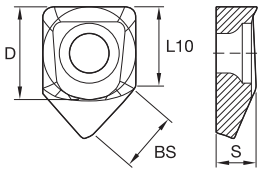
		TN6525	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
P		●	●	●	●		●	●	
M		○	●	○	○		●	○	
K		○	○		○	●			○
N									●
S			●				○		○
H									

■ SNKT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN6525	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
SNKT1205AZR31	4	12,70	12,70	5,56	1,54	0,16	2964208	2964205	2020683	2020677	5427384	-	-	-


XNKT-12 Wiper


XNKT-11 Wiper



● first choice
○ alternate choice

		TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
P		●	●	●		●	●	
M		●	○	○		●	○	
K		○		○	●			○
N								●
S		●				○		○
H								

■ XNKT-12 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
XNKT1205AZTR12	1	12,70	12,70	5,15	8,00	0,04	-	2015264	-	-	-	2015266	-

■ XNKT-11 Wiper

catalogue number	cutting edges	D	L10	S	BS	hm	TN6540	TN7525	TN7535	WK15CM	WP40PM	TTI25	THM
XNKT1205AZER11	1	12,70	12,70	5,15	8,00	0,04	-	2015242	-	5427381	-	2015244	2015246

Recommended Starting Speeds [m/min]

Material Group		TN6525			TN6540			TN7525			TN7535		
P	1	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445
	2	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275
	3	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245
	4	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190
	5	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250
	6	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130
M	1	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185
	2	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170
	3	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140
K	1	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290
	2	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230
	3	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–
	3	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WK15CM			WP40PM			TTI25			THM		
P	1	–	–	–	355	**310**	295	430	**360**	300	–	–	–
	2	–	–	–	300	**260**	215	310	**250**	215	–	–	–
	3	–	–	–	275	**235**	190	310	**250**	215	–	–	–
	4	–	–	–	245	**205**	160	265	**215**	180	–	–	–
	5	–	–	–	205	**185**	160	320	**235**	200	–	–	–
	6	–	–	–	180	**140**	110	145	**110**	90	–	–	–
M	1	–	–	–	235	**205**	185	480	**310**	215	–	–	–
	2	–	–	–	210	**180**	150	325	**205**	145	–	–	–
	3	–	–	–	155	**140**	110	320	**210**	145	–	–	–
K	1	505	**460**	410	–	–	–	220	**185**	155	145	**110**	90
	2	400	**355**	330	–	–	–	180	**145**	125	150	**120**	85
	3	335	**300**	275	–	–	–	145	**125**	100	155	**115**	70
N	1	–	–	–	–	–	–	–	–	–	1080	**720**	600
	2	–	–	–	–	–	–	–	–	–	820	**560**	460
	3	–	–	–	–	–	–	–	–	–	540	**335**	240
S	1	–	–	–	50	**40**	35	–	–	–	–	–	–
	2	–	–	–	50	**40**	35	–	–	–	–	–	–
	3	–	–	–	60	**50**	35	–	–	–	–	–	–
	4	–	–	–	80	**60**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

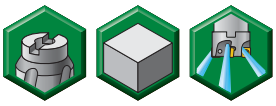
Recommended Starting Feeds [mm]

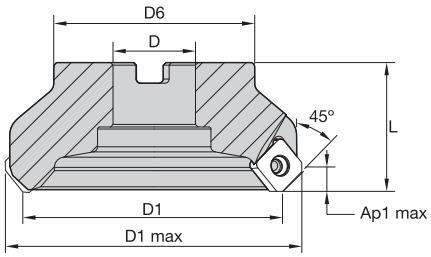
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...20	0,17	**0,66**	1,19	0,12	**0,47**	0,86	0,09	**0,35**	0,64	0,08	**0,31**	0,56	0,07	**0,28**	0,51	...20
...21	0,24	**0,74**	1,25	0,18	**0,53**	0,89	0,13	**0,40**	0,66	0,12	**0,35**	0,58	0,11	**0,32**	0,53	...21
...31	0,26	**0,76**	1,28	0,19	**0,55**	0,91	0,14	**0,41**	0,68	0,12	**0,36**	0,59	0,11	**0,33**	0,54	...31

NOTE: Use "Light Machining" value as starting feed rate.

- Four cutting edges.
- Strong tool body design.
- Thick inserts for reliability.







Shell Mills

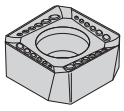
order number	catalogue number	D1	D1 max	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003593	**12396215000**	100	116,9	32	78	50	8,0	7	8900	No	1,60

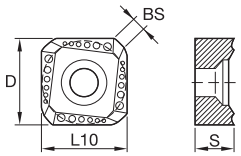
Spare Parts

D1	insert screw	Nm	Torx driver
100	**12148007200**	3,5	**12148007500**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	...31	WP40PM	**...31**	**WP40PM**	...31	WP40PM
P3–P4	...31	WP25PM	**...31**	**WP35CM**	...31	WP35CM
P5–P6	...31	WP25PM	**...31**	**WP35CM**	...31	WP35CM
M1–M2	...31	WP25PM	**...31**	**WP25PM**	...31	WP25PM
M3	...31	WP35CM	**...31**	**WP35CM**	...31	WP35CM
K1–K2	...31	WK15CM	**...31**	**WK15CM**	...31	WK15CM
K3	...31	WK15CM	**...31**	**WK35CM**	...31	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	...31	WP25PM	**...31**	**WP25PM**	...31	WP25PM
S3	–	–	**–**	**–**	–	–
S4	...31	WP40PM	**...31**	**WP40PM**	...31	WP40PM
H1	–	–	**–**	**–**	–	–


SNMT-31

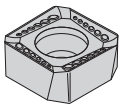


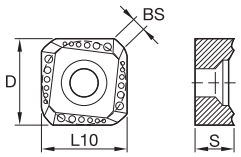
● first choice
○ alternate choice

P		●	●
M		○	○
K			○	●
N				
S				
H				

SNMT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN7525	TN7535	WK15CM
SNMT1505AZR31	4	16	15,88	5,56	2,00	0,16	2020701	2020695	5427386


SNKT-31



● first choice
○ alternate choice

P		●	●		●	●	●
M		○	○		●	●	●
K			○	●	○		
N					●		
S						●	○
H					○		

SNKT-31

catalogue number	cutting edges	D	L10	S	BS	hm	TN7525	TN7535	WK15CM	WP25PM	WP35CM	WP40PM
SNKT1505AZR31	4	16	15,88	5,56	2,00	0,16	2020711	2020705	5427385	5895538	5895539	5895540

Recommended Starting Speeds [m/min]

Material Group		TN6525			TN7525			TN7535			WK15CM			WP25PM			WP35CM			WP40PM		
P	1	410	**320**	280	410	**310**	280	545	**475**	445	–	**–**	–	395	**340**	325	545	**475**	445	355	**310**	295
	2	320	**250**	215	310	**250**	215	335	**305**	275	–	**–**	–	330	**290**	240	335	**305**	275	300	**260**	215
	3	280	**215**	185	280	**215**	185	305	**275**	245	–	**–**	–	305	**260**	210	305	**275**	245	275	**235**	190
	4	235	**170**	145	235	**170**	145	230	**210**	190	–	**–**	–	270	**220**	180	230	**210**	190	245	**205**	160
	5	310	**235**	200	310	**235**	200	310	**275**	250	–	**–**	–	220	**205**	180	310	**275**	250	205	**185**	160
	6	205	**160**	130	205	**160**	130	190	**160**	130	–	**–**	–	200	**150**	120	190	**160**	130	180	**140**	110
M	1	190	**120**	80	245	**220**	185	245	**220**	185	–	**–**	–	245	**215**	200	245	**220**	185	235	**205**	185
	2	120	**80**	50	220	**190**	170	220	**190**	170	–	**–**	–	220	**190**	155	220	**190**	170	210	**180**	150
	3	125	**80**	55	175	**155**	140	175	**155**	140	–	**–**	–	170	**145**	115	175	**155**	140	155	**140**	110
K	1	275	**245**	220	380	**280**	240	355	**320**	290	505	**460**	410	275	**245**	220	355	**320**	290	–	**–**	–
	2	215	**190**	180	325	**240**	200	280	**250**	230	400	**355**	330	215	**190**	180	280	**250**	230	–	**–**	–
	3	180	**160**	145	240	**200**	170	235	**210**	190	335	**300**	275	180	**160**	145	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30	–	**–**	–	50	**40**	35
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	50	**40**	30	–	**–**	–	50	**40**	35
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	60	**50**	30	–	**–**	–	60	**50**	35
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	85	**60**	40	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...21	0,24	**0,74**	1,25	0,18	**0,53**	0,89	0,13	**0,40**	0,66	0,12	**0,35**	0,58	0,11	**0,32**	0,53	...21
...31	0,33	**0,84**	1,35	0,24	**0,60**	0,97	0,18	**0,45**	0,72	0,16	**0,39**	0,63	0,14	**0,36**	0,57	...31

NOTE: Use "Light Machining" value as starting feed rate.

NOVO KNOWS SEARCH

Searching for a tool by using the outdated method of a catalogue has been replaced with the Advise and Select functions from NOVO™ — saving you time and money.

ADVISE

Uses a rules-based approach to provide cutting tool recommendations:

- Define Machining Feature (face milling, slotting, blind hole, etc.)
- Apply Constraint Requirements (geometric, material, tolerance, etc.)
- Set Machining Sequence (single or multi-step operations, rough then finish, etc.)
- Receive Ranked Results

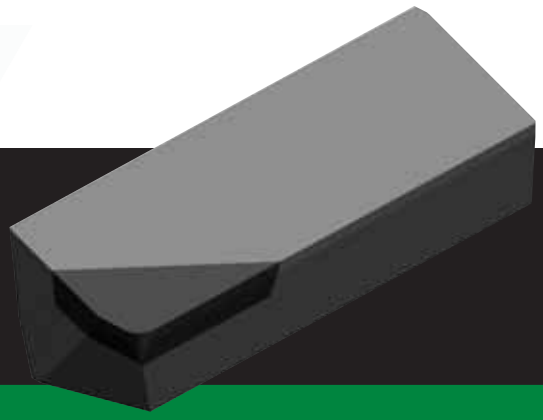
SELECT

A method of selecting cutting tools from a tree structure via a hierarchy or parametric search:

- If you know which product you are looking for, a quick search can be performed by just the catalogue number or product description.
- Smart filters significantly reduce the amount of potential tooling solutions.
- After the tool is selected, NOVO also provides cutting and adaptive item options that fit with your solution.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

The new SuperFeed face mills and end mills are the first choice platform for machining aluminium in the transportation and general engineering industries.



SuperFeed

Our unique insert design delivers exceptional stability and performance. Reduced complexity with exceptional finishing capabilities make SuperFeed the go-to platform in aluminium and non-ferrous face and end milling applications.

- Durable cutter body protection.
- Five PCD cartridge options for increased flexibility.
- User-friendly axial adjustment 0,3–0,8mm.
- Reduce overall tooling costs with reconditioning options.

Features	Benefits
• Anodised aluminium cutter bodies.	• Durable and lightweight.
• Easy axial adjustment range 0,3–0,8mm.	• Simple and very user-friendly.
• DovLok™ PCD cartridge design.	• Proven in demanding automotive applications.
• Fine pitch cutters.	• Shorter cycle times, higher MRR and productivity.



Face Mills



SuperFeed™

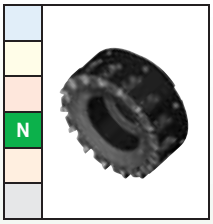
Max depth of cut: 6,35mm
(can be less depending on the cartridge)

Lead angle: 90°

Indexes per insert:
1 edge per PCD cartridge

Diameter: Standard Platform
63–200mm

Pages: H64–H68





Insert Offering



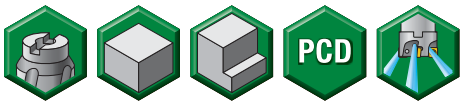
SDR/EDR

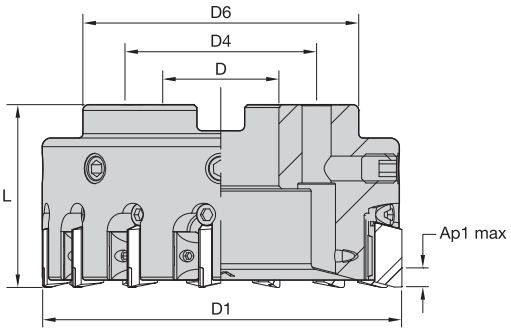
Corner Radii:
SDR — 0,8mm and 2,36mm
EDR — 0,8mm

Axial DOC:
SDR — 6,35mm max
EDR — 6,35mm max

WIDIA™ Grade WDN00U™:
- Ultra fine grain PCD.
- Long tool life, consistent results, excellent surface qualities.

- Through coolant capability.
- +/- 3 micron axial adjustment range.
- Balanced design.
- Easy setup in a simple system design.
- Modified standards available.







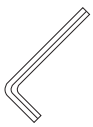
Face Mills • Metric

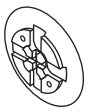
order number	catalogue number	D1	D	D4	D6	L	Ap1 max	Z	Z ADJ	kg	max RPM
5363208	**SF06306RH**	63	22	–	60	40	6	6	6	0,45	20000
5363209	**SF08008RH**	80	27	–	77	50	6	8	8	0,63	20000
5363220	**SF10012RH**	100	32	–	97	50	6	12	12	1,13	17320
5363221	**SF12515RH**	125	40	–	122	63	6	15	15	2,30	15500
5363222	**SF16018RH**	160	40	–	157	63	6	18	18	3,20	14150
5363223	**SF20024RH**	200	60	102	197	63	6	24	24	4,21	12240

NOTE: Z = Number of cartridges.
Z ADJ = Number of adjustable cartridges.

Spare Parts





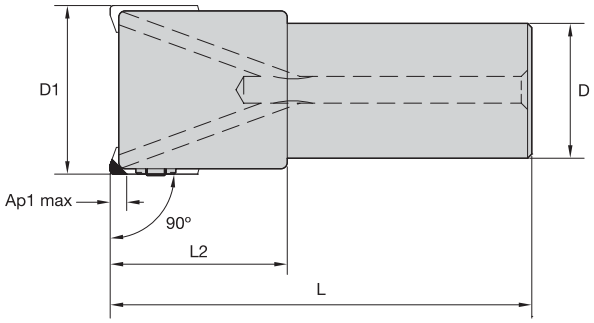



D1	wedge screw	wrench size wedge screw	adjusting screw	wrench size-adjusting screw	coolant cap	coolant shower plate	wedge
63	**LS103**	3 mm	**SWSM515**	4 mm	**SALS063**	–	**HDWM5EU4DD**
80	**LS103**	3 mm	**SWSM515**	4 mm	**SALS080**	–	**HDWM5EU4DD**
100	**LS103**	3 mm	**SWSM515**	4 mm	**SALS100**	–	**HDWM5EU4DD**
125	**LS103**	3 mm	**SWSM515**	4 mm	**SALS125**	–	**HDWM5EU4DD**
160	**LS103**	3 mm	**SWSM515**	4 mm	**SALS160**	–	**HDWM5EU4DD**
200	**LS103**	3 mm	**SWSM515**	4 mm	–	**SSP8**	**HDWM5EU4DD**

NOTE: Coolant cap or coolant shower plate must be ordered separately.

- Through coolant capability.
- +/- 3 micron axial adjustment range.
- Easy setup in a simple system design.
- Modified standards available.







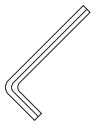
End Mills • Metric

order number	catalogue number	D1	D	L2	L	Ap1 max	Z	Z ADJ	kg	max RPM
5363252	**WSSEM02502RH**	25	20	40	100	6,4	2	2	0,22	35800
5363253	**WSSEM03203RH**	32	32	42	100	6,4	3	3	0,54	31600
5363254	**WSSEM04004RH**	40	32	42	100	6,4	4	4	0,49	28300
5363255	**WSSEM05005RH**	50	32	42	100	6,4	5	5	0,79	25300

NOTE: Z = Number of cartridges.
Z ADJ = Number of adjustable cartridges.

Spare Parts



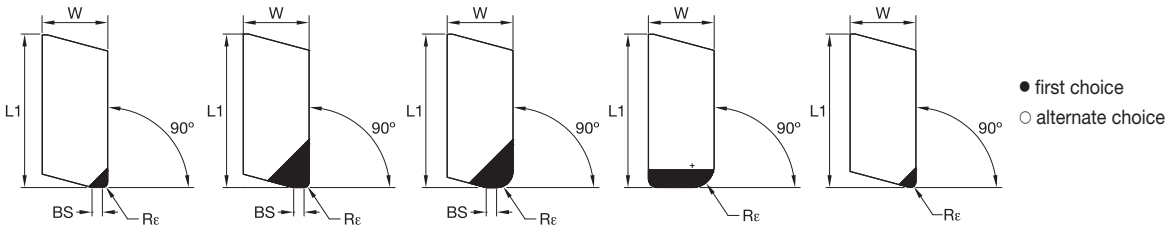



D1	wedge screw	wrench size wedge screw	wedge	adjusting screw	wrench size- adjusting screw
25	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
32	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
40	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm
50	**DSM550**	3 mm	**HDWM5S**	**SWSM5155**	4 mm

NOTE: For setting procedure, see page H68.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	–	–	–	–	–	–
P3–P4	–	–	–	–	–	–
P5–P6	–	–	–	–	–	–
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	–	–	–	–	–	–
K3	–	–	–	–	–	–
N1–N2	SDR.../EDR...	WDN00U	**SDR.../EDR...**	**WDN00U**	SDR.../EDR...	WDN00U
N3	SDR.../EDR...	WDN00U	**SDR.../EDR...**	**WDN00U**	SDR.../EDR...	WDN00U
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–



● first choice
○ alternate choice

P M K N S H

PCD Inserts • Face Mills • SDR

catalogue number	cutting edges	L1	BS	W	Rε	hm	WDN00U
SDR100031E0NW	1	22,23	–	9,53	0,79	0,02	5358450
SDR100031E0W4	1	22,23	1,52	9,53	0,79	0,02	5358407
SDR100031E1W4	1	22,23	1,52	9,53	0,79	0,02	5358408
SDR100093E1W4	1	22,23	1,52	9,53	2,36	0,02	5358409
SDR102	1	22,22	–	9,52	3,17	0,02	5358451

PCD Inserts • End Mills • EDR

catalogue number	cutting edges	L1	BS	W	Rε	hm	WDN00U
EDR100031E1W4	1	22,23	1,52	6,36	0,79	0,02	5358452

NOTE: hm = Average chip thickness; BS = Wiper facet length; E0 = 2,5 ap1 max; E1 = 6,3 ap1 max.

Recommended Starting Speeds [m/min]

Material Group		WDN00U		
P	1	–	–	–
	2	–	–	–
	3	–	–	–
	4	–	–	–
	5	–	–	–
	6	–	–	–
M	1	–	–	–
	2	–	–	–
	3	–	–	–
K	1	–	–	–
	2	–	–	–
	3	–	–	–
N	1–2	910	**1980**	4880
	3	460	**610**	760
S	1	–	–	–
	2	–	–	–
	3	–	–	–
	4	–	–	–
H	1	–	–	–

Recommended Starting Feeds

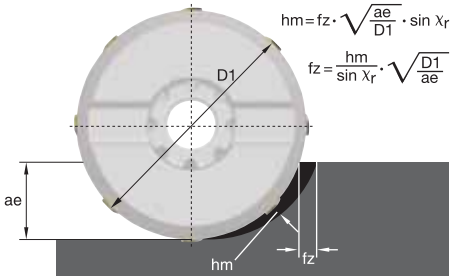
Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	10%			20%			30%			40%			50–100%			
SDR…	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	0,05	**0,10**	0,20	SDR…
EDR…	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	0,05	**0,10**	0,20	EDR…

*NOTE: First choice starting feed (fz) is in **bold** type.*
Use corresponding speed (vc).
fz and vc are valid for ae ≥0,4 D1.
For smaller ae, fz and vc should be multiplied by the factor given below:

ae/D1 =	0,2	0,3	0,4
fz-Factor	1,5	1,3	1,0
vc-Factor	1,3	1,2	1,1



General

- Non-contact gages are preferred.
- Contact gages can be used with the following precautions:
  - Indicator must be flat and parallel to the base.
  - Always approach the PCD cartridge from the relief angle under the PCD segment.
  - Do NOT let the indicator drop on the PCD segment.
- Remove all worn PCD cartridges.
- Clean the pockets of the cutter completely.

Face Mills

- Apply a small amount of lubricant to the following areas:
  - Pocket area where the wedge slides.
  - Threads of the cartridge locking screw.
  - Threads of the axial adjustment screw.
- Install cartridges applying light torque to the wedge assembly locking screw.
- Turn axial adjustment screw until the cartridge is 0,01–0,015mm below the final set height.
- Tighten the wedge assembly locking screw to 4 Nm.
- Turn the axial adjustment screw moving the PCD cartridge 0,005mm to the final set height position.
- Set all cartridges as above.

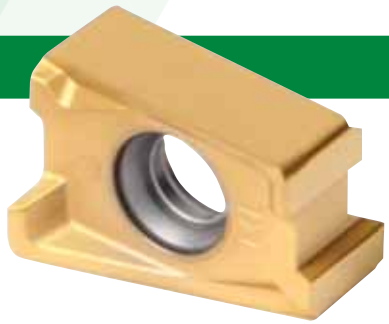
End Mills

- Apply a small amount of lubricant to the following areas:
  - Threads of the cartridge locking screw.
  - Threads of the axial adjustment screw.
- Install cartridges applying light torque to the locking screws.
- Turn axial adjustment screw until the cartridge is 0,01–0,015mm below the final set height.
- Tighten the locking screw (left-hand threads) to 8 Nm leaving 0,005mm below the final set height.
- Turn the axial adjustment screw moving the PCD cartridge 0,005mm to the final set height position.
- Set all cartridges as above.

Making the Grade in Innovative Metalcutting Technology









EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Victory™ Milling Grades

Our new Victory Milling Grades are designed to deliver higher productivity, longer tool life, and increased application versatility.

- WP40PM™ — New best-in-class Victory milling grade for machining steel materials in ISO material group P40 in rough milling applications.
- WK15CM™ — New milling grade for cast irons for higher tool life and increased productivity.
- WS30PM™ — A new high-performance milling grade for machining titanium and stainless steels.

To learn more about the benefits of the new **WIDIA™ Victory milling grades**, contact your local distributor.

WIDIA™

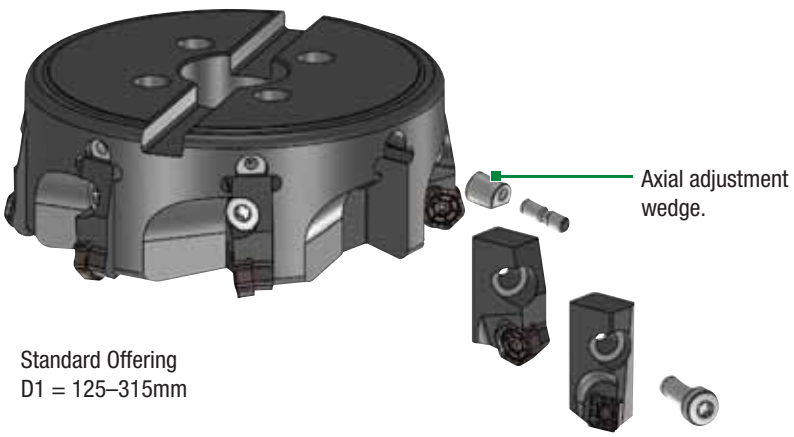
M4000



Cartridges with different insert styles and lead angles can be easily changed.

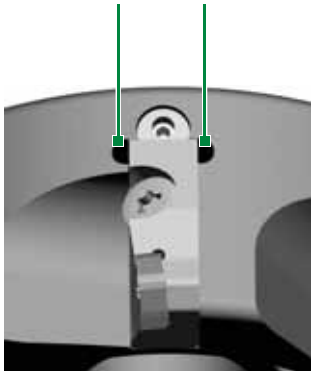
- Roughing and finishing solution with a single tool.
- Adjustable pockets and cartridge stop feature.
- Easily change cartridges with different insert styles and lead angles.
- Best-in-class flexibility lowers cost per tool.
- Easy runout adjustment.
- Perfect floor surface for finishing operations.

Roughing and Finishing with a Single Tool



Standard Offering
D1 = 125–315mm

Quick cartridge stop — ready to go in a minute with no adjustment for roughing.



Face Mills



M4000
Cartridge Milling System

All front line insert styles available.

Diameter: 125–315mm

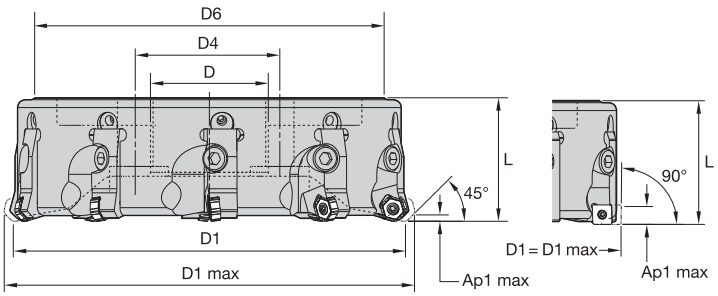
Pages: H72–H74

P
M
K
N
S
H





- Roughing and finishing with a single tool.
- Quick cartridge stop feature.
- Easy runout adjustment.
- Easy change of cartridges with different insert styles and lead angles.





Cartridge Milling System

order number	catalogue number	D1	D	D4	D6	L	number of cartridges	kg
4136343	**M4000D125Z06ADJ**	125	40	–	108	68,0	6	3,34
4136344	**M4000D125Z08ADJ**	125	40	–	108	68,0	8	3,51
4136345	**M4000D160Z08ADJ**	160	40	66,7	137	63,0	8	5,19
4136346	**M4000D160Z12ADJ**	160	40	66,7	137	63,0	12	5,20
4136347	**M4000D200Z10ADJ**	200	60	101,6	178	63,0	10	8,02
4136348	**M4000D200Z14ADJ**	200	60	101,6	178	80,0	14	12,57
4136349	**M4000D250Z12ADJ**	250	60	101,6	228	63,0	12	13,53
4136350	**M4000D250Z18ADJ**	250	60	101,6	228	63,0	18	13,90
4136351	**M4000D315Z16ADJ**	315	60	101,6	293	80,0	16	25,08
4136352	**M4000D315Z22ADJ**	315	60	101,6	293	80,0	22	25,42

Spare Parts

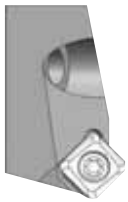
D1	cartridge screw	Nm	wedge	adjusting screw
125	**MS1294**	20,0	**12748308500**	**12748600900**
160	**MS1294**	20,0	**12748308500**	**12748600900**
200	**MS1294**	20,0	**12748308500**	**12748600900**
250	**MS1294**	20,0	**12748308500**	**12748600900**
315	**MS1294**	20,0	**12748308500**	**12748600900**

Cartridge

order number	catalogue number	insert style	master platform *	Ap max
4159022	M4000CA-AD1505	AD.T1505	CIP	14,0
4159020	M4000CA-AP1003	AP.T1003	CIP	10,2
4159021	M4000CA-AP1604	AP.T1604	CIP	16,2
3968124	M4000CA-HN07	HN.J0704/XNGJ0704	M1200 Mini	3,5
4159018	M4000CA-HN07HD	HN.J0704	M1200 Mini	4,7
4159017	M4000CA-HN07HF	HN.J0704	M1200 Mini	1,0
3126691	M4000CA-HN09	HN.J0905/XNGJ0905	M1200	4,4
4159019	M4000CA-HN09HD	HN.J0905	M1200	6,0
3954792	M4000CA-HN09HF	HN.J0905	M1200	2,2
2511344	M4000CA-HP06	HP.T06T3	M640	4,8
2006361	M4000CA-MDHX10	MDHX1004	M76	1,0
2006346	M4000CA-RC1606	RC.T1606	M100	8,0
2067492	M4000CA-SD1204	SDM.1204	M690	11,7
2006359	M4000CA-SD1506	SDM.1506	M690	14,9
2006374	M4000CA-SE1203	SE.N1203/SE.R1203	M68	6,0
2033495	M4000CA-SE1204	SE.N1204/SE.R1204	M68	6,0
2006377	M4000CA-SE1504	SE.N1504/SE.R1504	M68	8,0
2006348	M4000CA-SN12	SN.T1205/XNKT1205	M660	6,4
2006360	M4000CA-SN15	SN.T1505	M660	8,0
2006362	M4000CA-SP12	121358680	M40Wiper	9,0
2006373	M4000CA-SP1203	SP.N1203/SP.R1203	M40	9,0
2006376	M4000CA-SP1504	SP.N1504	M40	12,0
2033496	M4000CA-TP1603	TP.N1603/TP.R1603	M40	12,0
2006379	M4000CA-TP2204	TP.N2204/TP.R2204	M40	18,0
2006347	M4000CA-XP16	XP.T1604	M680	14,0

** For all details regarding insert offering and cutting conditions, please refer to the master platforms.*

	 M4000CA-MDHX10CA	 M4000CA-HN07HF	 M4000CA-HN07	 M4000CA-HN07HD	 M4000CA-HN09HF	 M4000CA-HN09	 M4000CA-HN09HD	 M4000CA-HP06
	order number 2006361	order number 4159017	order number 3968124	order number 4159018	order number 3954792	order number 3126691	order number 4159019	order number 2511344
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	125	139	134	132	143	136	133	131,4
160	160	174	169	167	178	171	168	166,4
200	200	214	209	207	218	211	208	206,4
250	250	264	259	257	268	261	258	256,4
315	315	329	324	322	333	326	323	321,4

	 M4000CA-SN12	 M4000CA-SN12RC	 M4000CA-SN15	 M4000CA-XP16	 M4000CA-AP1003	 M4000CA-AD1505	 M4000CA-AP1604	 M4000CA-SD1204	 M4000CA-SD1506
	order number 2006348	order number 2006357	order number 2006360	order number 2006347	order number 4159020	order number 4159022	order number 4159021	order number 2067492	order number 2006359
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	139,3	139,3	143	125	125	125	125	125	125
160	174,3	174,3	178	160	160	160	160	160	160
200	214,3	214,3	218	200	200	200	200	200	200
250	264,3	264,3	268	250	250	250	250	250	250
315	329,3	329,3	333	315	315	315	315	315	315

	 M4000CA-RC1606	 M4000CA-SE1203	 M4000CA-SE1204	 M4000CA-SE1504	 M4000CA-SP1203	 M4000CA-SP12 Wiper	 M4000CA-SP1504	 M4000CA-TP1603	 M4000CA-TP2204
	order number 2006346	order number 2006374	order number 2033495	order number 2006377	order number 2006373	order number 2006362	order number 2006376	order number 2033496	order number 2006379
D1	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max	D1 max
125	125	139	139	143	130,6	132,2	132,2	125	125
160	160	174	174	178	165,6	167,2	167,2	160	160
200	200	214	214	218	205,6	207,2	207,2	200	200
250	250	264	264	268	255,6	257,2	257,2	250	250
315	315	329	329	333	320,6	322,2	322,2	315	315

Reduced Complexity with Exceptional Finishing Capabilities



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

SuperFeed™

The new SuperFeed face mills and end mills are the first choice PCD platform for machining aluminium in the transportation and general engineering industries.

- Durable, lightweight anodised aluminium cutter body.
- DovLok PCD cartridge design.
- Simple, user-friendly axial adjustment range from 0,3–0,8mm.
- Fine-pitch cutters reduce cycle times while offering higher MRR and productivity.
- Reduce overall tooling costs with reconditioning.

To learn more about the benefits of **WIDIA™ SuperFeed**, contact your local distributor.

WIDIA™



Indexable Milling • Chamfer Mills

M25 ..... I2–I10



For Chamfering and Countersinking Applications •

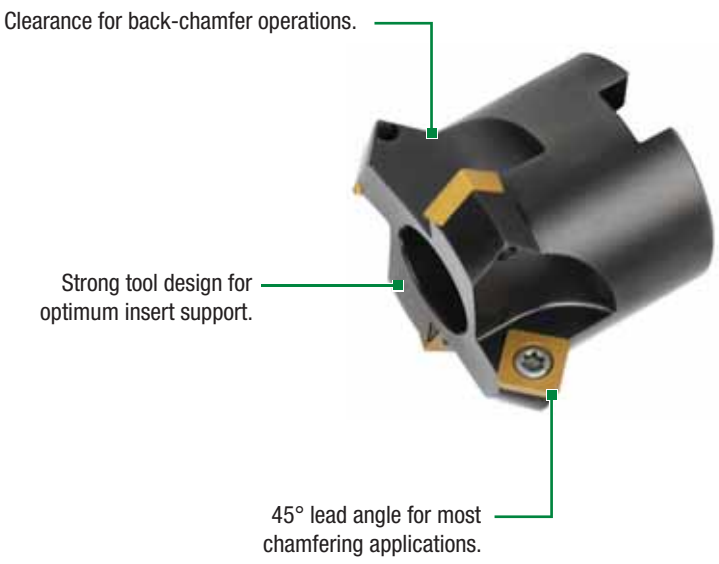
M25™ Series Chamfer Mills

M25



M25 Series Chamfer Mills are the ideal tool of choice for milling all steel, stainless steel, and cast iron materials. With clearance for back-chamfer operations, the M25 Series will help streamline your most challenging milling operations.

- Strong tool design for optimum insert support.
- 45° lead angle for most chamfering applications.



Chamfer Mills



M25™ SD0903..

Max depth of cut: 6,4mm

Lead angle: 45°
Indexes per insert: 4
Diameter: 25–40mm

Pages: I4–I6, I8, I10





M25 SP1204..

Max depth of cut: 8,3mm

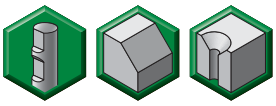
Lead angle: 45°
Indexes per insert: 4
Diameter: 50–63mm

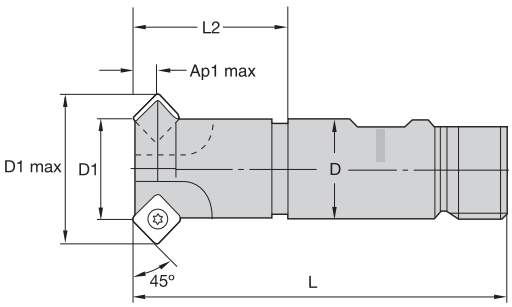
Pages: I7, I9–I10





- Chamfer milling in steel, stainless steel, and cast iron.







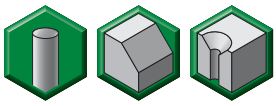
Weldon Shanks

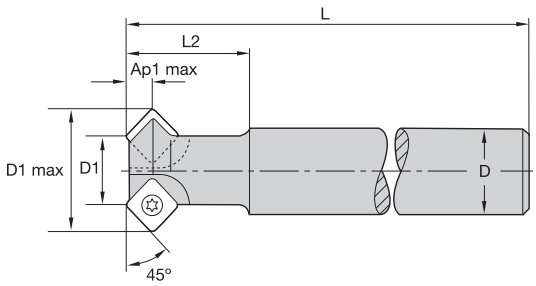
order number	catalogue number	D	D1	D1 max	L	L2	Ap1 max	Z	insert 1	coolant supply	kg
2022628	**12292510400**	16	16	28,8	75	27	6,4	2	SD..0903..	No	0,10
2022629	**12292510800**	25	25	37,8	96	40	6,4	2	SD..0903..	No	0,30
2022630	**12292511000**	32	32	44,8	100	40	6,4	3	SD..0903..	No	0,50

Spare Parts

		
insert screw	**Nm**	**Torx wrench**
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast Iron.







Cylindrical Shanks

order number	catalogue number	D1	D1 max	D	L	L2	Ap1 max	Z	insert 1	coolant supply	kg
2022634	**12292550400**	16	28,8	16	200	27	6,4	2	SD..0903..	No	0,40
2022635	**12292550800**	25	37,8	25	200	40	6,4	2	SD..0903..	No	0,70
2022636	**12292551000**	32	44,8	32	200	40	6,4	3	SD..0903..	No	1,20

Spare Parts

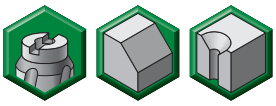


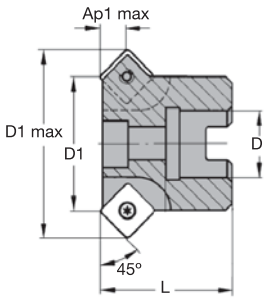




insert screw	Nm	Torx driver
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast iron.







Shell Mills

order number	catalogue number	D1	D1 max	D	L	Ap1 max	Z	insert 1	coolant supply	kg
2022631	**12292511200**	40	52,3	22	40	6,1	4	SD..0903..	No	0,80

NOTE: Standard milling cutters will accept insert nose radii up to 2mm without modification.

Spare Parts

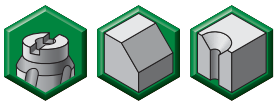


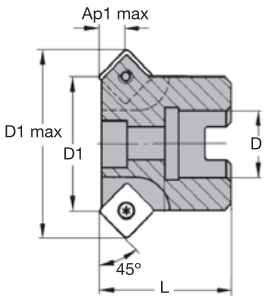




insert screw	Nm	Torx driver
12148095100	3,0	**12148000600**

- Chamfer milling in steel, stainless steel, and cast Iron.







Shell Mills

order number	catalogue number	D1	D1 max	D	L	Ap1 max	Z	insert 1	coolant supply	kg
2022632	**12292511400**	50	66,7	22	40	8,3	4	SP..1204..	No	0,90
2022633	**12292511600**	63	79,7	22	40	8,3	5	SP..1204..	No	1,10

Spare Parts



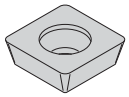


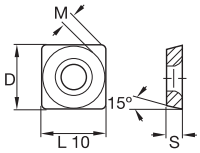


insert screw	Nm	Torx driver
12148007200	4,0	**12148007500**

Insert Selection Guide for Insert Style SD09

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	. ..	TN7525	. ..	**TN7525**	. ..	TN7525
P3–P4	. ..	TN7525	. ..	**TN7535**	. ..	TN7535
P5–P6	. ..	TN7525	. ..	**TN7535**	. ..	TN7535
M1–M2	. ..	TN7525	. ..	**TN7525**	. ..	TN7525
M3	. ..	TN7535	. ..	**TN7535**	. ..	TN7535
K1–K2	–	–	–	–	–	–
K3	. ..	TN7535	. ..	**TN7535**	. ..	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	. ..	TN2510	–	–	–	–


SDNT

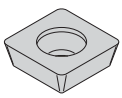


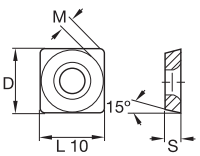
● first choice
○ alternate choice

P	○	●	●
M		○	○
K	●		○
N			
S			
H	●		

SDNT

catalogue number	cutting edges	D	L10	M	S	hm	TN2510	TN7525	TN7535
SDNT090308	4	9,53	9,53	1,64	3,18	0,10	–	2030200	2030198
SDNT090308T	4	9,53	9,53	1,64	3,18	0,10	2028336	–	–


SDMW



● first choice
○ alternate choice

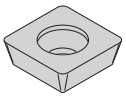
P		●	
M		○	
K			○
N			●
S			○
H			

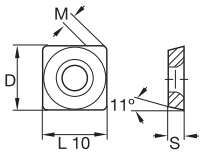
SDMW

catalogue number	cutting edges	D	L10	M	S	hm	TN7525	THM
SDMW090308	4	9,53	9,53	1,64	3,18	0,10	2105263	2028332

Insert Selection Guide for Insert Style SP12

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	. ..	TN7525	. ..	**TN7525**	. ..	TN7525
P3–P4	. ..	TN7525	. ..	**TN7535**	. ..	TN7535
P5–P6	. ..	TN7525	. ..	**TN7535**	. ..	TN7535
M1–M2	. ..	TN7525	. ..	**TN7525**	. ..	TN7525
M3	. ..	TN7535	. ..	**TN7535**	. ..	TN7535
K1–K2	. ..	WK15CM	. ..	**WK15CM**	. ..	WK15CM
K3	. ..	TN7535	. ..	**WK15CM**	. ..	WK15CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–


SPNT

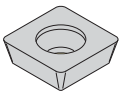


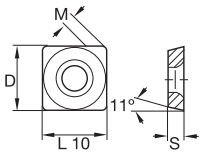
● first choice
○ alternate choice

P		●	●
M		○	○
K			○
N			
S			
H			

SPNT

catalogue number	cutting edges	D	L10	M	S	hm	TN7525	TN7535
SPNT120408	4	12,70	12,70	2,30	4,76	0,10	2029794	2029792


SPMW



● first choice
○ alternate choice

P			
M			
K		○	●
N		●	
S		○	
H			

SPMW

catalogue number	cutting edges	D	L10	M	S	hm	THM	WK15CM
SPMW120408	4	12,70	12,70	2,30	4,76	0,14	2014066	5427380

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN7525			TN7535			WK15CM			THM		
P	1	660	**580**	540	410	**310**	280	545	**475**	445	–	**–**	–	–	**–**	–
	2	410	**370**	330	310	**250**	215	335	**305**	275	–	**–**	–	–	**–**	–
	3	370	**330**	305	280	**215**	185	305	**275**	245	–	**–**	–	–	**–**	–
	4	275	**260**	230	235	**170**	145	230	**210**	190	–	**–**	–	–	**–**	–
	5	330	**300**	275	310	**235**	200	310	**275**	250	–	**–**	–	–	**–**	–
	6	230	**205**	175	205	**160**	130	190	**160**	130	–	**–**	–	–	**–**	–
M	1	270	**240**	210	245	**220**	185	245	**220**	185	–	**–**	–	–	**–**	–
	2	245	**210**	190	220	**190**	170	220	**190**	170	–	**–**	–	–	**–**	–
	3	190	**175**	150	175	**155**	140	175	**155**	140	–	**–**	–	–	**–**	–
K	1	420	**360**	300	380	**280**	240	355	**320**	290	505	**460**	410	145	**110**	90
	2	360	**300**	250	325	**240**	200	280	**250**	230	400	**355**	330	150	**120**	85
	3	300	**250**	200	240	**200**	170	235	**210**	190	335	**300**	275	155	**115**	70
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	1080	**720**	600
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	820	**560**	460
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	540	**335**	240
S	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz)			Insert Geometry
SD09	0,10	**0,15**	0,30	SD09
SP12	0,10	**0,15**	0,35	SP12

NOTE: Use "Light Machining" value as starting feed rate.

Reconditioning Services

Anyone can regrind our tools – but only we can recondition them

WIDIA™ Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

To use WIDIA™ tool reconditioning services, contact your authorised WIDIA distributor to get started.

Global Reconditioning Network



To locate a Reconditioning Center near you, visit **widia.com/services.**

WIDIA™


WIDIA

Indexable Milling • 90° Shoulder Mills

VSM11 • Versatile — Single-Sided 90° Shoulder Mill Platform J2–J16

VSM17 • Versatile — Single-Sided 90° Shoulder Mill Platform J18–J29

VSM490-15 • Double-Sided Shoulder Milling Platform with Four Cutting Edges J30–J40

M690 • Square Insert Shoulder Mill Platform J42–J51



VSM11



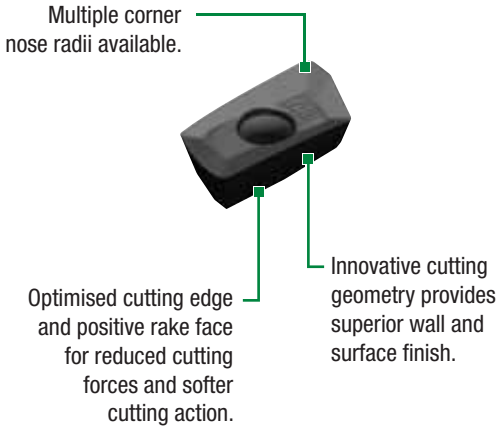
Victory™ Shoulder Mill 11™ is a high-performance, versatile, robust, 90° square shoulder milling platform. VSM11 is designed for versatility, low horsepower consumption, and easy cutting action. Cutters can be used for profiling, face milling, slotting, ramping, helical interpolation, circular interpolation, and other milling applications. Inserts are specially designed with innovative geometries and features like variable rake angles, negative T-land, small hone, and the latest Victory grades enhancing tool performance and versatility.

Take advantage of the high-performance, advanced carbide substrates, coatings, and surface treatment technologies of the available 6 Victory grades, 5 geometries, and broad range of cutter body product portfolio. This platform works with multiple material types and applications.

- State-of-the-art step down capability.
- Screw-on, end mill, and shell mill cutters with effective internal coolant supply.

Features

- Insert geometries and grades for all workpiece materials.
- Insert corner radius from 0,4–3,1mm (.016–.122").



Benefits

- Achieve 90° wall finish.
- Longer tool life.
- Latest WIDIA Victory milling grades for all workpiece materials.
- Soft cutting action, reduced cycle times, and low horsepower consumption.
- Stability and reliability.

90° Shoulder Mills

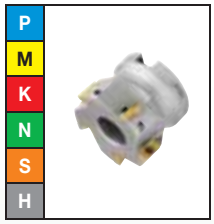


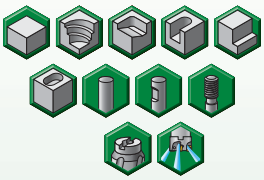
VSM11™

Max depth of cut: 11,7mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 16–125mm

Pages: J4–J16

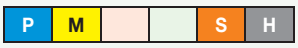




Insert Offering

XDCT-ML





Light to medium machining.
First choice for stainless steel and titanium.
Periphery ground.

XDPT-MM





Medium to heavy machining.
First choice for general purpose.
Precision pressed to size.

XDPT-MH





First choice for heavy-duty machining.
Steel and cast iron materials.
Precision pressed to size.

XDCT-ALP





Roughing and finishing of aluminium alloys.
High precision.
Periphery ground.

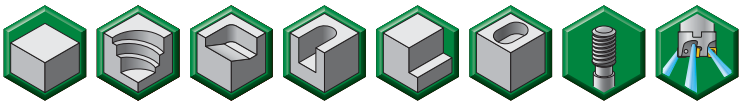
XDCW-PCD



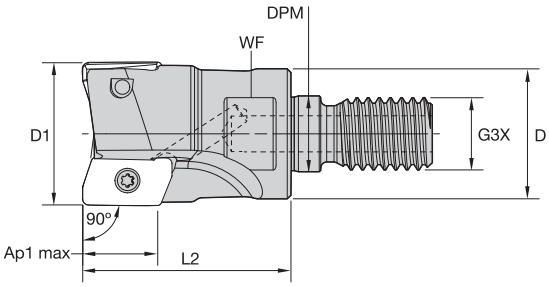


Roughing and finishing of aluminium alloys.
Abrasive non-ferrous materials.
High precision.
Periphery ground.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.







Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5417011	**VSM11D016Z02M08XD11**	16	13	8,5	M8	25	10	11,5	2	10.0°	Yes	41400	0,02
5417013	**VSM11D020Z03M10XD11**	20	18	10,5	M10	28	15	11,6	3	7.8°	Yes	35100	0,05
5417015	**VSM11D025Z04M12XD11**	25	21	12,5	M12	32	17	11,5	4	5.3°	Yes	30200	0,08
5417017	**VSM11D032Z04M16XD11**	32	29	17,0	M16	40	24	11,4	4	3.6°	Yes	25800	0,18
5417019	**VSM11D040Z06M16XD11**	40	29	17,0	M16	40	24	11,4	6	2.6°	Yes	22600	0,24

Spare Parts



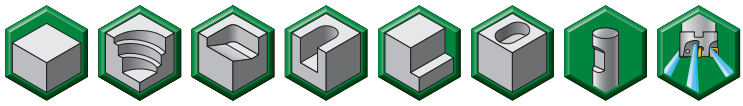




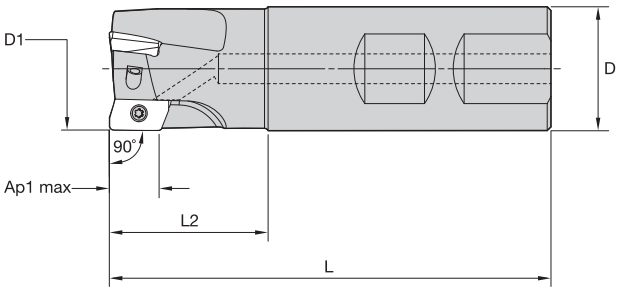
insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.







Weldon Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416454	**VSM11D012Z01B16XD11**	12	16	70	21	11,7	1	3.7°	Yes	53100	0,08
5416455	**VSM11D016Z02B16XD11**	16	16	70	21	11,5	2	10.0°	Yes	41400	0,09
5416457	**VSM11D020Z02B20XD11**	20	20	81	30	11,6	2	7.8°	Yes	35100	0,15
5416458	**VSM11D020Z03B20XD11**	20	20	81	30	11,6	3	7.8°	Yes	35100	0,16
5416459	**VSM11D025Z03B25XD11**	25	25	88	31	11,5	3	5.3°	Yes	30200	0,27
5416480	**VSM11D025Z04B25XD11**	25	25	88	31	11,5	4	5.3°	Yes	30200	0,28
5416481	**VSM11D030Z04B25XD11**	30	25	88	31	11,5	4	3.2°	Yes	26900	0,30
5416482	**VSM11D032Z04B32XD11**	32	32	100	39	11,4	4	3.6°	Yes	25800	0,51
5416483	**VSM11D032Z05B32XD11**	32	32	100	39	11,4	5	3.6°	Yes	25800	0,52

Spare Parts



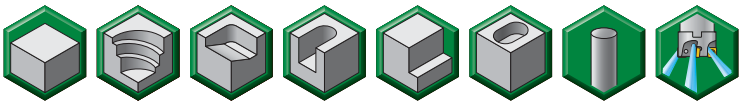


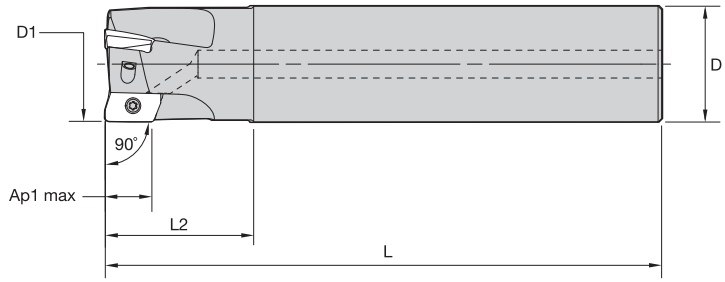


insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.







Cylindrical End Mills

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416632	**VSM11D012Z01A16XD11L100**	12	16	100	25	11,7	1	3.7°	Yes	53100	0,13
5416633	**VSM11D016Z02A16XD11L100**	16	16	100	31	11,5	2	10.0°	Yes	41400	0,12
5416634	**VSM11D020Z02A20XD11L110**	20	20	110	31	11,6	2	7.8°	Yes	35100	0,22
5416635	**VSM11D020Z03A20XD11L110**	20	20	110	31	11,6	3	7.8°	Yes	35100	0,23
5416636	**VSM11D025Z03A25XD11L120**	25	25	120	33	11,5	3	5.3°	Yes	30200	0,39
5416637	**VSM11D025Z04A25XD11L120**	25	25	120	33	11,5	4	5.3°	Yes	30200	0,40
5416638	**VSM11D032Z03A32XD11L130**	32	32	130	41	11,4	3	3.6°	Yes	25800	0,70
5416639	**VSM11D032Z05A32XD11L130**	32	32	130	41	11,4	5	3.6°	Yes	25800	0,71

Spare Parts



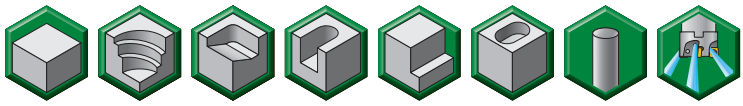


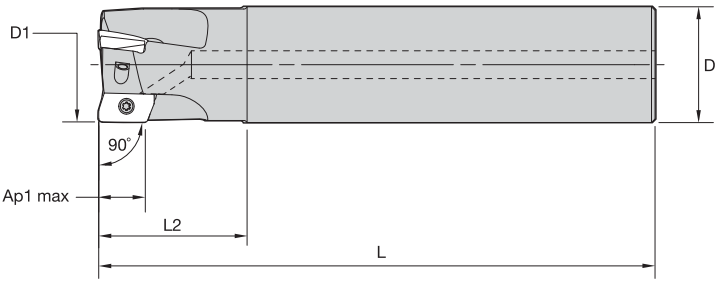


insert screw	Nm	wrench
192.432	1,0	**170.028**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.







Cylindrical End Mills • Long Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416700	**VSM11D016Z02A16XD11L170**	16	16	170	25	11,5	2	10.0°	Yes	41400	0,23
5416701	**VSM11D018Z02A16XD11L170**	18	16	170	25	11,6	2	9.7°	Yes	37900	0,23
5416702	**VSM11D020Z02A20XD11L170**	20	20	170	41	11,6	2	7.8°	Yes	35100	0,35
5416703	**VSM11D020Z03A20XD11L170**	20	20	170	41	11,6	3	7.8°	Yes	35100	0,36
5416704	**VSM11D022Z03A20XD11L170**	22	20	170	30	11,5	3	6.6°	Yes	32900	0,37
5416705	**VSM11D025Z03A25XD11L210**	25	25	210	50	11,5	3	5.3°	Yes	30200	0,70
5416706	**VSM11D025Z04A25XD11L210**	25	25	210	50	11,5	4	5.3°	Yes	30200	0,72
5416707	**VSM11D032Z03A32XD11L250**	32	32	250	65	11,4	3	3.6°	Yes	25800	1,39

Spare Parts



insert screw

192.432



Nm

1,0

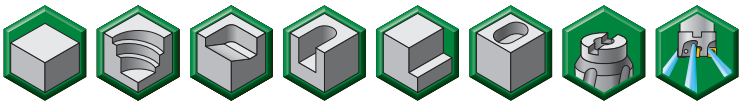


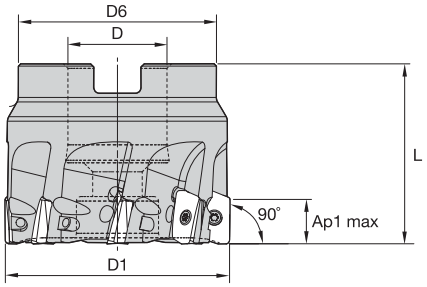
wrench

170.028

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

- True 90° capability.
- Increased ramping capability.
- Superior wall and surface finish.
- Effective internal coolant feature, precisely reaching the cutting edge.







Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5416316	**VSM11D040Z04S016XD11**	40	16	37	40	11,4	4	2.6°	Yes	22600	0,22
5416317	**VSM11D040Z06S016XD11**	40	16	37	40	11,4	6	2.6°	Yes	22600	0,22
5416318	**VSM11D050Z05S022XD11**	50	22	44	40	11,3	5	1.9°	Yes	19900	0,33
5416319	**VSM11D050Z08S022XD11**	50	22	44	40	11,3	8	1.9°	Yes	19900	0,33
5416340	**VSM11D063Z06S022XD11**	63	22	44	40	11,3	6	1.5°	Yes	17500	0,50
5416341	**VSM11D063Z09S022XD11**	63	22	44	40	11,3	9	1.5°	Yes	17500	0,52
5416342	**VSM11D080Z08S027XD11**	80	27	60	50	11,3	8	1.1°	Yes	15300	1,14
5416345	**VSM11D100Z09S032XD11**	100	32	80	50	11,3	9	0.9°	Yes	13600	1,79
5416347	**VSM11D125Z011S040XD11**	125	40	80	63	11,3	11	0.7°	Yes	12100	3,01

Spare Parts

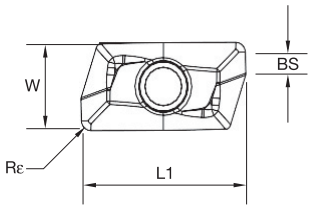
D1	 insert screw	 Nm	 wrench	 socket-head cap screw	 socket-head cap screw with coolant groove	 coolant lock screw assembly
40,0	**192.432**	1,0	**170.028**	**MS1294**	**MS1294CG**	–
50,0	**192.432**	1,0	**170.028**	**12146120500**	**MS1234CG**	–
63,0	**192.432**	1,0	**170.028**	**12146120500**	**MS1234CG**	–
80,0	**192.432**	1,0	**170.028**	**125.230**	**MS2038CG**	–
100,0	**192.432**	1,0	**170.028**	–	–	**MS2195C**
125,0	**192.432**	1,0	**170.028**	–	–	**MS2187C**

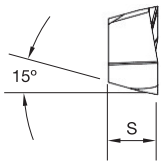
NOTE: Socket-head cap screw and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..ML	WP40PM	**.E..MM**	**WP40PM**	.S..MH	WP40PM
P3–P4	.E..ML	WP35CM	**.E..MM**	**WP35CM**	.S..MH	WP35CM
P5–P6	.E..MM	WP25PM	**.S..MH**	**WP35CM**	.S..MH	WP35CM
M1–M2	.E..ML	WU35PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
M3	.E..ML	WU35PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
K1–K2	.E..ML	WK15CM	**.E..MM**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WP25PM	**.E..MM**	**WP25PM**	.S..MH	WP25PM
N1–N2	.F..ALP	WN25PM	**.F..ALP**	**WN25PM**	.E..ML	WP25PM
N3	.F..ALP	WN25PM	**.F..ALP**	**WN25PM**	.E..ML	WP25PM
S1–S2	.E..ML	WP25PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
S3	.E..ML	WP25PM	**.E..MM**	**WU35PM**	.S..MH	WU35PM
S4	.E..MM	WU35PM	**.S..MH**	**WU35PM**	–	–
H1	.E..MM	WP25PM	**.E..MM**	**WP25PM**	–	–


XDCT-ML





- -ML is a light- to medium-machining geometry and is the first choice for stainless steel and titanium materials.

● first choice
○ alternate choice

WIDIA VICTORY

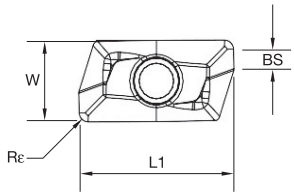
	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
P				○	●	●		●
M				●	○	●		●
K		●		○	○			
N	●		●					
S				●		○	●	●
H								

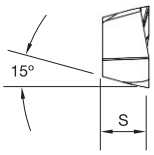
XDCT-ML

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDCT110404PDERML	2	13,43	2,09	4,00	6,90	0,40	0,04	-	-	-	5536671	5536670	5642230	-	-
XDCT110408PDERML	2	13,44	1,69	4,00	6,90	0,80	0,04	-	5415549	-	5415548	5415547	5545065	5517826	5415546


XDPT-MM


XDPT-MH





● first choice
○ alternate choice

		WIDIA VICTORY							
		WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
P					○	●	●		●
M					●	○	●		●
K			●		○	○			
N		●		●					
S					●		○	●	●
H									

- -MM is a medium- to heavy-machining geometry and is the first choice for general purpose and universal applications.

XDPT-MM

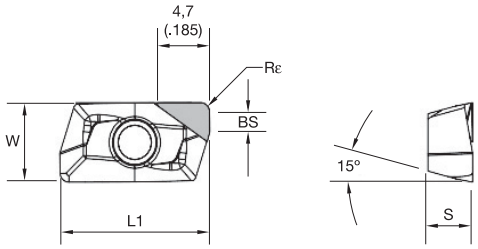
catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110404PDSRMM	2	13,43	2,06	4,00	6,90	0,40	0,06	-	5415428	-	5642237	5415450	5642231	-	-
XDPT110408PDSRMM	2	13,44	1,68	4,00	6,90	0,79	0,06	-	5415315	-	5415319	5415318	5545063	5519921	5415317
XDPT110412PDSRMM	2	13,44	1,29	4,00	6,90	1,20	0,06	-	5415310	-	5415314	5415313	5642232	-	5415312
XDPT110416PDSRMM	2	13,51	0,85	4,13	6,95	1,60	0,06	-	5415250	-	5415254	5415253	5642233	-	-
XDPT110420PDSRMM	2	13,51	0,45	4,13	6,95	2,00	0,06	-	-	-	5980399	5980400	5980398	-	-
XDPT110424PDSRMM	2	13,37	–	4,01	6,94	2,40	0,06	-	-	-	5901355	-	5901354	-	-
XDPT110431PDSRMM	2	12,91	–	4,00	6,89	3,10	0,06	-	5415422	-	5415426	5415425	5642234	5517827	-

- -MH is a heavy-duty machining geometry and is the first choice for steel and cast iron materials.

XDPT-MH

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WS30PM	WU35PM
XDPT110408PDSRMH	2	13,44	1,68	4,00	6,90	0,79	0,13	-	5415255	-	-	5415257	5545064	-	5415256
XDPT110412PDSRMH	2	13,44	1,29	4,00	6,90	1,20	0,13	-	5415360	-	-	5415362	5642235	-	-
XDPT110416PDSRMH	2	13,44	0,90	4,00	6,90	1,59	0,13	-	5415364	-	-	5415366	5642236	-	-


XDCW-PCD



WIDIA VICTORY

P		
M		
K		
N		●
S		
H		

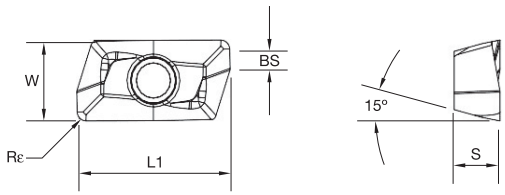
● first choice
○ alternate choice

- -PCD is the first choice for roughing and finishing of abrasive non-ferrous materials and aluminium alloys.

XDCW-PCD

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WDN10U
XDCW110404PDFRPCD	1	13,43	2,10	4,00	6,90	0,40	0,02	5415420
XDCW110408PDFRPCD	1	13,44	1,70	4,00	6,90	0,80	0,02	5415421


XDCT-ALP



WIDIA VICTORY

P		
M		
K		
N	●	●
S		
H		

● first choice
○ alternate choice

- -ALP is the first choice for roughing and finishing of aluminium alloys.

XDCT-ALP

catalogue number	cutting edges	L1	BS	S	W	Rε	hm	WN10HM	WN25PM
XDCT110404PDFRALP	2	13,43	2,09	4,00	6,90	0,40	0,02	5933940	5417054
XDCT110408PDFRALP	2	13,44	1,69	4,00	6,90	0,80	0,02	5936171	5417053
XDCT110412PDFRALP	2	13,44	1,29	4,00	6,90	1,20	–	6055634	6055635
XDCT110416PDFRALP	2	13,44	0,88	4,00	6,89	1,60	–	6055598	6055599
XDCT110424PDFRALP	2	13,44	0,16	4,00	6,88	2,40	–	6055600	6055631
XDCT110432PDFRALP	2	12,86	–	4,00	6,89	3,20	–	6055632	6055633

Recommended Starting Speeds [m/min]

Material Group		WP25PM			WU35PM			WP40PM			WK15CM		
P	1	330	**285**	270	260	**230**	215	300	**260**	250	–	**–**	–
	2	275	**240**	200	220	**190**	160	250	**220**	180	–	**–**	–
	3	255	**215**	175	200	**170**	140	230	**200**	160	–	**–**	–
	4	225	**185**	150	180	**150**	120	210	**170**	140	–	**–**	–
	5	185	**170**	150	150	**135**	120	170	**160**	140	–	**–**	–
	6	165	**125**	100	130	**100**	80	150	**120**	90	–	**–**	–
M	1	205	**180**	165	170	**150**	135	200	**170**	160	–	**–**	–
	2	185	**160**	130	155	**130**	110	180	**150**	130	–	**–**	–
	3	140	**120**	95	115	**100**	80	130	**120**	90	–	**–**	–
K	1	230	**205**	185	–	**–**	–	–	**–**	–	420	**385**	340
	2	180	**160**	150	–	**–**	–	–	**–**	–	335	**295**	275
	3	150	**135**	120	–	**–**	–	–	**–**	–	280	**250**	230
N	1–2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–
	2	40	**35**	25	35	**30**	25	40	**40**	30	–	**–**	–
	3	50	**40**	25	45	**35**	25	50	**40**	30	–	**–**	–
	4	70	**50**	35	60	**45**	30	70	**50**	40	–	**–**	–
H	1	120	**90**	70	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WS30PM			WP35CM			WN25PM			WDN10U		
P	1	–	–	–	455	**395**	370	–	–	–	–	–	–
	2	–	–	–	280	**255**	230	–	–	–	–	–	–
	3	–	–	–	255	**230**	205	–	–	–	–	–	–
	4	–	–	–	190	**175**	160	–	–	–	–	–	–
	5	–	–	–	260	**230**	210	–	–	–	–	–	–
	6	–	–	–	160	**135**	110	–	–	–	–	–	–
M	1	225	**200**	185	205	**185**	155	–	–	–	–	–	–
	2	205	**180**	145	185	**160**	140	–	–	–	–	–	–
	3	155	**135**	105	145	**130**	115	–	–	–	–	–	–
K	1	–	–	–	295	**265**	240	–	–	–	–	–	–
	2	–	–	–	235	**210**	190	–	–	–	–	–	–
	3	–	–	–	195	**175**	160	–	–	–	–	–	–
N	1–2	–	–	–	–	–	–	1075	**945**	875	2755	**2450**	2255
	3	–	–	–	–	–	–	945	**875**	760	2285	**1670**	1355
S	1	45	**40**	30	–	–	–	–	–	–	–	–	–
	2	45	**40**	30	–	–	–	–	–	–	–	–	–
	3	55	**45**	30	–	–	–	–	–	–	–	–	–
	4	85	**60**	40	66	**50**	33	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	10%			20%			30%			40%			50–100%			
.F..-PCD	0,08	**0,17**	0,23	0,06	**0,13**	0,18	0,06	**0,11**	0,15	0,05	**0,10**	0,14	0,05	**0,10**	0,14	.F..-PCD
.F..ALP	0,08	**0,10**	0,16	0,06	**0,07**	0,12	0,06	**0,06**	0,10	0,05	**0,06**	0,10	0,05	**0,06**	0,10	.F..ALP
.E..ML	0,09	**0,18**	0,30	0,07	**0,14**	0,23	0,06	**0,12**	0,20	0,05	**0,11**	0,19	0,05	**0,11**	0,18	.E..ML
.S..MM	0,17	**0,20**	0,34	0,13	**0,15**	0,25	0,11	**0,13**	0,22	0,10	**0,12**	0,21	0,10	**0,12**	0,20	.S..MM
.S..MH	0,17	**0,25**	0,40	0,13	**0,19**	0,30	0,11	**0,17**	0,26	0,10	**0,15**	0,24	0,10	**0,15**	0,24	.S..MH

NOTE: Use "Light Machining" values as starting feed rate.

Achieve True 90° Shoulder Milling with the New High-Performance WIDIA™ VSM11™ Starter Kits.

Victory™ Shoulder Mill 11™ Starter Kits

Order one of our starter kits and test the performance of our new VSM11 platform. The kits are set up to serve the majority of shoulder milling applications, delivered with a cutter body and the latest WIDIA Victory™ grades. Detailed order information can be found in the table below.

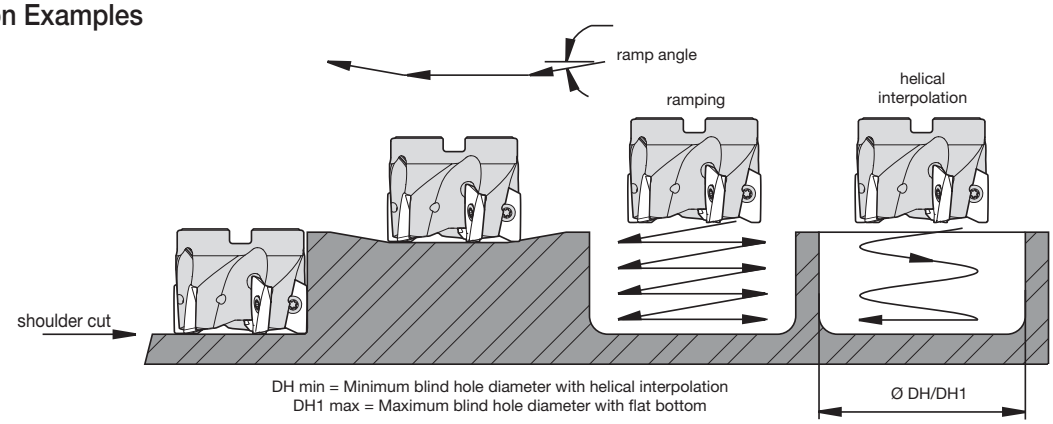


VSM11 Starter Kits • Metric

order number	catalogue number	diameter D1 (mm)	cutter body type	material group	content				
					cutter	qty	inserts	grade	Z (pocket seats)
5527101	VSM11KITWD016Z02WP40PM	16	Weldon	P	VSM11D016Z02B16XD11	10	XDPT110408PDSRMM	WP40PM	2
5527102	VSM11KITWD020Z03WP40PM	20	Weldon	P	VSM11D020Z03B20XD11	10	XDPT110408PDSRMM	WP40PM	3
5527106	VSM11KITSD050Z05WP40PM	50	Shell	P	VSM11D050Z05S022XD11	10	XDPT110408PDSRMM	WP40PM	5
5719051	VSM11KITSD040Z06WP40PM	40	Shell	P	VSM11D040Z06S016XD11	10	XDPT110408PDSRMM	WP40PM	6
5719052	VSM11KITCD016Z02WP40PM	16	Cylindrical	P	VSM11D016Z02A16XD11L100	10	XDPT110408PDSRMM	WP40PM	2
5719053	VSM11KITCD020Z03WP40PM	20	Cylindrical	P	VSM11D020Z03A20XD11L110	10	XDPT110408PDSRMM	WP40PM	3
5719054	VSM11KITCD025Z04WP40PM	25	Cylindrical	P	VSM11D025Z04A25XD11L120	10	XDPT110408PDSRMM	WP40PM	4
5719055	VSM11KITCD032Z03WP40PM	32	Cylindrical	P	VSM11D032Z03A32XD11L130	10	XDPT110408PDSRMM	WP40PM	3
5886219	VSM11KITCD025Z03L120WP40PM	25	Cylindrical	P	VSM11D025Z03A25XD11L120	10	XDPT110408PDSRMM	WP40PM	3
5886220*	VSM11KITCD025Z03L210WP40PM	25	Cylindrical	P	VSM11D025Z03A25XD11L210	10	XDPT110408PDSRMM	WP40PM	3
5886251*	VSM11KITCD032Z03L250WP40PM	32	Cylindrical	P	VSM11D032Z03A32XD11L250	10	XDPT110408PDSRMM	WP40PM	3

**Starter Kit to be delivered in regular WIDIA™ corrugated box.*

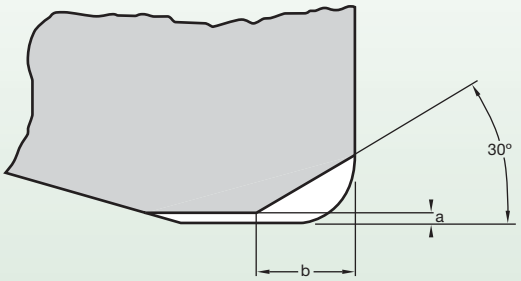
Application Examples



order number	catalogue number	number of inserts	max RPM	max ramp angle to steel body interference	max flat-bottom hole diameter (DH1 max)	min hole diameter (DH min)
5417011	VSM11D016Z02M08XD11	2	41400	10.00°	32,00	19,00
5417013	VSM11D020Z03M10XD11	3	35100	7.80°	40,00	27,00
5417015	VSM11D025Z04M12XD11	4	30200	5.30°	50,00	37,00
5417017	VSM11D032Z04M16XD11	4	25800	3.60°	64,00	51,00
5417019	VSM11D040Z06M16XD11	6	22600	2.60°	80,00	67,00
5416454	VSM11D012Z01B16XD11	1	53100	3.70°	24,00	11,00
5416455	VSM11D016Z02B16XD11	2	41400	10.00°	32,00	19,00
5416457	VSM11D020Z02B20XD11	2	35100	7.80°	40,00	27,00
5416458	VSM11D020Z03B20XD11	3	35100	7.80°	40,00	27,00
5416459	VSM11D025Z03B25XD11	3	30200	5.30°	50,00	37,00
5416480	VSM11D025Z04B25XD11	4	30200	5.30°	50,00	37,00
5416481	VSM11D030Z04B25XD11	4	26900	3.20°	60,00	47,00
5416482	VSM11D032Z04B32XD11	4	25800	3.60°	64,00	51,00
5416483	VSM11D032Z05B32XD11	5	25800	3.60°	64,00	51,00
5416632	VSM11D012Z01A16XD11L100	1	53100	4.00°	24,00	11,00
5416633	VSM11D016Z02A16XD11L100	2	41400	10.00°	32,00	19,00
5416634	VSM11D020Z02A20XD11L110	2	35100	8.00°	40,00	27,00
5416635	VSM11D020Z03A20XD11L110	3	35100	8.00°	40,00	27,00
5416637	VSM11D025Z04A25XD11L120	4	30200	5.00°	50,00	37,00
5416636	VSM11D025Z03A25XD11L120	3	30200	5.00°	50,00	37,00
5416638	VSM11D032Z03A32XD11L130	3	25800	4.00°	64,00	51,00
5416639	VSM11D032Z05A32XD11L130	5	25800	4.00°	64,00	51,00
5416700	VSM11D016Z02A16XD11L170	2	41400	10.00°	32,00	19,00
5416701	VSM11D018Z02A16XD11L170	2	37900	10.00°	36,00	23,00
5416703	VSM11D020Z03A20XD11L170	3	35100	8.00°	40,00	27,00
5416702	VSM11D020Z02A20XD11L170	2	35100	8.00°	40,00	27,00
5416704	VSM11D022Z03A20XD11L170	3	32900	7.00°	44,00	31,00
5416705	VSM11D025Z03A25XD11L210	3	30200	5.00°	50,00	37,00
5416706	VSM11D025Z04A25XD11L210	4	30200	5.00°	50,00	37,00
5416707	VSM11D032Z03A32XD11L250	3	25800	4.00°	64,00	51,00
5416316	VSM11D040Z04S016XD11	4	22600	3.00°	80,00	67,00
5416317	VSM11D040Z06S016XD11	6	22600	3.00°	80,00	67,00
5416318	VSM11D050Z05S022XD11	5	19900	2.00°	100,00	87,00
5416319	VSM11D050Z08S022XD11	8	19900	2.00°	100,00	87,00
5416340	VSM11D063Z06S022XD11	6	17500	2.00°	126,00	113,00
5416341	VSM11D063Z09S022XD11	9	17500	2.00°	126,00	113,00
5416342	VSM11D080Z08S027XD11	8	15300	1.00°	160,00	147,00
5416345	VSM11D100Z09S032XD11	9	13600	0.90°	200,00	187,00
5416347	VSM11D125Z011S040XD11	11	12100	0.70°	250,00	237,00

NOTE: For DH1 max, subtract the insert corner radius from the max hole diameter.

Modification Instructions for Use of Larger Radii Inserts (Shoulder Mills and Helical Mills)



	material to remove	
insert corner radius	a	b
3,1mm	0,2mm	1,8mm



Engineered to Achieve Superior Surface Quality



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Victory™ Shoulder Mill Series

The Victory Shoulder Mill (VSM) family of tools provides a comprehensive solution for your most challenging shoulder milling applications. The unique design of the VSM11™, VSM17™, and VSM490™ is capable of producing a true 90° wall in multiple material types. When combined with the latest WIDIA™ Victory™ grades, VSM from WIDIA provides superior performance at high speeds.

- Innovative cutting geometry provides superior wall and surface finish.
- State-of-the-art step-down capability.
- Real soft cutting action results in lower cutting forces and low machine power consumption.
- VSM11 and VSM17 offer aggressive ramping capabilities.
- VSM490 provides outstanding step-down capabilities in applications that require multiple passes.

To learn more about the benefits of the **WIDIA™ Victory Shoulder Mill Series**, contact your local distributor.

WIDIA™



VSM17

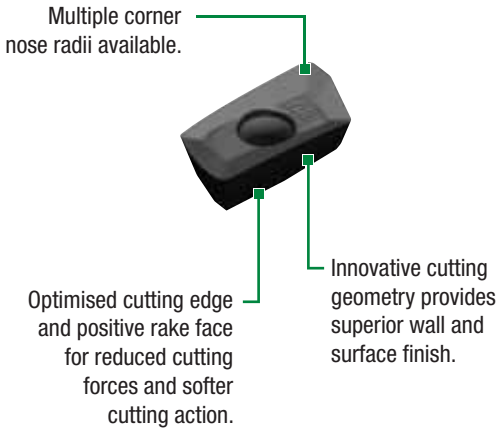
WIDIA Victory Shoulder Mill 17 is a high-performance, versatile, robust, 90° square shoulder milling platform. VSM17 is designed for versatility, low horsepower consumption, and easy cutting action. Cutters can be used for shoulder milling, profiling, face milling, slotting, ramping, helical interpolation, and circular interpolation milling applications. Inserts are specially designed with innovative geometries and features like variable rake angles, negative T-land, small hone, and the latest Victory grades enhancing tool performance and versatility.

Take advantage of the high-performance, advanced carbide substrates, coatings, and surface treatment technologies of the available 7 Victory grades, 4 geometries, and a broad-range cutter body product portfolio. This platform works with multiple material types and applications.

- Up to 16,33mm (.65") depth-of-cut capabilities.
- State-of-the-art step down capability.
- Screw-on, end mill, and shell mill cutters with effective internal coolant supply.

Features

- Insert geometries and grades for all workpiece materials.
- Insert corner radius from 0,4–4mm (.015–.157").
- Max axial depth of cut 16,3mm (0.65").



Benefits

- Achieve true 90° wall finish.
- High performance and longer tool life.
- Latest WIDIA Victory milling grades for all workpiece materials.
- High positive geometry, soft cutting action, reduced cycle times, and low horsepower consumption.
- Stability and reliability.

90° Shoulder Mills



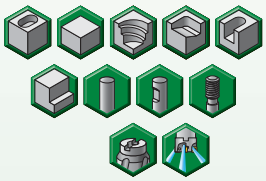
VSM17™

Max depth of cut: 16,33mm

Lead angle: 90°
Indexes per insert: 2
Diameter: 25–160mm

Pages: J20–J29





Insert Offering

XDPT-MM



P M K S H

Medium to heavy machining.
First choice for general purpose.
Precision pressed to size.

XDPT-MH



P M K S

First choice for heavy-duty machining.
Steel and cast iron materials.
Precision pressed to size.

XDCT-ALP



N

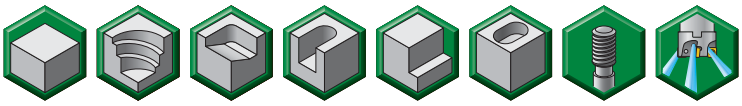
Roughing and finishing
of aluminium alloys.
High precision.
Periphery ground.

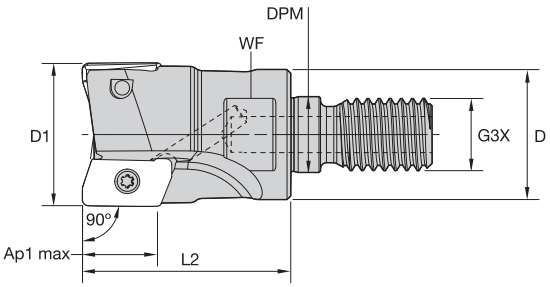
XDCT-ML



P M S H

Light to medium machining.
First choice for stainless steel
and titanium.
Periphery ground.







Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988091	**VSM17D025Z02M12XD17**	25	21	12,5	M12	35	17	16,3	2	8.8	Yes	41800	0,08
5988092	**VSM17D032Z03M16XD17**	32	29	17,0	M16	40	24	16,3	3	5.7	Yes	34700	0,17
5988132	**VSM17D32Z02M016XD17**	32	29	17,0	M16	40	24	16,3	2	5.7	Yes	34700	0,18
5988093	**VSM17D040Z04M16XD17**	40	29	17,0	M16	40	24	16,2	4	4.0	Yes	29800	0,20
5988131	**VSM17D40Z03M016XD17**	40	29	17,0	M16	40	24	16,2	3	4.0	Yes	29800	0,20

Spare Parts



insert screw

191.725



Nm

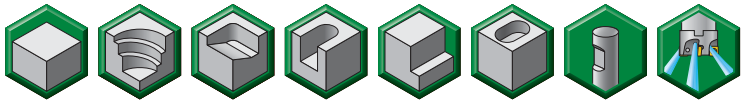
3,5

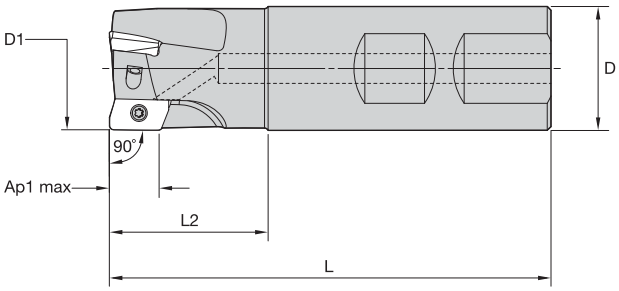


wrench

170.025

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.







Weldon Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988102	**VSM17D025Z02B25XD17**	25	25	90	33	16,3	2	8.8	Yes	41800	0,26
5988136	**VSM17D032Z02B32XD17**	32	32	100	39	16,3	2	5.7	Yes	34700	0,49
5988103	**VSM17D032Z03B32XD17**	32	32	100	39	16,3	3	5.7	Yes	34700	0,48
5988137	**VSM17D040Z03B40XD17**	40	40	110	39	16,2	3	4.0	Yes	29800	0,88
5988104	**VSM17D040Z04B40XD17**	40	40	110	39	16,2	4	4.0	Yes	29800	0,87

Spare Parts

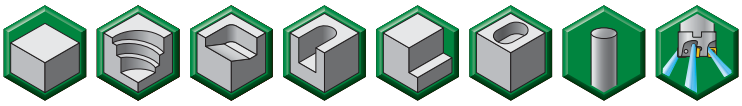


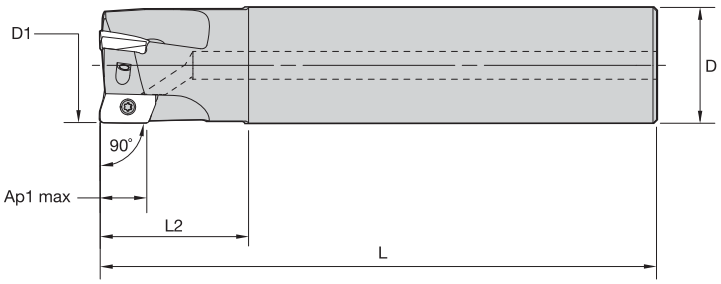




insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.







Cylindrical End Mills

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988055	**VSM17D025Z02A25XD17L110**	25	25	110	44	16,3	2	8.8	Yes	41800	0,32
5988056	**VSM17D025Z02A25XD17L170**	25	25	170	44	16,3	2	8.8	Yes	41800	0,54
5988107	**VSM17D032Z02A32XD17L120**	32	32	120	50	16,3	2	5.7	Yes	34700	0,60
5988057	**VSM17D032Z03A32XD17L120**	32	32	120	50	16,3	3	5.7	Yes	34700	0,60
5988109	**VSM17D040Z03A32XD17L130**	40	32	130	50	16,2	3	4.0	Yes	29800	0,77
5988059	**VSM17D040Z04A32XD17L130**	40	32	130	50	16,2	4	4.0	Yes	29800	0,77

Spare Parts

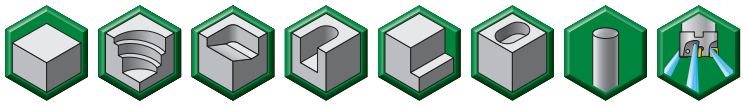


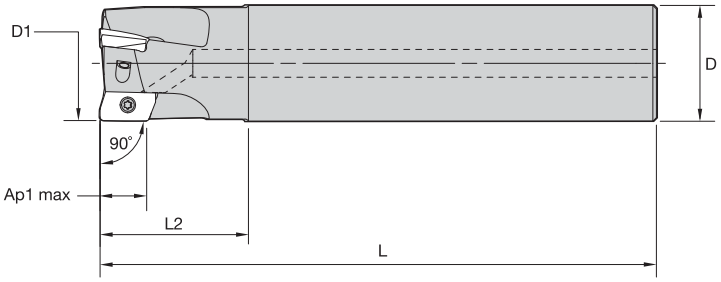




insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.







Cylindrical End Mills • Long Shank

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988108	**VSM17D032Z02A32XD17L210**	32	32	210	50	16,3	2	5.7	Yes	34700	1,14
5988058	**VSM17D032Z03A32XD17L210**	32	32	210	50	16,3	3	5.7	Yes	34700	1,13
5988110	**VSM17D040Z03A32XD17L250**	40	32	250	50	16,2	3	4.0	Yes	29800	1,49
5988060	**VSM17D040Z04A32XD17L250**	40	32	250	50	16,2	4	4.0	Yes	29800	1,49

Spare Parts

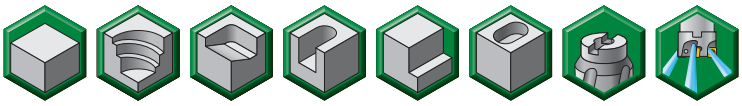


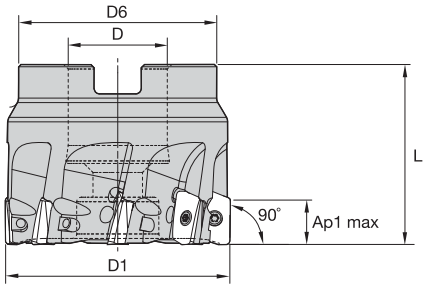




insert screw	Nm	wrench
191.725	3,5	**170.025**

NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.







Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max ramp angle	coolant supply	max RPM	kg
5988094	**VSM17D040Z04S16XD17**	40	16	37	40	16,2	4	4.0	Yes	29800	0,19
5988095	**VSM17D050Z04S22XD17**	50	22	45	40	16,1	4	3.0	Yes	25800	0,28
5988096	**VSM17D050Z05S22XD17**	50	22	45	40	16,1	5	3.0	Yes	25800	0,29
5988134	**VSM17D050Z06S22XD17**	50	22	45	40	16,1	6	3.0	Yes	25800	0,28
5988097	**VSM17D063Z05S22XD17**	63	22	50	40	16,0	5	2.1	Yes	22400	0,45
5988135	**VSM17D063Z06S22XD17**	63	22	50	40	16,0	6	2.1	Yes	22400	0,45
5988098	**VSM17D080Z06S27XD17**	80	27	60	50	15,9	6	1.6	Yes	19500	0,98
5988133	**VSM17D080Z07S27XD17**	80	27	60	50	15,9	7	1.6	Yes	19500	0,96
5988099	**VSM17D100Z08S32XD17**	100	32	80	50	15,8	8	1.2	Yes	17200	1,63
5988100	**VSM17D125Z09S40XD17**	125	40	90	63	15,7	9	0.9	Yes	15200	2,94
5988101	**VSM17D160Z12S40XD17**	160	40	100	63	15,6	12	0.7	Yes	13300	3,66

Spare Parts



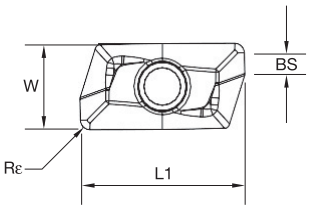
D1	insert screw	Nm	wrench	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw assembly	coolant lock screw	coolant cap
40,0	**191.725**	3,5	**170.025**	**MS1294**	**MS1294CG**	–	–	–
50,0	**191.725**	3,5	**170.025**	**MS1234**	**MS1294CG**	–	–	–
50,0	**191.725**	3,5	**170.025**	**MS1234**	**MS1234CG**	–	–	–
63,0	**191.725**	3,5	**170.025**	**MS1234**	**MS1234CG**	–	–	–
80,0	**191.725**	3,5	**170.025**	**MS2038**	**MS2038CG**	–	–	–
100,0	**191.725**	3,5	**170.025**	–	–	**MS2195C**	–	–
125,0	**191.725**	3,5	**170.025**	–	–	**MS2187C**	–	–
160,0	**191.725**	3,5	**170.025**	–	–	–	**12146107000**	**12146111100**

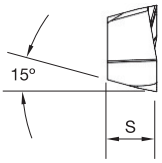
NOTE: Standard milling cutters will accept insert nose radii up to 1,6mm without modification.
For tool body modification instructions, see page J16.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..ML	WP40PM	**.S..MM**	**WP40PM**	.S..MH	WP40PM
P3–P4	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
P5–P6	.E..ML	WP35CM	**.S..MM**	**WU35PM**	.S..MH	WP35CM
M1–M2	.E..ML	WP25PM	**.S..MM**	**WP25PM**	.S..MM	WU35PM
M3	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
K1–K2	.S..MM	WK15CM	**.S..MM**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WP35CM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
N1–N2	.F..ALP	WN10HM	**.F..ALP**	**WN25PM**	.F..ALP	WN25PM
N3	–	–	**–**	**–**	–	–
S1–S2	.S..MM	WP25PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
S3	.S..MM	WU35PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
S4	.S..MM	WP25PM	**.S..MM**	**WU35PM**	.S..MM	WU35PM
H1	–	–	**–**	**–**	–	–


XDCT-ML





● first choice
○ alternate choice

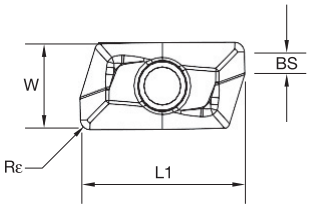
WIDIA VICTORY

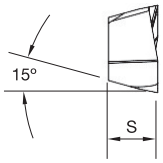
P				○	●	●	●
M				●	○	●	●
K		●		○	○		
N			●				
S				●		○	●
H				●	○		

XDCT-ML

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDCT170404PEERML	2	19,15	2,62	4,90	9,60	0,40	■	■	5989010	■	■	■
XDCT170408PEERML	2	19,15	2,22	4,90	9,60	0,80	■	■	5988983	5988982	5988981	■
XDCT170412PEERML	2	19,16	1,82	4,90	9,60	1,20	■	■	5988988	5988987	5988986	■
XDCT170416PEERML	2	19,17	1,42	4,90	9,60	1,60	■	■	6001257	■	■	■
XDCT170420PEERML	2	19,17	1,01	4,90	9,60	2,00	■	■	6001255	■	■	■
XDCT170424PEERML	2	19,17	0,63	4,90	9,60	2,40	■	■	6001253	■	■	■
XDCT170432PEERML	2	18,85	–	4,88	9,59	3,20	■	■	6001251	■	■	■
XDCT170440PEERML	2	18,33	–	4,87	9,59	4,00	■	■	6001239	■	■	■


XDCT-ALP





● first choice
○ alternate choice

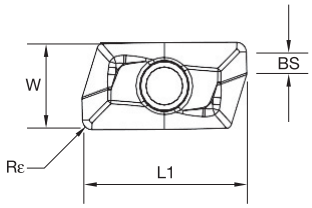
P		
M		
K		
N	●	●
S		
H		

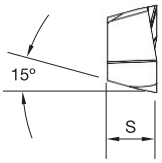
XDCT-ALP

catalogue number	cutting edges	L1	BS	S	W	Rε	WN10HM	WN25PM
XDCT170404PEFRALP	2	19,15	2,62	4,90	9,60	0,40	6007341	6007220
XDCT170408PEFRALP	2	19,15	2,22	4,90	9,60	0,80	6007345	6007344
XDCT170412PEFRALP	2	19,16	1,82	4,90	9,60	1,20	6007342	6001537
XDCT170416PEFRALP	2	19,17	1,42	4,90	9,60	1,60	–	6001256
XDCT170420PEFRALP	2	19,17	1,01	4,90	9,60	2,00	–	6001254
XDCT170424PEFRALP	2	19,17	0,63	4,90	9,60	2,40	–	6001252
XDCT170432PEFRALP	2	18,85	–	4,88	9,59	3,20	–	6001240
XDCT170440PEFRALP	2	18,33	–	4,87	9,59	4,00	–	6001238


XDPT-MM


XDPT-MH





● first choice
○ alternate choice

WIDIA VICTORY

P				○	●	●	●
M				●	○	●	●
K	●			○	○		
N		●					
S				●		○	●
H				●	○		

XDPT-MM

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170404PESRMM	2	19,15	2,52	4,90	9,60	0,40	-	-	-	-	5987689	5987690
XDPT170408PESRMM	2	19,15	2,15	4,90	9,60	0,80	5987948	-	5987949	5987947	5987946	5987950
XDPT170412PESRMM	2	19,16	1,77	4,90	9,60	1,20	5988138	-	5988151	5988140	5988139	5988152
XDPT170416PESRMM	2	19,17	1,38	4,90	9,60	1,60	5988153	-	5988155	5988156	5988154	-
XDPT170420PESRMM	2	19,17	0,99	4,90	9,60	2,00	-	-	5988158	5988160	5988159	-
XDPT170424PESRMM	2	19,17	0,62	4,90	9,60	2,40	-	-	5988203	-	5988202	-
XDPT170432PESRMM	2	18,85	–	4,89	9,59	3,20	-	-	5988206	5988204	5988205	-
XDPT170440PESRMM	2	18,33	–	4,87	9,59	4,00	-	-	5988970	-	5988969	-

XDPT-MH

catalogue number	cutting edges	L1	BS	S	W	Rε	WK15CM	WN25PM	WP25PM	WP35CM	WP40PM	WU35PM
XDPT170408PESRMH	2	19,15	2,10	4,91	9,60	0,80	5989053	-	-	5989054	5989052	-
XDPT170412PESRMH	2	19,16	1,73	4,91	9,60	1,20	5991817	-	-	5991816	5991815	-

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WN25PM			WP25PM			WP35CM			WP40PM			WN10HM			WU35PM		
P	1	–	**–**	–	–	**–**	–	330	**285**	270	455	**395**	370	295	**260**	245	–	**–**	–	260	**230**	215
	2	–	**–**	–	–	**–**	–	275	**240**	200	280	**255**	230	250	**215**	180	–	**–**	–	220	**190**	160
	3	–	**–**	–	–	**–**	–	255	**215**	175	255	**230**	205	230	**195**	160	–	**–**	–	200	**170**	140
	4	–	**–**	–	–	**–**	–	225	**185**	150	190	**175**	160	205	**170**	135	–	**–**	–	180	**150**	120
	5	–	**–**	–	–	**–**	–	185	**170**	150	260	**230**	210	170	**155**	135	–	**–**	–	150	**135**	120
	6	–	**–**	–	–	**–**	–	165	**125**	100	160	**135**	110	150	**115**	90	–	**–**	–	130	**100**	80
M	1	–	**–**	–	–	**–**	–	205	**180**	165	205	**185**	155	195	**170**	155	–	**–**	–	170	**150**	135
	2	–	**–**	–	–	**–**	–	185	**160**	130	185	**160**	140	175	**150**	125	–	**–**	–	155	**130**	110
	3	–	**–**	–	–	**–**	–	140	**120**	95	145	**130**	115	130	**115**	90	–	**–**	–	115	**100**	80
K	1	420	**385**	340	–	**–**	–	230	**205**	185	295	**265**	240	–	**–**	–	190	**170**	150	–	**–**	–
	2	335	**295**	275	–	**–**	–	180	**160**	150	235	**210**	190	–	**–**	–	–	**–**	–	–	**–**	–
	3	280	**250**	230	–	**–**	–	150	**135**	120	195	**175**	160	–	**–**	–	–	**–**	–	–	**–**	–
N	1	–	**–**	–	1075	**945**	875	–	**–**	–	–	**–**	–	–	**–**	–	2000	**1200**	1000	–	**–**	–
	2	–	**–**	–	945	**875**	760	–	**–**	–	–	**–**	–	–	**–**	–	1365	**815**	665	–	**–**	–
	3	–	**–**	–	945	**875**	760	–	**–**	–	–	**–**	–	–	**–**	–	800	**500**	400	–	**–**	–
S	1	–	**–**	–	–	**–**	–	40	**35**	25	–	**–**	–	40	**35**	30	–	**–**	–	35	**30**	25
	2	–	**–**	–	–	**–**	–	40	**35**	25	–	**–**	–	40	**35**	30	–	**–**	–	35	**30**	25
	3	–	**–**	–	–	**–**	–	50	**40**	25	–	**–**	–	50	**40**	30	–	**–**	–	45	**35**	25
	4	–	**–**	–	–	**–**	–	70	**50**	35	66	**50**	33	65	**50**	35	–	**–**	–	60	**45**	30
H	1	–	**–**	–	–	**–**	–	120	**90**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,58	0,08	**0,17**	0,42	0,06	**0,13**	0,31	0,06	**0,11**	0,27	0,05	**0,10**	0,25	.F..ALP
.E..ML	0,16	**0,35**	0,70	0,12	**0,25**	0,50	0,09	**0,19**	0,38	0,08	**0,16**	0,33	0,07	**0,15**	0,30	.E..ML
.S..MM	0,16	**0,46**	0,87	0,12	**0,33**	0,63	0,09	**0,25**	0,47	0,08	**0,22**	0,41	0,07	**0,20**	0,38	.S..MM
.S..MH	0,23	**0,58**	0,93	0,17	**0,42**	0,67	0,13	**0,31**	0,50	0,11	**0,27**	0,44	0,10	**0,25**	0,40	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.

Order a VSM17™ Kit to achieve true 90° high-performance shoulder milling!

Victory™ Shoulder Mill 17™ Starter Kits

Order one of our starter kits and test the performance of our new VSM17 platform. The kits are set up to serve the majority of shoulder milling applications, delivered with a cutter body and the latest WIDIA™ Victory™ grades. Detailed order information can be found in the table below.



■ VSM17 Starter Kits • Metric

order number	catalogue number	diameter D1 (mm)	cutter body type	material group	content					
					cutter	qty	inserts	qty	grade	Z (Pocket Seats)
6049187	VSM17KITCD025Z2WP40PM	25	CYLINDRICAL	P	VSM17D025Z02A25XD17L110	1	XDPT170408PESRMM	10	WP40PM	2
6049185	VSM17KITSW025Z2WP40PM	25	SCREW ON	P	VSM17D025Z02M12XD17	1	XDPT170408PESRMM	10	WP40PM	2
6049186	VSM17KITWD025Z2WP40PM	25	WELDON	P	VSM17D025Z02B25XD17	1	XDPT170408PESRMM	10	WP40PM	2
6049190	VSM17KITCD032Z3WP40PM	32	CYLINDRICAL	P	VSM17D032Z03A32XD17L120	1	XDPT170408PESRMM	10	WP40PM	3
6049188	VSM17KITSW032Z3WP40PM	32	SCREW ON	P	VSM17D032Z03M16XD17	1	XDPT170408PESRMM	10	WP40PM	3
6049189	VSM17KITWD032Z3WP40PM	32	WELDON	P	VSM17D032Z03B32XD17	1	XDPT170408PESRMM	10	WP40PM	3
6049311	VSM17KITCD032Z2WP40PM	32	CYLINDRICAL	P	VSM17D032Z02A32XD17L120	1	XDPT170408PESRMM	10	WP40PM	2
6049313	VSM17KITCD040Z4WP40PM	40	CYLINDRICAL	P	VSM17D040Z04A32XD17L130	1	XDPT170408PESRMM	10	WP40PM	4
6049312	VSM17KITSD040Z4WP40PM	40	SHELL MILL	P	VSM17D040Z04S16XD17	1	XDPT170408PESRMM	10	WP40PM	4
6049314	VSM17KITSD050Z4WP40PM	50	SHELL MILL	P	VSM17D050Z04S22XD17	1	XDPT170408PESRMM	10	WP40PM	4
6049315	VSM17KITSD050Z5WP40PM	50	SHELL MILL	P	VSM17D050Z05S22XD17	1	XDPT170408PESRMM	10	WP40PM	5
6049316	VSM17KITSD063Z5WP40PM	63	SHELL MILL	P	VSM17D063Z05S22XD17	1	XDPT170408PESRMM	10	WP40PM	5
6049317	VSM17KITSD080Z6WP40PM	80	SHELL MILL	P	VSM17D080Z06S27XD17	1	XDPT170408PESRMM	10	WP40PM	6
6049318	VSM17KITSD100Z8WP40PM	100	SHELL MILL	P	VSM17D100Z08S32XD17	1	XDPT170408PESRMM	10	WP40PM	8
6049321	VSM17KITCD025Z2WK15CM	25	CYLINDRICAL	K	VSM17D025Z02A25XD17L110	1	XDPT170408PESRMM	10	WK15CM	2
6049319	VSM17KITSW025Z2WK15CM	25	SCREW ON	K	VSM17D025Z02M12XD17	1	XDPT170408PESRMM	10	WK15CM	2
6049320	VSM17KITWD025Z2WK15CM	25	WELDON	K	VSM17D025Z02B25XD17	1	XDPT170408PESRMM	10	WK15CM	2
6049324	VSM17KITCD032Z3WK15CM	32	CYLINDRICAL	K	VSM17D032Z03A32XD17L120	1	XDPT170408PESRMM	10	WK15CM	3
6049322	VSM17KITSW032Z3WK15CM	32	SCREW ON	K	VSM17D032Z03M16XD17	1	XDPT170408PESRMM	10	WK15CM	3
6049323	VSM17KITWD032Z3WK15CM	32	WELDON	K	VSM17D032Z03B32XD17	1	XDPT170408PESRMM	10	WK15CM	3
6049325	VSM17KITCD032Z2WK15CM	32	CYLINDRICAL	K	VSM17D032Z02A32XD17L120	1	XDPT170408PESRMM	10	WK15CM	2
6049327	VSM17KITCD040Z4WK15CM	40	CYLINDRICAL	K	VSM17D040Z04A32XD17L130	1	XDPT170408PESRMM	10	WK15CM	4
6049326	VSM17KITSD040Z4WK15CM	40	SHELL MILL	K	VSM17D040Z04S16XD17	1	XDPT170408PESRMM	10	WK15CM	4
6049328	VSM17KITSD050Z4WK15CM	50	SHELL MILL	K	VSM17D050Z04S22XD17	1	XDPT170408PESRMM	10	WK15CM	4
6049329	VSM17KITSD050Z5WK15CM	50	SHELL MILL	K	VSM17D050Z05S22XD17	1	XDPT170408PESRMM	10	WK15CM	5
6049330	VSM17KITSD063Z5WK15CM	63	SHELL MILL	K	VSM17D063Z05S22XD17	1	XDPT170408PESRMM	10	WK15CM	5
6049331	VSM17KITSD080Z6WK15CM	80	SHELL MILL	K	VSM17D080Z06S27XD17	1	XDPT170408PESRMM	10	WK15CM	6
6049332	VSM17KITSD100Z8WK15CM	100	SHELL MILL	K	VSM17D100Z08S32XD17	1	XDPT170408PESRMM	10	WK15CM	8

Double-Sided Shoulder Mill •
VSM490™-15

VSM490-15



WIDIA™ Victory™ Shoulder Milling Series (VSM series) is specially engineered to achieve excellent surface quality as well as higher material removal rates in shoulder milling applications. The VSM490 series, with its unique design, enables the tool to be applied in multiple passes (stepping down) with outstanding results. VSM490-15 is applicable in a wide range of workpiece materials: steel, cast iron, stainless steel, and titanium, from roughing to finishing applications.

- Double-sided strong insert with 4 cutting edges.
- High positive geometry for lower cutting forces.
- Superior wall and surface finish capabilities.

State-of-the-art stepping down capabilities due to its ultimate design concept.

Multiple corner nose radii available.

Up to 15mm (0.59") depth-of-cut capabilities.

Cutter bodies with effective internal coolant supply.



Two geometries for all material groups in shoulder milling applications.

-ML	-MM	-MH
		
P M S	P M K S	P K
First choice for stainless steel. Lower cutting forces.	First choice especially when machining steels.	First choice for cast iron, also recommended for heavy applications.

Geometry Strengthening

Finishing Capabilities/Reduced Cutting Force

90° Shoulder Mills

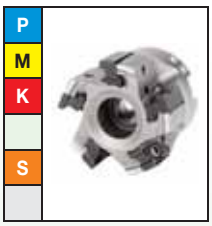


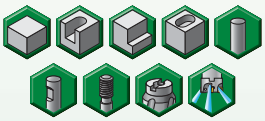
VSM490™-15

Max depth of cut: 15mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 25–160mm

Pages: J32–J40





VSM490™-15 • Unbeatable Performance in Shoulder Milling

- "Stepless" solution.
- No mismatch when machining walls in different steps.

Innovative cutting geometry provides superior wall and surface finish.



Integrated wiper facet for excellent floor finishing.

Competitor Tool • Wall Quality



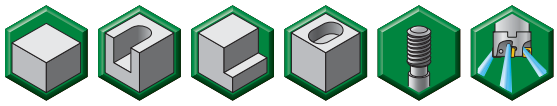
Traditional tools are designed to achieve a 90° wall, but exhibit poor performance when machining walls in multiple passes.

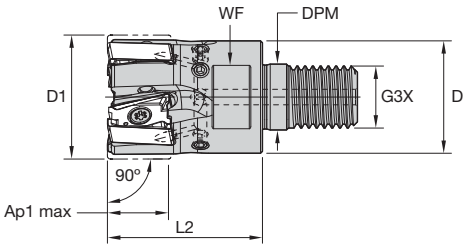
VSM490-15 • Wall Quality



VSM490-15 minimises the marks left. By increasing wall quality and avoiding a second tool, productivity increases significantly.

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.







Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	kg	max RPM
5873211	**VSM490D025Z02M12XN15**	25	21	13	M12	32	17	15,0	2	0,18	26700
5873212	**VSM490D032Z03M16XN15**	32	29	17	M16	40	24	15,0	3	0,18	22000
5873213	**VSM490D032Z04M16XN15**	32	29	17	M16	40	24	15,0	4	0,18	22000
5873214	**VSM490D035Z04M16XN15**	35	29	17	M16	40	24	15,0	4	0,19	20600

Spare Parts

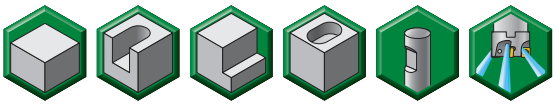


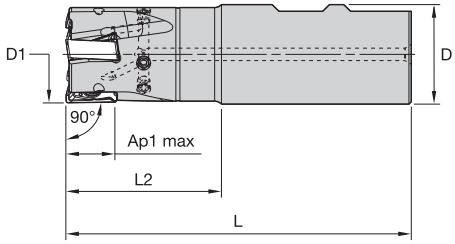




insert screw	Nm	Torx Plus driver
MS-2071	3,5	**DT15IP**

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.







Weldon Shanks

order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5710285	**VSM490D025Z02B25XN15**	25	25	89	32	15,0	2	0,28	26700
5710286	**VSM490D032Z03B32XN15**	32	32	111	50	15,0	3	0,58	22000
5873215	**VSM490D040Z03B32XN15**	40	32	111	50	15,0	3	0,65	18800

NOTE: Weldon type not recommended for finishing operations.

Spare Parts

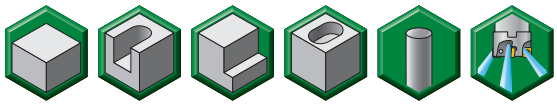


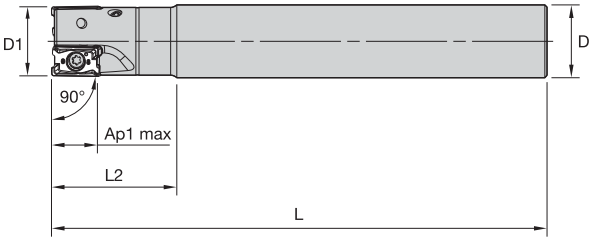




insert screw	Nm	Torx Plus driver
MS-2071	3,5	**DT15IP**

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.







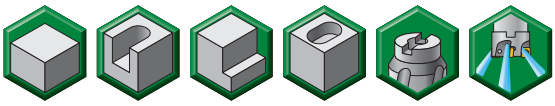
Cylindrical End Mills

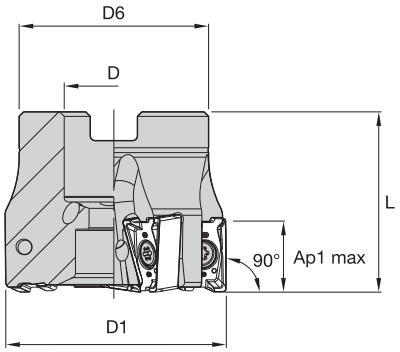
order number	catalogue number	D1	D	L	L2	Ap1 max	Z	kg	max RPM
5873216	**VSM490D025Z02A25XN15L100**	25	25	100	43	15,0	2	0,32	26700
5710287	**VSM490D025Z02A25XN15L170**	25	25	170	43	15,0	2	0,59	26700
5873217	**VSM490D032Z03A32XN15L110**	32	32	110	49	15,0	3	0,59	22000
5710288	**VSM490D032Z03A32XN15L200**	32	32	200	50	15,0	3	1,14	22000
5873218	**VSM490D032Z04A32XN15L110**	32	32	110	49	15,0	4	0,58	22000
5873219	**VSM490D032Z04A32XN15L200**	32	32	200	50	15,0	4	1,14	22000

Spare Parts

 insert screw	 Nm	 Torx Plus driver
MS-2071	3,5	**DT15IP**

- Superior wall and surface finish capabilities.
- “Stepless” solution. True 90° to run precise applications in multiple axial passes.
- Strong concept to run up to 15mm (.590") depth of cut.
- Effective internal coolant feature, reaching the cutting edge precisely.



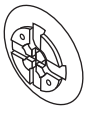




Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	kg	max RPM
5710289	VSM490D040Z04S16XN15	40	16	37	40	15,0	4	0,20	18800
5710520	VSM490D040Z05S16XN15	40	16	37	40	15,0	5	0,19	18800
5873221	VSM490D050Z04S22XN15	50	22	42	40	15,0	4	0,28	16300
5710521	VSM490D050Z05S22XN15	50	22	42	40	15,0	5	0,28	16300
5710522	VSM490D050Z06S22XN15	50	22	42	40	15,0	6	0,28	16300
5873222	VSM490D063Z05S22XN15	63	22	50	40	15,0	5	0,50	14200
5710523	VSM490D063Z06S22XN15	63	22	50	40	15,0	6	0,49	14200
5710524	VSM490D063Z07S22XN15	63	22	50	40	15,0	7	0,48	14200
5873223	VSM490D080Z05S27XN15	80	27	60	50	15,0	5	1,03	12300
5710525	VSM490D080Z07S27XN15	80	27	60	50	15,0	7	1,03	12300
5873224	VSM490D080Z09S27XN15	80	27	60	50	15,0	9	1,04	12300
5710526	VSM490D100Z08S32XN15	100	32	80	50	15,0	8	1,61	10900
5873225	VSM490D100Z11S32XN15	100	32	80	50	15,0	11	1,64	10900
5873226	VSM490D125Z09S40XN15	125	40	90	63	15,0	9	2,96	9600
5873227	VSM490D125Z12S40XN15	125	40	90	63	15,0	12	3,11	9600
5873228	VSM490D160Z12S40XN15	160	40	110	63	15,0	12	4,80	8400

Spare Parts

D1	 insert screw	 Nm	 Torx Plus driver	 socket-head cap screw	 socket-head cap screw with coolant groove	 coolant lock screw assembly	 coolant lock screw	 coolant shower plate
40	MS-2071	3,5	DT15IP	125.825	MS1294CG	–	–	–
50	MS-2071	3,5	DT15IP	125.025	MS1234CG	–	–	–
63	MS-2071	3,5	DT15IP	125.025	MS1234CG	–	–	–
80	MS-2071	3,5	DT15IP	125.230	MS2038CG	–	–	–
100	MS-2071	3,5	DT15IP	–	–	MS2189C	–	–
125	MS-2071	3,5	DT15IP	–	–	MS2187C	–	–
160	MS-2071	3,5	DT15IP	–	–	–	420.200	470.233

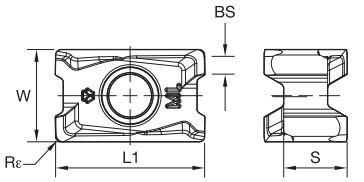
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	XNGU-ML	WP40PM	**XNPU-ML**	**WP40PM**	XNPU-MM	WP40PM
P3–P4	XNGU-ML	WP25PM	**XNPU-MM**	**WP35CM**	XNPU-MM	WP40PM
P5–P6	XNGU-MM	WP25PM	**XNPU-MM**	**WP35CM**	XNPU-MM	WP35CM
M1–M2	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
M3	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
K1–K2	XNGU-MH	WK15CM	**XNGU-MH**	**WK15CM**	XNGU-MH	WP35CM
K3	XNGU-MH	WK15PM	**XNGU-MH**	**WK15PM**	XNGU-MH	WP40PM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
S3	XNGU-ML	WP25PM	**XNGU-ML**	**WU35PM**	XNGU-MM	WU35PM
S4	XNGU-ML	WU35PM	**XNGU-ML**	**WU35PM**	XNPU-MM	WU35PM
H1	–	–	**–**	**–**	–	–


XNGU-ML


XNGU-ML



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.

● first choice
○ alternate choice

		WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
P			○	●	●		●
M			●	●	●		○
K	●	○				●	○
N							
S			●	●	○		
H							

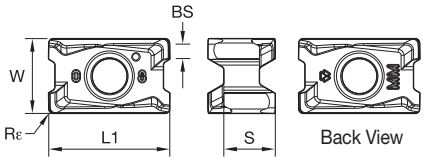
XNGU-ML • Precision Finishing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T604ERML	4	16,20	6,88	10,00	2,20	0,40	0,08	▪	5890821	5890823	5890822	▪	▪
XNGU15T608ERML	4	16,20	6,88	10,00	1,80	0,80	0,08	▪	5873481	5873483	5873482	▪	▪


XNGU-MM
XNPU-MM


XNGU-ML
XNPU-ML


XNGU-MH



- -ML geometry is the first choice for machining stainless steel. With reduced cutting forces, this is recommended for improved wall finishing capabilities in steels.
- -MM is the universal geometry for VSM490-15. First choice when machining steel, as well as stainless steel and high-temp alloys in heavy applications.
- -MH geometry is the first choice for cast iron machining in the medium and heavy applications.

● first choice
○ alternate choice

P			○	●	●		●
M			●	●	●		○
K	●	○				●	○
N							
S			●	●	○		
H							

XNGU-MM • Precision Finishing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T604SRMM	4	16,20	6,88	10,00	2,20	0,40	0,10	-	5949204	5949206	5949205	-	-
XNGU15T608SRMM	4	16,20	6,88	10,00	1,90	0,80	0,10	-	5710527	5710529	5710528	-	-

XNPU-ML • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNPU15T608ERML	4	16,10	6,88	10,00	1,90	0,80	0,08	-	5883097	5883099	5883098	-	-

XNPU-MM • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	hm	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNPU15T608SRMM	4	16,10	6,88	10,00	1,90	0,80	0,10	5873419	5873415	5873417	5873416	5873420	5873418
XNPU15T612SRMM	4	16,10	6,88	10,00	1,50	1,20	0,10	5890762	5890728	5890730	5890729	5890763	5890761
XNPU15T616SRMM	4	16,10	6,88	10,00	1,10	1,60	0,10	5883521	5883447	5883449	5883448	5883522	5883450

XNGU-MH • Utility Roughing

catalogue number	cutting edges	L1	S	W	BS	Rε	WK15PM	WP25PM	WU35PM	WP40PM	WK15CM	WP35CM
XNGU15T608SRMH	4	16,20	6,88	10,00	1,80	0,80	6003724	6003570	6003722	6003721	6003725	6003723
XNGU15T616SRMH	4	16,20	6,88	10,00	1,00	1,60	6030378	6030376	-	-	6030380	6030377

Recommended Starting Speeds [m/min]

Material Group		WK15PM			WP25PM			WU35PM			WP40PM			WK15CM			WP35CM		
P	1	–	–	–	330	**285**	270	260	**230**	215	300	**260**	250	–	–	–	455	**395**	370
	2	–	–	–	275	**240**	200	220	**190**	160	250	**220**	180	–	–	–	280	**255**	230
	3	–	–	–	255	**215**	175	200	**170**	140	230	**200**	160	–	–	–	255	**230**	205
	4	–	–	–	225	**185**	150	180	**150**	120	210	**170**	140	–	–	–	190	**175**	160
	5	–	–	–	185	**170**	150	150	**135**	120	170	**160**	140	–	–	–	260	**230**	210
	6	–	–	–	165	**125**	100	130	**100**	80	150	**120**	90	–	–	–	160	**135**	110
M	1	–	–	–	205	**180**	165	170	**150**	135	200	**170**	160	–	–	–	205	**185**	155
	2	–	–	–	185	**160**	130	155	**130**	110	180	**150**	130	–	–	–	185	**160**	140
	3	–	–	–	140	**120**	95	115	**100**	80	130	**120**	90	–	–	–	145	**130**	115
K	1	270	**245**	215	230	**205**	185	–	–	–	–	–	–	420	**385**	340	295	**265**	240
	2	210	**190**	175	180	**160**	150	–	–	–	–	–	–	335	**295**	275	235	**210**	190
	3	175	**160**	145	150	**135**	120	–	–	–	–	–	–	280	**250**	230	195	**175**	160
N	1–2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	40	**35**	25	35	**30**	25	40	**40**	30	–	–	–	–	–	–
	2	–	–	–	40	**35**	25	35	**30**	25	40	**40**	30	–	–	–	–	–	–
	3	–	–	–	50	**40**	25	45	**35**	25	50	**40**	30	–	–	–	–	–	–
	4	–	–	–	70	**50**	35	60	**45**	30	70	**50**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
XN.U-ML	0,17	**0,29**	0,46	0,13	**0,21**	0,33	0,09	**0,16**	0,25	0,08	**0,14**	0,22	0,08	**0,13**	0,20	XN.U-ML
XN.U-MM	0,21	**0,39**	0,58	0,15	**0,28**	0,42	0,11	**0,21**	0,31	0,10	**0,19**	0,27	0,09	**0,17**	0,25	XN.U-MM
XNGU-MH	0,23	**0,45**	0,70	0,17	**0,33**	0,50	0,13	**0,24**	0,38	0,11	**0,21**	0,33	0,10	**0,20**	0,30	XNGU-MH

NOTE: Use "Light Machining" values as starting feed rate.

Order a VSM490™ Kit and experience the next level of shoulder milling!

VSM490-15 Starter Kits

Order one of our starter kits and test the performance of our new VSM490-15 platform. The kits are set up to serve the majority of shoulder milling applications and workpiece materials, delivered with a cutter body as well as 20 inserts from a premium WIDIA™ grade. Detailed order information can be found in the table below.



VSM490-15 Starter Kits • Metric

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content				
						cutter	qty	inserts	grade	qty
5966234	VSM490KITC-D25Z02WP40PM	25z2	CYLINDRICAL	P	∇∇	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WP40PM	20
5966235	VSM490KITC-D32Z03WP40PM	32z3	CYLINDRICAL	P	∇∇	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WP40PM	20
5966236	VSM490KITS-D40Z04WP40PM	40z4	SHELL MILL	P	∇∇	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WP40PM	20
5966237	VSM490KITS-D50Z05WP40PM	50z5	SHELL MILL	P	∇∇	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966238	VSM490KITS-D50Z06WP40PM	50z6	SHELL MILL	P	∇∇	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966239	VSM490KITS-D63Z06WP40PM	63z6	SHELL MILL	P	∇∇	VSM490D063Z06S22XN15	1	XNPU15T608SRMM	WP40PM	20
5966240	VSM490KITS-D80Z07WP40PM	80z7	SHELL MILL	P	∇∇	VSM490D080Z07S27XN15	1	XNPU15T608SRMM	WP40PM	20
5966251	VSM490KITS-D100Z08WP40PM	100z8	SHELL MILL	P	∇∇∇	VSM490D100Z08S32XN15	1	XNPU15T608SRMM	WP40PM	20

∇ Heavy/Roughing
∇∇ Medium
∇∇∇ Light Machining/Finishing

(continued)

(VSM490-15 Starter Kits • Metric — continued)

order number	catalogue number	cutter diameter/ flutes	cutter body type	material group	application range	content				
						cutter	qty	inserts	grade	qty
5966252	VSM490KITC-D25Z02WU35PM	25z2	CYLINDRICAL	M+S	∇∇∇	VSM490D025Z02A25XN15L170	1	XNGU15T608ERML	WU35PM	20
5966253	VSM490KITC-D32Z03WU35PM	32z3	CYLINDRICAL	M+S	∇∇∇	VSM490D032Z03A32XN15L200	1	XNGU15T608ERML	WU35PM	20
5966255	VSM490KITS-D40Z04WU35PM	40z4	SHELL MILL	M+S	∇∇∇	VSM490D040Z04S16XN15	1	XNGU15T608ERML	WU35PM	20
5966256	VSM490KITS-D50Z05WU35PM	50z5	SHELL MILL	M+S	∇∇∇	VSM490D050Z05S22XN15	1	XNGU15T608ERML	WU35PM	20
5966257	VSM490KITS-D50Z06WU35PM	50z6	SHELL MILL	M+S	∇∇∇	VSM490D050Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966258	VSM490KITS-D63Z06WU35PM	63z6	SHELL MILL	M+S	∇∇∇	VSM490D063Z06S22XN15	1	XNGU15T608ERML	WU35PM	20
5966259	VSM490KITS-D80Z07WU35PM	80z7	SHELL MILL	M+S	∇∇∇	VSM490D080Z07S27XN15	1	XNGU15T608ERML	WU35PM	20
5966260	VSM490KITC-D25Z02WK15PM	25z2	CYLINDRICAL	K	∇	VSM490D025Z02A25XN15L170	1	XNPU15T608SRMM	WK15PM	20
5966261	VSM490KITC-D32Z03WK15PM	32z3	CYLINDRICAL	K	∇	VSM490D032Z03A32XN15L200	1	XNPU15T608SRMM	WK15PM	20
5966262	VSM490KITS-D40Z04WK15PM	40z4	SHELL MILL	K	∇	VSM490D040Z04S16XN15	1	XNPU15T608SRMM	WK15PM	20
5966263	VSM490KITS-D50Z05WK15PM	50z5	SHELL MILL	K	∇	VSM490D050Z05S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966264	VSM490KITS-D50Z06WK15PM	50z6	SHELL MILL	K	∇	VSM490D050Z06S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966265	VSM490KITS-D63Z07WK15PM	63z7	SHELL MILL	K	∇	VSM490D063Z07S22XN15	1	XNPU15T608SRMM	WK15PM	20
5966266	VSM490KITS-D80Z09WK15PM	80z9	SHELL MILL	K	∇	VSM490D080Z09S27XN15	1	XNPU15T608SRMM	WK15PM	20
5966267	VSM490KITS-D100Z11WK15PM	100z11	SHELL MILL	K	∇	VSM490D100Z11S32XN15	1	XNPU15T608SRMM	WK15PM	20

∇ Heavy/Roughing
∇∇ Medium
∇∇∇ Light Machining/Finishing

Good for You, Better for the Environment!

The WIDIA™ Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.



For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

First Choice for Economical Shoulder Milling •

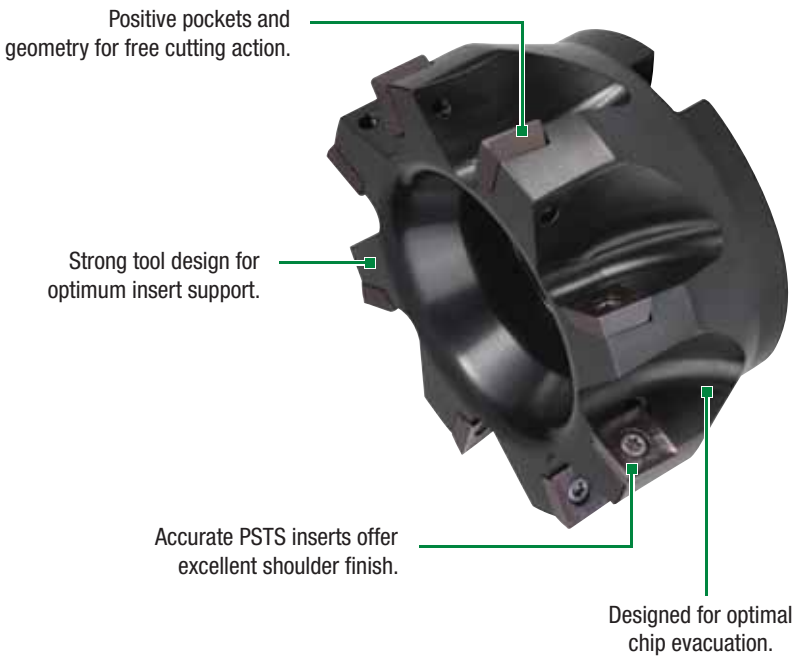
M690 Series 90° Shoulder Mills



M690

Designed to streamline even your most challenging milling operations, the M690 Series provides optimal chip evacuation, excellent shoulder finish, free cutting action, and solid tool design for optimal insert support.

- New SDMX inserts — helical cutting edges for smooth cutting.
- Strong insert and tool design for maximum productivity.
- Four cutting edges enable excellent machining economy.



90° Shoulder Mills



M690 SD1204..

Max depth of cut: 10mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–160mm

Pages: J44–J47





M690 SD1506..

Max depth of cut: 12mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–125mm

Pages: J48–J51





Insert Offering



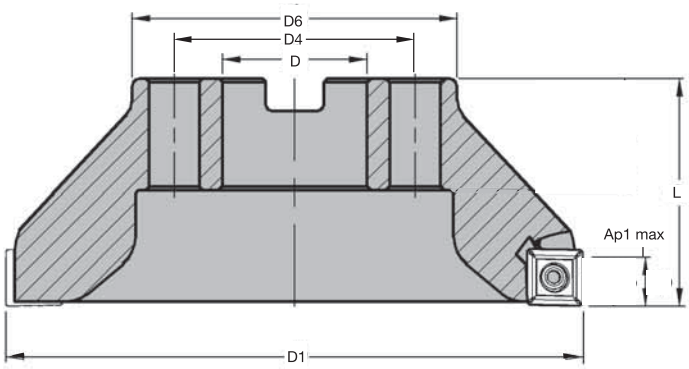
12mm iC insert



15mm iC insert

- Four cutting edges.
- 90° shoulders.
- Excellent for slot and profile milling.







Shell Mills

order number	catalogue number	D1	D	D4	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003556	**12396953800**	50	22	—	47	40	10,0	4	22400	Yes	0,3
2003557	**12396954000**	50	22	—	47	40	10,0	5	22400	Yes	0,3
2003573	**12396954200**	63	22	—	50	40	10,0	5	20000	Yes	0,5
2003574	**12396954400**	63	22	—	50	40	10,0	6	20000	Yes	0,5
2003580	**12396954600**	80	27	—	60	50	10,0	6	17700	Yes	1,0
2003581	**12396954800**	80	27	—	60	50	10,0	8	17700	Yes	1,1
2003596	**12396955000**	100	32	—	78	50	10,0	8	15800	No	1,5
2003597	**12396955200**	100	32	—	78	50	10,0	10	15800	No	1,6
2003693	**12396955400**	125	40	—	89	63	10,0	9	14200	No	3,0
2003694	**12396955600**	125	40	—	89	63	10,0	12	14200	No	3,0
2003793	**12396955800**	160	40	66,7	90	63	10,0	12	12500	No	3,6
2003794	**12396956000**	160	40	66,7	90	63	10,0	15	12500	No	3,6

NOTE: Standard milling cutters will accept insert nose radius up to 2mm without modification.
For tool body modification instructions, see page J16.

Spare Parts



insert screw



Nm

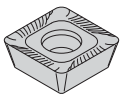


Torx driver

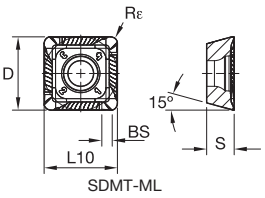
insert screw	Nm	Torx driver
12148037700	4,0	**12148000600**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**TN6525**	.S..MH	TN6525
N1–N2	.ALP	THM-U	**.E..ML**	**THM-U**	.S..ML	THM-U
N3	.ALP	THM-U	**.E..ML**	**THM-U**	.S..ML	THM-U
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
H1	.S..MM	WS30PM	**.S..MM**	**WS30PM**	.S..MM	WS30PM


SDMT-ML


SDMX-MM



● first choice
○ alternate choice

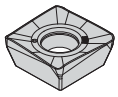
		TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P		○		●	●	●	●		
M				○	●	○	○		○
K		●	●	○	○		○	●	
N									
S					●				●
H		●							

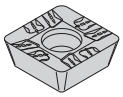
SDMT-ML

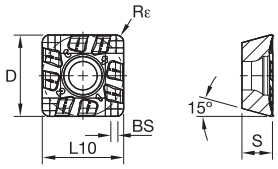
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRML	4	12,70	12,70	4,77	1,10	1,20	0,08	-	3094667	-	3020185	2030439	2030437	5427423	-

SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMM	4	12,70	12,70	4,76	1,93	0,80	0,10	-	-	3950588	3950589	3950590	3950591	-	5522490
SDMX120412RMM	4	12,70	12,70	4,76	1,50	1,20	0,10	-	-	3950596	3950597	3950599	3950600	-	5519572
SDMX120416RMM	4	12,70	12,70	4,76	1,50	1,60	0,10	-	4145063	4145064	4145065	-	-	-	-
SDMX120424RMM	4	12,70	12,70	4,76	0,60	2,40	0,10	-	-	-	4145072	-	4145093	-	-
SDMX120432RMM	4	12,70	12,70	4,76	–	3,20	0,10	-	-	-	4145094	-	4145095	-	-


SDMX-MH


SDMT-MH



● first choice
○ alternate choice

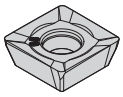
P	○		●	●	●	●		
M			○	●	○	○		○
K	●	●	○	○		○	●	
N								
S				●				●
H	●							

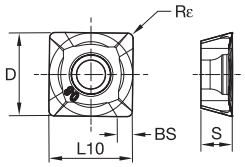
■ SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMH	4	12,70	12,70	4,76	1,93	0,80	0,14	-	-	-	3950592	3950594	3950595	5427427	-
SDMX120412RMH	4	12,70	12,70	4,76	1,54	1,20	0,14	-	3950614	3950601	3950603	3950605	3950606	5427428	-
SDMX120416RMH	4	12,70	12,70	4,76	1,50	1,60	0,14	-	-	-	3950607	-	3950609	-	-

■ SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRMH	4	12,70	12,70	4,81	1,10	1,20	0,14	2028314	3094669	3325040	3326330	2030419	2030417	5427422	-


SDEX-ALP



● first choice
○ alternate choice

P	
M	
K	
N	●
S	
H	

■ SDEX-ALP

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	THM-U
SDEX120408FRALP	4	12,70	12,70	4,76	1,52	0,80	0,02	5281790

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6520			TN6525			TN6540			TN7525		
P	0	–	–	–	–	–	–	340	**265**	235	300	**235**	200	340	**260**	235
	1	550	**485**	450	–	–	–	340	**265**	235	300	**235**	200	340	**260**	235
	2	340	**310**	275	–	–	–	265	**210**	180	210	**160**	140	260	**210**	180
	3	310	**275**	255	–	–	–	235	**180**	155	180	**140**	115	235	**180**	155
	4	230	**215**	190	–	–	–	195	**140**	120	150	**110**	90	195	**140**	120
	5	275	**250**	230	–	–	–	260	**195**	165	200	**150**	125	260	**195**	165
	6	190	**170**	145	–	–	–	170	**135**	110	135	**100**	85	170	**135**	110
M	1	225	**200**	175	–	–	–	160	**100**	65	110	**65**	50	205	**185**	155
	2	205	**175**	160	–	–	–	100	**65**	40	65	**40**	35	185	**160**	140
	3	160	**145**	125	–	–	–	105	**65**	45	70	**40**	35	145	**130**	115
K	1	350	**300**	250	375	**265**	190	230	**205**	185	185	**170**	150	315	**235**	200
	2	300	**250**	210	325	**210**	160	180	**160**	150	145	**130**	115	270	**200**	165
	3	250	**210**	165	250	**190**	135	150	**135**	120	130	**120**	105	200	**165**	140
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	40	**30**	25	–	–	–
	2	–	–	–	–	–	–	–	–	–	20	**15**	10	–	–	–
	3	–	–	–	–	–	–	–	–	–	60	**35**	25	–	–	–
	4	–	–	–	–	–	–	–	–	–	50	**25**	20	–	–	–
H	1	115	**90**	60	–	–	–	–	–	–	–	–	–	–	–	–
	2	115	**90**	60	–	–	–	–	–	–	–	–	–	–	–	–
	3	85	**65**	45	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		TN7535			WK15CM			WS30PM			TTI25			THM-U		
P	0	455	**395**	370	–	–	–	–	–	–	360	**300**	250	–	–	–
	1	455	**395**	370	–	–	–	–	–	–	360	**300**	250	–	–	–
	2	280	**255**	230	–	–	–	–	–	–	260	**210**	180	–	–	–
	3	255	**230**	205	–	–	–	–	–	–	260	**210**	180	–	–	–
	4	190	**175**	160	–	–	–	–	–	–	220	**180**	150	–	–	–
	5	260	**230**	210	–	–	–	–	–	–	265	**195**	165	–	–	–
	6	160	**135**	110	–	–	–	–	–	–	120	**90**	75	–	–	–
M	1	205	**185**	155	–	–	–	225	**200**	185	400	**260**	180	–	–	–
	2	185	**160**	140	–	–	–	205	**180**	145	270	**170**	120	–	–	–
	3	145	**130**	115	–	–	–	155	**135**	105	265	**175**	120	–	–	–
K	1	295	**265**	240	420	**385**	340	–	–	–	185	**155**	130	190	**170**	150
	2	235	**210**	190	335	**295**	275	–	–	–	150	**120**	105	–	–	–
	3	195	**175**	160	280	**250**	230	–	–	–	120	**105**	85	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–	2000	**1200**	1000
	2	–	–	–	–	–	–	–	–	–	–	–	–	1365	**815**	665
	3	–	–	–	–	–	–	–	–	–	–	–	–	800	**500**	400
S	1	–	–	–	–	–	–	45	**40**	30	–	–	–	–	–	–
	2	–	–	–	–	–	–	45	**40**	30	–	–	–	–	–	–
	3	–	–	–	–	–	–	55	**45**	30	–	–	–	–	–	–
	4	–	–	–	–	–	–	85	**60**	40	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

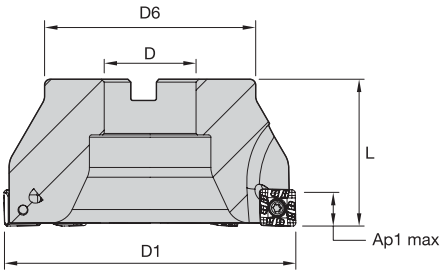
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.

- Four cutting edges.
- 90° shoulders.
- Excellent for slot and profile milling.







Shell Mills

order number	catalogue number	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
2003555	**12396943800**	50	22	47	40	12,0	4	18500	Yes	0,3
2003562	**12396944200**	63	22	50	40	12,0	5	16100	Yes	0,4
2003579	**12396944600**	80	27	60	50	12,0	6	14000	Yes	0,9
2003595	**12396945000**	100	32	78	50	12,0	8	12300	No	1,3
2003682	**12396945400**	125	40	89	63	12,0	9	10800	No	2,7

Spare Parts



insert screw

MS2260



Nm

6,0



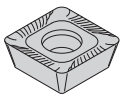
Torx driver

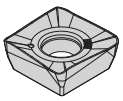
12148007500

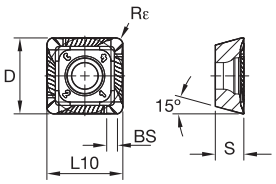
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**WK15CM**	.S..MH	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
H1	.S..MM	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540

Inserts • SD1506..


SDMT-ML


SDMX-MM



● first choice
○ alternate choice

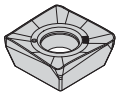
P	○	●	●	●		
M		●	○	○		
K	●	○		○	●	
N						
S		●				
H	●					

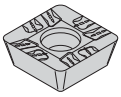
SDMT-ML

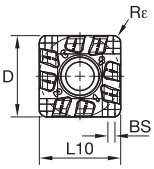
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMT1506PDRML	4	15,88	15,88	6,32	1,10	1,20	0,08	▪	3378677	2030434	2030420	5427425

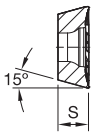
SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMX150612RMM	4	15,88	15,88	6,35	1,45	1,20	0,14	▪	3949807	3949809	▪	▪


SDMX-MH


SDMT-MH





● first choice
○ alternate choice

P		○	●	●	●	
M			●	○	○	
K		●	○		○	●
N						
S			●			
H		●				

■ SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMX150612RMH	4	15,88	15,88	6,35	1,45	1,20	0,20	-	3949811	3950583	3950584	5427426
SDMX150616RMH	4	15,88	15,88	6,35	1,51	1,60	0,20	-	3950585	-	3950587	-

■ SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN2510	TN6540	TN7525	TN7535	WK15CM
SDMT1506PDRMH	4	15,88	15,88	6,35	1,10	1,20	0,20	2028325	3378676	2030414	2030400	5427424

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6540			TN7525			TN7535			WK15CM		
P	0	–	–	–	300	**235**	200	340	**260**	235	455	**395**	370	–	–	–
	1	550	**485**	450	300	**235**	200	340	**260**	235	455	**395**	370	–	–	–
	2	340	**310**	275	210	**160**	140	260	**210**	180	280	**255**	230	–	–	–
	3	310	**275**	255	180	**140**	115	235	**180**	155	255	**230**	205	–	–	–
	4	230	**215**	190	150	**110**	90	195	**140**	120	190	**175**	160	–	–	–
	5	275	**250**	230	200	**150**	125	260	**195**	165	260	**230**	210	–	–	–
	6	190	**170**	145	135	**100**	85	170	**135**	110	160	**135**	110	–	–	–
M	1	225	**200**	175	110	**65**	50	205	**185**	155	205	**185**	155	–	–	–
	2	205	**175**	160	65	**40**	35	185	**160**	140	185	**160**	140	–	–	–
	3	160	**145**	125	70	**40**	35	145	**130**	115	145	**130**	115	–	–	–
K	1	350	**300**	250	185	**170**	150	315	**235**	200	295	**265**	240	420	**385**	340
	2	300	**250**	210	145	**130**	115	270	**200**	165	235	**210**	190	335	**295**	275
	3	250	**210**	165	130	**120**	105	200	**165**	140	195	**175**	160	280	**250**	230
N	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	40	**30**	25	–	–	–	–	–	–	–	–	–
	2	–	–	–	20	**15**	10	–	–	–	–	–	–	–	–	–
	3	–	–	–	60	**35**	25	–	–	–	–	–	–	–	–	–
	4	–	–	–	50	**25**	20	–	–	–	–	–	–	–	–	–
H	1	115	**90**	60	–	–	–	–	–	–	–	–	–	–	–	–
	2	115	**90**	60	–	–	–	–	–	–	–	–	–	–	–	–
	3	85	**65**	45	–	–	–	–	–	–	–	–	–	–	–	–

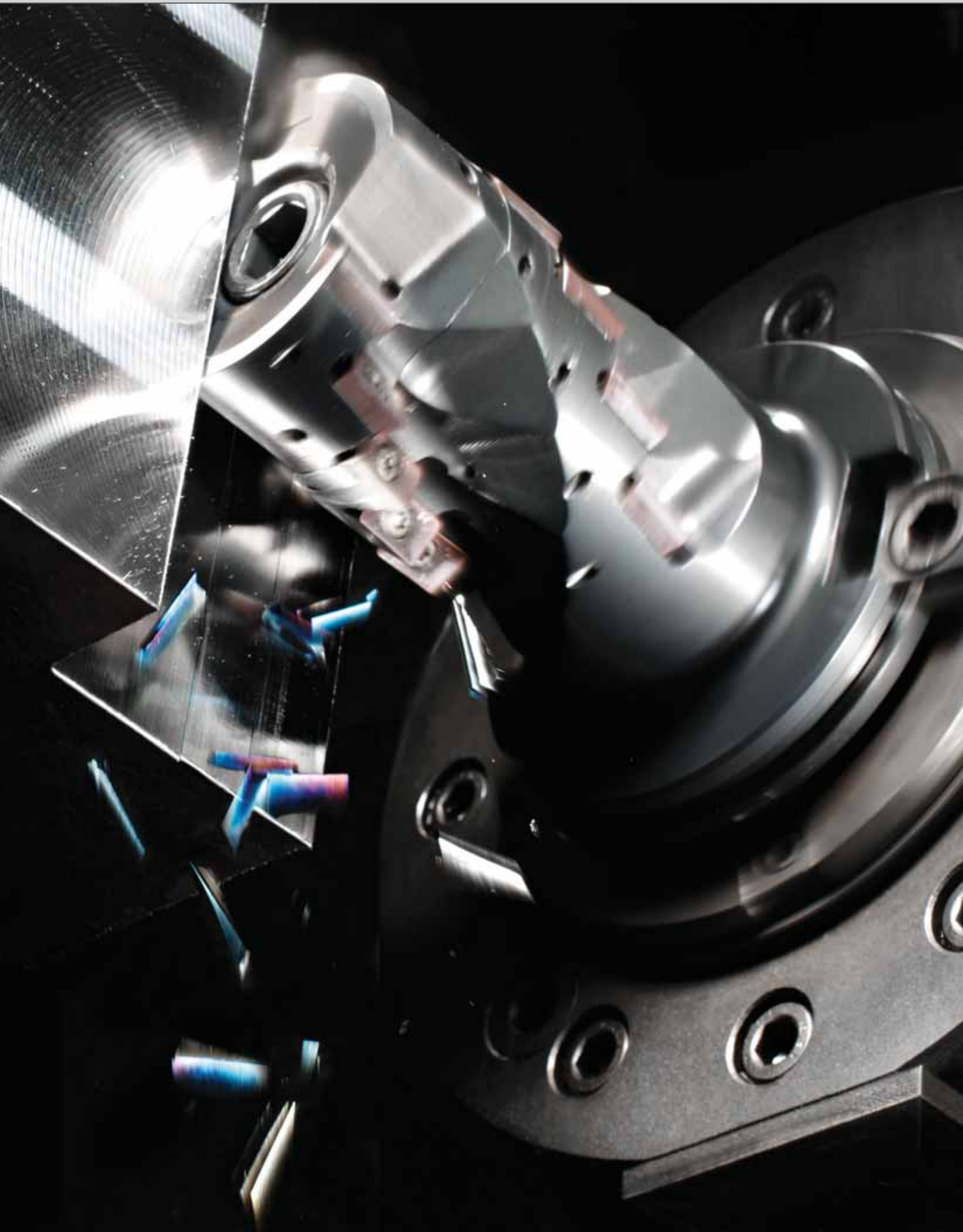
*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.



Indexable Milling • Helical Mills

M390 • Square Insert Helical Mill Platform K2–K9



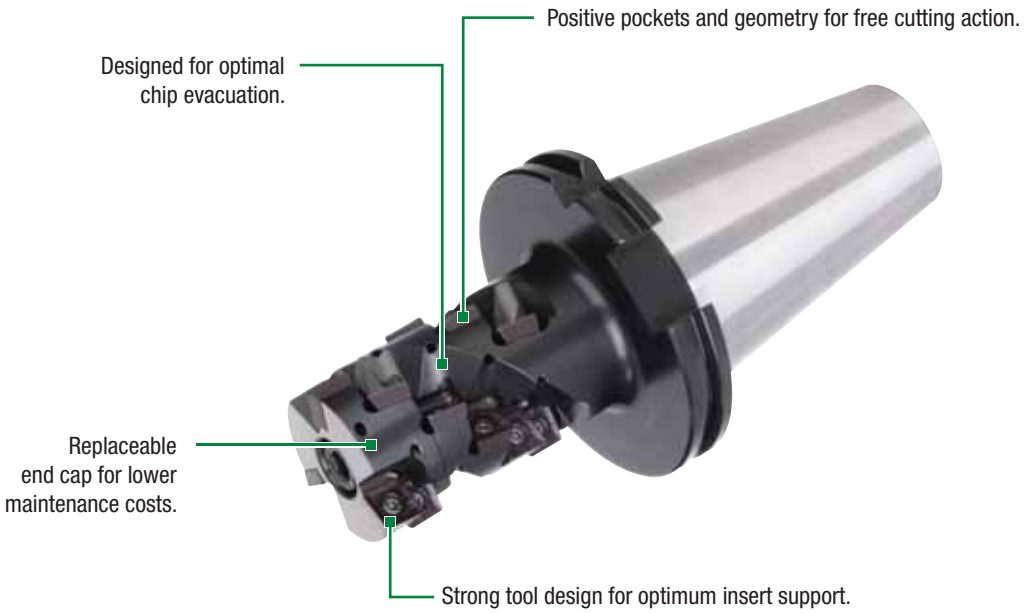
First Choice for High Productivity Helical Milling •
M390 Series

M390



With a replaceable nose collar and positive helix for increased productivity, the M390 Series Helical Mills provide optimal chip evacuation and performance with lower maintenance costs.

- Strong insert and tool design for maximum productivity.
- New SDMX inserts — helical cutting edge for smooth cutting.
- Long edge shoulder ensures stable insert support.



Helical Mills

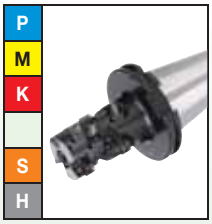


M390 SD1204...

Max depth of cut: 17mm

Lead angle: 90°
Indexes per insert: 4
Diameter: 50–80mm

Pages: K4–K9





Maximum cutting depth (Ap1) and contact width (ae) ratios based on application type

Slot Milling

ae = 1 x D1
Ap1 max = 0,6 x D1



**Not recommended in ISO "H" materials.*

Contouring

ae = 0,25–0,4 x D1
Ap1 max = 1 x D1
ae = >0,4 x D1
Ap1 max = 0,6 x D1



**Not recommended in ISO "H" materials.*

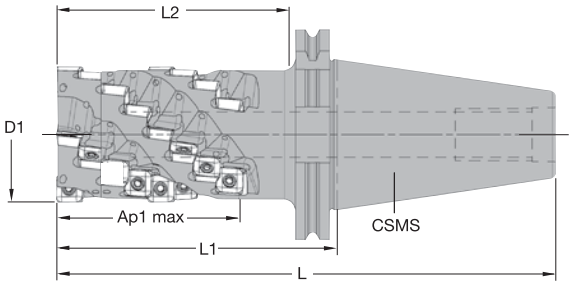
Profiling

ae = <0,25 x D1
Ap1 max = Ap1 max



- Four cutting edges per insert.
- Replaceable end cap.
- Positive helix for high productivity.







Integral

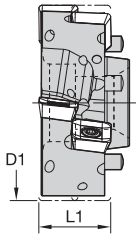
order number	catalogue number	D1	L	L1	L2	Ap1 max	Z	Z U	CSMS system size	max RPM	coolant supply	kg
2021422	**12393041200**	50	207	105	82	64,0	18	3	DV50	14000	Yes	3,4
2021423	**12393041400**	63	232	130	107	85,0	32	4	DV50	12000	Yes	4,3
2021424	**12393041800**	80	262	160	137	117,0	55	5	DV50	10500	Yes	6,3

NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

Spare Parts

D1	 insert screw	 Nm	 Torx wrench	 end cap	 socket-head cap screw
50	**12148037700**	4,0	**12148000600**	**12393051200**	**12147625400**
63	**12148037700**	4,0	**12148000600**	**12393051400**	**12148783700**
80	**12148037700**	4,0	**12148000600**	**12393051800**	**12148783700**

- Four cutting edges per insert.
- Replaceable end cap.
- Positive helix for high productivity.





End Cap

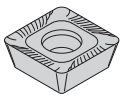
order number	catalogue number	D1	L1	Z U	Z	kg
2021428	**12393051200**	50	21	3	6	0,2
2021429	**12393051400**	63	21	4	8	0,3
2021430	**12393051800**	80	21	5	10	0,5

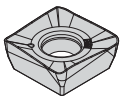
NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

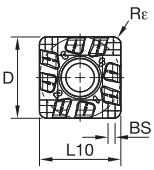
Insert Selection Guide

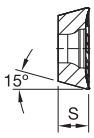
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
P3–P4	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
P5–P6	.E..ML	TN7535	**.S..MM**	**TN6540**	.S..MH	TN6540
M1–M2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MH	TN6540
M3	.E..ML	TN7535	**.S..MM**	**TN7535**	.S..MH	TN7535
K1–K2	.E..ML	WK15CM	**.E..ML**	**WK15CM**	.S..MH	WK15CM
K3	.E..ML	WK15CM	**.S..MM**	**TN6525**	.S..MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	.E..ML	TN6540	**.S..MM**	**TN6540**	.S..MM	TN6540
S3	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
S4	.E..ML	TN6540	**.S..MM**	**WS30PM**	.S..MM	TN6540
H1	.S..MM	WS30PM	**.S..MM**	**WS30PM**	.S..MM	WS30PM

Inserts • SD1204..


SDMT-ML


SDMX-MM





● first choice
○ alternate choice

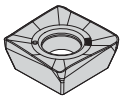
P			●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H								

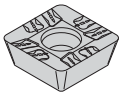
SDMT-ML

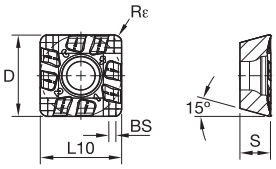
catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRML	4	12,70	12,70	4,77	1,10	1,20	0,08	3094667	-	3020185	2030439	2030437	5427423	-

SDMX-MM

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMM	4	12,70	12,70	4,76	1,93	0,80	0,10	-	3950588	3950589	3950590	3950591	-	5522490
SDMX120412RMM	4	12,70	12,70	4,76	1,50	1,20	0,10	-	3950596	3950597	3950599	3950600	-	5519572
SDMX120416RMM	4	12,70	12,70	4,76	1,50	1,60	0,10	4145063	4145064	4145065	-	-	-	-
SDMX120424RMM	4	12,70	12,70	4,76	0,60	2,40	0,10	-	-	4145072	-	4145093	-	-
SDMX120432RMM	4	12,70	12,70	4,76	–	3,20	0,10	-	-	4145094	-	4145095	-	-


SDMX-MH


SDMT-MH



● first choice
○ alternate choice

P			●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H								

■ SDMX-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMX120408RMH	4	12,70	12,70	4,76	1,93	0,80	0,14	-	-	3950592	3950594	3950595	5427427	-
SDMX120412RMH	4	12,70	12,70	4,76	1,54	1,20	0,14	3950614	3950601	3950603	3950605	3950606	5427428	-
SDMX120416RMH	4	12,70	12,70	4,76	1,50	1,60	0,14	-	-	3950607	-	3950609	-	-

■ SDMT-MH

catalogue number	cutting edges	D	L10	S	BS	Rε	hm	TN6520	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
SDMT1204PDRMH	4	12,70	12,70	4,81	1,10	1,20	0,14	3094669	3325040	3326330	2030419	2030417	5427422	-

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN6540			TN7525		
P	0	–	–	–	340	**265**	235	300	**235**	200	340	**260**	235
	1	–	–	–	340	**265**	235	300	**235**	200	340	**260**	235
	2	–	–	–	265	**210**	180	210	**160**	140	260	**210**	180
	3	–	–	–	235	**180**	155	180	**140**	115	235	**180**	155
	4	–	–	–	195	**140**	120	150	**110**	90	195	**140**	120
	5	–	–	–	260	**195**	165	200	**150**	125	260	**195**	165
	6	–	–	–	170	**135**	110	135	**100**	85	170	**135**	110
M	1	–	–	–	160	**100**	65	110	**65**	50	205	**185**	155
	2	–	–	–	100	**65**	40	65	**40**	35	185	**160**	140
	3	–	–	–	105	**65**	45	70	**40**	35	145	**130**	115
K	1	375	**265**	190	230	**205**	185	185	**170**	150	315	**235**	200
	2	325	**210**	160	180	**160**	150	145	**130**	115	270	**200**	165
	3	250	**190**	135	150	**135**	120	130	**120**	105	200	**165**	140
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	40	**30**	25	–	–	–
	2	–	–	–	–	–	–	20	**15**	10	–	–	–
	3	–	–	–	–	–	–	60	**35**	25	–	–	–
	4	–	–	–	–	–	–	50	**25**	20	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		TN7535			WK15CM			WS30PM		
P	0	455	**395**	370	–	–	–	–	–	–
	1	455	**395**	370	–	–	–	–	–	–
	2	280	**255**	230	–	–	–	–	–	–
	3	255	**230**	205	–	–	–	–	–	–
	4	190	**175**	160	–	–	–	–	–	–
	5	260	**230**	210	–	–	–	–	–	–
	6	160	**135**	110	–	–	–	–	–	–
M	1	205	**185**	155	–	–	–	225	**200**	185
	2	185	**160**	140	–	–	–	205	**180**	145
	3	145	**130**	115	–	–	–	155	**135**	105
K	1	295	**265**	240	420	**385**	340	–	–	–
	2	235	**210**	190	335	**295**	275	–	–	–
	3	195	**175**	160	280	**250**	230	–	–	–
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	45	**40**	30
	2	–	–	–	–	–	–	45	**40**	30
	3	–	–	–	–	–	–	55	**45**	30
	4	–	–	–	–	–	–	85	**60**	40
H	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
.F..ALP	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	.F..ALP
.E..ML	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	.E..ML
.S..MM	0,12	**0,42**	0,70	0,08	**0,30**	0,50	0,06	**0,23**	0,38	0,06	**0,20**	0,33	0,05	**0,18**	0,30	.S..MM
.S..MH	0,23	**0,54**	0,85	0,17	**0,39**	0,61	0,13	**0,29**	0,46	0,11	**0,25**	0,40	0,10	**0,23**	0,36	.S..MH

NOTE: Use "Light Machining" value as starting feed rate.



Indexable Milling • Slotting Mills

M16 • T-Slotting Platform L2–L7

M94 • Precise Slotting and Grooving L8–L14

M95 • Square Style Insert Slotting Platform L16–L21

M900 • Adjustable Slotting Platform ..... L22—L33



Reliable, Powerful, and Durable Milling Tools •

M16 Series T-Slotting Mills

M16



Designed for maximum chip evacuation and optimum security, the M16 Series Slotting Mills are an excellent choice for T-slot milling of steel and cast iron.

- Strong and sturdy tool design ensures reliable steel and cast iron machining, time after time.
- Maximum chip evacuation streamlines your most challenging milling operations.



Slotting Mills

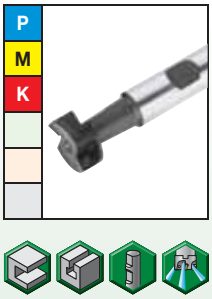


M16

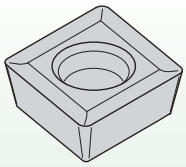
Slot Width Range:
11–21,9mm

Indexes per insert: 2
Diameter: 25–50mm

Pages: L4–L7



Insert Offering



Inserts with positive chipbreaker providing low cutting forces.

T-Slotting

Steel

- If machining a vertical slot, minimise depth; reference Figure 1. If the depth is greater than Figure 1, chip evacuation problems could occur.
- Vibrations could occur when the T-slot cutter diameter increases; use Figure 1 as the starting point. If vibrations are a concern, adopt the Figure 2 solution.

Cast Iron

- Fewer problems with chip evacuation and reduced cutting forces enable deeper vertical slots as shown in Figures 2 and 3.

Figure 1

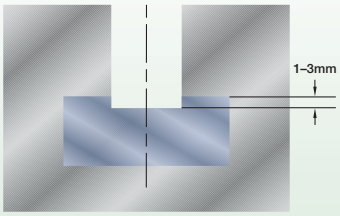


Figure 2

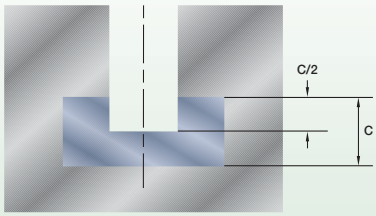
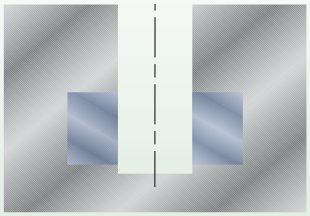
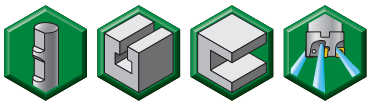


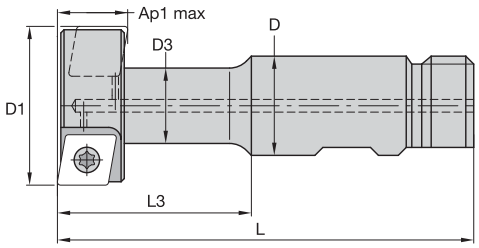
Figure 3



NOTE: Air blast is recommended to disperse the chips.

- T-slot mill.
- Ideal for steel and cast iron machining.







Weldon Shanks

order number	catalogue number	D1	D	D3	L	L3	Ap1 max	Z	Z U	insert 1	coolant supply	kg
2021380	**12391602600M**	25	16	13	80	32	11,0	4	2	CPNT060204T	Yes	0,1
2021381	**12391603000**	32	16	15	90	42	13,9	4	2	CPNT080308T	Yes	0,2
2021382	**12391603400**	40	25	19	105	49	17,9	4	2	CPNT09T308T	Yes	0,4
2021383	**12391603800**	50	32	25	120	60	21,9	4	2	CPNT120408T	Yes	0,7

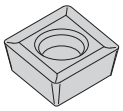
NOTE: Z = number of pocket seats.
ZU = number of effective teeth.

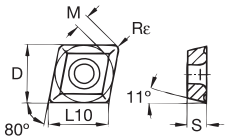
Spare Parts

D1	insert screw	Nm	Torx driver	Torx wrench
25	**12148068700**	1,0	**12148086600**	–
32	**12148067200**	2,0	**12148086600**	–
40	**12148038800**	3,0	–	**12148000600**
50	**12148007200**	4,0	–	**12148007500**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	CPNT	WP40PM	**CPNT**	**WP40PM**	CPNT	WP40PM
P3–P4	CPNT	WP35CM	**CPNT**	**WP35CM**	CPNT	WP35CM
P5–P6	CPNT	WP35CM	**CPNT**	**WP40PM**	CPNT	WP40PM
M1–M2	CPNT	WP40PM	**CPNT**	**WP40PM**	CPNT	WP40PM
M3	CPNT	TN7535	**CPNT**	**WP35CM**	CPNT	WP35CM
K1–K2	CPNT	WK15CM	**CPNT**	**WK15CM**	CPNT	WK15CM
K3	CPNT	WK15CM	**CPNT**	**WP35CM**	CPNT	WP35CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–


CPNT



● first choice
○ alternate choice

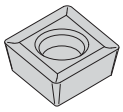
P		●	●
M		○	●
K	●	○	
N			
S			○
H			

CPNT • CP0602..

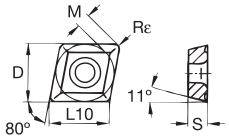
catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT060204T	2	6,35	6,45	1,54	2,38	0,40	0,03	5903680	5903676	5578222

CPNT • CP0803..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT080308T	2	7,94	8,06	1,76	3,18	0,80	0,09	5903701	5903677	–



CPNT



● first choice
○ alternate choice

P	●	●	
M		○	●
K	●	○	
N			
S			○
H			

■ CPNT • CP09T3..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT09T308T	2	9,52	9,67	2,20	3,97	0,80	0,04	5903702	5903678	ı

■ CPNT • CP1204..

catalogue number	cutting edges	D	L10	M	S	Rε	hm	WK15CM	WP35CM	WP40PM
CPNT120408T	2	12,70	12,90	3,08	4,76	0,80	0,03	5903703	5903679	ı

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP35CM			WP40PM		
P	0	–	–	–	455	**395**	370	295	**260**	245
	1	–	–	–	455	**395**	370	295	**260**	245
	2	–	–	–	280	**255**	230	250	**215**	180
	3	–	–	–	255	**230**	205	230	**195**	160
	4	–	–	–	190	**175**	160	205	**170**	135
	5	–	–	–	260	**230**	210	170	**155**	135
	6	–	–	–	160	**135**	110	150	**115**	90
M	1	–	–	–	205	**185**	155	195	**170**	155
	2	–	–	–	185	**160**	140	175	**150**	125
	3	–	–	–	145	**130**	115	130	**115**	90
K	1	420	**385**	340	295	**265**	240	–	–	–
	2	335	**295**	275	235	**210**	190	–	–	–
	3	280	**250**	230	195	**175**	160	–	–	–
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	40	**35**	30
	2	–	–	–	–	–	–	40	**35**	30
	3	–	–	–	–	–	–	50	**40**	30
	4	–	–	–	66	**50**	33	65	**50**	35
H	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
CPNT	0,12	**0,29**	0,46	0,09	**0,21**	0,33	0,07	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,29**	0,46	0,09	**0,21**	0,33	0,07	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,29**	0,46	0,08	**0,21**	0,33	0,06	**0,16**	0,25	0,06	**0,14**	0,22	0,05	**0,13**	0,20	CPNT
CPNT	0,12	**0,35**	0,58	0,08	**0,25**	0,42	0,06	**0,19**	0,32	0,06	**0,16**	0,28	0,05	**0,15**	0,25	CPNT

NOTE: Use "Light Machining" value as starting feed rate.

For Precise Slotting and Grooving Applications •

M94 Series Slotting Mills

M94



The M94 Series Slotting Mills are equipped with three cutting edges per insert and precise cooling capabilities for the most demanding small width slotting and grooving operations.

- Coolant grooves provide accurate and consistent cooling performance.
- Perfect choice when shallow grooving and slotting are required.
- Tangential mounted inserts ensure maximum strength and stability.



Slotting Mills



M94

Slot Width Range:
1,93–5,23mm

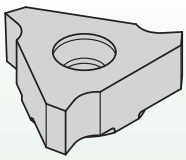
Indexes per insert: 3
Diameter: 25–80mm

Pages: L10–L14



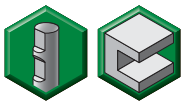


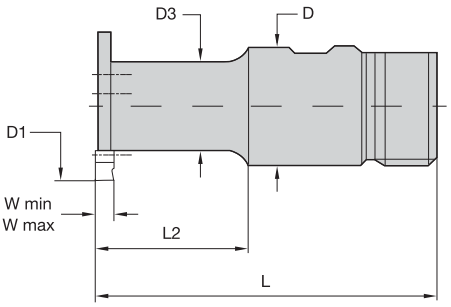
Insert Offering

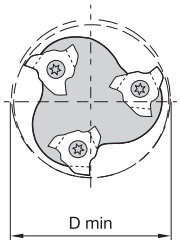


Inserts with free-cutting geometry providing low cutting forces.

- Three cutting edges per insert.
- Tangential mounted inserts.
- Shallow grooving and slotting.









Weldon Shanks

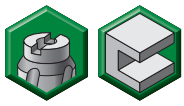
order number	catalogue number	D1	D	D3	D min	L	L2	W min	W max	Z	insert 1	coolant supply	kg
2022619	**12290900800**	25	25	21	34	100	44	1,93	2,73	3	TCAX1103ZZ..	No	0,4
2022620	**12290901200**	40	32	32	65	110	50	2,73	4,26	3	TNAX1604ZZ..	No	0,7

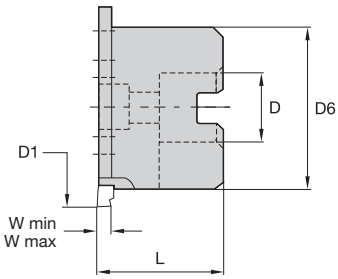
NOTE: D min = minimum internal hole diameter required for clearance.

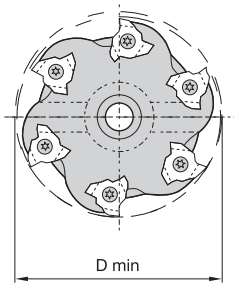
Spare Parts

D1	 insert screw	 Nm	 Torx driver
25	**12148080000**	1,0	**12148086600**
40	**12148067200**	3,5	**12148086600**

- Three cutting edges per insert.
- Tangential mounted inserts.
- Shallow grooving and slotting.









Shell Mills

order number	catalogue number	D1	D	D min	D6	L	W min	W max	Z	insert 1	coolant supply	kg
2022621	**12290911600**	63	22	85	55	40	2,73	4,26	6	TNAX1604ZZ..	No	0,7
2022622	**12290911800**	80	27	102	68	50	4,26	5,23	6	TNAX2206ZZ..	No	1,3

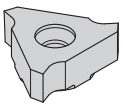
NOTE: D min = minimum internal hole diameter required for clearance.

Spare Parts

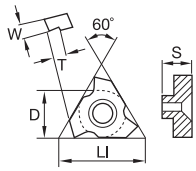
D1	 insert screw	 Nm	 Torx driver	 Torx driver
63	**12148067200**	3,5	–	**12148086600**
80	**12148007200**	6,0	**12148007500**	–

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
P3–P4	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
P5–P6	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
M1–M2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
M3	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
K1–K2	TCAX/TNAX	TTM/TTM08	**TCAX/TNAX**	**TTM/TTM08**	TCAX/TNAX	TTM/TTM08
K3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
N1–N2	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
N3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S1–S2	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S3	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
S4	TCAX/TNAX	THM	**TCAX/TNAX**	**THM**	TCAX/TNAX	THM
H1	–	–	–	–	–	–



TCAX
TNAX



● first choice
○ alternate choice

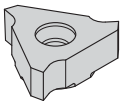
P		●	●
M		○	○
K	○	○	○
N	●		
S	○		
H			

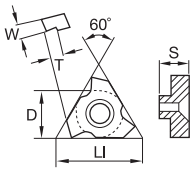
TCAX • 1103..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TCAX1103ZZ18	3	6,35	11,00	1,93	2,10	3,20	0,07	-	-	2014041
TCAX1103ZZ21	3	6,35	11,00	2,23	2,25	3,20	0,07	2026017	-	2026018
TCAX1103ZZ26	3	6,35	11,00	2,73	2,35	3,20	0,07	2014054	2014056	-

TNAX • 1604..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TNAX1604ZZ26	3	9,52	16,49	2,73	3,08	4,76	0,07	2014152	-	2014164
TNAX1604ZZ31	3	9,52	16,49	3,26	3,04	4,76	0,07	2014166	-	2014168
TNAX1604ZZ41	3	9,52	16,49	4,26	3,32	4,76	0,07	2014170	2014172	-


TNAX



● first choice
○ alternate choice

		THM	TTM	TTM08
P			●	●
M			○	○
K		○	○	○
N		●		
S		○		
H				

■ TNAX • 2206..

catalogue number	cutting edges	D	LI	W	T	S	hm	THM	TTM	TTM08
TNAX2206ZZ41	3	12,70	22,00	4,26	4,02	6,40	0,07	I	2014176	I
TNAX2206ZZ51	3	12,70	22,00	5,23	4,43	6,40	0,07	I	2026022	I

Recommended Starting Speeds [m/min]

Material Group		THM			TTM/TTM08		
P	1	–	–	–	560	**490**	460
	2	–	–	–	345	**280**	245
	3	–	–	–	345	**280**	245
	4	–	–	–	280	**195**	180
	5	–	–	–	360	**280**	260
	6	–	–	–	165	**130**	115
M	1	–	–	–	330	**195**	130
	2	–	–	–	195	**115**	80
	3	–	–	–	215	**130**	100
K	1	395	**295**	245	–	–	–
	2	410	**330**	230	–	–	–
	3	425	**310**	195	–	–	–
N	1	2950	**1970**	1640	–	–	–
	2	2245	**1525**	1265	–	–	–
	3	1475	**920**	655	–	–	–
S	1	–	–	–	–	–	–
	2	–	–	–	–	–	–
	3	–	–	–	–	–	–
	4	–	–	–	–	–	–
H	1	–	–	–	–	–	–
	2	–	–	–	–	–	–
	3	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
TCAX/TNAX	0,12	**0,29**	0,45	0,08	**0,21**	0,33	0,06	**0,16**	0,25	0,06	**0,14**	0,21	0,05	**0,13**	0,20	TCAX/TNAX

NOTE: Use "Light Machining" value as starting feed rate.

Easy Access to Proven Metalworking Expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Customer Application Support (CAS)

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	+61 001 724 539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049 911 9735 429*	eu.techsupport@widia.com
Belgium	English / French	0800 80410	0049 911 9735 429*	eu.techsupport@widia.com
China	Chinese	+86 400 889 2237	+86 21 58999985 *	w-cn.techsupport@widia.com
Denmark	English	+45 808 89295	001 724 539 6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001 724 539 6830 *	na.techsupport@widia.com
France	Frensh	+33 080 5540 379	0049 911 9735 429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911 9735 429*	eu.techsupport@widia.com
India	English	+91 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Israel	English	+972 1809 449907	001 724 539 6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	+81 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Korea (South)	English	+82 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001 724 539 6830 *	na.techsupport@widia.com
New Zealand	English	+64 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001 724 539 6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504*	eu.techsupport@widia.com
Russia (landline)	Russian	+7 8800 5556395	0048 6166 56504*	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504*	eu.techsupport@widia.com
Singapore	English	+65 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
South Africa	English	+27 0800 981644	001 724 539 6830 *	na.techsupport@widia.com
Sweden	English	+46 020798794	001 724 539 6830 *	na.techsupport@widia.com
Taiwan	English	+886 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

Phone and fax numbers marked with * are not toll free.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

M95



M95 slotting cutters are ideal for deeper applications that require the cutting load to be shared from one insert to the other. They provide groove widths from 4–10mm and cutter diameters from 100–200mm as well as an economical way to achieve balanced cutting.

Features and Benefits

- Cutters available in arbour mount.
- Inserts with four indexes.
- Staggered keyways in mounting bore, used for multiple ganged cutters.
- Slot width 4–10mm.
- Three insert geometries available; SNHX in 11 and 12mm iC.
- Requires only one spare part.
- Economical to use.
- Available in Latest WIDIA™ Victory™ Grade.

Slotting Mills

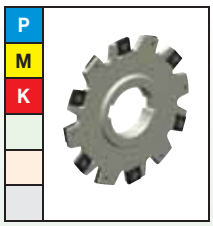


M95

Slot Width Range:
4–10mm

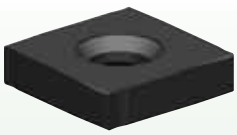
Indexes per insert: 4
Diameter: 100–200mm

Pages: L18–L21



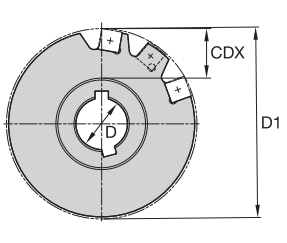


Insert Offering



SNHX

Inserts with free-cutting geometry providing low cutting forces.





M95

order number	catalogue number	D1	D	D6	B min	CDX	THUB	Z	Z S	coolant supply	kg
2016502	**12299510400**	100	27	48	4	25,0	12,0	12	6	No	0,3
2016514	**12299515500**	100	27	48	5	25,0	12,0	12	6	No	0,3
2016516	**12299515600**	100	27	48	6	25,0	12,0	10	5	No	0,3
2016518	**12299515700**	100	27	48	7	25,0	12,0	9	3	No	0,3
2016520	**12299515800**	100	27	48	8	25,0	12,0	9	3	No	0,4
2016524	**12299520400**	125	40	58	4	32,5	12,0	14	7	No	0,4
2016526	**12299525500**	125	40	58	5	32,5	12,0	14	7	No	0,4
2016528	**12299525600**	125	40	58	6	32,5	12,0	12	6	No	0,5
2016530	**12299525700**	125	40	58	7	32,5	12,0	12	4	No	0,5
2016532	**12299525800**	125	40	58	8	32,5	12,0	12	4	No	0,6
2016544	**12299526000**	125	40	58	10	32,5	12,0	12	6	No	0,6
2016547	**12299530400**	160	40	68	4	45,0	12,0	18	9	No	0,7
2022648	**12299535500**	160	40	68	5	45,0	12,0	18	9	No	0,7
2016551	**12299535600**	160	40	68	6	45,0	12,0	16	8	No	1,0
2022649	**12299535700**	160	40	68	7	45,0	12,0	15	5	No	1,0
2016555	**12299535800**	160	40	68	8	45,0	12,0	15	5	No	1,1
2022650	**12299536000**	160	40	68	10	45,0	12,0	16	8	No	1,2
2016562	**12299546000**	200	22	72	10	63,0	12,0	18	9	No	1,9
2022652	**12299545800**	200	50	72	8	63,0	12,0	18	6	No	1,6

Spare Parts

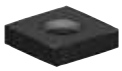


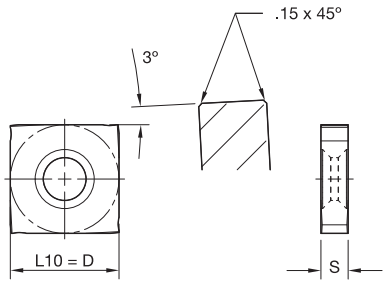



D1	B min	insert screw	Nm	wrench	bushing
100	4	**12147548500**	1,2	**170.023**	**–**
100	5	**12147562300**	1,2	**170.023**	**12147676800**
100	6	**12147548600**	5,0	**170.025**	**12147676900**
100	7	**12147548600**	5,0	**170.025**	**12147676900**
100	8	**12147548600**	5,0	**170.025**	**12147676900**
125	4	**12147548500**	1,2	**170.023**	**–**
125	5	**12147562300**	1,2	**170.023**	**12147676800**
125	6	**12147548600**	5,0	**170.025**	**12147676900**
125	7	**12147548600**	5,0	**170.025**	**12147676900**
125	8	**12147548600**	5,0	**170.025**	**12147676900**
125	10	**12147572400**	5,0	**170.025**	**12147677000**
160	4	**12147548500**	1,2	**170.023**	**–**
160	5	**12147562300**	1,2	**170.023**	**12147676800**
160	6	**12147548600**	5,0	**170.025**	**12147676900**
160	7	**12147548600**	5,0	**170.025**	**12147676900**
160	8	**12147548600**	5,0	**170.025**	**12147676900**
160	10	**12147572400**	5,0	**170.025**	**12147677000**
200	8	**12147548600**	5,0	**170.025**	**12147676900**
200	10	**12147572400**	5,0	**170.025**	**12147677000**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	SNHX	WP40PM	**SNHX**	**WP40PM**	SNHX	WP40PM
P3–P4	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
P5–P6	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
M1–M2	SNHX	WP40PM	**SNHX**	**WP40PM**	SNHX	WP40PM
M3	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
K1–K2	SNHX	WK15CM	**SNHX**	**WK15CM**	SNHX	WK15CM
K3	SNHX	WP35CM	**SNHX**	**WP35CM**	SNHX	WP35CM
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–


SNHX



P		●	●
M		○	●
K	●	○	
N			
S			○
H			

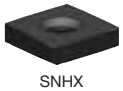
● first choice
○ alternate choice

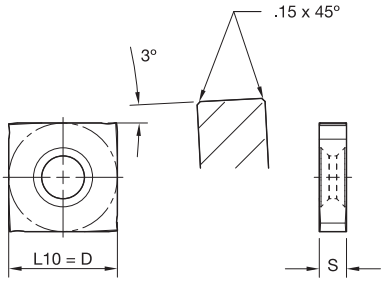
SNHX • 12,7mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506601	4	12,70	12,70	3,18	0,08	5903650	5903674	5903646

SNHX • 11mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506599	4	11,00	11,00	2,38	0,08	5903648	5903672	5903644


SNHX



● first choice
○ alternate choice

P		●	●
M		○	●
K	●	○	
N			
S			○
H			

■ SNHX • 11mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506600	4	11,00	11,00	2,70	0,08	5903649	5903673	5903645

■ SNHX • 12,7mm iC

catalogue number	cutting edges	D	L10	S	hm	WK15CM	WP35CM	WP40PM
123506602	4	12,70	12,70	5,40	0,08	5903671	5903675	5903647

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP35CM			WP40PM		
P	0	–	**–**	–	455	**395**	370	295	**260**	245
	1	–	**–**	–	455	**395**	370	295	**260**	245
	2	–	**–**	–	280	**255**	230	250	**215**	180
	3	–	**–**	–	255	**230**	205	230	**195**	160
	4	–	**–**	–	190	**175**	160	205	**170**	135
	5	–	**–**	–	260	**230**	210	170	**155**	135
	6	–	**–**	–	160	**135**	110	150	**115**	90
M	1	–	**–**	–	205	**185**	155	195	**170**	155
	2	–	**–**	–	185	**160**	140	175	**150**	125
	3	–	**–**	–	145	**130**	115	130	**115**	90
K	1	420	**385**	340	295	**265**	240	–	**–**	–
	2	335	**295**	275	235	**210**	190	–	**–**	–
	3	280	**250**	230	195	**175**	160	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	66	**50**	33	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
SNHX	0,12	**0,28**	0,71	0,08	**0,20**	0,51	0,06	**0,15**	0,38	0,06	**0,13**	0,33	0,05	**0,12**	0,30	SNHX

NOTE: Use "Light Machining" value as starting feed rate.

WIDIA™ M900™ Series •
Adjustable Slotting Cutters

The WIDIA M900 Series is a multipurpose slotting cutter with high-precision capability for numerous operations. The cutter is one of the most productive of its kind for slotting and for cut-off operations. Two keyways in the cutter provide wide slot options by mounting several cutters together in a gang-slotting style operation.

M900



Features

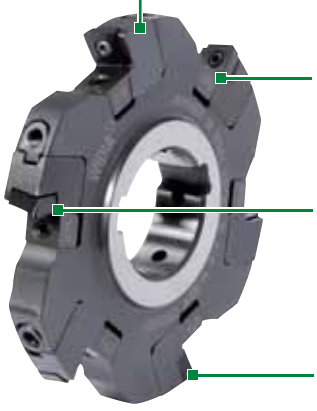
- Insert geometries and grades for various workpiece materials.
- Easy setting for desired width.
- Superior cartridge sliding mechanism.
- Available in arbour and shell mount.
- Two keyways for staggered slotting.
- Strong, reliable pocket seat.

Benefits

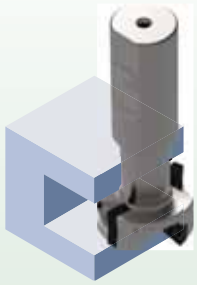
- Wide range of slot width options.
- High accuracy of slots.
- Security/stability of cartridge cutter.
- Wide range of mounting options.
- Multiple slots by gang slotting.

Application

- Full slotting.
- Half slotting (left and right styles).
- Gang slotting.
- Shoulder milling.
- Face milling.
- Back face milling.



Slotting Mills



M900™

Slot Width Range:
12–22mm

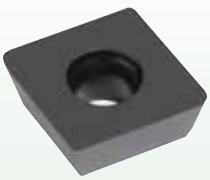
Indexes per insert: 2
Diameter: 100–315mm

Pages: L24–L30, L32–L33

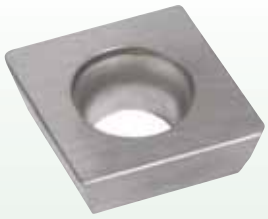




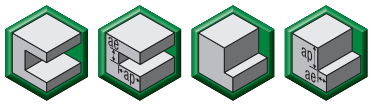
Insert Offering

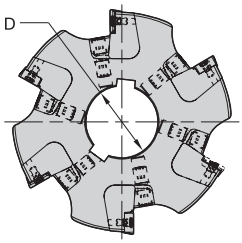


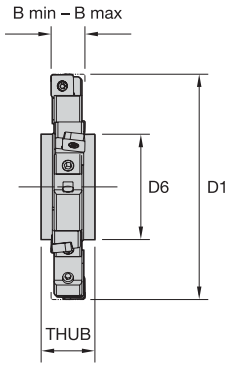
MDHX Geometry
iC 09mm



MDHW Geometry
iC 12mm









Arbour Mount • 9mm

order number	catalogue number	D1	D	D6	B min	B max	THUB	Z	max RPM	coolant supply	kg
2003598	**12399010200**	100	32	48	12	14	16,0	6	7070	No	0,5
2067540	**12399011400**	100	32	48	14	16	16,0	6	7070	No	0,8
2003695	**12399010400**	125	40	58	12	14	16,0	8	6370	No	0,8
2003696	**12399011600**	125	40	58	14	16	16,0	8	6370	No	0,9
2003697	**12399012800**	125	40	58	16	18	20,0	8	6370	No	1,1
2003796	**12399011800**	160	40	58	14	16	16,0	10	5600	No	1,6
2003797	**12399013000**	160	40	58	16	18	20,0	10	5600	No	1,9
2065591	**12399010800**	200	50	72	12	14	16,0	12	5040	No	2,1
2003879	**12399012000**	200	50	72	14	16	16,0	12	5040	No	2,6
2003880	**12399013200**	200	50	72	16	18	20,0	12	5040	No	2,9
2067541	**12399013400**	250	50	72	16	18	20,0	16	4480	No	7,0
2116241	**12399013600**	315	60	84	16	18	20,0	20	3990	No	7,6

Spare Parts



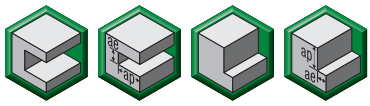


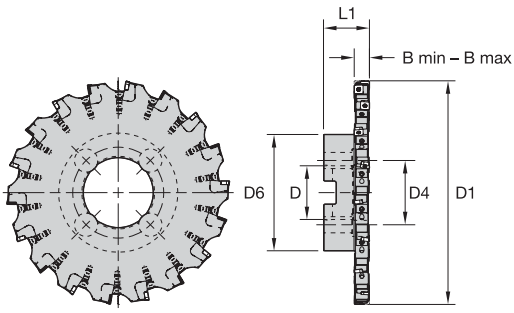






D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
100	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
100	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
160	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
160	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
250	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
315	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**



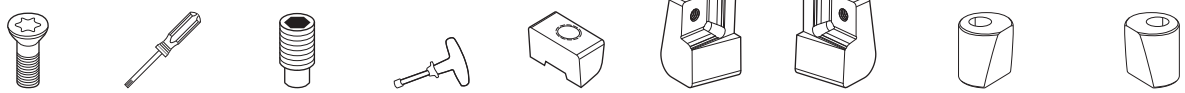




Shell Mount • 9mm

order number	catalogue number	D1	D	D4	D6	B min	B max	L1	Z	max RPM	coolant supply	kg
2003602	**12399111400**	100	27	–	48	14	16	33,0	6	7070	No	0,8
2003700	**12399110400**	125	32	–	58	12	14	37,0	8	6370	No	1,1
2003701	**12399111600**	125	32	–	58	14	16	37,0	8	6370	No	1,2
2003702	**12399112800**	125	32	–	58	16	18	37,0	8	6370	No	1,4
2003800	**12399110600**	160	40	–	70	12	14	42,0	10	5600	No	1,8
2003801	**12399111800**	160	40	–	70	14	16	42,0	10	5600	No	2,1
2003802	**12399113000**	160	40	–	70	16	18	42,0	10	5600	No	2,3
2003897	**12399110800**	200	40	67	90	12	14	44,0	12	5040	No	3,0
2003898	**12399112000**	200	40	67	90	14	16	44,0	12	5040	No	3,3
2003899	**12399113200**	200	40	67	90	16	18	44,0	12	5040	No	3,7
2003997	**12399113400**	250	60	102	130	16	18	50,0	16	4480	No	7,0
2004095	**12399113600**	315	60	102	130	16	18	50,0	20	3990	No	9,7

Spare Parts

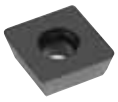


D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
100	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
125	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
160	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
160	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
160	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210100**	**12748210200**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307600**	**12748210300**	**12748210400**	**12748551100**	**12748551200**
200	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
250	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**
315	**12148067200**	**12749726100**	**12148574100**	**12148050000**	**12748307700**	**12748210500**	**12748210600**	**12748551100**	**12748551200**

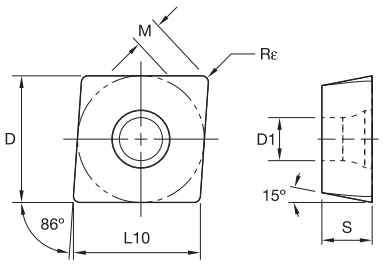
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MDHX	WP40PM	**MDHX**	**WP40PM**	MDHX	WP40PM
P3–P4	MDHX	WP35CM	**MDHX**	**WP35CM**	MDHX	WP35CM
P5–P6	MDHX	WP35CM	**MDHX**	**WP40PM**	MDHX	WU35PM
M1–M2	MDHX	WP25PM	**MDHX**	**WP25PM**	MDHX	WU35PM
M3	MDHX	WP35CM	**MDHX**	**WP40PM**	MDHX	WU35PM
K1–K2	MDHX	WK15CM	**MDHX**	**WK15CM**	MDHX	WK15CM
K3	MDHX	WK15CM	**MDHX**	**WP35CM**	MDHX	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	MDHX	WP25PM	**MDHX**	**WU35PM**	MDHX	WU35PM
S3	MDHX	WU35PM	**MDHX**	**WU35PM**	MDHX	WU35PM
S4	MDHX	WP25PM	**MDHX**	**WU35PM**	MDHX	WU35PM
H1	–	–	**–**	**–**	–	–

Inserts • MDH..


MDHX


MDHX



● first choice
○ alternate choice

	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
P		●	●	●	●
M		●	●	○	●
K	●	○		○	
N					
S		●	●		○
H		○			

MDHX

catalogue number	cutting edges	D	D1	L10	M	S	Rε	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
MDHX09T308	2	9,53	3,40	9,55	1,85	3,97	0,80	5903706	5903722	5903710	5903708	5903704

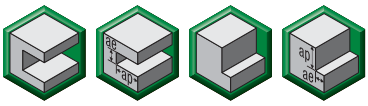
Recommended Starting Feeds

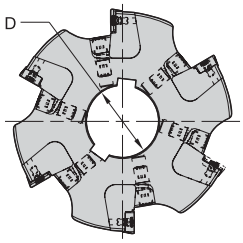
Recommended Starting Feeds [mm]

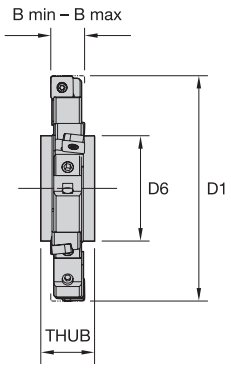
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MDHX	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	MDHX

NOTE: Use "Light Machining" value as starting feed rate.









Arbour Mount • 12mm

order number	catalogue number	D1	D	D6	B min	B max	THUB	Z	max RPM	coolant supply	kg
2003881	**12399014400**	200	50	72	18	20	20,0	12	5040	No	3,2
2003882	**12399015600**	200	50	72	20	22	24,0	12	3990	No	3,7
2003993	**12399014600**	250	50	72	18	20	20,0	16	4480	No	5,1
2003994	**12399015800**	250	50	72	20	22	24,0	16	3570	No	5,9
2004081	**12399014800**	315	60	84	18	20	20,0	20	3990	No	8,1
2004082	**12399016000**	315	60	84	20	22	24,0	20	3220	No	9,4

Spare Parts



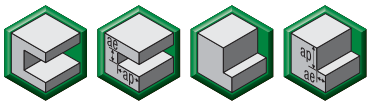


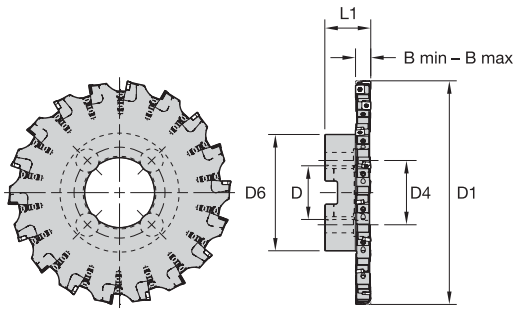






D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**



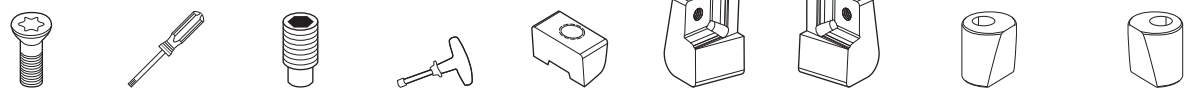




Shell Mount • 12mm

order number	catalogue number	D1	D	D4	D6	B min	B max	L1	Z	max RPM	coolant supply	kg
2003900	**12399114400**	200	40	67	90	18	20	44,8	12	5040	No	3,8
2003901	**12399115600**	200	40	67	90	20	22	46,0	12	3990	No	4,3
2003998	**12399114600**	250	60	102	130	18	20	51,8	16	4480	No	7,2
2003999	**12399115800**	250	60	102	130	20	22	53,0	16	3570	No	7,9
2004096	**12399114800**	315	60	102	130	18	20	51,8	20	3990	No	10,2
2004097	**12399116000**	315	60	102	130	20	22	53,0	20	3220	No	11,3

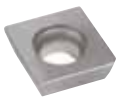
Spare Parts



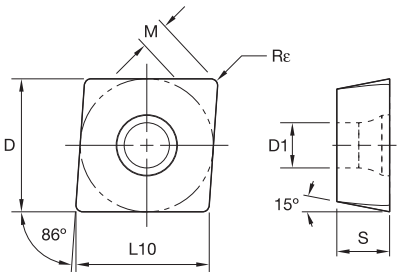
D1	insert screw	Torx driver	STC screw	T-handle hex wrench	clamp wedge	cartridge left-hand	cartridge right-hand	adjusting wedge left-hand	adjusting wedge right-hand
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
200	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
250	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307700**	**12748210700**	**12748210800**	**12748551100**	**12748551200**
315	**12748605300**	**12749723200**	**12148574100**	**12148050000**	**12748307800**	**12748210900**	**12748211000**	**12748551100**	**12748551200**

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MDHW	WP40PM	**MDHW**	**WP40PM**	MDHW	WP40PM
P3–P4	MDHW	WP35CM	**MDHW**	**WP35CM**	MDHW	WP35CM
P5–P6	MDHW	WP35CM	**MDHW**	**WP40PM**	MDHW	WU35PM
M1–M2	MDHW	WP25PM	**MDHW**	**WP25PM**	MDHW	WU35PM
M3	MDHW	WP35CM	**MDHW**	**WP40PM**	MDHW	WU35PM
K1–K2	MDHW	WK15CM	**MDHW**	**WK15CM**	MDHW	WK15CM
K3	MDHW	WK15CM	**MDHW**	**WP35CM**	MDHW	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	MDHW	WP25PM	**MDHW**	**WU35PM**	MDHW	WU35PM
S3	MDHW	WU35PM	**MDHW**	**WU35PM**	MDHW	WU35PM
S4	MDHW	WP25PM	**MDHW**	**WU35PM**	MDHW	WU35PM
H1	–	–	**–**	**–**	–	–


MDHW


MDHW



● first choice
○ alternate choice

		WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
P			●	●	●	●
M			●	●	○	●
K		●	○		○	
N						
S			●	●		○
H			○			

MDHW

catalogue number	cutting edges	D	D1	L10	M	S	Rε	WK15CM	WP25PM	WU35PM	WP35CM	WP40PM
MDHW120408	2	12,70	5,50	12,73	2,58	4,76	0,80	5903707	5903723	5903721	5903709	5903705

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP25PM			WU35PM			WP35CM			WP40PM		
P	0	–	**–**	–	330	**285**	270	260	**230**	215	455	**395**	370	295	**260**	245
	1	–	**–**	–	330	**285**	270	260	**230**	215	455	**395**	370	295	**260**	245
	2	–	**–**	–	275	**240**	200	220	**190**	160	280	**255**	230	250	**215**	180
	3	–	**–**	–	255	**215**	175	200	**170**	140	255	**230**	205	230	**195**	160
	4	–	**–**	–	225	**185**	150	180	**150**	120	190	**175**	160	205	**170**	135
	5	–	**–**	–	185	**170**	150	150	**135**	120	260	**230**	210	170	**155**	135
	6	–	**–**	–	165	**125**	100	130	**100**	80	160	**135**	110	150	**115**	90
M	1	–	**–**	–	205	**180**	165	170	**150**	135	205	**185**	155	195	**170**	155
	2	–	**–**	–	185	**160**	130	155	**130**	110	185	**160**	140	175	**150**	125
	3	–	**–**	–	140	**120**	95	115	**100**	80	145	**130**	115	130	**115**	90
K	1	420	**385**	340	230	**205**	185	–	**–**	–	295	**265**	240	–	**–**	–
	2	335	**295**	275	180	**160**	150	–	**–**	–	235	**210**	190	–	**–**	–
	3	280	**250**	230	150	**135**	120	–	**–**	–	195	**175**	160	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	40	**35**	25	35	**30**	25	–	**–**	–	40	**35**	30
	2	–	**–**	–	40	**35**	25	35	**30**	25	–	**–**	–	40	**35**	30
	3	–	**–**	–	50	**40**	25	45	**35**	25	–	**–**	–	50	**40**	30
	4	–	**–**	–	70	**50**	35	60	**45**	30	66	**50**	33	65	**50**	35
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MDHW	0,12	**0,23**	0,46	0,08	**0,17**	0,33	0,06	**0,13**	0,25	0,06	**0,11**	0,22	0,05	**0,10**	0,20	MDHW

NOTE: Use "Light Machining" value as starting feed rate.



WIDIA™ Knowledge Center

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Classes to Suit Everyone

Doing things the same way year after year can stall productivity. Continuing education and training in the latest machining practices are necessary to stay competitive.

The Knowledge Center offers several ways to get trained: industry- and application-specific courses, customer onsite programs, and online-based certified metalcutting professional courses. In-person classes include lecture, lab, and machining demonstrations.

Regional Training

The Regional Application Engineering Program is designed to provide a broad base of knowledge for the selection and use of metalcutting tools. Instruction includes lecture-style presentations and video demonstrations. Participants receive notes and text materials, and the video demonstrations reinforce the theories presented in the lecture.

Metalcutting Application Training

The Comprehensive Metalworking Application Course provides a broad base of knowledge for the selection and use of metalcutting tools. Lecture-style presentations and laboratory demonstrations enhance course material through actual cutting tests and reinforce the theories presented in the lecture.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Assembly and Operating Instructions

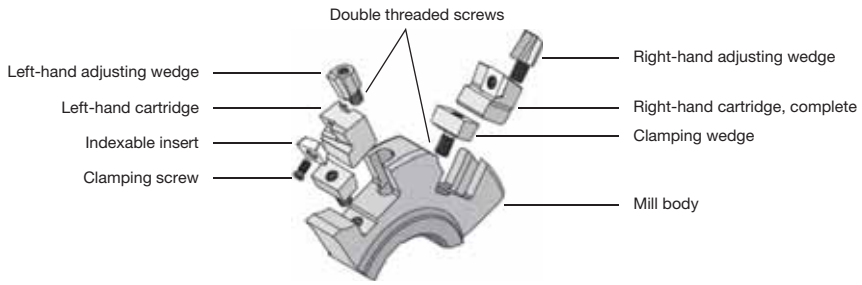




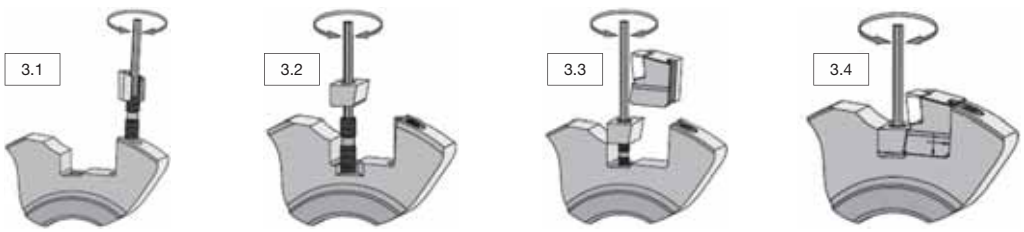
1. General

The runout tolerance of the milling cutter has a decisive effect on the quality of workpieces and the life cycle of tools. Proper tool fitting and the precise axial setting of the milling insert are essential for a successful application and optimum results. One key requirement for assembly and setting work is that all components are clean. Bearing surfaces must be free from grease, and only the threads of indexable insert clamping screws and double threaded screws of clamping and adjusting wedges should be lubricated with copper grease. The indexable inserts should be inserted in the cleaned insert seats so that they are positioned correctly on the bearing surfaces. The indexable insert clamping screws should be tightened with the specified torque.

2. Exploded Diagram of Spare Parts



3. Mounting the Cartridges in the Mill Body



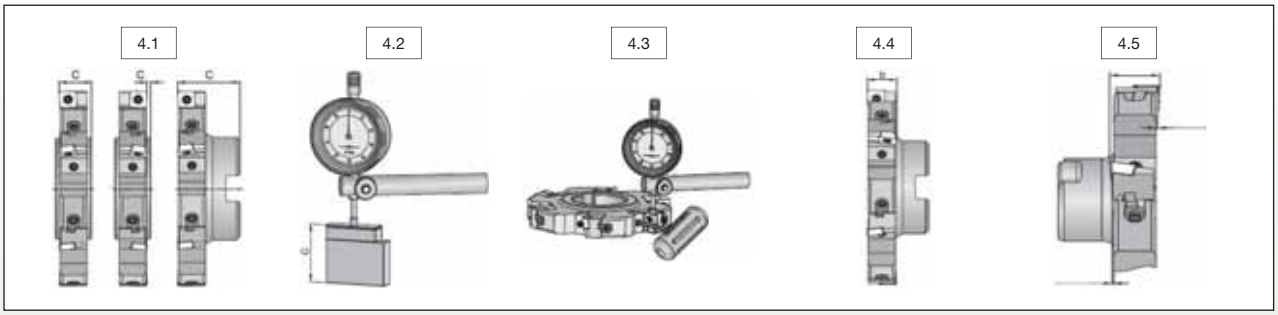
3.1 Turn double threaded screw one turn clockwise in the adjusting wedge. Then insert both parts in the slot in the mill body and turn the double threaded screw clockwise until the adjusting wedge is flush with the milling cutter.

3.2 Turn double threaded screw three turns clockwise in the mill body. Then mount the clamping wedge on the double threaded screw and screw both parts together until the lower edge of the clamping wedge is at the same height as the chip space runout.

3.3 Push the top of the fully assembled cartridge into the mill body using the rear bearing surface of the milling cutter so that the cartridge slot makes contact with the adjusting wedge spring. Ensure a perfect axial/radial surface.

3.4 Secure the correctly positioned cartridge by tightening the clamping wedge with a preset torque of MApre = 1 Nm to set the runout or cutting width.

4. Setting the Runout for Milling Cutters with 2–3 Cutting Edges



4.1 Possible interpretations of the measuring dimension C.

4.2 Set gage to desired measurement C using gage blocks set to 0.

4.3 Set cartridge to ~0,1mm before final measurement. Clamping wedge is tightened with torque MApre = 1 Nm. Then briefly loosen clamping wedge and tighten again.

4.4 Set cartridge to 0,02mm before final measurement. Then briefly loosen clamping wedge so that the contact surfaces can level out. Tighten clamping.

4.4 Wedge again with torque MApre = 1 Nm.

4.5 Adjust cartridge to final measurement. Tighten clamping wedge with torque MA = 4 Nm. Check runout of the fully adjusted milling cutter.

5. Setting the Runout for Milling Cutters with 3 Cutting Edges

The cutting widths for milling cutters with three cutting edges are set using purpose-designed optical tool presetting equipment. Note that the projection of the cartridges from the mill body must be almost exactly the same on both sides. The sequence of steps required for setting the cartridge is identical to those for tools with two cutting edges.

ATTENTION:

At each tool adjustment, the body, cartridges, indexable inserts, and spare parts must be checked and replaced if necessary. Before each tool use, the clamping and double threaded screws must be tightened with the specified torque. The tools must only be used in accordance with their function. We accept no liability for their improper use. Changes of any kind and/or printing errors are not valid grounds for claims.



Indexable Milling • Copy Mills

M370 • High-Feed Double-Sided Platform M2–M16
M200 • Double-Sided Round Inserts M18–M39
M170 • Round Inserts, Ideal for Die and Mould Applications M40–M70
M100 • Positive Round Inserts M72–M99
M270 • Indexable Ball Nose and Toroidal Inserts for Complex Parts M100–M130

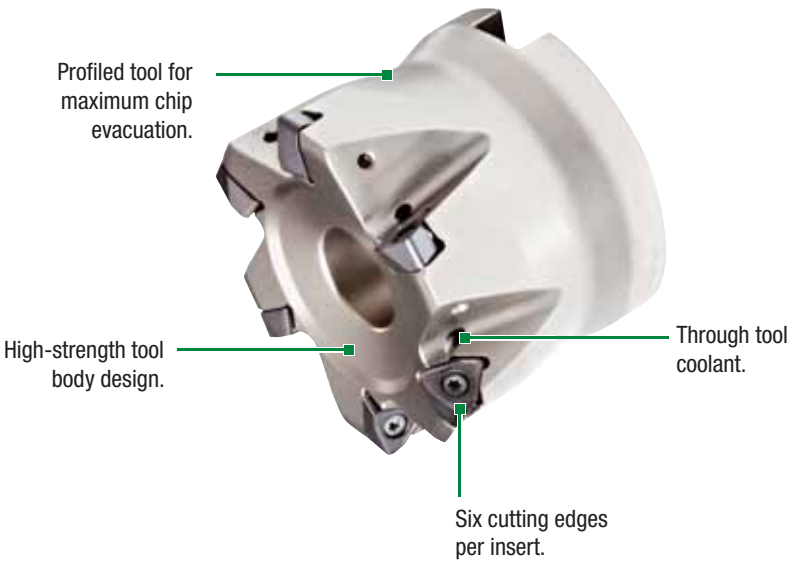


M370

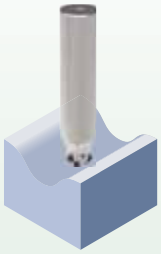


Designed for high feed rate productivity, M370 Series provides the latest insert technology with outstanding performance and reliability. Its double-sided concept and six cutting edges provide security and optimal metal removal with an efficient cost per edge.

- Double-sided design offers six cutting edges per insert.
- Extremely high metal removal rates.
- First choice for high-feed roughing applications.



Copy Mills

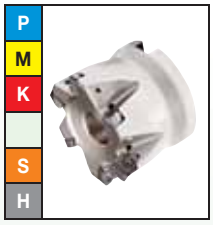


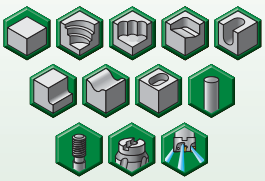
M370™

Max depth of cut: up to 2mm

Indexes per insert: 6
Diameter: 25–125mm

Pages: M4–M16





Insert Offering

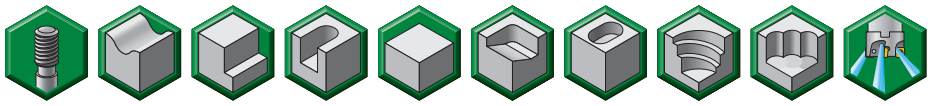


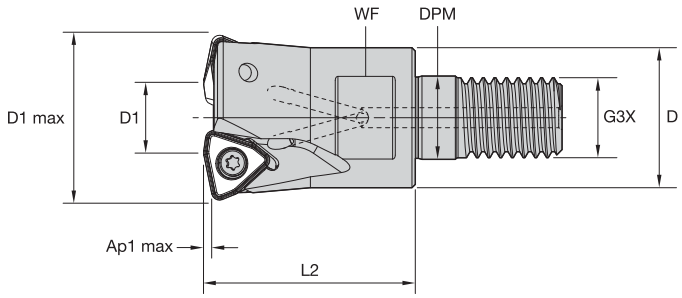
8mm iC Insert WOEJ0804
Up to 1,3mm Ap max
Diameter range 25–80mm



12mm iC Insert WOEJ1207
Up to 2mm Ap max
Diameter range 42–125mm

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







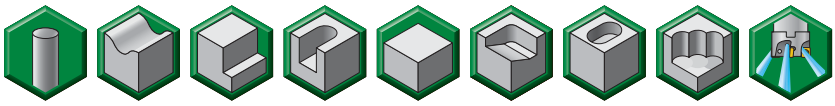
Screw-On End Mills

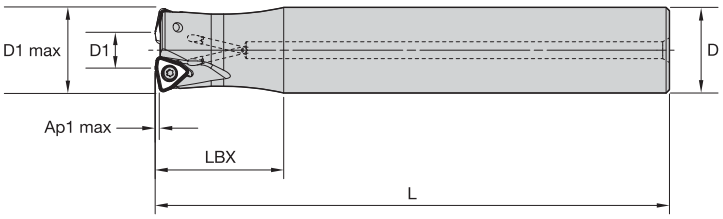
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
4056186	**M370D025Z02M12WO08**	25	11	21	12,5	M12	35	17	1,3	2	2.1°	46000	Yes	0,09
4170918	**M370D025Z03M12WO08**	25	11	21	12,5	M12	35	17	1,3	3	2.1°	46000	Yes	0,09
4056187	**M370D032Z04M16WO08**	32	18	29	17,0	M16	43	24	1,3	4	1.4°	38700	Yes	0,21
4056188	**M370D042Z05M16WO08**	42	28	29	17,0	M16	43	24	1,3	5	1.0°	32500	Yes	0,57

Spare Parts

D1 max	insert screw	Nm	Torx driver
25	**MS2219**	1,8	**DT9IP**
32	**MS2219**	1,8	**DT9IP**
42	**MS2219**	1,8	**DT9IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







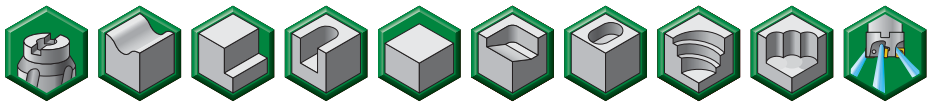
Cylindrical End Mills

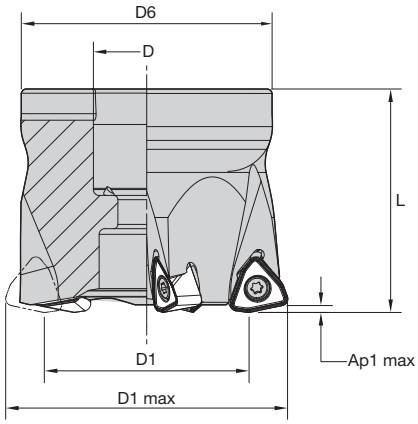
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4056189	**M370D025Z03A25WO08L150**	25	11	25	150	40	1,3	3	46000	Yes	0,50
4008281	**M370D025Z02A25WO08L200**	25	11	25	200	50	1,3	2	46000	Yes	0,68
4170919	**M370D025Z03A25WO08L200**	25	11	25	200	40	1,3	3	46000	Yes	0,69
4170920	**M370D025Z02A25WO08L300**	25	11	25	300	40	1,3	2	46000	Yes	1,08
4056190	**M370D028Z03A25WO08L200**	28	14	25	200	40	1,3	3	42400	Yes	0,70
4056192	**M370D032Z04A32WO08L200**	32	18	32	200	50	1,3	4	38700	Yes	1,14
4056191	**M370D032Z04A32WO08L150**	32	18	32	150	40	1,3	4	38700	Yes	0,84
4170921	**M370D032Z03A32WO08L300**	32	18	32	300	40	1,3	3	38700	Yes	0,84

Spare Parts

D1 max	 insert screw	 Nm	 wrench
25	**MS2219**	1,8	**DT9IP**
28	**MS2219**	1,8	**DT9IP**
32	**MS2219**	1,8	**DT9IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4056193	**M370D040Z04WO08**	40	26	16	37	40	1,3	4	33500	Yes	0,19
4170922	**M370D040Z05WO08**	40	26	16	37	40	1,3	5	33500	Yes	0,19
4008276	**M370D050Z05WO08**	50	36	22	44	40	1,3	5	29200	Yes	0,29
4171223	**M370D050Z06WO08**	50	36	22	44	40	1,3	6	29200	Yes	0,29
4171224	**M370D052Z06WO08**	52	38	22	44	50	1,3	6	28600	Yes	0,40
4056194	**M370D052Z05WO08**	52	38	22	44	50	1,3	5	28600	Yes	0,41
4056195	**M370D063Z06WO08**	63	49	22	60	50	1,3	6	25500	Yes	0,74
4008277	**M370D066Z06WO08**	66	52	27	60	50	1,3	6	24900	Yes	0,77
4171225	**M370D080Z07WO08**	80	66	27	60	50	1,3	7	24900	Yes	2,36

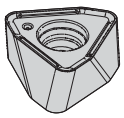
Spare Parts

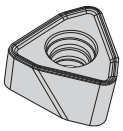
D1 max	 insert screw	 Nm	 Torx Plus driver	 socket-head cap screw	 socket-head cap screw with coolant groove
40	**MS2219**	1,8	**DT9IP**	**125.825**	**MS1294CG**
50	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
52	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
63	**MS2219**	1,8	**DT9IP**	**12146120500**	**MS1234CG**
66	**MS2219**	1,8	**DT9IP**	**MS2038**	**MS2038CG**
80	**MS2219**	1,8	**DT9IP**	**MS2038**	**MS2038CG**

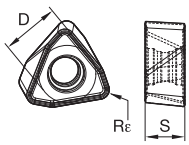
NOTE: Socket-head cap screw with coolant groove must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	..MM	WP40PM	**..MM**	**WP40PM**	..MM	WP40PM
P3–P4	..MM	WP25PM	**..MM**	**WP40PM**	..MH	WP40PM
P5–P6	..MM	WP25PM	**..MH**	**WP25PM**	..MH	WP40PM
M1–M2	..MM	WP25PM	**..MM**	**WS30PM**	..MM	WP40PM
M3	..MM	WP25PM	**..MM**	**WP25PM**	..MM	WP40PM
K1–K2	..MH	WK15CM	**..MH**	**WK15CM**	..MH	WK15CM
K3	..MH	TN6520	**..MH**	**TN6520**	..MH	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	..MM	WP25PM	**..MM**	**WS30PM**	..MM	WP40PM
S3	..MM	WS30PM	**..MM**	**WS30PM**	..MM	WP40PM
S4	..MM	WS30PM	**..MM**	**WP40PM**	..MM	WP40PM
H1	..MH	WP25PM	**–**	**–**	–	–


WOEJ-MM


WOEJ-MH



- -MM geometry provides lower cutting forces. First choice for steel, stainless steel, and high-temp alloys.
- -MH geometry is the first choice for high-strength steel and cast iron.

● first choice
○ alternate choice

		TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
P		○	●	●		●		●
M			○	○		●	○	●
K		●	○	○	●	○		
N								
S						●	●	○
H			○			○		

WOEJ-MM

catalogue number	cutting edges	D	S	Rε	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMM	6	7,79	4,70	1,22	-	4113892	4113916	-	5564597	5520248	5544753

WOEJ-MH

catalogue number	cutting edges	D	S	Rε	TN6520	TN6525	TN7535	WK15CM	WP25PM	WS30PM	WP40PM
WOEJ080412SRMH	6	7,79	4,75	1,22	4136480	4052411	4068517	5427443	5564596	-	5544752

Recommended Starting Speeds [m/min]

Material Group		TN6520			TN6525			TN7535			WK15CM		
P	1	–	–	–	410	**320**	280	545	**475**	445	–	–	–
	2	–	–	–	320	**250**	215	335	**305**	275	–	–	–
	3	–	–	–	280	**215**	185	305	**275**	245	–	–	–
	4	–	–	–	235	**170**	145	230	**210**	190	–	–	–
	5	–	–	–	310	**235**	200	310	**275**	250	–	–	–
	6	–	–	–	205	**160**	130	190	**160**	130	–	–	–
M	1	–	–	–	190	**120**	80	245	**220**	185	–	–	–
	2	–	–	–	120	**80**	50	220	**190**	170	–	–	–
	3	–	–	–	125	**80**	55	175	**155**	140	–	–	–
K	1	450	**320**	230	275	**245**	220	355	**320**	290	505	**460**	410
	2	390	**250**	190	215	**190**	180	280	**250**	230	400	**355**	330
	3	300	**230**	160	180	**160**	145	235	**210**	190	335	**300**	275
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
	4	–	–	–	–	–	–	–	–	–	–	–	–
H	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP25PM			WS30PM			WP40PM		
P	1	395	**340**	325	–	**–**	–	355	**310**	295
	2	330	**290**	240	–	**–**	–	300	**260**	215
	3	305	**260**	210	–	**–**	–	275	**235**	190
	4	270	**220**	180	–	**–**	–	245	**205**	160
	5	220	**205**	180	–	**–**	–	205	**185**	160
	6	200	**150**	120	–	**–**	–	180	**140**	110
M	1	245	**215**	200	270	**240**	220	235	**205**	185
	2	220	**190**	155	245	**215**	175	210	**180**	150
	3	170	**145**	115	185	**160**	125	155	**140**	110
K	1	275	**245**	220	–	**–**	–	–	**–**	–
	2	215	**190**	180	–	**–**	–	–	**–**	–
	3	180	**160**	145	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	50	**40**	30	55	**50**	35	50	**40**	35
	2	50	**40**	30	55	**50**	35	50	**40**	35
	3	60	**50**	30	65	**55**	35	60	**50**	35
	4	85	**60**	40	100	**70**	50	80	**60**	40
H	1	145	**110**	85	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

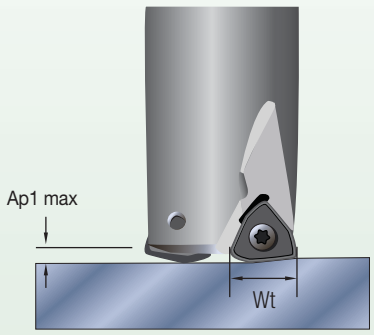
For Plunging Applications

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
..MM	0,90	**1,67**	4,09	0,65	**1,19**	2,83	0,48	**0,88**	2,08	0,42	**0,77**	1,80	0,38	**0,70**	1,64	..MM
..MH	0,90	**2,34**	5,00	0,65	**1,66**	3,41	0,48	**1,23**	2,49	0,42	**1,07**	2,16	0,38	**0,98**	1,97	..MH

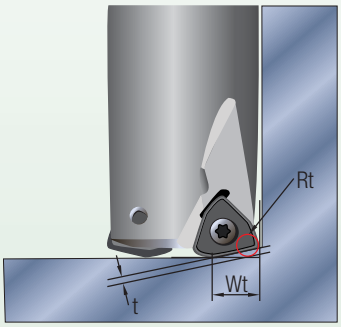
NOTE: Use "Light Machining" value as starting feed rate.

Applying High-Feed Tools

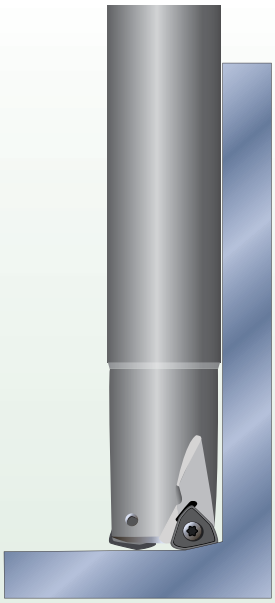
The high-feed concept bases its strategy on small depth of cut and higher fz values, which results in a higher MRR and productivity with low radial forces.



Small Ap1 values and higher feed rates generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.

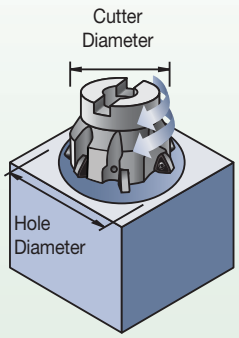
General Programming Information for Applying M370

L/D ratio	starting Ap1	starting fz range
<3	0,9mm	1–1,3mm
>3–<5	0,6mm	1–1,3mm
>5–<7	0,4mm	0,6–1mm

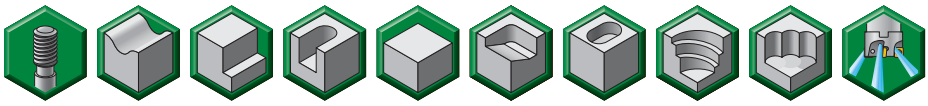
Rt	t	Wt
2,5mm	1mm	7,5mm

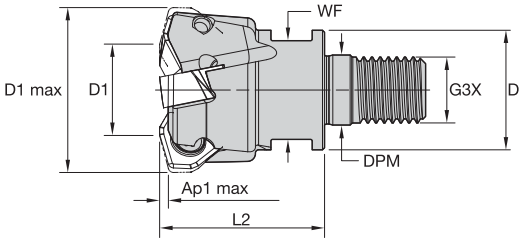
■ Maximum Linear Ramping and Helical Interpolation from Solid • Metric

cutter diameter	max linear ramp angle (straight line)	min hole diameter	max hole diameter	Ap1 max per revolution
25	3,1°	30,2	49,5	1,25
28	2,6°	36,1	55,5	1,25
32	2,9°	44,1	63,5	1,25
40	1,6°	60	79,5	1,25
42	1,5°	64	83,5	1,25
50	1,3°	80	99,5	1,25
52	1,2°	84	103,5	1,25
63	1°	106	125,5	1,25
66	1°	112	131,5	1,25
80	0,8°	140	155,5	1,25



- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







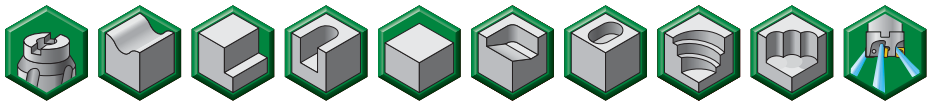
Screw-On End Mills

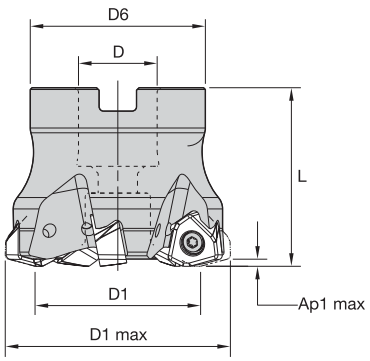
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
5338912	**M370D42Z03M16WO12**	42	25	29	17,0	M16	40	24	2,0	3	5.1°	21310	Yes	0,22

Spare Parts

D1 max	insert screw	Nm	Torx driver
42	**MS2085**	4,0	**DT15IP**

- Double-sided, six cutting edges.
- Highest metal removal rates.
- First choice for roughing applications.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5338913	**M370D50Z04WO12**	50,0	33	22	42	50	2,0	4	19530	Yes	0,38
5338914	**M370D52Z04WO12**	52,0	35	22	49	50	2,0	4	19160	Yes	0,47
5338915	**M370D63Z04WO12**	63,0	46	22	49	50	2,0	4	17400	Yes	0,57
5338916	**M370D63Z05WO12**	63,0	46	22	49	50	2,0	5	17400	Yes	0,57
5338917	**M370D66Z05WO12**	66,0	49	27	60	50	2,0	5	17000	Yes	0,79
5338918	**M370D80Z05WO12**	80,0	63	27	60	50	2,0	5	15440	Yes	0,94
5338919	**M370D80Z06WO12**	80,0	63	27	60	50	2,0	6	15440	Yes	0,94
5338920	**M370D100Z06WO12**	100,0	83	32	78	50	2,0	6	13810	Yes	1,56
5338921	**M370D100Z07WO12**	100,0	83	32	78	50	2,0	7	13810	Yes	1,57
5338922	**M370D125Z07WO12**	125,0	108	40	90	63	2,0	7	12350	Yes	2,92
5338923	**M370D125Z09WO12**	125,0	108	40	90	63	2,0	9	12350	Yes	2,94

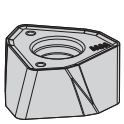
Spare Parts

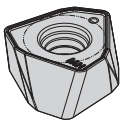
D1 max	 insert screw	 Nm	 Torx Plus driver	 socket-head cap screw	 socket-head cap screw with coolant groove	 coolant lock screw	 coolant lock screw assembly
50	**MS2085**	4,0	**DT15IP**	**12146120500**	**MS1234CG**	**–**	**–**
52	**MS2085**	4,0	**DT15IP**	**12146120500**	**MS1234CG**	**–**	**–**
63	**MS2085**	4,0	**DT15IP**	**125.025**	**MS1234CG**	**–**	**–**
66	**MS2085**	4,0	**DT15IP**	**125.230**	**MS2038CG**	**–**	**–**
80	**MS2085**	4,0	**DT15IP**	**125.230**	**MS2038CG**	**–**	**–**
100	**MS2085**	4,0	**DT15IP**	**–**	**–**	**KLS32M**	**MS2195C**
125	**MS2085**	4,0	**DT15IP**	**–**	**–**	**KLS40M**	**MS2187C**

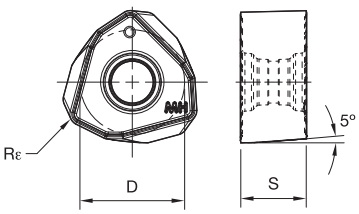
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	.S..MM	WU35PM	**.S..MM**	**WP40PM**	.S..MM	WP40PM
P3–P4	.S..MM	WP25PM	**.S..MM**	**WP25PM**	.S..MH	WP40PM
P5–P6	.S..MM	WP25PM	**.S..MM**	**WP35CM**	.S..MH	WP35CM
M1–M2	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
M3	.S..MM	WP25PM	**.S..MM**	**WP35CM**	.S..MM	WP40PM
K1–K2	.S..MH	WK15CM	**.S..MH**	**WK15CM**	.S..MH	WP20CM
K3	.S..MH	WK15CM	**.S..MH**	**WK15CM**	.S..MH	WP20CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
S3	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
S4	.S..MM	WS30PM	**.S..MM**	**WU35PM**	.S..MM	WP40PM
H1	.S..MH	WP35CM	**.S..MR**	**WP25PM**	–	–


WOEJ-MM


WOEJ-MH



- -MM geometry provides lower cutting forces. First choice for steel, stainless steel, and high-temp alloys.
- -MH geometry is the first choice for high-strength steel and cast iron.
- -MR geometry is designed for heavy-duty steel and cast iron applications.

● first choice
○ alternate choice

		WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
P			●	●	●	●		●
M			○	●	●	○	○	●
K		●	○	○		○		
N								
S				●	●		●	○
H			○	○				

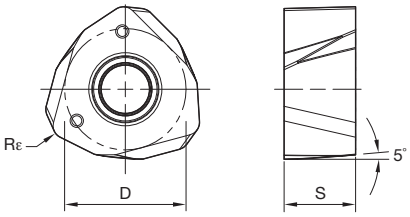
WOEJ-MM

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMM	6	12,00	7,30	1,27	ı	5419790	5419648	5419649	5419791	5520249	5542346

WOEJ-MH

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMH	6	12,00	7,30	1,27	5338860	5338861	5338818	5338819	5338862	ı	5542347


WOEJ-MR



● first choice
○ alternate choice

P			●	●	●	●		●
M			○	●	●	○	○	●
K	●	○	○		○			
N								
S				●	●		●	○
H			○	○				

■ WOEJ-MR

catalogue number	cutting edges	D	S	Rε	WK15CM	WP20CM	WP25PM	WU35PM	WP35CM	WS30PM	WP40PM
WOEJ120712SRMR	6	12,00	7,30	1,27	'	'	5698343	'	'	'	5698342

Recommended Starting Speeds

■ Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WU35PM		
P	1	–	**–**	–	660	**580**	540	395	**340**	325	310	**275**	260
	2	–	**–**	–	410	**370**	330	330	**290**	240	265	**230**	190
	3	–	**–**	–	370	**330**	305	305	**260**	210	240	**205**	170
	4	–	**–**	–	275	**260**	230	270	**220**	180	215	**180**	145
	5	–	**–**	–	330	**300**	275	220	**205**	180	180	**160**	145
	6	–	**–**	–	230	**205**	175	200	**150**	120	155	**120**	95
M	1	–	**–**	–	270	**240**	210	245	**215**	200	205	**180**	160
	2	–	**–**	–	245	**210**	190	220	**190**	155	185	**155**	130
	3	–	**–**	–	190	**175**	150	170	**145**	115	140	**120**	95
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	**–**	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	**–**	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**40**	30	40	**35**	30
	2	–	**–**	–	–	**–**	–	50	**40**	30	40	**35**	30
	3	–	**–**	–	–	**–**	–	60	**50**	30	55	**40**	30
	4	–	**–**	–	–	**–**	–	85	**60**	40	70	**55**	35
H	1	–	**–**	–	170	**140**	115	145	**110**	85	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

(continued)

(Recommended Starting Speeds [m/min] — continued)

Material Group		WP35CM			WS30PM			WP40PM		
P	1	545	**475**	445	–	**–**	–	355	**310**	295
	2	335	**305**	275	–	**–**	–	300	**260**	215
	3	305	**275**	245	–	**–**	–	275	**235**	190
	4	230	**210**	190	–	**–**	–	245	**205**	160
	5	310	**275**	250	–	**–**	–	205	**185**	160
	6	190	**160**	130	–	**–**	–	180	**140**	110
M	1	245	**220**	185	270	**240**	220	235	**205**	185
	2	220	**190**	170	245	**215**	175	210	**180**	150
	3	175	**155**	140	185	**160**	125	155	**140**	110
K	1	355	**320**	290	–	**–**	–	–	**–**	–
	2	280	**250**	230	–	**–**	–	–	**–**	–
	3	235	**210**	190	–	**–**	–	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	55	**50**	35	50	**40**	35
	2	–	**–**	–	55	**50**	35	50	**40**	35
	3	–	**–**	–	65	**55**	35	60	**50**	35
	4	80	**60**	40	100	**70**	50	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

■ Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

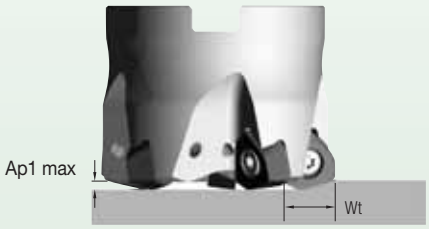
For All Other Applications

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
..MM	0,90	**1,87**	3,62	0,65	**1,33**	2,52	0,48	**0,99**	1,86	0,42	**0,86**	1,61	0,39	**0,79**	1,47	..MM
..MH	0,90	**2,35**	4,97	0,65	**1,67**	3,40	0,48	**1,23**	2,48	0,42	**1,07**	2,15	0,39	**0,98**	1,96	..MH
..MR	0,90	**2,81**	5,44	0,65	**1,97**	3,69	0,48	**1,46**	2,69	0,42	**1,27**	2,33	0,39	**1,16**	2,13	..MR

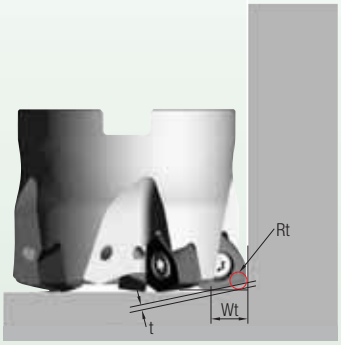
NOTE: Use "Light Machining" value as starting feed rate.

Applying High-Feed Tools

The high-feed concept bases its strategy on small depth of cut and higher fz values, which results in a higher MRR and productivity with low radial forces.



Small Ap1 values and higher feed rates generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.

General Programming Information for Applying M370

	CAM programming information		
	Rt	**Wt**	**t**
mm value	3,2	9	1,4

■ Maximum Linear Ramping and Helical Interpolation from Solid • Metric

diameter	max ramp angle	max ramp angle for 360° helical interpolation	max plunge depth	min hole diameter (DH min)	max flat-bottom hole diameter (DH1 max)	max diameter (no flat bottom)
42	5,1°	1,44°	1,66	57,36	65,29	84
50	3,7°	1,09°	1,66	73,07	81,24	100
52	3,5°	1,03°	1,66	77,03	85,24	104
63	2,6°	0,78°	1,66	98,88	107,20	126
66	2,4°	0,74°	1,66	104,85	113,20	132
80	1,8°	0,57°	1,66	132,77	141,18	160
100	1,3°	0,43°	1,66	172,70	181,16	200
125	1,0°	0,33°	1,66	222,66	231,15	250



On the Web

We are here to serve you.

Visit our homepage at widia.com to:

- Find a Local WIDIA™ Authorized Distributor near you.
- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
- Purchase WIDIA-branded merchandise.
- Get social with us on Facebook, Twitter, Instagram, YouTube, and more!



NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Double-Sided Round Insert •

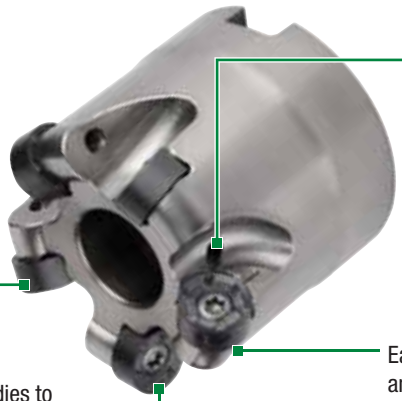
M200™ Series

Revolutionary double-sided round insert, capable of running in multiple types of milling operations and workpiece materials, increases customer's productivity with the most efficient cost per edge.

M200



- Up to 12 cutting edges per insert.
- Effective anti-rotation feature.
- Able to apply in all type of materials and milling applications.
- Latest WIDIA™ Victory™ grades offered.



Screw-on, end mill, and shell mill cutters with internal coolant.

Higher clearance in bodies to permit pocketing, profiling, and 5-axis machining.

Easy-to-use and unique anti-rotation feature for excellent stability for higher feed rates and cutting forces.

Three different insert sizes and three insert topography styles with the new WIDIA Victory milling grades cover any type of component and application.

Copy Mills

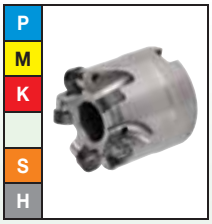


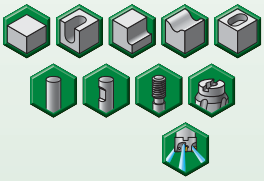
M200™

Max depth of cut: up to 5mm

Indexes per insert: up to 12
Diameter: 25–125mm

Pages: M20–M39





Insert Offering



M200 iC 10
10mm iC insert
8 cutting edges



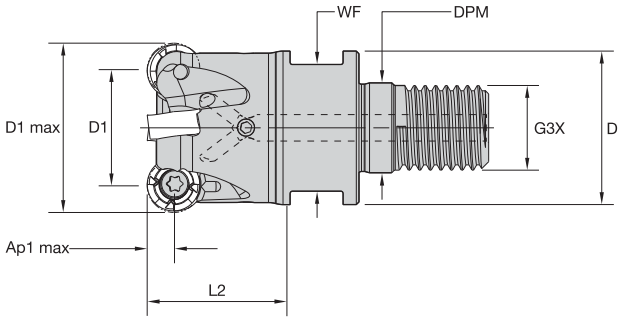
M200 iC 12
12mm iC insert
12 cutting edges



M200 iC 16
16mm iC insert
12 cutting edges

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Screw-On End Mills

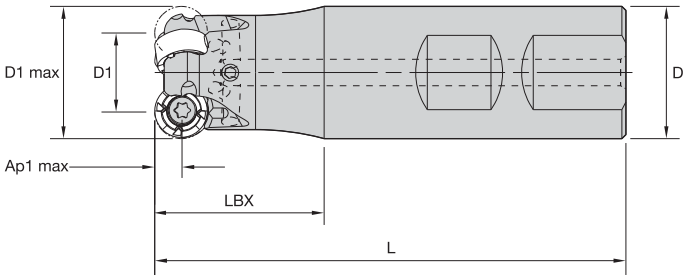
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max RPM	coolant supply	kg
5210273	**M200D25Z03M12RN10**	25	15	21	12,5	M12	32	17	5,0	3	54700	Yes	0,08
5210274	**M200D32Z04M16RN10**	32	22	29	17,0	M16	40	24	5,0	4	48300	Yes	0,18
5210275	**M200D35Z05M16RN10**	35	24	29	17,0	M16	40	24	5,0	5	46200	Yes	0,20
5210276	**M200D42Z06M16RN10**	42	32	29	17,0	M16	40	24	5,0	6	42200	Yes	0,24

Spare Parts

 insert screw	 Nm	 Torx driver
191.848	2,0	**170.025**

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
5210277	**M200D25Z03B25RN10**	25	15	25	89	40	5,0	3	54700	Yes	0,27
5210278	**M200D32Z04B32RN10**	32	22	32	101	40	5,0	4	48300	Yes	0,52

Spare Parts



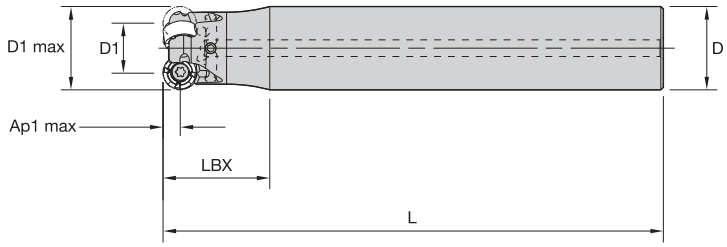


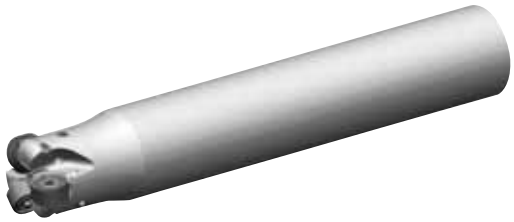


insert screw	Nm	Torx driver
191.848	2,0	**170.025**

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Cylindrical End Mills

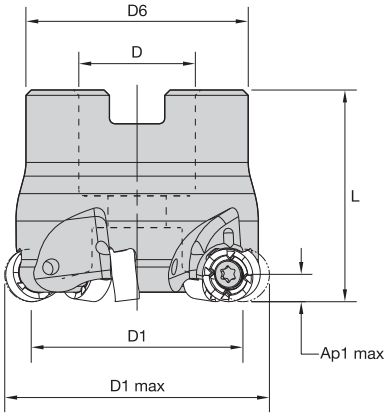
order number	catalogue number	D1 max	D1	D	L	LBX	L2	Ap1 max	Z	max RPM	coolant supply	kg
5210279	**M200D25Z03A25RN10L150**	25	15	25	150	32	32	5,0	3	54700	Yes	0,50
5210300	**M200D25Z03A25RN10L200**	25	15	25	200	32	32	5,0	3	54700	Yes	0,69
5210301	**M200D25Z03A32RN10L250**	25	15	32	250	32	32	5,0	3	54700	Yes	1,41
5210302	**M200D28Z03A25RN10L200**	28	18	25	200	40	40	5,0	3	51600	Yes	0,70
5210303	**M200D32Z04A32RN10L150**	32	22	32	150	40	40	5,0	4	48300	Yes	0,83
5210304	**M200D32Z03A32RN10L200**	32	22	32	200	40	40	5,0	3	48300	Yes	1,14

Spare Parts

 insert screw	 Nm	 Torx driver
191.848	2,0	**170.025**

- Double-sided, eight cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5210305	**M200D40Z04RN10**	40	30	16	38	40	5,0	4	43200	Yes	0,23
5210306	**M200D40Z06RN10**	40	30	16	38	40	5,0	6	43200	Yes	0,24
5210307	**M200D50Z05RN10**	50	40	22	42	40	5,0	5	38600	Yes	0,32
5210308	**M200D50Z06RN10**	50	40	22	42	40	5,0	6	38600	Yes	0,32
5210309	**M200D52Z06RN10**	52	42	22	49	50	5,0	6	37900	Yes	0,52

Spare Parts

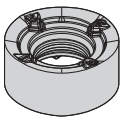
D1 max	 insert screw	 Nm	 wrench	 socket-head cap screw	 socket-head cap screw with coolant groove
40	**191.848**	2,0	**170.025**	**MS1294**	**MS1294CG**
50	**191.848**	2,0	**170.025**	**MS1234**	**MS1234CG**
52	**191.848**	2,0	**170.025**	**MS1242**	**MS1242CG**

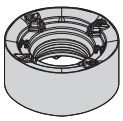
NOTE: Socket-head cap screw and socket-head cap screw with coolant groove must be ordered separately.

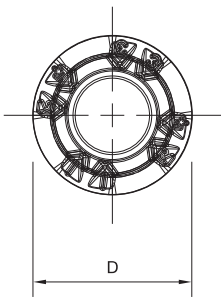
Insert Selection Guide

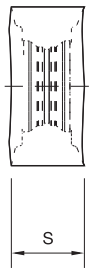
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15CM	**MH**	**WK15CM**	MH	WP25PM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**MM**	**WS30PM**	MM	WU35PM
S3	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
S4	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–

iC10 • Inserts • RN.J10…


RNGJ-ML


RNGJ-MM





- -ML geometry is the first choice for stainless steel and high-temp alloys.
- -MM geometry is for general purpose, especially for steel.

● first choice
○ alternate choice

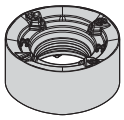
P			●	●		●	●	●
M			○	●	○	●	○	●
K		●	○	○			○	
N								
S				●	●	●		○
H			○	○				

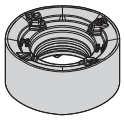
RNGJ-ML

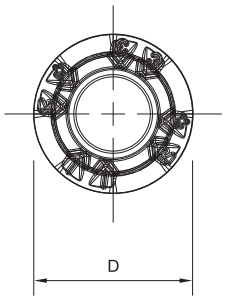
catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0EML	8	10,00	4,76	▪	▪	5274456	5520352	5274457	5274455	▪

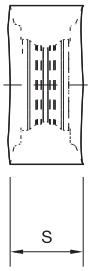
RNGJ-MM

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ10T3M0SMM	8	10,00	4,76	▪	▪	5274511	5520353	5274512	▪	▪


RNGJ-MM


RNPJ-MH





- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

● first choice
○ alternate choice

		WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K		●	○	○			○	
N								
S				●	●	●		○
H			○	○				

RNPJ-MM

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ10T3M0SMM	8	10,00	4,76	-	5276198	5276197	-	-	5276196	5542327

RNPJ-MH

catalogue number	number of indexes	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ10T3M0SMH	8	10,00	4,76	5276243	5276241	5276240	-	5476633	5276199	5542328

Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WS30PM		
P	1	–	–	–	660	**580**	540	395	**340**	325	–	–	–
	2	–	–	–	410	**370**	330	330	**290**	240	–	–	–
	3	–	–	–	370	**330**	305	305	**260**	210	–	–	–
	4	–	–	–	275	**260**	230	270	**220**	180	–	–	–
	5	–	–	–	330	**300**	275	220	**205**	180	–	–	–
	6	–	–	–	230	**205**	175	200	**150**	120	–	–	–
M	1	–	–	–	270	**240**	210	245	**215**	200	270	**240**	220
	2	–	–	–	245	**210**	190	220	**190**	155	245	**215**	175
	3	–	–	–	190	**175**	150	170	**145**	115	185	**160**	125
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	–	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	–	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**40**	30	55	**50**	35
	2	–	–	–	–	–	–	50	**40**	30	55	**50**	35
	3	–	–	–	–	–	–	60	**50**	30	65	**55**	35
	4	–	–	–	–	–	–	85	**60**	40	100	**70**	50
H	1	–	–	–	170	**140**	115	145	**110**	85	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		WU35PM			WP35CM			WP40PM		
P	1	310	**275**	260	545	**475**	445	355	**310**	295
	2	265	**230**	190	335	**305**	275	300	**260**	215
	3	240	**205**	170	305	**275**	245	275	**235**	190
	4	215	**180**	145	230	**210**	190	245	**205**	160
	5	180	**160**	145	310	**275**	250	205	**185**	160
	6	155	**120**	95	190	**160**	130	180	**140**	110
M	1	205	**180**	160	245	**220**	185	235	**205**	185
	2	185	**155**	130	220	**190**	170	210	**180**	150
	3	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	–	–	355	**320**	290	–	–	–
	2	–	–	–	280	**250**	230	–	–	–
	3	–	–	–	235	**210**	190	–	–	–
N	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–
S	1	40	**35**	30	–	–	–	50	**40**	35
	2	40	**35**	30	–	–	–	50	**40**	35
	3	55	**40**	30	–	–	–	60	**50**	35
	4	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,13	**0,44**	0,80	0,10	**0,32**	0,57	0,07	**0,24**	0,43	0,06	**0,21**	0,37	0,06	**0,19**	0,34	ML
MM	0,28	**0,50**	0,91	0,20	**0,36**	0,66	0,15	**0,27**	0,49	0,13	**0,24**	0,43	0,12	**0,22**	0,39	MM
MH	0,46	**0,58**	0,96	0,33	**0,42**	0,69	0,25	**0,31**	0,51	0,22	**0,27**	0,45	0,20	**0,25**	0,41	MH

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,15	**0,51**	0,92	0,11	**0,37**	0,66	0,08	**0,27**	0,49	0,07	**0,24**	0,43	0,07	**0,22**	0,39	ML
MM	0,32	**0,58**	1,06	0,23	**0,42**	0,76	0,18	**0,31**	0,57	0,15	**0,27**	0,49	0,14	**0,25**	0,45	MM
MH	0,54	**0,67**	1,11	0,39	**0,48**	0,80	0,29	**0,36**	0,59	0,25	**0,32**	0,52	0,23	**0,29**	0,47	MH

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,20	**0,67**	1,21	0,14	**0,48**	0,87	0,11	**0,36**	0,65	0,09	**0,31**	0,56	0,09	**0,29**	0,52	ML
MM	0,43	**0,77**	1,39	0,31	**0,55**	1,00	0,23	**0,41**	0,74	0,20	**0,36**	0,65	0,18	**0,33**	0,59	MM
MH	0,70	**0,88**	1,46	0,51	**0,63**	1,04	0,38	**0,47**	0,78	0,33	**0,41**	0,68	0,30	**0,38**	0,62	MH

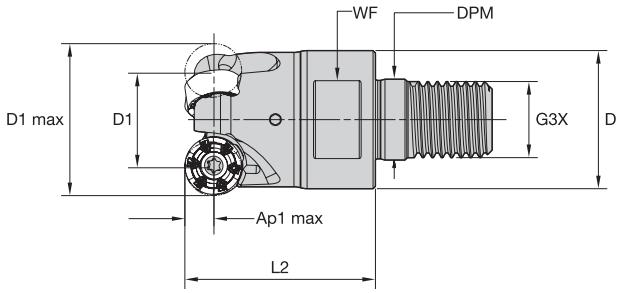
At 0,63 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,27	**0,92**	1,67	0,20	**0,66**	1,19	0,15	**0,49**	0,89	0,13	**0,43**	0,77	0,12	**0,39**	0,71	ML
MM	0,58	**1,05**	1,92	0,42	**0,75**	1,37	0,31	**0,56**	1,02	0,27	**0,49**	0,88	0,25	**0,45**	0,81	MM
MH	0,96	**1,21**	2,02	0,69	**0,87**	1,43	0,52	**0,65**	1,06	0,45	**0,56**	0,93	0,41	**0,52**	0,85	MH

NOTE: Use "Light Machining" value as starting feed rate.

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Screw-On End Mills

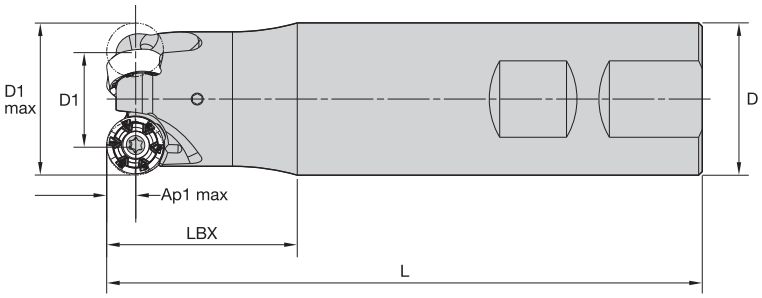
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max RPM	coolant supply	kg
4147560	**M200D32Z03M16RN12**	32	20	29	17,0	M16	40	24	3,0	3	39160	Yes	0,18
4147561	**M200D35Z03M16RN12**	35	23	29	17,0	M16	40	24	3,0	3	37440	Yes	0,19
4147562	**M200D42Z04M16RN12**	42	30	29	17,0	M16	40	24	3,0	4	34180	Yes	0,24

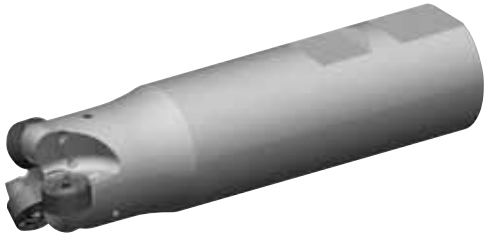
Spare Parts

D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**
35	**193.492**	4,0	**170.025**
42	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Weldon Shanks

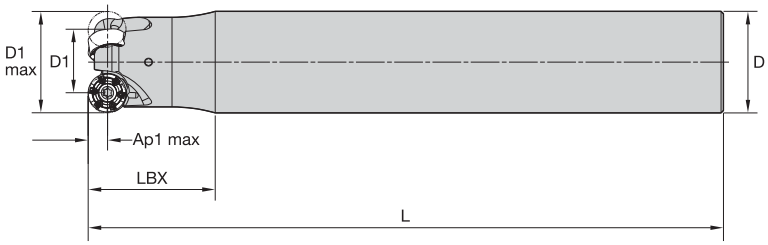
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147564	**M200D32Z03B32RN12**	32	20	32	125	40	3,0	3	39160	Yes	0,65

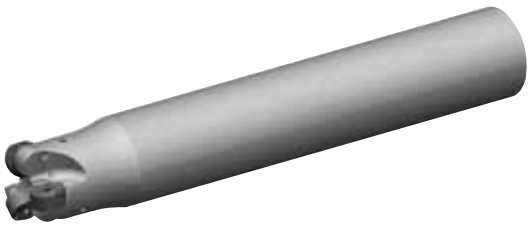
Spare Parts

D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Cylindrical End Mills

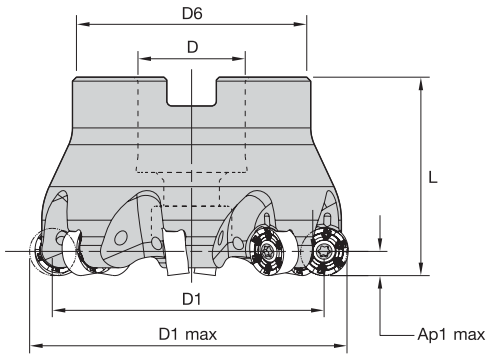
order number	catalogue number	D1 max	D1	D	L	LBX	Ap1 max	Z	max RPM	coolant supply	kg
4147566	**M200D32Z03A32RN12L200**	32	20	32	200	40	3,0	3	39160	Yes	1,10
4147567	**M200D32Z02A32RN12L250**	32	20	32	250	40	3,0	2	39160	Yes	1,41

Spare Parts

D1 max	insert screw	Nm	Torx driver
32	**193.492**	4,0	**170.025**

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
4147568	**M200D40Z04RN12**	40	28	16	38	40	3,0	4	35020	Yes	0,22
4147569	**M200D50Z04RN12**	50	38	22	42	40	3,0	4	31330	Yes	0,30
4147570	**M200D50Z05RN12**	50	38	22	42	40	3,0	5	31330	Yes	0,29
4147571	**M200D52Z05RN12**	52	40	22	49	50	3,0	5	30720	Yes	0,49
4147572	**M200D63Z05RN12**	63	51	22	49	50	3,0	5	27910	Yes	0,63
4147573	**M200D63Z07RN12**	63	51	22	49	50	3,0	7	27910	Yes	0,63
4147574	**M200D66Z07RN12**	66	54	27	60	50	3,0	7	27260	Yes	0,82
4147575	**M200D80Z06RN12**	80	68	27	60	50	3,0	6	24760	Yes	1,02
4147576	**M200D80Z08RN12**	80	68	27	60	50	3,0	8	24760	Yes	1,02
4147577	**M200D100Z07RN12**	100	88	32	78	50	3,0	7	22150	Yes	1,45
4147578	**M200D100Z09RN12**	100	88	32	78	50	3,0	9	22150	Yes	1,41

Spare Parts

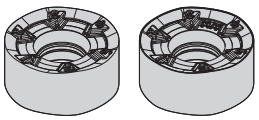
D1 max	 insert screw	 Nm	wrench	 low-head cap screw	 socket-head cap screw	 socket-head cap screw with coolant groove	 coolant lock screw	 coolant lock screw assembly
40	**193.492**	4,0	**170.025**	–	**MS1294**	**MS1294CG**	–	–
50	**193.492**	4,0	**170.025**	**MS1336**	–	**MS2072CG**	–	–
52	**193.492**	4,0	**170.025**	–	**MS1242**	**MS1242CG**	–	–
63	**193.492**	4,0	**170.025**	–	**MS1242**	**MS1242CG**	–	–
66	**193.492**	4,0	**170.025**	–	**MS2038**	**MS2038CG**	–	–
80	**193.492**	4,0	**170.025**	–	**MS2038**	**MS2038CG**	–	–
100	**193.492**	4,0	**170.025**	–	–	–	**KLS32M**	**MS2195C**

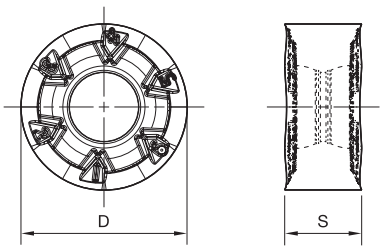
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15PM	**MH**	**WK15PM**	MH	WP25PM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**MM**	**WS30PM**	MM	WU35PM
S3	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
S4	ML	WS30PM	**MM**	**WU35PM**	MM	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–

iC12 • Inserts • RN.J12..


RNGJ-ML RNGJ-MM



- -ML geometry is the first choice for stainless steel and high-temp alloys.
- -MM geometry is for general purpose, especially for steel.

● first choice
○ alternate choice

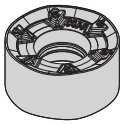
	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K	●	●	○	○			○	
N								
S				●	●	●		○
H			○	○				

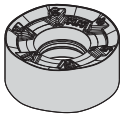
RNGJ-ML

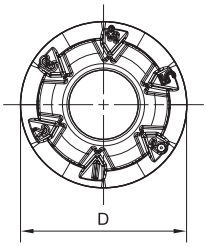
catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0EML	12	12,00	4,75	-	-	-	5123863	5520350	5123864	5123865	-

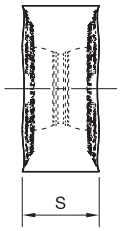
RNGJ-MM

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0SMM	12	12,00	4,75	5123866	-	-	5123867	5520351	5123868	5123869	-


RNGJ-MH
RNPJ-MH


RNPJ-MM





- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steel.

● first choice
○ alternate choice

		WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P				●	●		●	●	●
M				○	●	○	●	○	●
K		●	●	○	○			○	
N									
S					●	●	●		○
H				○	○				

■ RNGJ-MH

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1204M0SMH	12	12,00	4,75	5123900	-	-	5123901	-	5123902	5123903	-

■ RNPJ-MM

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1204M0SMM	12	12,00	4,75	-	-	5276362	5276361	-	5476634	5276360	5542329

■ RNPJ-MH

catalogue number	cutting edges	D	S	WK15PM	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1204M0SMH	12	12,00	4,75	-	5276366	5276365	5276364	-	5476635	5276363	5542340

Recommended Starting Speeds [m/min]

Material Group		WK15PM			WK15CM			WP20CM			WP25PM		
P	1	–	–	–	–	–	–	660	**580**	540	395	**340**	325
	2	–	–	–	–	–	–	410	**370**	330	330	**290**	240
	3	–	–	–	–	–	–	370	**330**	305	305	**260**	210
	4	–	–	–	–	–	–	275	**260**	230	270	**220**	180
	5	–	–	–	–	–	–	330	**300**	275	220	**205**	180
	6	–	–	–	–	–	–	230	**205**	175	200	**150**	120
M	1	–	–	–	–	–	–	270	**240**	210	245	**215**	200
	2	–	–	–	–	–	–	245	**210**	190	220	**190**	155
	3	–	–	–	–	–	–	190	**175**	150	170	**145**	115
K	1	325	**295**	260	505	**460**	410	430	**390**	355	275	**245**	220
	2	250	**230**	210	400	**355**	330	340	**305**	280	215	**190**	180
	3	210	**190**	175	335	**300**	275	290	**260**	240	180	**160**	145
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	–	–	–	50	**40**	30
	2	–	–	–	–	–	–	–	–	–	50	**40**	30
	3	–	–	–	–	–	–	–	–	–	60	**50**	30
	4	–	–	–	–	–	–	–	–	–	85	**60**	40
H	1	–	–	–	–	–	–	170	**140**	115	145	**110**	85
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

Material Group		WS30PM			WU35PM			WP35CM			WP40PM		
P	1	–	–	–	310	**275**	260	545	**475**	445	355	**310**	295
	2	–	–	–	265	**230**	190	335	**305**	275	300	**260**	215
	3	–	–	–	240	**205**	170	305	**275**	245	275	**235**	190
	4	–	–	–	215	**180**	145	230	**210**	190	245	**205**	160
	5	–	–	–	180	**160**	145	310	**275**	250	205	**185**	160
	6	–	–	–	155	**120**	95	190	**160**	130	180	**140**	110
M	1	270	**240**	220	205	**180**	160	245	**220**	185	235	**205**	185
	2	245	**215**	175	185	**155**	130	220	**190**	170	210	**180**	150
	3	185	**160**	125	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	–	–	–	–	–	355	**320**	290	–	–	–
	2	–	–	–	–	–	–	280	**250**	230	–	–	–
	3	–	–	–	–	–	–	235	**210**	190	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	55	**50**	35	40	**35**	30	–	–	–	50	**40**	35
	2	55	**50**	35	40	**35**	30	–	–	–	50	**40**	35
	3	65	**55**	35	55	**40**	30	–	–	–	60	**50**	35
	4	100	**70**	50	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,12	**0,18**	0,32	0,09	**0,13**	0,23	0,07	**0,10**	0,18	0,06	**0,08**	0,15	0,05	**0,08**	0,14	ML
MM	0,28	**0,51**	0,84	0,21	**0,37**	0,61	0,15	**0,28**	0,45	0,13	**0,24**	0,39	0,12	**0,22**	0,36	MM
MH	0,46	**0,70**	1,02	0,33	**0,50**	0,73	0,25	**0,38**	0,55	0,22	**0,33**	0,48	0,20	**0,30**	0,44	MH

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,14	**0,20**	0,37	0,10	**0,15**	0,27	0,08	**0,11**	0,20	0,07	**0,10**	0,18	0,06	**0,09**	0,16	ML
MM	0,33	**0,59**	0,97	0,24	**0,43**	0,70	0,18	**0,32**	0,52	0,16	**0,28**	0,45	0,14	**0,25**	0,42	MM
MH	0,54	**0,81**	1,18	0,39	**0,58**	0,85	0,29	**0,43**	0,63	0,25	**0,38**	0,55	0,23	**0,35**	0,51	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,18	**0,27**	0,49	0,13	**0,19**	0,35	0,10	**0,15**	0,26	0,09	**0,13**	0,23	0,08	**0,12**	0,21	ML
MM	0,43	**0,77**	1,28	0,31	**0,56**	0,92	0,23	**0,42**	0,68	0,20	**0,36**	0,60	0,19	**0,33**	0,55	MM
MH	0,70	**1,06**	1,56	0,51	**0,76**	1,12	0,38	**0,57**	0,83	0,33	**0,50**	0,72	0,30	**0,45**	0,66	MH

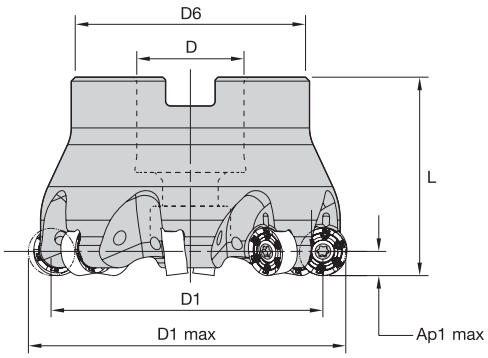
At 0,75 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,25	**0,37**	0,67	0,18	**0,27**	0,48	0,14	**0,20**	0,36	0,12	**0,17**	0,32	0,11	**0,16**	0,29	ML
MM	0,59	**1,06**	1,77	0,43	**0,76**	1,26	0,32	**0,57**	0,94	0,28	**0,50**	0,81	0,25	**0,45**	0,75	MM
MH	0,96	**1,46**	2,16	0,69	**1,04**	1,53	0,52	**0,78**	1,14	0,45	**0,68**	0,99	0,41	**0,62**	0,90	MH

NOTE: Use "Light Machining" value as starting feed rate.

- Double-sided, 12 cutting edges.
- Anti-rotation feature for better stability and higher feed rates.
- Pocketing and profiling capabilities.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max RPM	coolant supply	kg
5209989	**M200D50Z04RN16**	50	34	22	42	50	4,0	4	26700	Yes	0,36
5210210	**M200D52Z04RN16**	52	36	22	42	50	4,0	4	26000	Yes	0,39
5210212	**M200D63Z06RN16**	63	47	22	49	50	4,0	6	22700	Yes	0,56
5210211	**M200D63Z04RN16**	63	47	22	49	50	4,0	4	22700	Yes	0,58
5210213	**M200D66Z05RN16**	66	50	27	60	50	4,0	5	22000	Yes	0,69
5210214	**M200D80Z05RN16**	80	64	27	60	50	4,0	5	19500	Yes	0,88
5210215	**M200D80Z07RN16**	80	64	27	60	50	4,0	7	19500	Yes	0,89
5210216	**M200D100Z06RN16**	100	84	32	78	50	4,0	6	17000	Yes	1,36
5210217	**M200D100Z08RN16**	100	84	32	78	50	4,0	8	17000	Yes	1,37
5210218	**M200D125Z08RN16**	125	109	40	90	63	4,0	8	14900	Yes	2,50

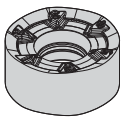
Spare Parts

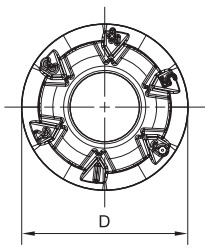
D1 max	 insert screw	 Nm	 wrench	 socket-head cap screw	 socket-head cap screw with coolant groove	 coolant lock screw	 coolant lock screw assembly
50	**192.932**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
52	**MS2260**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
63	**MS2260**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
63	**193.343**	4,0	**170.026**	**MS1242**	**MS1242CG**	–	–
66	**MS2260**	4,0	**170.026**	**MS2038**	**MS2038CG**	–	–
80	**MS2260**	4,0	**170.026**	**MS2038**	**MS2038CG**	–	–
100	**MS2260**	4,0	**170.026**	–	–	**KLS32M**	**MS2195C**
125	**MS2260**	4,0	**170.026**	–	–	**KLS40M**	**MS2187C**

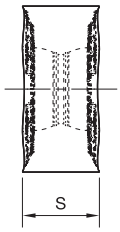
NOTE: Socket-head cap screw with coolant groove and coolant lock screw assembly must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	ML	WP25PM	**MM**	**WP40PM**	MM	WP40PM
P3–P4	ML	WP25PM	**MM**	**WP25PM**	MH	WP40PM
P5–P6	ML	WP35CM	**MM**	**WP35CM**	MH	WP35CM
M1–M2	ML	WP25PM	**ML**	**WU35PM**	MM	WU35PM
M3	ML	WP25PM	**MM**	**WU35PM**	MM	WU35PM
K1–K2	MH	WK15CM	**MH**	**WK15CM**	MH	WP20CM
K3	MH	WK15CM	**MH**	**WP20CM**	MH	WP35CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	ML	WS30PM	**ML**	**WS30PM**	ML	WU35PM
S3	ML	WS30PM	**ML**	**WU35PM**	ML	WU35PM
S4	ML	WS30PM	**ML**	**WU35PM**	ML	WU35PM
H1	MH	WP25PM	**MH**	**WP20CM**	–	–


RNGJ-ML





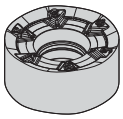
- -ML geometry is the first choice for stainless steel and high-temp alloys.

● first choice
○ alternate choice

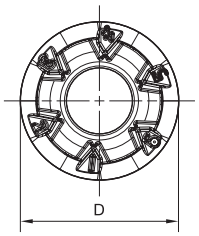
		WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
P			●	●		●	●	●
M			○	●	○	●	○	●
K		●	○	○			○	
N								
S				●	●	●		○
H			○	○				

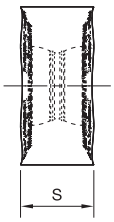
RNGJ-ML

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNGJ1605M0EML	12	16,00	6,35	-	-	5274561	5520354	5274562	5274560	-



RNPJ-MM
RNPJ-MH





- -MM geometry is for general purpose, especially for steel.
- -MH geometry is the first choice for heavy applications, cast iron, and high-strength steels.

● first choice
○ alternate choice

P			●	●		●	●	●
M			○	●	○	●	○	●
K	●	○	○				○	
N								
S				●	●	●		○
H			○	○				

■ RNPJ-MM

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1605M0SMM	12	16,00	6,35	–	5276472	5276471	–	5476637	5276470	5542341

■ RNPJ-MH

catalogue number	cutting edges	D	S	WK15CM	WP20CM	WP25PM	WS30PM	WU35PM	WP35CM	WP40PM
RNPJ1605M0SMH	12	16,00	6,35	5276476	5276475	5276474	–	5476636	5276473	5542342

Recommended Starting Speeds

■ Recommended Starting Speeds [m/min]

Material Group		WK15CM			WP20CM			WP25PM			WS30PM		
P	1	–	–	–	660	**580**	540	395	**340**	325	–	–	–
	2	–	–	–	410	**370**	330	330	**290**	240	–	–	–
	3	–	–	–	370	**330**	305	305	**260**	210	–	–	–
	4	–	–	–	275	**260**	230	270	**220**	180	–	–	–
	5	–	–	–	330	**300**	275	220	**205**	180	–	–	–
	6	–	–	–	230	**205**	175	200	**150**	120	–	–	–
M	1	–	–	–	270	**240**	210	245	**215**	200	270	**240**	220
	2	–	–	–	245	**210**	190	220	**190**	155	245	**215**	175
	3	–	–	–	190	**175**	150	170	**145**	115	185	**160**	125
K	1	505	**460**	410	430	**390**	355	275	**245**	220	–	–	–
	2	400	**355**	330	340	**305**	280	215	**190**	180	–	–	–
	3	335	**300**	275	290	**260**	240	180	**160**	145	–	–	–
N	1	–	–	–	–	–	–	–	–	–	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–
S	1	–	–	–	–	–	–	50	**40**	30	55	**50**	35
	2	–	–	–	–	–	–	50	**40**	30	55	**50**	35
	3	–	–	–	–	–	–	60	**50**	30	65	**55**	35
	4	–	–	–	–	–	–	85	**60**	40	100	**70**	50
H	1	–	–	–	170	**140**	115	145	**110**	85	–	–	–
	2	–	–	–	–	–	–	–	–	–	–	–	–
	3	–	–	–	–	–	–	–	–	–	–	–	–

(Recommended Starting Speeds [m/min] — continued)

Material Group		WU35PM			WP35CM			WP40PM		
P	1	310	**275**	260	545	**475**	445	355	**310**	295
	2	265	**230**	190	335	**305**	275	300	**260**	215
	3	240	**205**	170	305	**275**	245	275	**235**	190
	4	215	**180**	145	230	**210**	190	245	**205**	160
	5	180	**160**	145	310	**275**	250	205	**185**	160
	6	155	**120**	95	190	**160**	130	180	**140**	110
M	1	205	**180**	160	245	**220**	185	235	**205**	185
	2	185	**155**	130	220	**190**	170	210	**180**	150
	3	140	**120**	95	175	**155**	140	155	**140**	110
K	1	–	**–**	–	355	**320**	290	–	**–**	–
	2	–	**–**	–	280	**250**	230	–	**–**	–
	3	–	**–**	–	235	**210**	190	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	40	**35**	30	–	**–**	–	50	**40**	35
	2	40	**35**	30	–	**–**	–	50	**40**	35
	3	55	**40**	30	–	**–**	–	60	**50**	35
	4	70	**55**	35	80	**60**	40	80	**60**	40
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,12	**0,37**	0,48	0,09	**0,27**	0,35	0,07	**0,20**	0,26	0,06	**0,17**	0,23	0,05	**0,16**	0,21	ML
MM	0,28	**0,70**	0,81	0,21	**0,50**	0,58	0,15	**0,38**	0,44	0,13	**0,33**	0,38	0,12	**0,30**	0,35	MM
MH	0,53	**0,70**	1,17	0,38	**0,50**	0,84	0,29	**0,38**	0,63	0,25	**0,33**	0,55	0,23	**0,30**	0,50	MH

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,14	**0,43**	0,56	0,10	**0,31**	0,40	0,08	**0,23**	0,30	0,07	**0,20**	0,26	0,06	**0,18**	0,24	ML
MM	0,33	**0,81**	0,94	0,24	**0,58**	0,67	0,18	**0,43**	0,50	0,16	**0,38**	0,44	0,14	**0,35**	0,40	MM
MH	0,62	**0,81**	1,36	0,44	**0,58**	0,97	0,33	**0,43**	0,72	0,29	**0,38**	0,63	0,27	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,19	**0,56**	0,73	0,14	**0,40**	0,53	0,10	**0,30**	0,40	0,09	**0,26**	0,34	0,08	**0,24**	0,32	ML
MM	0,43	**1,06**	1,24	0,31	**0,76**	0,89	0,23	**0,57**	0,66	0,20	**0,50**	0,57	0,19	**0,45**	0,53	MM
MH	0,81	**1,06**	1,79	0,58	**0,76**	1,28	0,44	**0,57**	0,95	0,38	**0,50**	0,83	0,35	**0,45**	0,76	MH

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
ML	0,26	**0,77**	1,01	0,19	**0,55**	0,73	0,14	**0,41**	0,54	0,12	**0,36**	0,47	0,11	**0,33**	0,43	ML
MM	0,59	**1,46**	1,70	0,43	**1,04**	1,21	0,32	**0,78**	0,90	0,28	**0,68**	0,79	0,25	**0,62**	0,72	MM
MH	1,11	**1,46**	2,48	0,80	**1,04**	1,75	0,60	**0,78**	1,30	0,52	**0,68**	1,13	0,48	**0,62**	1,03	MH

NOTE: Use "Light Machining" value as starting feed rate.

Ideal for Die and Mould Applications •
M170™ Series



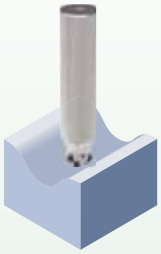
M170

Specially engineered with industry standard insert sizes, the M170 Series offers the highest performance rates for best-in-class cost efficiency, high-strength steel, and hard machining capability, and a strong, solid cutter body designed for maximum performance.

- Nickel-coated cutter bodies ensure improved tool life and chip flow.
- Screw-on end mills and shell mills.
- High tooth density for optimised HSM.
- High-accuracy PSTS inserts are ideal for die and mould manufacturing.



Copy Mills



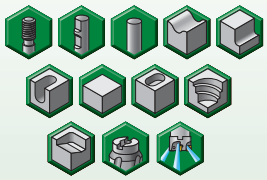
M170™

Max depth of cut: 8mm

Diameter: 12–125mm

Pages: M42–M70





Insert Offering



iC07

7mm iC insert RD.X
Up to 3,5mm Ap max.
Diameter range
12–35mm



iC10

10mm iC insert RDPX
Up to 5mm Ap max.
Diameter range
20–52mm



iC12

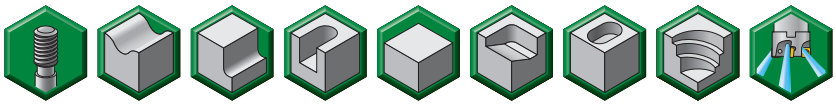
12mm iC insert RDPX
Up to 6mm Ap max.
Diameter range
24–100mm

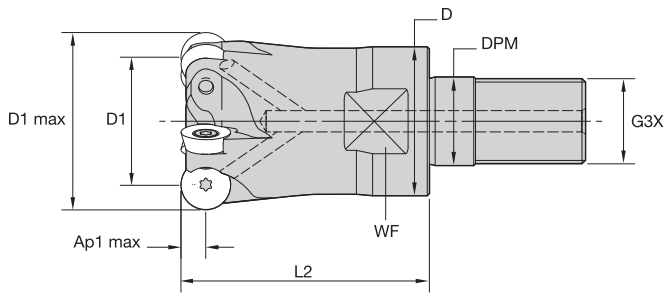


iC16

16mm iC insert RDPX
Up to 8mm Ap max.
Diameter range
32–125mm

- Longer cutter tool life.
- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

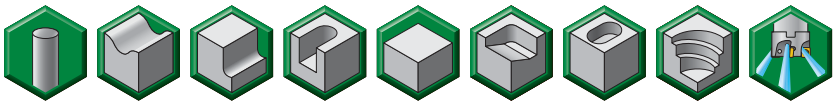
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3935336	**M170D012Z02M06RD07T**	12	5	10	6,5	M6	18	7	3,5	2	22.0°	26200	Yes	0,02
3935337	**M170D012Z02M08RD07T**	12	5	13	8,5	M8	23	10	3,5	2	22.0°	26200	Yes	0,02
3935338	**M170D015Z03M08RD07T**	15	8	13	8,5	M8	18	10	3,5	3	11.0°	21200	Yes	0,02

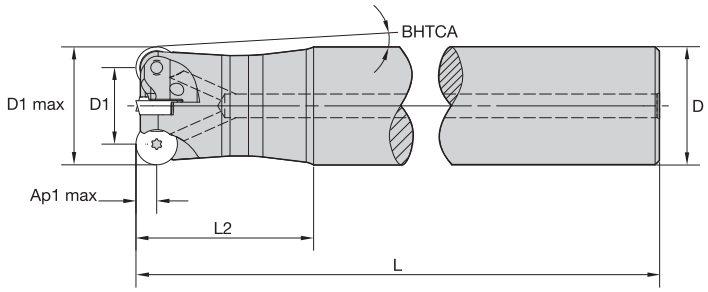
Spare Parts

D1 max	 insert screw	 Nm	 Torx driver
12	**193.364**	1,0	**12147549000**
15	**193.364**	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

- Longer cutter tool life.
- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3935339	**M170D012Z02A12RD07TL100**	12	5	12	100	20	–	3,5	2	22.0°	26200	Yes	0,07
3935340	**M170D012Z02A16RD07TL120**	12	5	16	120	60	2.0°	3,5	2	22.0°	26200	Yes	0,14
3935341	**M170D012Z02A16RD07TL140**	12	5	16	140	80	1.5°	3,5	2	22.0°	26200	Yes	0,16
3935342	**M170D015Z03A16RD07TL130**	15	8	16	130	60	0.5°	3,5	3	11.0°	21200	Yes	0,13

Spare Parts

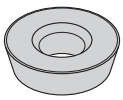
D1 max	 insert screw	 Nm	 Torx driver
12	**193.364**	1,0	**12147549000**
15	**193.364**	1,0	**12147549000**

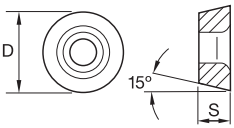
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	–	–	–	–	–	–
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

iC07 • Inserts


RDHX-MH



- -MH geometry is suitable for high-strength steels, cast iron, and hard machining.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDHX-MH

catalogue number	D	S	hm	3960578	3960573	3960532
RDHX07T1M0SNMH	7,00	1,98	0,08			

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 3,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,23	**0,46**	0,74	0,17	**0,33**	0,54	0,13	**0,25**	0,40	0,11	**0,22**	0,35	0,10	**0,20**	0,32	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,28	**0,56**	0,91	0,20	**0,41**	0,65	0,15	**0,31**	0,49	0,13	**0,27**	0,43	0,12	**0,24**	0,39	MH

At 0,75 Axial Depth of Cut (ap)

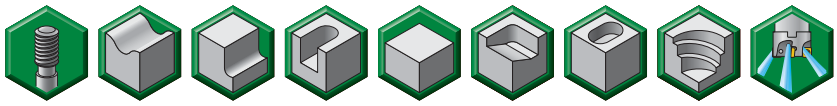
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,37	**0,75**	1,21	0,27	**0,54**	0,87	0,20	**0,40**	0,65	0,18	**0,35**	0,56	0,16	**0,32**	0,52	MH

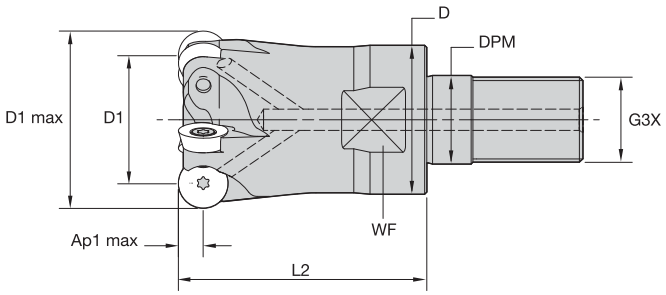
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,45	**0,91**	1,47	0,32	**0,65**	1,05	0,24	**0,49**	0,78	0,21	**0,42**	0,68	0,19	**0,39**	0,62	MH

NOTE: Use "Light Machining" value as starting feed rate.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926607	**M170D015Z02M08RD07**	15	8	13	8,5	M8	23	10	3,5	2	18.0°	21200	Yes	0,03
3926608	**M170D016Z03M08RD07**	16	9	13	8,5	M8	23	10	3,5	3	9.0°	21200	Yes	0,03
3926609	**M170D020Z04M10RD07**	20	13	18	10,5	M10	30	14	3,5	4	12.5°	19600	Yes	0,06
3926610	**M170D025Z05M12RD07**	25	18	21	12,5	M12	35	19	3,5	5	8.5°	12700	Yes	0,10
3926611	**M170D030Z05M16RD07**	30	23	29	17,0	M16	43	22	3,5	5	6.5°	10600	Yes	0,20
3926612	**M170D035Z06M16RD07**	35	28	29	17,0	M16	43	22	3,5	6	4.8°	9900	Yes	0,23

Spare Parts



insert screw

193.341



Nm

1,0

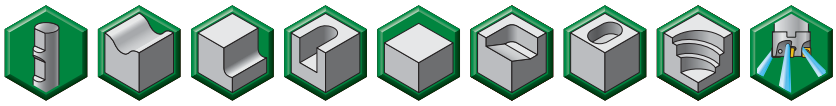


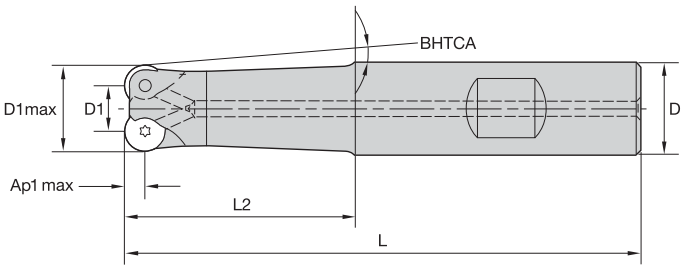
Torx

12147549000

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Weldon Shanks

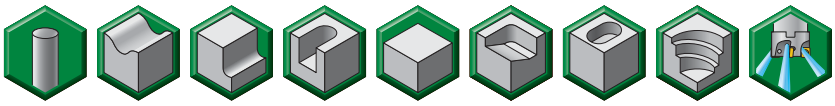
order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3929403	**M170D015Z02B16RD07**	15	8	16	90	40	1.0°	3,5	2	18.0°	21200	Yes	0,11

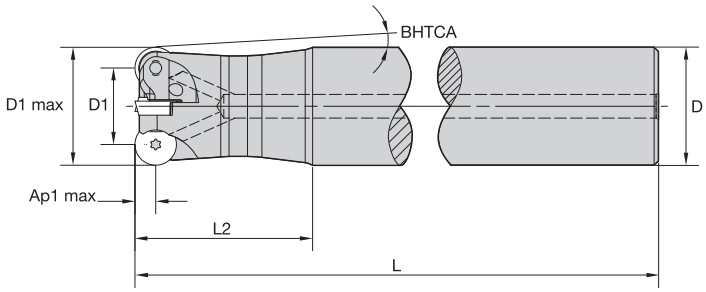
Spare Parts

D1 max	 insert screw	 Nm	 Torx driver
15	**193.341**	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3929404	**M170D015Z02A16RD07L110**	15	8	16	110	60	0.5°	3,5	2	18.0°	21200	Yes	0,14
3929405	**M170D015Z02A16RD07L150**	15	8	16	150	60	0.5°	3,5	2	18.0°	21200	Yes	0,20
3929407	**M170D016Z02A16RD07L150**	16	9	16	150	30	–	3,5	2	9.0°	21200	Yes	0,21
3929406	**M170D016Z03A16RD07L110**	16	9	16	110	20	–	3,5	3	9.0°	21200	Yes	0,16
3929409	**M170D020Z03A20RD07L140**	20	13	20	140	40	–	3,5	3	12.0°	10600	Yes	0,29
3929408	**M170D020Z04A20RD07L115**	20	13	20	115	30	–	3,5	4	12.0°	10600	Yes	0,25

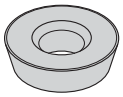
Spare Parts

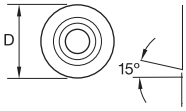
D1 max	 insert screw	 Nm	 Torx driver
15	**193.341**	1,0	**12147549000**
16	**193.341**	1,0	**12147549000**
20	**193.341**	1,0	**12147549000**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	–	–	–	–	–	–
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	–	–	–	–
M3	–	–	–	–	–	–
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–


RDPX-MH



- -MH geometry is suitable for high-strength steels, cast iron, and hard machining.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MH

catalogue number	D	S	hm	3959627	3959626	3959625
RDPX0702M0SNMH	7,00	2,38	0,08			

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 3,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,23	**0,46**	0,74	0,17	**0,33**	0,54	0,13	**0,25**	0,40	0,11	**0,22**	0,35	0,10	**0,20**	0,32	MH

At 1,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,28	**0,56**	0,91	0,20	**0,41**	0,65	0,15	**0,31**	0,49	0,13	**0,27**	0,43	0,12	**0,24**	0,39	MH

At 0,75 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,37	**0,75**	1,21	0,27	**0,54**	0,87	0,20	**0,40**	0,65	0,18	**0,35**	0,56	0,16	**0,32**	0,52	MH

At 0,50 Axial Depth of Cut (ap)

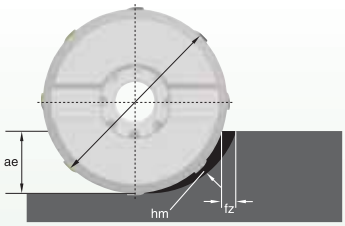
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MH	0,45	**0,91**	1,47	0,32	**0,65**	1,05	0,24	**0,49**	0,78	0,21	**0,42**	0,68	0,19	**0,39**	0,62	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

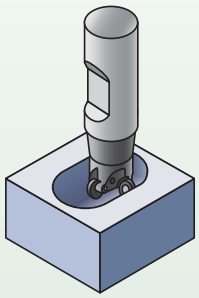
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 0,5mm	0,59mm	0,42mm	0,34mm	0,30mm	0,26mm	0,19mm
Ap1 = 0,75mm	0,50mm	0,36mm	0,29mm	0,25mm	0,22mm	0,16mm
Ap1 = 1mm	0,42mm	0,30mm	0,24mm	0,21mm	0,19mm	0,13mm
Ap1 = 1,5mm	0,34mm	0,24mm	0,20mm	0,17mm	0,15mm	0,11mm
Ap1 = 3,5mm	0,22mm	0,16mm	0,13mm	0,11mm	0,10mm	0,08mm

Example application highlighted.

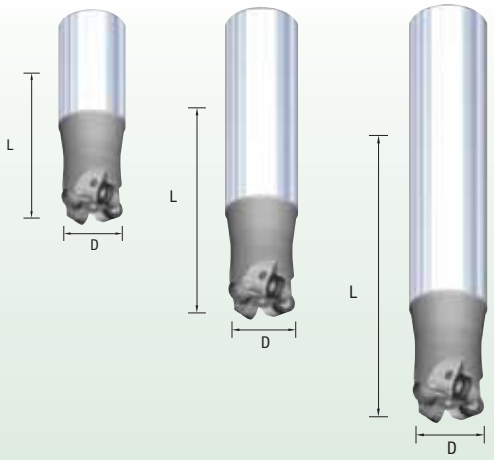


Example Cutting Conditions for RD..07... Insert in Pocketing, L/D ratio = 2 x D:

insert = RDPX0702M0SNMH		TN2505			TN6525			TN6540		
		feed per tooth fz (mm)/ae>50%								
		min	med	max	min	med	max	min	med	max
ae>50%	Recommended starting Ap1 = 0,5mm	0,19mm	0,22mm	0,30mm	0,19mm	0,30mm	0,35mm	0,19mm	0,30mm	0,40mm

2. Ap1 and vc corrections depend on L/D ratio

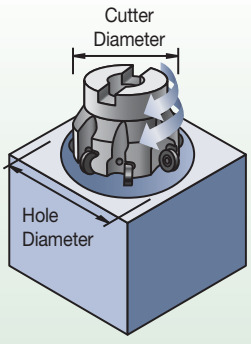
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:



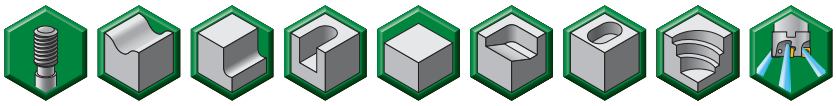
L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

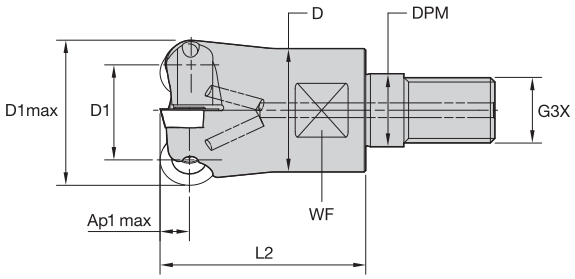
Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
12	17mm	17mm	3,5mm	22°	1mm
15	18mm	23mm	2,8mm	18°	2,2mm
16	20mm	25mm	1,9mm	9°	1,4mm
20	28mm	33mm	3,5mm	12°	1,5mm
25	36,5mm	43mm	3,5mm	8.5°	2,5mm
30	46,4mm	53mm	3,5mm	6.5°	2,5mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

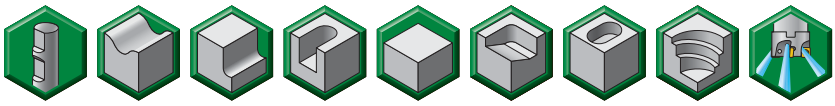
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3934647	**M170D020Z02M10RD10**	20	10	18	10,5	M10	30	15	5,0	2	20.0°	15900	Yes	0,06
3934648	**M170D025Z02M12RD10**	25	15	21	12,5	M12	35	19	5,0	2	8.0°	12800	Yes	0,10
3934649	**M170D025Z03M12RD10**	25	15	21	12,5	M12	35	19	5,0	3	8.0°	12800	Yes	0,10
3934650	**M170D030Z04M16RD10**	30	20	29	17,0	M16	43	22	5,0	4	10.0°	10600	Yes	0,24
3934651	**M170D035Z05M16RD10**	35	25	29	17,0	M16	45	22	5,0	5	8.5°	9100	Yes	0,23
3934652	**M170D042Z06M16RD10**	42	32	29	17,0	M16	45	22	5,0	6	6.0°	7800	Yes	0,28

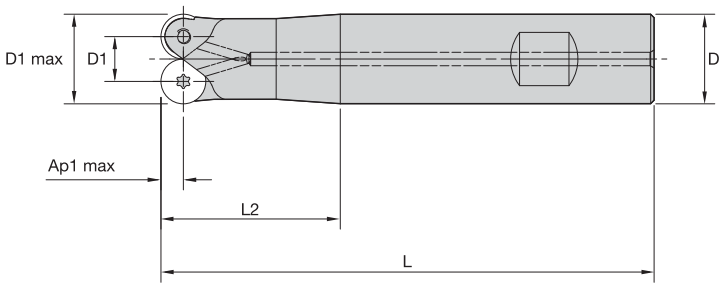
Spare Parts

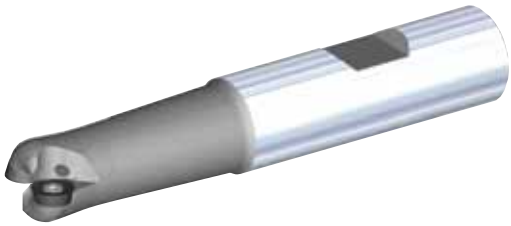
		
insert screw	**Nm**	**Torx driver**
193.342	3,5	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Weldon Shanks

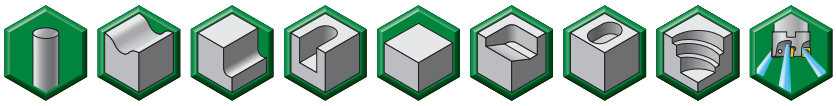
order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940703	**M170D020Z02B20RD10**	20	10	20	110	40	5,0	2	20.0°	15900	Yes	0,24
3940708	**M170D025Z03B25RD10**	25	15	25	110	40	5,0	3	9.0°	12900	Yes	0,35

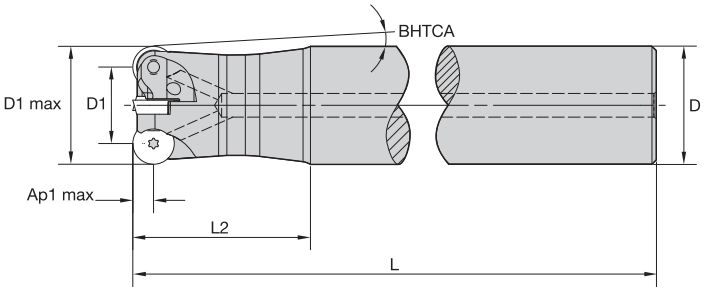
Spare Parts

D1 max	insert screw	Nm	Torx driver
20	**193.342**	3,5	**12148082400**
25	**193.342**	3,5	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Cylindrical Shanks

order number	catalogue number	D1 max	D1	D	L	L2	BHTCA	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940704	**M170D020Z02A20RD10L140**	20	10	20	140	60	–	5,0	2	20.0°	15900	Yes	0,30
3940705	**M170D020Z02A25RD10L160**	20	10	25	160	80	2.0°	5,0	2	20.0°	15900	Yes	0,48
3940706	**M170D020Z02A25RD10L180**	20	10	25	180	100	1.5°	5,0	2	20.0°	15900	Yes	0,53
3940707	**M170D022Z02A20RD10L160**	22	12	20	160	40	–	5,0	2	12.0°	14400	Yes	0,35
3940709	**M170D025Z02A25RD10L180**	25	15	25	180	70	–	5,0	2	9.0°	12800	Yes	0,61
3940710	**M170D025Z02A25RD10L220**	25	15	25	220	100	–	5,0	2	9.0°	12800	Yes	0,74
3940711	**M170D028Z02A25RD10L200**	28	18	25	200	40	–	5,0	2	15.0°	11300	Yes	0,74

Spare Parts



insert screw

193.342



Nm

3,5

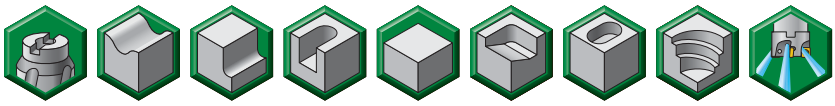


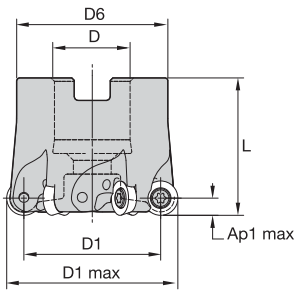
Torx driver

12148082400

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3940712	**M170D040Z05RD10**	40	30	16	37	40	5,0	5	7.2°	9950	Yes	0,28
3940723	**M170D042Z05RD10**	42	32	16	37	40	5,0	5	5.8°	9500	Yes	0,28
3940724	**M170D050Z06RD10**	50	40	22	44	40	5,0	6	5.2°	7950	Yes	0,35
3940725	**M170D052Z06RD10**	52	42	22	44	50	5,0	6	3.0°	7650	Yes	0,51

Spare Parts

D1 max	insert screw	Nm	Torx driver	socket-head cap screw	low-head cap screw	socket-head cap screw with coolant groove
40	**193.342**	3,5	**12148082400**	**MS1294**	**–**	**MS1294CG**
42	**193.342**	3,5	**12148082400**	**MS1294**	**–**	**MS1294CG**
50	**193.342**	3,5	**12148082400**	**–**	**129.025**	**MS2072CG**
52	**193.342**	3,5	**12148082400**	**–**	**129.025**	**MS2072CG**

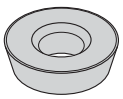
NOTE: All spare parts except the insert screws must be ordered separately.

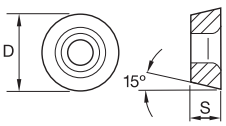
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

iC10 • Inserts


RDPX-MM


RDPX-MH



- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1003M0SNMM	10,00	3,18	0,11		3959633	3959582

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1003M0SNMH	10,00	3,18	0,12	3959581	3959580	3959579

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,28	**0,41**	0,74	0,20	**0,29**	0,53	0,15	**0,22**	0,4	0,13	**0,19**	0,35	0,12	**0,18**	0,32	MM
MH	0,33	**0,58**	0,98	0,24	**0,42**	0,71	0,18	**0,32**	0,53	0,16	**0,28**	0,46	0,14	**0,25**	0,42	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,35	**0,51**	0,93	0,25	**0,37**	0,67	0,19	**0,28**	0,50	0,17	**0,24**	0,44	0,15	**0,22**	0,40	MM
MH	0,42	**0,73**	1,23	0,30	**0,53**	0,88	0,23	**0,39**	0,66	0,20	**0,34**	0,57	0,18	**0,32**	0,53	MH

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,47	**0,68**	1,25	0,34	**0,49**	0,89	0,25	**0,37**	0,67	0,22	**0,32**	0,58	0,20	**0,29**	0,53	MM
MH	0,56	**0,98**	1,66	0,40	**0,71**	1,18	0,30	**0,53**	0,88	0,26	**0,46**	0,76	0,24	**0,42**	0,70	MH

At 0,50 Axial Depth of Cut (ap)

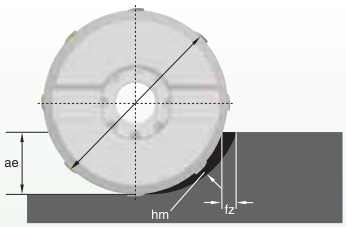
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,64	**0,94**	1,73	0,46	**0,68**	1,24	0,35	**0,51**	0,92	0,30	**0,44**	0,80	0,28	**0,40**	0,73	MM
MH	0,77	**1,36**	2,31	0,55	**0,97**	1,63	0,41	**0,73**	1,21	0,36	**0,63**	1,05	0,33	**0,58**	0,96	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

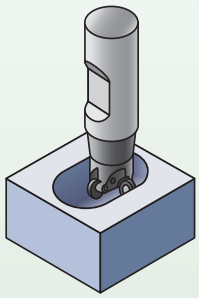
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 0,5mm	1,18mm	0,70mm	0,63mm	0,56mm	0,50mm	0,35mm
Ap1 = 0,75mm	0,95mm	0,62mm	0,56mm	0,50mm	0,45mm	0,30mm
Ap1 = 1mm	0,80mm	0,57mm	0,46mm	0,40mm	0,36mm	0,25mm
Ap1 = 2mm	0,57mm	0,40mm	0,33mm	0,28mm	0,25mm	0,18mm
Ap1 = 3mm	0,46mm	0,33mm	0,27mm	0,23mm	0,21mm	0,15mm
Ap1 = 5mm	0,36mm	0,25mm	0,21mm	0,18mm	0,16mm	0,11mm

Example application highlighted.



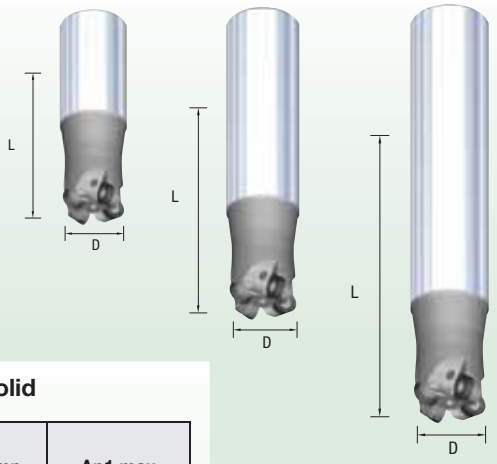
Example Cutting Conditions for RD..10... Insert in Pocketing, L/D ratio = 2 x D:

insert = RDPX1003M0SN			TN2505			TN6525			TN6540		
			feed per tooth fz (mm)/ae>50%								
			min	med	max	min	med	max	min	med	max
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 1mm	–	–	–	0,25mm	0,30mm	0,40mm	0,25mm	0,32mm	0,45mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 1mm	0,25mm	0,32mm	0,40mm	0,25mm	0,35mm	0,55mm	0,25mm	0,45mm	0,65mm

2. Ap1 and vc corrections depend on L/D ratio

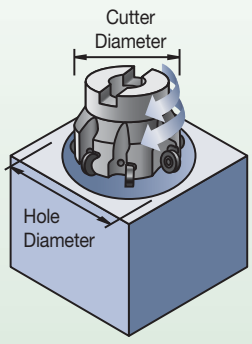
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

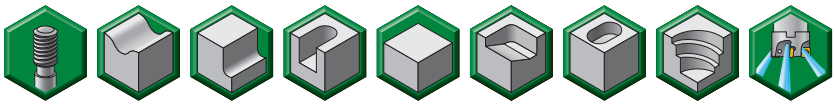


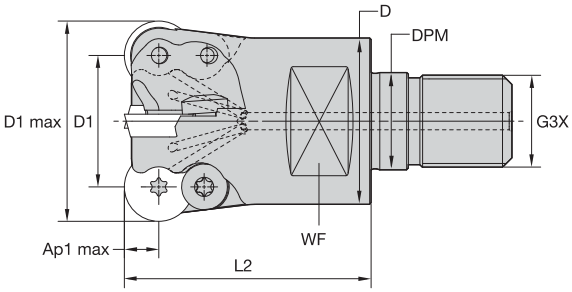
Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
20	22mm	30mm	2,1mm	20°	4mm
22	24mm	34mm	2,1mm	20°	2,4mm
25	33mm	40mm	3,2mm	8°	1,7mm
28	36mm	46mm	5mm	15°	3,8mm
30	40,6mm	50mm	5mm	10°	3,4mm
35	50,7mm	60mm	5mm	8,5°	3,4mm
40	60,5mm	70mm	5mm	7,2°	3,6mm
42	64,5mm	74mm	5mm	5,8°	3,6mm
50	80,3mm	90mm	5mm	5,2°	4mm
52	85,8mm	94mm	5mm	3°	2,2mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

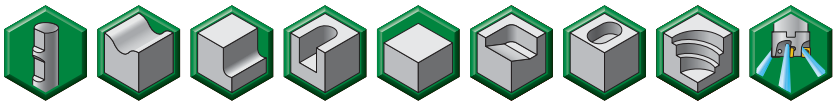
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930950	**M170D024Z02M12RD12**	24	12	21	12,5	M12	35	19	6,0	2	15.0°	13200	Yes	0,08
3930954	**M170D035Z03M16RD12**	35	23	29	17,0	M16	43	22	6,0	3	11.0°	9900	Yes	0,22
3930956	**M170D035Z04M16RD12**	35	23	29	17,0	M16	43	22	6,0	4	10.5°	9900	Yes	0,21
3930958	**M170D042Z05M16RD12**	42	30	29	17,0	M16	43	22	6,0	5	7.2°	7500	Yes	0,26

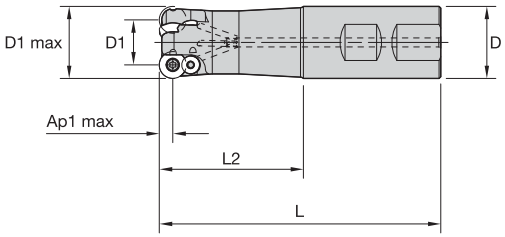
Spare Parts

D1 max	 insert screw	 Nm	 clamp screw	 Torx driver
24	**193.342**	3,5	**193.338**	**12148082400**
35	**193.342**	3,5	**193.338**	**12148082400**
42	**193.342**	3,5	**193.338**	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Weldon Shanks

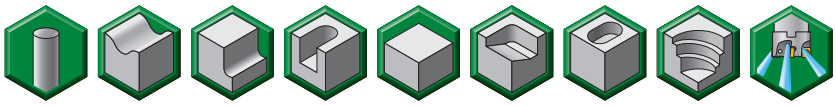
order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930960	**M170D032Z03B32RD12**	32	20	32	125	64	6,0	3	12.0°	9500	Yes	0,63

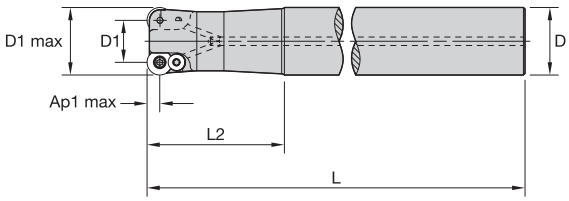
Spare Parts

D1 max	 insert screw	 Nm	 clamp screw	 Torx driver
32	**193.342**	3,5	**193.338**	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Cylindrical Shanks

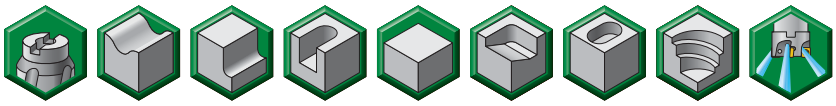
order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930962	**M170D032Z02A32RD12L200**	32	20	32	200	65	6,0	2	12.0°	9500	Yes	1,12
3930964	**M170D032Z02A32RD12L300**	32	20	32	300	65	6,0	2	12.0°	9500	Yes	1,74
3930966	**M170D035Z02A32RD12L300**	35	23	32	300	40	6,0	2	11.0°	9100	Yes	1,79

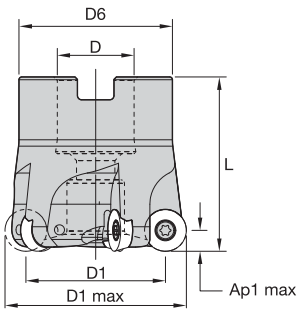
Spare Parts

D1 max	 insert screw	 Nm	 clamp screw	 Torx driver
32	**193.342**	3,5	**193.338**	**12148082400**
35	**193.342**	3,5	**193.338**	**12148082400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.



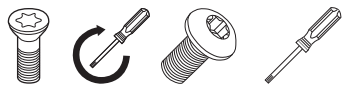




Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3930968	**M170D040Z04RD12**	40	28	16	37	40	6,0	4	9.3°	7000	Yes	0,22
3930970	**M170D050Z05RD12**	50	38	22	44	40	6,0	5	6.1°	7950	Yes	0,32
3930972	**M170D052Z05RD12**	52	40	22	44	50	6,0	5	4.5°	7600	Yes	0,44
3930975	**M170D063Z06RD12**	63	51	22	44	40	6,0	6	4.5°	6300	Yes	0,45
3930976	**M170D066Z06RD12**	66	54	27	60	50	6,0	6	4.5°	6030	Yes	0,81
3930979	**M170D080Z07RD12**	80	68	27	60	50	6,0	7	3.5°	4900	Yes	0,97
3930981	**M170D100Z08RD12**	100	88	32	80	55	6,0	8	2.2°	3900	Yes	1,95

Spare Parts



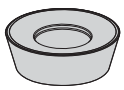


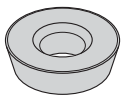

D1 max	insert screw	Nm	clamp screw	Torx driver	low-head cap screw	low-head cap screw with coolant groove	socket-head cap screw	socket-head cap screw with coolant groove
40	**193.342**	3,5	**193.338**	**12148082400**	**–**	**–**	**MS1294**	**MS1294CG**
50	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	**–**	**–**	**MS2072CG**
52	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	**–**	**–**	**MS2072CG**
63	**193.342**	3,5	**193.338**	**12148082400**	**129.025**	**–**	**–**	**MS2072CG**
66	**193.342**	3,5	**193.338**	**12148082400**	**–**	**–**	**MS2038**	**MS2038CG**
80	**193.342**	3,5	**193.338**	**12148082400**	**–**	**–**	**MS2038**	**MS2038CG**
100	**193.342**	3,5	**193.338**	**12148082400**	**MS1254**	**MS1254CG**	**–**	**–**

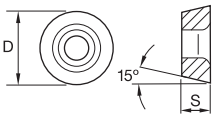
NOTE: Socket-head cap screw, socket-head cap screw with coolant groove, low-head cap screw with coolant groove, and Torx driver must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–


RDPX-MM


RDHX-MH



- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

● first choice
○ alternate choice

P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX12T3M0SNMM	12,00	3,97	0,13	-	3959624	3959623

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX12T3M0SNMH	12,00	3,97	0,17	3959622	3959621	3959620

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,33	**0,48**	0,76	0,24	**0,35**	0,54	0,18	**0,26**	0,41	0,16	**0,23**	0,35	0,14	**0,21**	0,33	MM
MH	0,35	**0,70**	1,17	0,25	**0,50**	0,84	0,19	**0,38**	0,63	0,16	**0,33**	0,55	0,15	**0,30**	0,50	MH

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,38	**0,56**	0,88	0,28	**0,40**	0,63	0,21	**0,30**	0,47	0,18	**0,26**	0,41	0,17	**0,24**	0,38	MM
MH	0,40	**0,81**	1,36	0,29	**0,58**	0,97	0,22	**0,43**	0,72	0,19	**0,38**	0,63	0,17	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,44	**0,65**	1,02	0,32	**0,47**	0,73	0,24	**0,35**	0,55	0,21	**0,30**	0,48	0,19	**0,28**	0,44	MM
MH	0,47	**0,94**	1,59	0,34	**0,68**	1,13	0,25	**0,50**	0,84	0,22	**0,44**	0,73	0,20	**0,40**	0,67	MH

At 1,00 Axial Depth of Cut (ap)

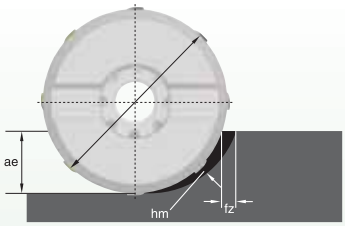
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,60	**0,88**	1,38	0,43	**0,63**	0,99	0,32	**0,47**	0,74	0,28	**0,41**	0,64	0,26	**0,38**	0,59	MM
MH	0,63	**1,28**	2,16	0,45	**0,91**	1,53	0,34	**0,68**	1,14	0,30	**0,59**	0,99	0,27	**0,54**	0,90	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

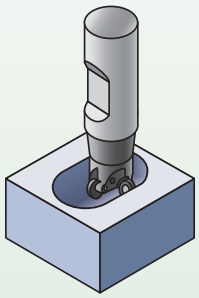
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 1mm	1,01mm	0,77mm	0,63mm	0,55mm	0,49mm	0,35mm
Ap1 = 2mm	0,77mm	0,55mm	0,45mm	0,39mm	0,35mm	0,24mm
Ap1 = 3mm	0,63mm	0,45mm	0,37mm	0,32mm	0,28mm	0,20mm
Ap1 = 4mm	0,55mm	0,39mm	0,32mm	0,27mm	0,24mm	0,17mm
Ap1 = 5mm	0,49mm	0,35mm	0,28mm	0,24mm	0,22mm	0,15mm
Ap1 = 6mm	0,45mm	0,32mm	0,26mm	0,22mm	0,20mm	0,14mm

Example application highlighted.



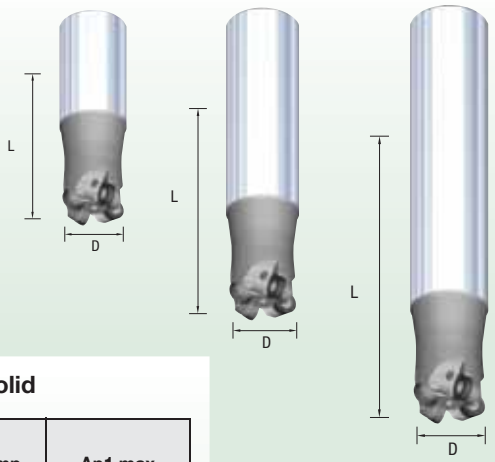
Example Cutting Conditions for RD..10... Insert in Pocketing, L/D ratio = 2 x D:

insert = RDPX12T3M0SN			TN2505			TN6525			TN6540		
			feed per tooth fz (mm)/ae>50%								
			min	med	max	min	med	max	min	med	max
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 2mm	–	–	–	0,24mm	0,30mm	0,50mm	0,24mm	0,40mm	0,60mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 2mm	0,24mm	0,30mm	0,50mm	0,24mm	0,40mm	0,65mm	0,24mm	0,50mm	0,70mm

2. Ap1 and vc corrections depend on L/D ratio

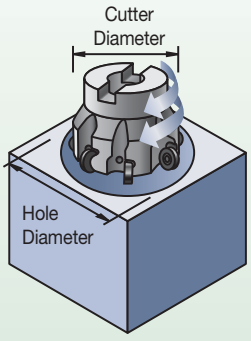
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

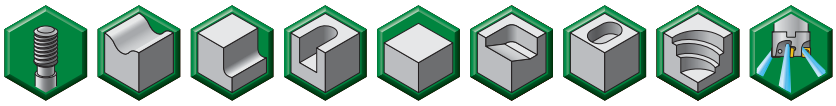


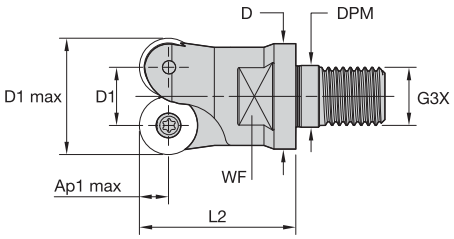
Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
24	25,6mm	36mm	1,3mm	15°	3mm
32	40,6mm	52mm	5,3mm	12°	4,4mm
35	46,9mm	58mm	6mm	11°	3,9mm
40	57,4mm	68mm	6mm	9.3°	3,3mm
42	61,2mm	72mm	6mm	7.2°	3,5mm
50	77,4mm	88mm	6mm	6.1°	3,5mm
52	81,3mm	92mm	6mm	4.5°	3,2mm
63	102,4mm	114mm	6mm	4.5°	4,6mm
66	108,5mm	120mm	6mm	4.5°	4,4mm
80	136,5mm	148mm	6mm	3.5°	4,2mm
100	176,5mm	188mm	6mm	2.2°	4,2mm



- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







Screw-On End Mills

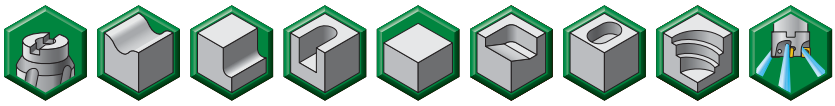
order number	catalogue number	D1 max	D1	D	DPM	G3X	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926601	**M170D032Z02M16RD16**	32	16	29	17,0	M16	43	22	8,0	2	20.0°	9950	Yes	0,17

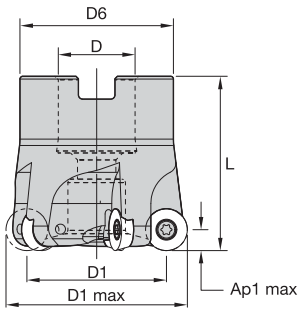
Spare Parts

D1 max	 insert screw	 Nm	 Torx driver
32	**193.343**	6,0	**12148099400**

NOTE: All spare parts except the insert screws must be ordered separately.

- Premium nickel-coated bodies.
- Designed for maximum performance.
- Ideally suited for die and mould manufacturing.







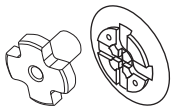
Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
3926602	**M170D050Z04RD16**	50	34	22	44	40	8,0	4	8.5°	7900	Yes	0,28
3934623	**M170D052Z04RD16**	52	36	22	44	50	8,0	4	8.2°	7650	Yes	0,36
3934624	**M170D063Z05RD16**	63	47	22	44	40	8,0	5	5.5°	5300	Yes	0,39
3934625	**M170D066Z05RD16**	66	50	27	60	50	8,0	5	4.0°	6000	Yes	0,74
3934626	**M170D080Z06RD16**	80	64	27	60	50	8,0	6	3.0°	4900	Yes	1,06
3934628	**M170D100Z07RD16**	100	84	32	80	55	8,0	7	2.4°	3950	Yes	1,94
3934629	**M170D125Z08RD16**	125	109	40	90	60	8,0	8	2.2°	3200	Yes	2,90

Spare Parts





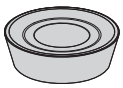
D1 max	insert screw	Nm	clamp screw	Torx driver	low-head cap screw	low-head cap screw with coolant groove	socket-head cap screw	socket-head cap screw with coolant groove	coolant lock screw	coolant cap
50	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
52	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
63	**193.343**	6,0	**193.383**	**12148099400**	**129.025**	–	–	**MS2072CG**	–	–
66	**193.343**	6,0	**193.383**	**12148099400**	–	–	**MS2038**	**MS2038CG**	–	–
80	**193.343**	6,0	**193.383**	**12148099400**	–	–	**MS2038**	**MS2038CG**	–	–
100	**193.343**	6,0	**193.383**	**12148099400**	**MS1254**	**MS1254CG**	–	–	–	–
125	**193.343**	6,0	**193.383**	**12148099400**	**129.512**	–	–	–	**420.200**	**470.232**

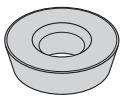
NOTE: All spare parts except the insert screws and clamp screws must be ordered separately.

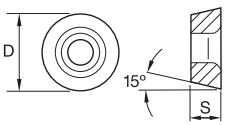
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	MM	TN6525	**MM**	**TN6525**	MM	TN6540
P3–P4	MH	TN2505	**MH**	**TN6525**	MH	TN6540
P5–P6	MH	TN2505	**MH**	**TN6525**	MH	TN6540
M1–M2	–	–	**MM**	**TN6525**	MM	TN6540
M3	–	–	**MM**	**TN6525**	MM	TN6540
K1–K2	MH	TN2505	**MH**	**TN2505**	MH	TN6525
K3	MH	TN2505	**MH**	**TN2505**	MH	TN6525
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**MM**	**TN6540**	–	–
S3	–	–	**MM**	**TN6540**	–	–
S4	–	–	**MM**	**TN6540**	–	–
H1	MH	TN2505	**MH**	**TN2505**	–	–

iC16 • Inserts


RDPX-MM


RDPX-MH



- -MM geometry is the best option for general-purpose use, materials, and applications. Used for reduced cutting forces.

● first choice
○ alternate choice

		TN2505	TN6525	TN6540
P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●		

RDPX-MM

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1604M0SNMM	16,00	4,76	0,14	-	3960516	3960515

- -MH geometry is the first choice for heavy machining.
- Suitable for high-strength steels, cast iron, and hard machining.

RDPX-MH

catalogue number	D	S	hm	TN2505	TN6525	TN6540
RDPX1604M0SNMH	16,00	4,76	0,22	3960514	3960513	3960462

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,39	**0,52**	0,82	0,28	**0,37**	0,59	0,21	**0,28**	0,44	0,18	**0,24**	0,38	0,17	**0,22**	0,35	MM
MH	0,51	**0,70**	1,17	0,37	**0,50**	0,84	0,28	**0,38**	0,63	0,24	**0,33**	0,55	0,22	**0,30**	0,50	MH

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,45	**0,60**	0,94	0,32	**0,43**	0,68	0,24	**0,32**	0,51	0,21	**0,28**	0,44	0,19	**0,26**	0,40	MM
MH	0,59	**0,81**	1,36	0,43	**0,58**	0,97	0,32	**0,43**	0,72	0,28	**0,38**	0,63	0,25	**0,35**	0,58	MH

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,59	**0,79**	1,24	0,43	**0,57**	0,89	0,32	**0,42**	0,66	0,28	**0,37**	0,58	0,25	**0,34**	0,53	MM
MH	0,77	**1,06**	1,79	0,56	**0,76**	1,28	0,42	**0,57**	0,95	0,36	**0,50**	0,83	0,33	**0,45**	0,76	MH

At 1,00 Axial Depth of Cut (ap)

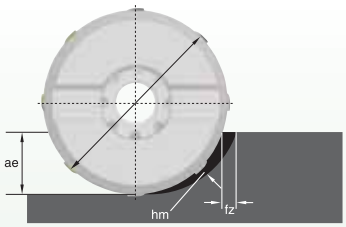
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
MM	0,81	**1,08**	1,71	0,58	**0,78**	1,22	0,43	**0,58**	0,91	0,38	**0,51**	0,79	0,35	**0,46**	0,72	MM
MH	1,06	**1,46**	2,48	0,76	**1,04**	1,75	0,57	**0,78**	1,30	0,50	**0,68**	1,13	0,45	**0,62**	1,03	MH

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Cutting Values

1. fz depends on the Ap1 and ae values

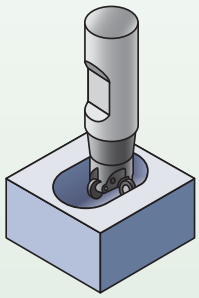
With round inserts, two factors can affect the hm: Ap1 and ae.
fz has to be adjusted accordingly.



Recommended Starting Feed Rate Values (fz) Related to the Ap1 and ae Values:

ae engagement	10%	20%	30%	40%	50%	100%
Ap1 = 1mm	1,52mm	1,07mm	0,88mm	0,76mm	0,68mm	0,48mm
Ap1 = 2mm	1,07mm	0,76mm	0,62mm	0,54mm	0,48mm	0,34mm
Ap1 = 3mm	0,88mm	0,62mm	0,51mm	0,44mm	0,39mm	0,28mm
Ap1 = 4mm	0,76mm	0,54mm	0,44mm	0,38mm	0,34mm	0,24mm
Ap1 = 5mm	0,62mm	0,44mm	0,36mm	0,31mm	0,26mm	0,20mm
Ap1 = 6mm	0,54mm	0,38mm	0,31mm	0,27mm	0,24mm	0,17mm

Example application highlighted.

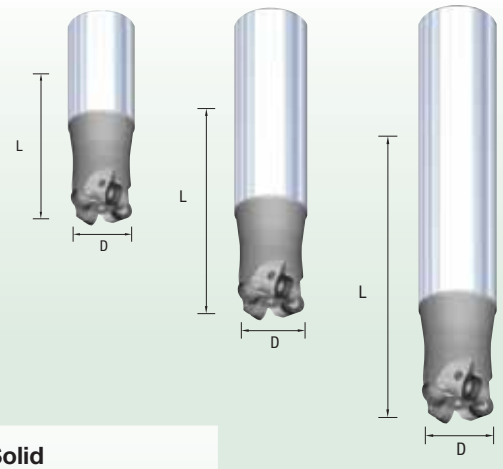


Example Cutting Conditions for iC16mm... Insert in Pocketing, up to 3 L/D approximately:

insert = RDPX1604M0SN			TN2505			TN6525			TN6540		
			feed per tooth fz (mm)/ae>50%								
			min	med	max	min	med	max	min	med	max
Edge Geometry MM	ae>50%	Recommended starting Ap1 = 3mm	–	–	–	0,28mm	0,45mm	0,65mm	0,28mm	0,50mm	0,70mm
Edge Geometry MH	ae>50%	Recommended starting Ap1 = 3mm	0,28mm	0,35mm	0,50mm	0,28mm	0,50mm	0,75mm	0,28mm	0,60mm	0,80mm

2. Ap1 and vc corrections depend on L/D ratio

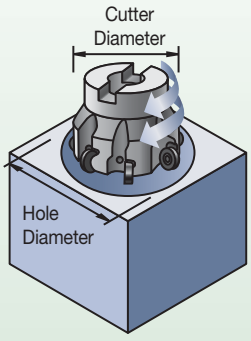
With increasing L/D ratios, or overhang, vibrations can occur due to reduced rigidity. To ensure successful application, it is recommended to adjust Ap1 and vc values according to the following table:



L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<2	0%	0%
2<L/D<4	65–75%	10–15%
>4	80–95%	20–40%

Recommended Cutting Conditions • Helical Interpolation from Solid

cutter diameter	min hole diameter	max hole diameter (flat bottom)	Ap1 max per revolution	max ramp angle	Ap1 max when plunging
32	36mm	48mm	3mm	20°	3mm
50	69mm	84mm	8mm	9,5°	4,8mm
52	73mm	88mm	8mm	8,2°	5mm
63	95mm	110mm	8mm	5,5°	4,7mm
66	101mm	120mm	8mm	4°	4,2mm
80	129mm	144mm	8mm	3°	4,1mm
100	169mm	184mm	8mm	2,4°	4,6mm
125	219mm	234mm	8mm	2,2°	4,4mm





REPAIR SERVICES

Getting Started (and Getting Finished) Is Easy.

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Tools Are Valuable. Protect Them and Get the Most from Your Investment.

WIDIA™ tooling products are produced to the highest specifications and manufactured from premium materials. However, like all mechanical devices, they wear and require repair. When your WIDIA advanced tooling products need to be serviced, the WIDIA Service and Repair Department has the highly trained staff to provide expert assistance.

For about half the cost of a new WIDIA tool purchase, some tools can be repaired to like-new condition. Contact WIDIA today with any questions and to find out if tool repair is a cost-effective option for you.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Versatile Platform for All Materials and Applications •

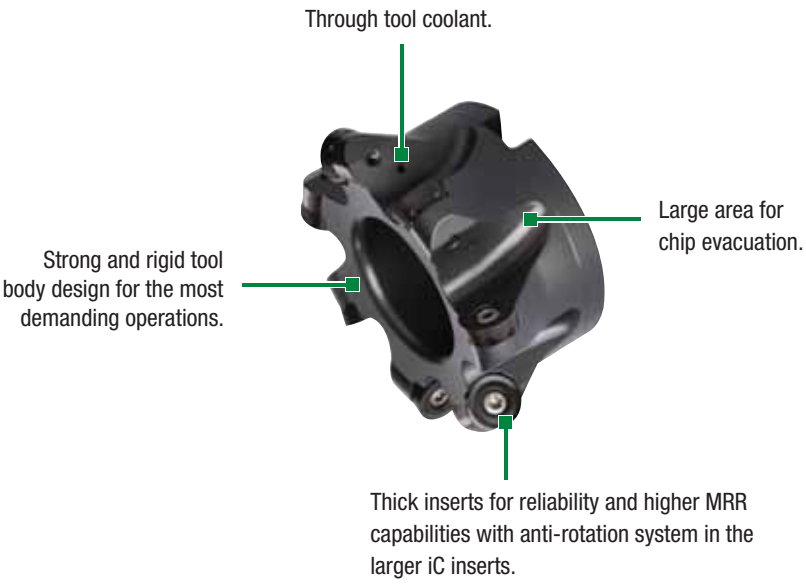
M100™ Series Copy Mills



M100

A trusted multipurpose solution for profiling and copy applications, the M100 Series ensures a reliable platform for all of your copy milling, face milling, helical interpolation, and roughing needs. The strong and rigid body design ensures superior results in even the most demanding operations.

- Thick inserts ensure reliability and consistent results.
- Anti-rotation systems in larger iC inserts provide higher MRR capabilities.
- Increased chip evacuation and through tool coolant for enhanced performance.



Copy Mills

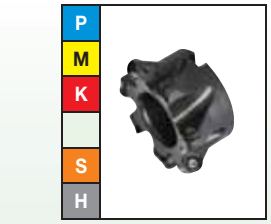


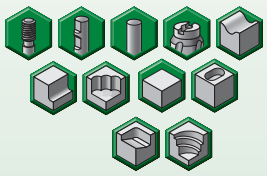
M100™

Max depth of cut: 6mm

Diameter: 24–125mm

Pages: M74–M99





Insert Offering



08mm iC
RD Insert Type
Ground and PSTS



10mm iC
RD Insert Type
Ground and PSTS



12mm iC
RD Insert Type
Anti-rotation Feature
Ground and PSTS

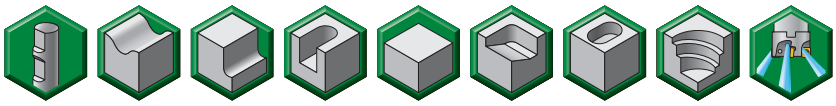


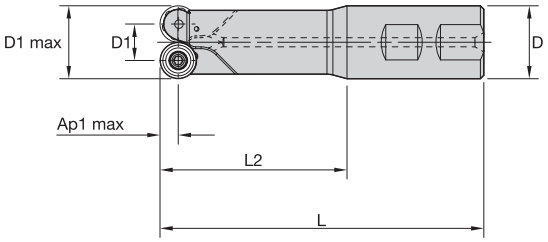
16mm iC
RD Insert Type
Anti-rotation Feature
Ground and PSTS



16mm iC
RC Insert Type
Anti-rotation Feature
Ground and PSTS

- General purpose face and copy milling.







Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021331	**12391010000**	12	4	16	90	42	4,0	1	2.0°	33000	Yes	0,10
2021332	**12391010400**	12	4	16	130	82	4,0	1	2.0°	33000	Yes	0,10
2021333	**12391010600**	16	8	16	90	42	4,0	2	7.5°	28000	Yes	0,10
2021334	**12391011000**	16	8	20	132	82	4,0	2	7.5°	28000	Yes	0,20
2021335	**12391011400**	16	8	25	183	127	4,0	2	7.5°	28000	Yes	0,40

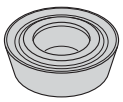
Spare Parts

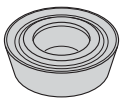
D1 max	insert screw	Nm	Torx driver
12	**12148001300**	3,0	**12148086600**
16	**12148001300**	3,0	**12148086600**

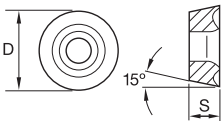
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	RDMT-T	TN7525	**RDMT-T**	**TN7525**	RDMT-T	TN7535
P3–P4	RDMT-T	TN7525	**RDMW-T**	**TN6540**	RDMW-T	TN6540
P5–P6	RDMT-T	TN7525	**RDMT-T**	**TN7535**	RDMT-T	TN7535
M1–M2	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN7535
M3	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN7535
K1–K2	–	–	**RDMW-T**	**TN7535**	RDMW-T	TN7535
K3	–	–	**RDMW-T**	**TN7535**	RDMW-T	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	–	–	–	–	–	–


RDMT-T


RDHT-T



● first choice
○ alternate choice

		TN2510	TN6540	TN7525	TN7535
P		○	●	●	●
M			●	○	○
K		●	○		○
N					
S			●		
H		●			

- Precision ground insert; first choice for light machining.

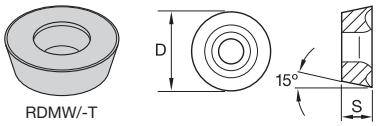
RDHT-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDHT0802M0T	8,00	2,38	0,09	'	'	2012426	'

- Precision pressed insert; positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDMT0802M0T	8,00	2,38	0,09	'	'	2012518	2020757



RDMW/-T

- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

● first choice
○ alternate choice

		TN2510	TN6540	TN7525	TN7535
P		○	●	●	●
M			●	○	○
K		●	○		○
N					
S			●		
H		●			

RDMW/-T

catalogue number	D	S	hm	TN2510	TN6540	TN7525	TN7535
RDMW0802M0	8,00	2,38	0,09	2012564	–	–	–
RDMW0802M0T	8,00	2,38	0,09	–	3353278	–	2020727

Recommended Starting Speeds

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6540			TN7525			TN7535		
P	1	660	**580**	540	360	**280**	240	410	**310**	280	545	**475**	445
	2	410	**370**	330	250	**190**	170	310	**250**	215	335	**305**	275
	3	370	**330**	305	215	**170**	140	280	**215**	185	305	**275**	245
	4	275	**260**	230	180	**130**	110	235	**170**	145	230	**210**	190
	5	330	**300**	275	240	**180**	150	310	**235**	200	310	**275**	250
	6	230	**205**	175	160	**120**	100	205	**160**	130	190	**160**	130
M	1	270	**240**	210	130	**80**	60	245	**220**	185	245	**220**	185
	2	245	**210**	190	80	**50**	40	220	**190**	170	220	**190**	170
	3	190	**175**	150	85	**50**	40	175	**155**	140	175	**155**	140
K	1	420	**360**	300	220	**205**	180	380	**280**	240	355	**320**	290
	2	360	**300**	250	175	**155**	140	325	**240**	200	280	**250**	230
	3	300	**250**	200	155	**145**	125	240	**200**	170	235	**210**	190
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–
	2	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–
	3	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–
	4	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,19	**0,29**	0,42	0,14	**0,21**	0,30	0,10	**0,16**	0,23	0,09	**0,14**	0,20	0,08	**0,13**	0,18	RDMW-
RDHT-T	0,23	**0,31**	0,63	0,17	**0,23**	0,45	0,13	**0,17**	0,34	0,11	**0,15**	0,29	0,10	**0,14**	0,27	RDHT-T
RDMT-T	0,23	**0,31**	0,63	0,17	**0,23**	0,45	0,13	**0,17**	0,34	0,11	**0,15**	0,29	0,10	**0,14**	0,27	RDMT-T
RDMW-T	0,23	**0,42**	0,73	0,17	**0,30**	0,53	0,13	**0,23**	0,39	0,11	**0,20**	0,34	0,10	**0,18**	0,32	RDMW-T

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,22	**0,34**	0,48	0,16	**0,24**	0,35	0,12	**0,18**	0,26	0,10	**0,16**	0,23	0,09	**0,15**	0,21	RDMW-
RDHT-T	0,27	**0,36**	0,72	0,19	**0,26**	0,52	0,14	**0,20**	0,39	0,13	**0,17**	0,34	0,12	**0,16**	0,31	RDHT-T
RDMT-T	0,27	**0,36**	0,72	0,19	**0,26**	0,52	0,14	**0,20**	0,39	0,13	**0,17**	0,34	0,12	**0,16**	0,31	RDMT-T
RDMW-T	0,27	**0,48**	0,85	0,19	**0,35**	0,61	0,14	**0,26**	0,46	0,13	**0,23**	0,40	0,12	**0,21**	0,36	RDMW-T

At 1,00 Axial Depth of Cut (ap)

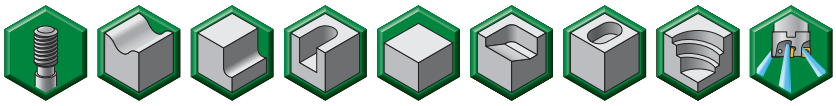
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,28	**0,44**	0,63	0,20	**0,32**	0,46	0,15	**0,24**	0,34	0,13	**0,21**	0,30	0,12	**0,19**	0,27	RDMW-
RDHT-T	0,35	**0,47**	0,95	0,25	**0,34**	0,69	0,19	**0,26**	0,51	0,17	**0,22**	0,45	0,15	**0,20**	0,41	RDHT-T
RDMT-T	0,35	**0,47**	0,95	0,25	**0,34**	0,69	0,19	**0,26**	0,51	0,17	**0,22**	0,45	0,15	**0,20**	0,41	RDMT-T
RDMW-T	0,35	**0,63**	1,12	0,25	**0,46**	0,80	0,19	**0,34**	0,60	0,17	**0,30**	0,52	0,15	**0,27**	0,48	RDMW-T

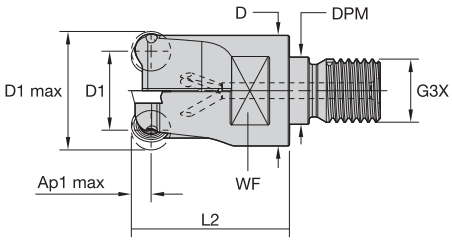
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDMW-	0,39	**0,60**	0,87	0,28	**0,44**	0,62	0,21	**0,33**	0,47	0,18	**0,28**	0,41	0,17	**0,26**	0,37	RDMW-
RDHT-T	0,48	**0,65**	1,31	0,35	**0,47**	0,94	0,26	**0,35**	0,70	0,23	**0,30**	0,61	0,21	**0,28**	0,56	RDHT-T
RDMT-T	0,48	**0,65**	1,31	0,35	**0,47**	0,94	0,26	**0,35**	0,70	0,23	**0,30**	0,61	0,21	**0,28**	0,56	RDMT-T
RDMW-T	0,48	**0,87**	1,54	0,35	**0,62**	1,10	0,26	**0,47**	0,82	0,23	**0,41**	0,71	0,21	**0,37**	0,65	RDMW-T

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.







Screw-On End Mills

order number	catalogue number	D1 max	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021375	**12391050400**	25	15	22	12,5	M12	52	30	19	5,0	2	15.8°	22000	Yes	0,10
2021376	**12391050600**	30	20	28	17,0	M16	63	40	22	5,0	3	10.3°	20000	Yes	0,20

Spare Parts



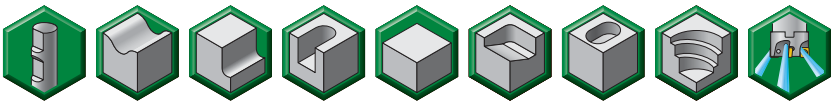


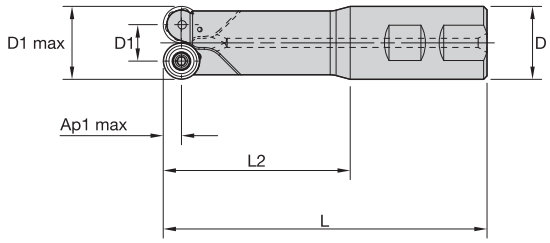


insert screw	Nm	Torx wrench
12148036700	3,0	**12148000600**

NOTE: All spare parts except the insert screws must be ordered separately.

- General purpose face and copy milling.







Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021336	**12391011600**	20	10	20	92	42	5,0	2	7.8°	25000	Yes	0,20
2021337	**12391012000**	20	10	25	138	82	5,0	2	8.8°	25000	Yes	0,40
2021338	**12391012400**	20	10	25	183	127	5,0	2	7.5°	25000	Yes	0,50
2021339	**12391012800**	26	16	32	142	82	5,0	2	13.5°	22000	Yes	0,60
2021340	**12391013200**	26	16	32	187	127	5,0	2	14.3°	22000	Yes	0,90

Spare Parts

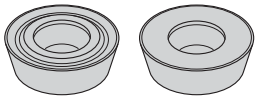
 insert screw	 Nm	 Torx driver
12148036700	3,0	**12148000600**

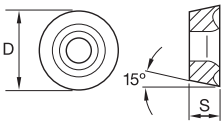
NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	RDMT-T	TN6525	**RDMT-T**	**TN6540**	RDMT-T	TN6540
P3–P4	RDMT-T	TN6525	**RDMW-T**	**TN6540**	RDMW-T	TN6540
P5–P6	RDMT-T	TN7525	**RDMT-T**	**TN7535**	RDMW-T	TN7535
M1–M2	RDHT-T	TN7525	**RDHT-T**	**TN7525**	RDMT-T	TN6540
M3	RDHT-T	TN7525	**RDMT-T**	**TN6540**	RDMT-T	TN6540
K1–K2	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	RDMW-T	TN7535
K3	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	RDMW-T	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**RDMT-T**	**TN6540**	–	–
S3	–	–	**RDMT-T**	**TN6540**	–	–
S4	–	–	**RDMT-T**	**TN6540**	RDMT-T	TN6540
H1	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	–	–

iC10 • Inserts





P	○	●	●	●	●	●
M		○	●	○	○	○
K	●	○	○		○	
N						
S			●			
H	●					

● first choice
○ alternate choice

- Precision ground insert; first choice for light machining.

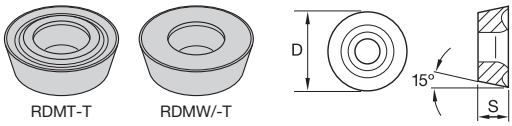
RDHT-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHT1003M0T	10,00	3,18	0,14	'	'	'	2012446	'	'

- Precision ground flat top geometry.

RDHW-MH

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHW1003M0MH	10,00	3,18	0,14	2012480	'	'	'	'	'



P		○	●	●	●	●	●
M			○	●	○	○	○
K		●	○	○		○	
N							
S				●			
H		●					

● first choice
○ alternate choice

- Precision pressed insert; positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMT1003M0T	10,00	3,18	0,14	-	2957429	2957428	2012534	2276618	-

- Precision pressed insert with flat top geometry.
- First choice for cast iron and high-strength steel.

RDMW/-T

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMW1003M0	10,00	3,18	0,09	2012572	-	-	-	-	-
RDMW1003M0T	10,00	3,18	0,14	-	-	3353279	2109381	2020735	2012578

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			TTI25		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	430	**360**	300
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	310	**250**	215
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	265	**215**	180
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	320	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	145	**110**	90
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	480	**310**	215
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	325	**205**	145
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	320	**210**	145
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	220	**185**	155
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	180	**145**	125
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,23	**0,39**	0,65	0,17	**0,28**	0,47	0,13	**0,21**	0,35	0,11	**0,18**	0,31	0,10	**0,17**	0,28	RDHT-T
RDHW-MH	0,23	**0,42**	0,88	0,17	**0,30**	0,63	0,13	**0,23**	0,47	0,11	**0,20**	0,41	0,10	**0,18**	0,38	RDHW-MH
RDMT-T	0,23	**0,39**	0,65	0,17	**0,28**	0,47	0,13	**0,21**	0,35	0,11	**0,18**	0,31	0,10	**0,17**	0,28	RDMT-T
RDMW	0,23	**0,21**	0,61	0,17	**0,15**	0,44	0,13	**0,11**	0,33	0,11	**0,10**	0,28	0,10	**0,09**	0,26	RDMW
RDMW-T	0,23	**0,57**	0,88	0,17	**0,41**	0,63	0,13	**0,31**	0,47	0,11	**0,27**	0,41	0,10	**0,25**	0,38	RDMW-T

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,29	**0,49**	0,82	0,21	**0,35**	0,59	0,16	**0,26**	0,44	0,14	**0,23**	0,38	0,13	**0,21**	0,35	RDHT-T
RDHW-MH	0,29	**0,53**	1,11	0,21	**0,38**	0,79	0,16	**0,28**	0,59	0,14	**0,25**	0,52	0,13	**0,23**	0,47	RDHW-MH
RDMT-T	0,29	**0,49**	0,82	0,21	**0,35**	0,59	0,16	**0,26**	0,44	0,14	**0,23**	0,38	0,13	**0,21**	0,35	RDMT-T
RDMW	0,29	**0,26**	0,76	0,21	**0,19**	0,55	0,16	**0,14**	0,41	0,14	**0,12**	0,36	0,13	**0,11**	0,33	RDMW
RDMW-T	0,29	**0,71**	1,11	0,21	**0,51**	0,79	0,16	**0,38**	0,59	0,14	**0,33**	0,52	0,13	**0,31**	0,47	RDMW-T

At 1,00 Axial Depth of Cut (ap)

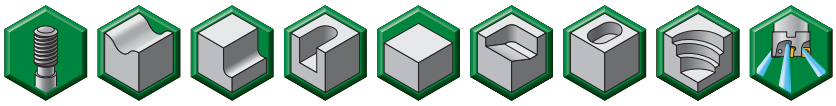
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,39	**0,65**	1,09	0,28	**0,47**	0,78	0,21	**0,35**	0,58	0,18	**0,31**	0,51	0,17	**0,28**	0,47	RDHT-T
RDHW-MH	0,39	**0,71**	1,49	0,28	**0,51**	1,06	0,21	**0,38**	0,79	0,18	**0,33**	0,69	0,17	**0,30**	0,63	RDHW-MH
RDMT-T	0,39	**0,65**	1,09	0,28	**0,47**	0,78	0,21	**0,35**	0,58	0,18	**0,31**	0,51	0,17	**0,28**	0,47	RDMT-T
RDMW	0,39	**0,35**	1,02	0,28	**0,25**	0,73	0,21	**0,19**	0,55	0,18	**0,16**	0,48	0,17	**0,15**	0,44	RDMW
RDMW-T	0,39	**0,95**	1,49	0,28	**0,69**	1,06	0,21	**0,51**	0,79	0,18	**0,45**	0,69	0,17	**0,41**	0,63	RDMW-T

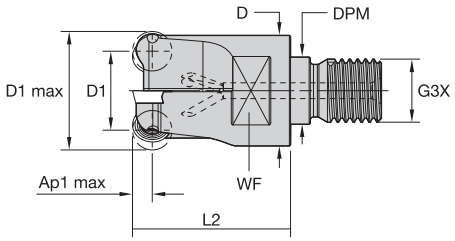
At 0,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-T	0,53	**0,90**	1,52	0,38	**0,65**	1,08	0,29	**0,48**	0,81	0,25	**0,42**	0,70	0,23	**0,39**	0,64	RDHT-T
RDHW-MH	0,53	**0,98**	2,07	0,38	**0,70**	1,47	0,29	**0,52**	1,09	0,25	**0,46**	0,95	0,23	**0,42**	0,87	RDHW-MH
RDMT-T	0,53	**0,90**	1,52	0,38	**0,65**	1,08	0,29	**0,48**	0,81	0,25	**0,42**	0,70	0,23	**0,39**	0,64	RDMT-T
RDMW	0,53	**0,48**	1,41	0,38	**0,35**	1,01	0,29	**0,26**	0,75	0,25	**0,23**	0,65	0,23	**0,21**	0,60	RDMW
RDMW-T	0,53	**1,32**	2,07	0,38	**0,95**	1,47	0,29	**0,70**	1,09	0,25	**0,61**	0,95	0,23	**0,56**	0,87	RDMW-T

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.







Screw-On End Mills

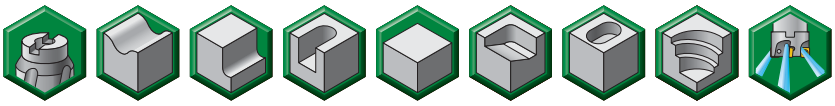
order number	catalogue number	D1 max	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021374	**12391050200**	24	12	22	12,5	M12	52	30	19	6,0	2	10.0°	23000	Yes	0,10
2021378	**12391051000**	35	23	28	17,0	M16	63	40	22	6,0	3	10.8°	19000	Yes	0,20
2021379	**12391051200**	40	28	28	17,0	M16	63	40	22	6,0	4	8.3°	17000	Yes	0,30

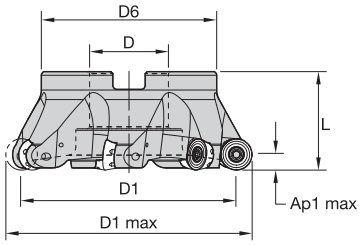
Spare Parts

D1 max	 insert screw	 Nm	 Torx wrench
24	**12148038800**	3,0	**12148000600**
35	**12148038800**	3,0	**12148000600**
40	**12148038800**	3,0	**12148000600**

NOTE: All spare parts except the insert screws must be ordered separately.

- General purpose face and copy milling.
- Anti-rotation feature for top security.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021342	**12391020000**	50	38	22	40	40	6,0	4	6.8°	15000	Yes	0,20
2021361	**12391024000**	52	40	22	40	40	6,0	4	6.5°	15000	Yes	0,20
2021343	**12391020200**	63	51	27	48	40	6,0	5	4.5°	14000	Yes	0,30
2021344	**12391020400**	80	68	27	60	50	6,0	6	3.5°	12000	Yes	0,90
2021345	**12391020600**	100	88	32	78	50	6,0	6	2.5°	11000	No	1,20
2021346	**12391020800**	125	113	40	89	50	6,0	7	2.0°	10000	No	1,70

Spare Parts

D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	**12148038800**	3,0	**12148000600**	**125.025**	**MS1234CG**
52	**12148038800**	3,0	**12148000600**	**125.025**	**MS1234CG**
63	**12148038800**	3,0	**12148000600**	**125.230**	**MS2038CG**
80	**12148038800**	3,0	**12148000600**	**125.230**	**MS2038CG**
100	**12148038800**	3,0	**12148000600**	**–**	**–**
125	**12148038800**	3,0	**12148000600**	**–**	**–**

NOTE: All spare parts except the insert screws must be ordered separately.

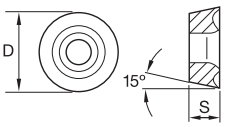
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	RDMT-TX	TN7525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
P3–P4	RDMT-TX	TN7525	**RDMW-TX**	**TN6540**	RDMW-TX	TN6540
P5–P6	RDMT-TX	TN7525	**RDPT-MMX**	**TN7535**	RDPT-MMX	TN7535
M1–M2	RDHT-TX	TN7525	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
M3	RDHT-TX	TN7525	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
K1–K2	RDMW-TX	WK15CM	**RDMW-TX**	**WK15CM**	RDMW-TX	TN7535
K3	RDHW-MH	TN2510	**RDMW-TX**	**WK15CM**	RDMW-TX	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**RDMT-TX**	**TN6540**	–	–
S3	–	–	**RDMT-TX**	**TN6540**	–	–
S4	–	–	**RDMT-TX**	**TN6540**	RDPT-MMX	TN6540
H1	RDHW-MH	TN2510	**RDHW-MH**	**TN2510**	–	–

iC12 • Inserts


RDHT-TX


RDHW-MH



- Precision ground positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys.

● first choice
○ alternate choice

	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
P	○	●	●	●	●		
M		○	●	○	○		○
K	●	○	○		○	●	
N							
S			●				●
H	●						

RDHT-TX

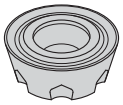
catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHT1204M0TX	6	12,00	4,76	0,12	ı	ı	ı	2020775	ı	ı	ı

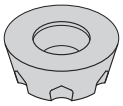
- Precision ground flat top insert.
- Alternative choice for stable milling operations in high-strength steel and hardened materials.

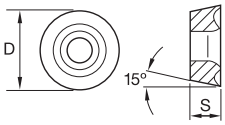
RDHW-MH

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDHW1204M0MH	6	12,00	4,76	0,14	2012484	ı	ı	ı	ı	ı	ı


RDPT-MMX


RDMT-TX


RDMW-TX



P		○	●	●	●	●		
M			○	●	○	○		○
K		●	○	○		○	●	
N								
S				●				●
H		●						

● first choice
○ alternate choice

- Precision pressed insert.
- Improved performance in stainless steel and high-temp alloys.

RDPT-MMX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDPT1204M0SMMX	6	12,00	4,76	0,18	-	-	5176974	-	5176975	-	-

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDMT1204M0TX	6	12,00	4,76	0,15	2109552	2957430	2957432	2020763	2109542	-	5520247

- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

RDMW-TX

catalogue number	number of indexes	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	WK15CM	WS30PM
RDMW1204M0TX	6	12,00	4,76	0,15	2012594	-	3353281	2109440	2020741	5427441	-

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–

Material Group		TN7535			WK15CM			WS30PM			TTI25		
P	1	545	**475**	445	–	**–**	–	–	**–**	–	430	**360**	300
	2	335	**305**	275	–	**–**	–	–	**–**	–	310	**250**	215
	3	305	**275**	245	–	**–**	–	–	**–**	–	310	**250**	215
	4	230	**210**	190	–	**–**	–	–	**–**	–	265	**215**	180
	5	310	**275**	250	–	**–**	–	–	**–**	–	320	**235**	200
	6	190	**160**	130	–	**–**	–	–	**–**	–	145	**110**	90
M	1	245	**220**	185	–	**–**	–	270	**240**	220	480	**310**	215
	2	220	**190**	170	–	**–**	–	245	**215**	175	325	**205**	145
	3	175	**155**	140	–	**–**	–	185	**160**	125	320	**210**	145
K	1	355	**320**	290	505	**460**	410	–	**–**	–	220	**185**	155
	2	280	**250**	230	400	**355**	330	–	**–**	–	180	**145**	125
	3	235	**210**	190	335	**300**	275	–	**–**	–	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	55	**50**	35	–	**–**	–
	2	–	**–**	–	–	**–**	–	55	**50**	35	–	**–**	–
	3	–	**–**	–	–	**–**	–	65	**55**	35	–	**–**	–
	4	–	**–**	–	–	**–**	–	100	**70**	50	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 6,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-TX	0,35	**0,33**	0,56	0,25	**0,24**	0,40	0,19	**0,18**	0,30	0,16	**0,16**	0,26	0,15	**0,14**	0,24	RDHT-TX
RDMT-TX	0,35	**0,42**	0,70	0,25	**0,30**	0,50	0,19	**0,23**	0,38	0,16	**0,20**	0,33	0,15	**0,18**	0,30	RDMT-TX
RDPT-MMX	0,35	**0,57**	0,93	0,25	**0,41**	0,67	0,19	**0,31**	0,50	0,16	**0,27**	0,43	0,15	**0,25**	0,40	RDPT-MMX
RDHW-MH	0,35	**0,70**	1,08	0,25	**0,50**	0,78	0,19	**0,38**	0,58	0,16	**0,33**	0,50	0,15	**0,30**	0,46	RDHW-MH
RDMW-TX	0,35	**0,70**	1,16	0,25	**0,50**	0,83	0,19	**0,38**	0,62	0,16	**0,33**	0,54	0,15	**0,30**	0,50	RDMW-TX

At 3,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-TX	0,40	**0,38**	0,64	0,29	**0,28**	0,46	0,22	**0,21**	0,35	0,19	**0,18**	0,30	0,17	**0,17**	0,28	RDHT-TX
RDMT-TX	0,40	**0,48**	0,81	0,29	**0,35**	0,58	0,22	**0,26**	0,43	0,19	**0,23**	0,38	0,17	**0,21**	0,35	RDMT-TX
RDPT-MMX	0,40	**0,66**	1,08	0,29	**0,48**	0,77	0,22	**0,36**	0,58	0,19	**0,31**	0,50	0,17	**0,29**	0,46	RDPT-MMX
RDHW-MH	0,40	**0,81**	1,25	0,29	**0,58**	0,90	0,22	**0,43**	0,67	0,19	**0,38**	0,58	0,17	**0,35**	0,53	RDHW-MH
RDMW-TX	0,40	**0,81**	1,34	0,29	**0,58**	0,96	0,22	**0,43**	0,72	0,19	**0,38**	0,62	0,17	**0,35**	0,57	RDMW-TX

At 1,50 Axial Depth of Cut (ap)

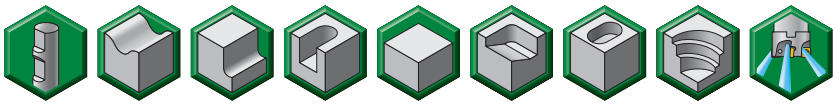
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-TX	0,53	**0,50**	0,85	0,38	**0,36**	0,61	0,28	**0,27**	0,45	0,25	**0,24**	0,40	0,23	**0,22**	0,36	RDHT-TX
RDMT-TX	0,53	**0,63**	1,06	0,38	**0,46**	0,76	0,28	**0,34**	0,57	0,25	**0,30**	0,50	0,23	**0,27**	0,45	RDMT-TX
RDPT-MMX	0,53	**0,87**	1,42	0,38	**0,63**	1,01	0,28	**0,47**	0,76	0,25	**0,41**	0,66	0,23	**0,37**	0,60	RDPT-MMX
RDHW-MH	0,53	**1,06**	1,65	0,38	**0,76**	1,18	0,28	**0,57**	0,88	0,25	**0,50**	0,76	0,23	**0,45**	0,70	RDHW-MH
RDMW-TX	0,53	**1,06**	1,78	0,38	**0,76**	1,26	0,28	**0,57**	0,94	0,25	**0,50**	0,82	0,23	**0,45**	0,75	RDMW-TX

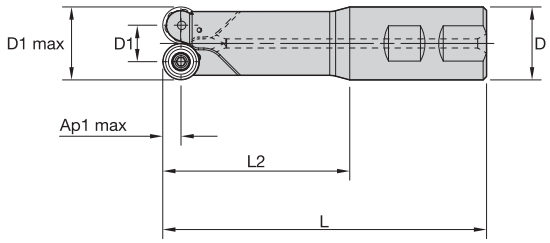
At 0,75 Axial Depth of Cut (ap)

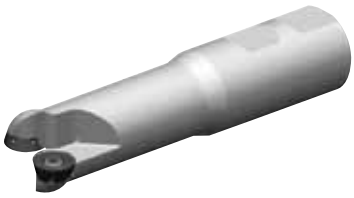
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHT-TX	0,72	**0,69**	1,16	0,52	**0,50**	0,83	0,39	**0,37**	0,62	0,34	**0,32**	0,54	0,31	**0,30**	0,50	RDHT-TX
RDMT-TX	0,72	**0,87**	1,46	0,52	**0,62**	1,04	0,39	**0,47**	0,78	0,34	**0,41**	0,68	0,31	**0,37**	0,62	RDMT-TX
RDPT-MMX	0,72	**1,20**	1,96	0,52	**0,86**	1,39	0,39	**0,64**	1,03	0,34	**0,56**	0,90	0,31	**0,51**	0,82	RDPT-MMX
RDHW-MH	0,72	**1,46**	2,29	0,52	**1,04**	1,62	0,39	**0,78**	1,20	0,34	**0,68**	1,04	0,31	**0,62**	0,95	RDHW-MH
RDMW-TX	0,72	**1,46**	2,46	0,52	**1,04**	1,74	0,39	**0,78**	1,29	0,34	**0,68**	1,12	0,31	**0,62**	1,02	RDMW-TX

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.







Weldon Shanks

order number	catalogue number	D1 max	D1	D	L	L2	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021341	**12391013800**	32	16	32	142	82	8,0	2	7.8°	19000	Yes	1,10

Spare Parts



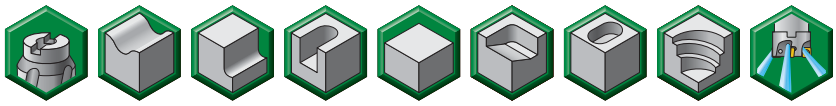


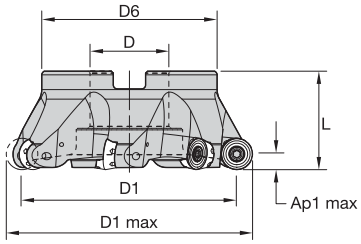


D1 max	insert screw	Nm	Torx driver
32	**12148007200**	4,0	**12148007500**

NOTE: All spare parts except the insert screws must be ordered separately.

- General purpose face and copy milling.
- Anti-rotation feature for top security.







Shell Mills

order number	catalogue number	D1 max	D1	D	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021347	**12391021000**	50	34	22	40	40	8,0	4	10.3°	13000	Yes	0,20
2021348	**12391021200**	63	47	27	48	40	8,0	4	7.0°	12000	Yes	0,30
2021349	**12391021400**	80	64	27	60	50	8,0	5	4.8°	10000	Yes	0,90
2021350	**12391021600**	100	84	32	78	50	8,0	6	3.8°	9000	No	1,20
2021351	**12391021800**	125	109	40	89	50	8,0	7	2.8°	8000	No	1,70

Spare Parts

D1 max	insert screw	Nm	Torx driver	socket-head cap screw	socket-head cap screw with coolant groove
50	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
63	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
80	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
100	**12148007200**	4,0	**12148007500**	–	–
125	**12148007200**	4,0	**12148007500**	–	–

NOTE: All spare parts except the insert screws must be ordered separately.

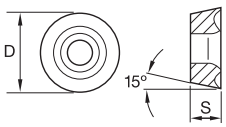
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
P3–P4	RDMT-TX	TN6525	**RDMW-TX**	**TN6540**	RDMW-TX	TN6540
P5–P6	RDMT-TX	TN7525	**RDMT-TX**	**TN7535**	RDMT-TX	TN7535
M1–M2	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
M3	RDMT-TX	TN6525	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
K1–K2	RDMW-TX	TN2510	**RDMW-TX**	**TN7535**	RDMW-TX	TN7535
K3	RDMW-TX	TN2510	**RDMW-TX**	**TN7535**	RDMW-TX	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	**RDMT-TX**	**TN6540**	–	–
S3	–	–	**RDMT-TX**	**TN6540**	–	–
S4	–	–	**RDMT-TX**	**TN6540**	RDMT-TX	TN6540
H1	RDMW-TX	TN2510	**RDMW-TX**	**TN2510**	–	–

iC16 • Inserts


RDMT-TX


RDHT-TX



P	○	●	●	●	●	●	
M		○	●	○	○	○	
K	●	○	○		○		
N							
S			●				
H	●						

● first choice
○ alternate choice

- Precision ground positive geometry for lower cutting forces
- First choice for general machining, stainless steel, and high-temp alloys.

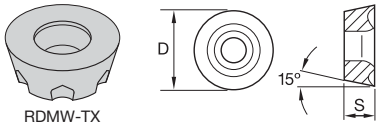
RDHT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDHT1605M0TX	16,00	5,56	0,12	▪	▪	▪	▪	▪	2012462

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RDMT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMT1605M0TX	16,00	5,56	0,18	▪	2957536	2957533	2020767	2207645	▪



RDMW-TX

- Precision pressed insert.
- First choice for roughing operations, especially for steel and cast iron.

● first choice
○ alternate choice

		TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
P		○	●	●	●	●	●
M			○	●	○	○	○
K		●	○	○		○	
N							
S				●			
H		●					

RDMW-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535	TTI25
RDMW1605M0TX	16,00	5,56	0,15	-	-	3523083	2109476	2020749	-

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			TTI25		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	430	**360**	300
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	310	**250**	215
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	310	**250**	215
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	265	**215**	180
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	320	**235**	200
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	145	**110**	90
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	480	**310**	215
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	325	**205**	145
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	320	**210**	145
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	220	**185**	155
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	180	**145**	125
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,11	**0,35**	0,70	0,08	**0,25**	0,50	0,06	**0,19**	0,38	0,05	**0,16**	0,33	0,05	**0,15**	0,30	RDHX-TX
RDMT-TX	0,23	**0,42**	0,84	0,17	**0,30**	0,60	0,13	**0,23**	0,45	0,11	**0,20**	0,39	0,10	**0,18**	0,36	RDMT-TX
RDMW-TX	0,23	**0,52**	1,05	0,17	**0,38**	0,76	0,13	**0,28**	0,56	0,11	**0,25**	0,49	0,10	**0,23**	0,45	RDMW-TX

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,13	**0,40**	0,81	0,10	**0,29**	0,58	0,07	**0,22**	0,43	0,06	**0,19**	0,38	0,06	**0,17**	0,35	RDHX-TX
RDMT-TX	0,27	**0,48**	0,97	0,19	**0,35**	0,70	0,14	**0,26**	0,52	0,13	**0,23**	0,45	0,12	**0,21**	0,42	RDMT-TX
RDMW-TX	0,27	**0,60**	1,22	0,19	**0,44**	0,87	0,14	**0,33**	0,65	0,13	**0,28**	0,57	0,12	**0,26**	0,52	RDMW-TX

At 2,00 Axial Depth of Cut (ap)

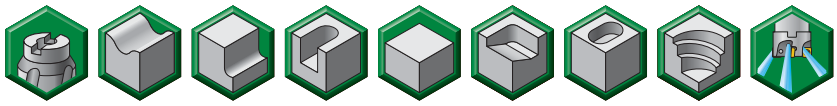
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,17	**0,53**	1,06	0,13	**0,38**	0,76	0,09	**0,28**	0,57	0,08	**0,25**	0,50	0,08	**0,23**	0,45	RDHX-TX
RDMT-TX	0,35	**0,63**	1,28	0,25	**0,46**	0,92	0,19	**0,34**	0,68	0,17	**0,30**	0,59	0,15	**0,27**	0,54	RDMT-TX
RDMW-TX	0,35	**0,79**	1,61	0,25	**0,57**	1,15	0,19	**0,43**	0,85	0,17	**0,37**	0,74	0,15	**0,34**	0,68	RDMW-TX

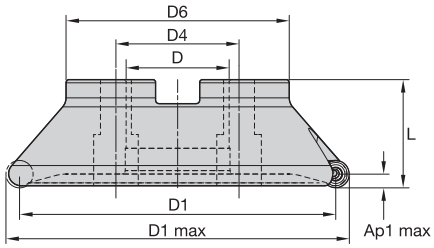
At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
RDHX-TX	0,24	**0,72**	1,46	0,17	**0,52**	1,04	0,13	**0,39**	0,78	0,11	**0,34**	0,68	0,10	**0,31**	0,62	RDHX-TX
RDMT-TX	0,48	**0,87**	1,76	0,35	**0,62**	1,26	0,26	**0,47**	0,93	0,23	**0,41**	0,81	0,21	**0,37**	0,74	RDMT-TX
RDMW-TX	0,48	**1,09**	2,22	0,35	**0,78**	1,58	0,26	**0,58**	1,17	0,23	**0,51**	1,02	0,21	**0,46**	0,93	RDMW-TX

NOTE: Use "Light Machining" value as starting feed rate.

- General purpose face and copy milling.
- Anti-rotation feature for top security.







Shell Mills

order number	catalogue number	D1 max	D1	D	D4	D6	L	Ap1 max	Z	max ramp angle	max RPM	coolant supply	kg
2021358	**12391023400**	50	34	22	–	40	40	8,0	4	6.0°	13000	Yes	0,20
2021359	**12391023600**	52	36	22	–	40	40	8,0	4	5.8°	13000	Yes	0,30
2021357	**12391023200**	63	47	27	–	48	40	8,0	5	4.0°	12000	Yes	0,20
2021360	**12391023800**	66	50	27	–	48	40	8,0	5	3.8°	12000	Yes	0,30
2021352	**12391022000**	80	64	27	–	60	50	8,0	6	2.8°	10000	Yes	0,90
2021353	**12391022200**	100	84	32	–	78	50	8,0	7	2.3°	9000	No	1,20
2021354	**12391022400**	125	109	40	–	89	50	8,0	8	1.8°	8000	No	1,80
2021355	**12391022600**	160	144	40	67	90	63	8,0	9	1.3°	7000	No	2,90
2021356	**12391022800**	200	184	60	102	130	63	8,0	11	0.8°	6000	No	0,30

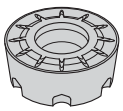
Spare Parts

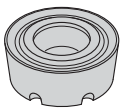
D1 max	 insert screw	 Nm	 Torx driver	 socket-head cap screw	 socket-head cap screw with coolant groove
50	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
52	**12148007200**	4,0	**12148007500**	**125.025**	**MS1234CG**
63	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
66	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
80	**12148007200**	4,0	**12148007500**	**125.230**	**MS2038CG**
100	**12148007200**	4,0	**12148007500**	–	–
125	**12148007200**	4,0	**12148007500**	–	–
160	**12148007200**	4,0	**12148007500**	–	–
200	**12148007200**	4,0	**12148007500**	–	–

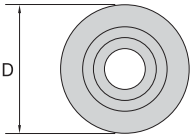
NOTE: All spare parts except the insert screws must be ordered separately.

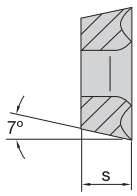
Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	...TX	TN6525	**...43**	**TN6540**	...43	TN6540
P3–P4	...TX	TN6525	**...TX**	**TN6540**	...43	TN6540
P5–P6	...TX	TN6525	**...TX**	**TN7535**	...TX	TN7535
M1–M2	...TX	TN6525	**...TX**	**TN6540**	...TX	TN6540
M3	...TX	TN6525	**...TX**	**TN6540**	...TX	TN6540
K1–K2	...43	TN2510	**...TX**	**WK15CM**	...TX	WK15CM
K3	...TX	TN6525	**...TX**	**WK15CM**	...TX	WK15CM
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**–**	**–**	–	–
S3	–	–	**–**	**–**	–	–
S4	...43	TN6540	**...TX**	**TN6540**	...TX	TN6540
H1	–	–	**...TX**	**TN2510**	–	–


RCMT-43


RCMT-TX





● first choice
○ alternate choice

		TN2510	TN6525	TN6540	TN7525	TN7535
P		○	●	●	●	●
M			○	●	○	○
K		●	○	○		○
N						
S				●		
H		●				

- Optimised geometry providing excellent chip control, even at lower depth of cut.

RCMT-43

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M043M	16,00	6,35	0,20	■	■	2957537	2020771	2067140

- Precision pressed positive geometry for lower cutting forces.
- First choice for general machining, stainless steel, and high-temp alloys in roughing operations.

RCMT-TX

catalogue number	D	S	hm	TN2510	TN6525	TN6540	TN7525	TN7535
RCMT1606M0TX	16,00	6,35	0,24	2012416	2957535	2957427	2012418	2020781

Recommended Starting Speeds [m/min]

Material Group		TN2510			TN6525			TN6540			TN7525			TN7535			WK15CM		
P	1	660	**580**	540	410	**320**	280	360	**280**	240	410	**310**	280	545	**475**	445	–	**–**	–
	2	410	**370**	330	320	**250**	215	250	**190**	170	310	**250**	215	335	**305**	275	–	**–**	–
	3	370	**330**	305	280	**215**	185	215	**170**	140	280	**215**	185	305	**275**	245	–	**–**	–
	4	275	**260**	230	235	**170**	145	180	**130**	110	235	**170**	145	230	**210**	190	–	**–**	–
	5	330	**300**	275	310	**235**	200	240	**180**	150	310	**235**	200	310	**275**	250	–	**–**	–
	6	230	**205**	175	205	**160**	130	160	**120**	100	205	**160**	130	190	**160**	130	–	**–**	–
M	1	270	**240**	210	190	**120**	80	130	**80**	60	245	**220**	185	245	**220**	185	–	**–**	–
	2	245	**210**	190	120	**80**	50	80	**50**	40	220	**190**	170	220	**190**	170	–	**–**	–
	3	190	**175**	150	125	**80**	55	85	**50**	40	175	**155**	140	175	**155**	140	–	**–**	–
K	1	420	**360**	300	275	**245**	220	220	**205**	180	380	**280**	240	355	**320**	290	505	**460**	410
	2	360	**300**	250	215	**190**	180	175	**155**	140	325	**240**	200	280	**250**	230	400	**355**	330
	3	300	**250**	200	180	**160**	145	155	**145**	125	240	**200**	170	235	**210**	190	335	**300**	275
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	25	**20**	10	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	70	**40**	30	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	60	**30**	25	–	**–**	–	–	**–**	–	–	**–**	–
H	1	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	145	**110**	70	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	115	**80**	45	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,46	**0,60**	0,93	0,33	**0,44**	0,67	0,25	**0,33**	0,50	0,22	**0,28**	0,44	0,20	**0,26**	0,40	...43
...TX	0,46	**0,70**	1,12	0,33	**0,50**	0,81	0,25	**0,38**	0,60	0,22	**0,33**	0,52	0,20	**0,30**	0,48	...TX

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,54	**0,70**	1,08	0,39	**0,50**	0,78	0,29	**0,38**	0,58	0,25	**0,33**	0,50	0,23	**0,30**	0,46	...43
...TX	0,54	**0,81**	1,30	0,39	**0,58**	0,93	0,29	**0,43**	0,69	0,25	**0,38**	0,61	0,23	**0,35**	0,55	...TX

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,70	**0,92**	1,42	0,51	**0,66**	1,02	0,38	**0,49**	0,76	0,33	**0,43**	0,66	0,30	**0,39**	0,60	...43
...TX	0,70	**1,06**	1,72	0,51	**0,76**	1,23	0,38	**0,57**	0,91	0,33	**0,50**	0,79	0,30	**0,45**	0,73	...TX

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
...43	0,96	**1,26**	1,97	0,69	**0,90**	1,40	0,52	**0,67**	1,04	0,45	**0,59**	0,90	0,41	**0,54**	0,83	...43
...TX	0,96	**1,46**	2,38	0,69	**1,04**	1,68	0,52	**0,78**	1,25	0,45	**0,68**	1,08	0,41	**0,62**	0,99	...TX

NOTE: Use "Light Machining" value as starting feed rate.

For Secure and Rigid Insert Clamping •

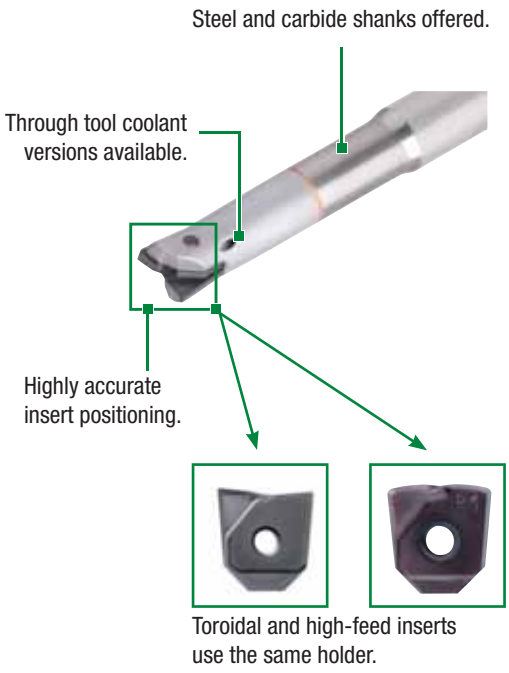
M270™ Series

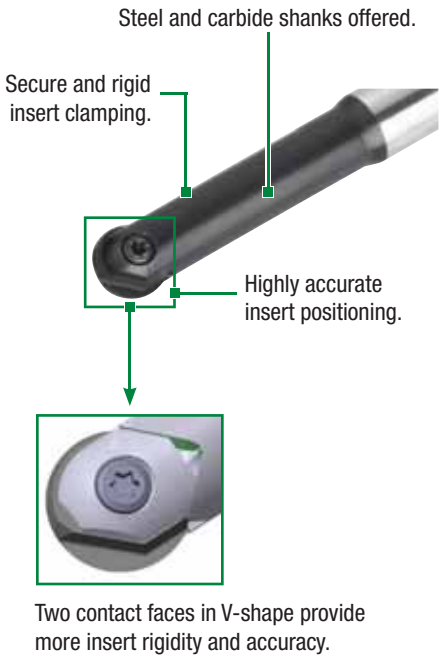
M270



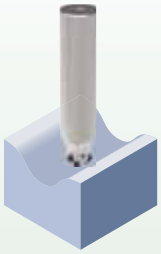
With precision-engineered ball nose, toroidal, and new high-feed inserts, the M270 Series provides the highest accuracy and insert stability for exceptional reliability and performance.

- Ball nose and toroidal tools for semi-finishing through finishing.
- Performance-boosting High-Feed (HF) inserts offered standard.
- V-shaped contact faces enable maximum stability and accuracy.





Copy Mills

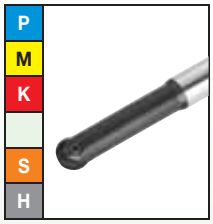


M270™ Ball Nose

Max depth of cut: 5–16mm

Diameter: 10–32mm

Pages: M102–M117





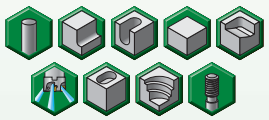
M270 Toroidal

Max depth of cut: 0,3–4mm

Diameter: 10–20mm

Pages: M118–M123



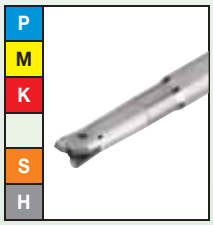


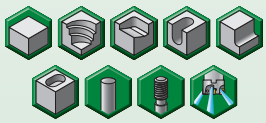
M270 High Feed

Max depth of cut: 0,6–1,1mm

Diameter: 10–20mm

Pages: M124–M130





Insert Offering



Ball nose inserts
BF/BR



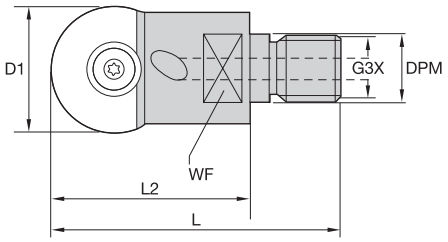
Toroidal inserts
TF



High-Feed inserts
HF

- Rough, semi-finishing, and finishing with one system.
- Through tool coolant.
- Secure and rigid insert clamping.







Ball Nose • Screw-On End Mills

order number	catalogue number	D1	DPM	G3X	L	L2	WF	Z	Z U	inserts	max RPM	coolant supply	kg
2243624	**M270BD010M08**	10	8,5	M8	42	25	10,0	1	2	M270B.10	57000	Yes	0,05
2243625	**M270BD012M08**	12	8,5	M8	42	25	10,0	1	2	M270B.12	55000	Yes	0,05
2243626	**M270BD016M08**	16	8,5	M8	47	30	10,0	1	2	M270B.16	53000	Yes	0,05
2243627	**M270BD020M10**	20	10,5	M10	59	40	14,0	1	2	M270B.20	52000	Yes	0,10
2243628	**M270BD025M12**	25	12,5	M12	72	50	19,0	1	2	M270B.25	50000	Yes	0,10
2243629	**M270BD032M16**	32	17,0	M16	73	50	22,0	1	2	M270B.32	46000	Yes	0,20

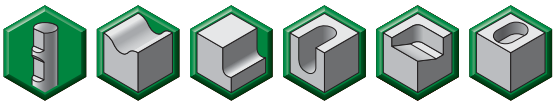
NOTE: ZU = Effective teeth.
Z = number of pocket seats.

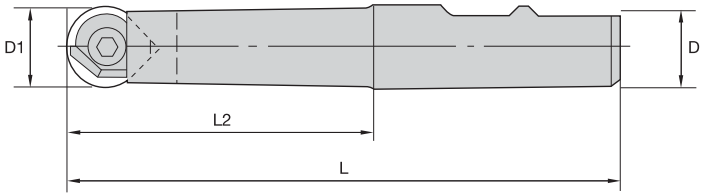
Spare Parts

D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Rough, semi-finishing, and finishing with one system.
- Secure and rigid insert clamping.







Ball Nose • Weldon® Shanks

order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2243618	**M270BD010B12L90**	10	12	90	45	1	2	M270B.10	57000	No	0,10
2243619	**M270BD012B12L95**	12	12	95	50	1	2	M270B.12	55000	No	0,10
2243620	**M270BD016B16L105**	16	16	105	57	1	2	M270B.16	53000	No	0,10
2243621	**M270BD020B20L120**	20	20	120	70	1	2	M270B.20	52000	No	0,20
2243622	**M270BD025B25L145**	25	25	145	89	1	2	M270B.25	50000	No	0,40
2243623	**M270BD032B32L155**	32	32	155	95	1	2	M270B.32	46000	No	0,80

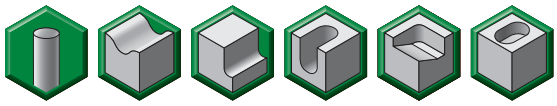
NOTE: ZU = Effective teeth.
Z = number of pocket seats.

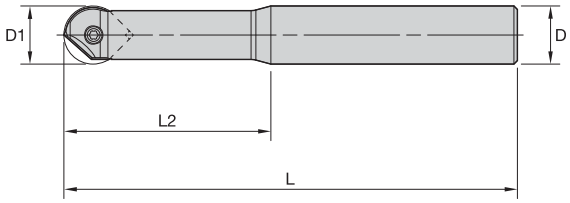
Spare Parts

D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Rough, semi-finishing, and finishing with one system.
- Secure and rigid insert clamping.







Ball Nose • Cylindrical Shanks

order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2243613	**M270BD010A12L140**	10	12	140	45	1	2	M270B.10	57000	No	0,10
2243614	**M270BD012A12L145**	12	12	145	50	1	2	M270B.12	55000	No	0,10
2067470	**M270BD016A16L155**	16	16	155	57	1	2	M270B.16	53000	No	0,20
2243615	**M270BD020A20L170**	20	20	170	70	1	2	M270B.20	52000	No	0,40
2243616	**M270BD025A25L195**	25	25	195	89	1	2	M270B.25	50000	No	0,60
2243617	**M270BD032A32L205**	32	32	205	95	1	2	M270B.32	46000	No	1,10

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

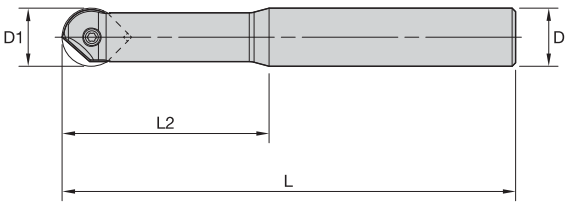
Spare Parts

D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**
25	**12748610900**	7,0	**12148086800**
32	**12748611000**	7,0	**12146006300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Rough, semi-finishing, and finishing with one system.
- Through tool coolant.
- Carbide shank to improve rigidity.







Ball Nose • Carbide Cylindrical Shanks

order number	catalogue number	D1	D	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
2424550	**M270BD010A12L140C**	10	12	140	45	1	2	M270B.10	57000	Yes	0,20
2424587	**M270BD012A12L145C**	12	12	145	50	1	2	M270B.12	55000	Yes	0,20
2424634	**M270BD016A16L155C**	16	16	155	57	1	2	M270B.16	53000	Yes	0,40
2639257	**M270BD020A20L170C**	20	20	170	70	1	2	M270B.20	52000	Yes	0,65

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts

D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide • .B..10

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN2505	**BR**	**TN7535**	BR	TN7535
M1–M2	BR	TN7535	**BR**	**TN7535**	BR	TN7535
M3	BR	TN7535	**BR**	**TN7535**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
K3	BF	TN2505	**BR**	**TN7535**	BR	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	BF	TN2505	**BF**	**TN2505**	–	TN2510

Insert Selection Guide • .B..12

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN2505	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN2505	**BR**	**TN7535**	BR	TN7535
M1–M2	BR	TN7535	**BR**	**TN7535**	BR	TN7535
M3	BR	TN7535	**BR**	**TN7535**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BR**	**TN2510**	BR	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	–	–	–	–	–	–
H1	BF	TN2505	**BF**	**TN2505**	BR	TN2510

Insert Selection Guide • .B..16

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN6525	**BR**	**TN7535**	BR	TN7535
P3–P4	BF	TN6525	**BR**	**TN7535**	BR	TN7535
P5–P6	BF	TN6525	**BR**	**TN7535**	BR	TN7535
M1–M2	BF	TN6525	**BF**	**TN6525**	BR	TN7535
M3	BF	TN6525	**BF**	**TN6525**	BR	TN7535
K1–K2	BF	TN2505	**BR**	**TN7535**	BR	TN7535
K3	BF	TN2505	**BR**	**TN7535**	BR	TN7535
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	–	–	–	–	–	–
S3	–	–	–	–	–	–
S4	BF	TN2505	–	–	–	–
H1	BF	TN2505	**BF**	**TN2505**	BR	TN2510

Insert Selection Guide • .B..20

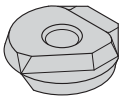
Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN6540	**BF**	**TN6540**	BF	TN6540
P3–P4	BF	TN6540	**BF**	**TN6540**	BF	TN7535
P5–P6	BF	TN6540	**BF**	**TN7535**	BF	TN7535
M1–M2	BF	TN6540	**BF**	**TN6540**	BF	TN7535
M3	BF	TN6540	**BF**	**TN6540**	BF	TN7535
K1–K2	BR	TN2505	**BR**	**TN2505**	–	–
K3	BR	TN2505	**BR**	**TN2505**	–	–
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	–	–	**BF**	**TN6540**	–	–
S3	–	–	**BF**	**TN6540**	–	–
S4	–	–	**BF**	**TN6540**	–	–
H1	–	–	**BR**	**TN2505**	–	TN2510

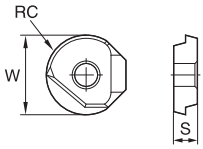
Insert Selection Guide • .B..25

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P3–P4	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P5–P6	BF	TN2510	**BR**	**TN7525**	BR	TN7535
M1–M2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
M3	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K1–K2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BF**	**TN2510**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	BF	TN2510	**–**	**–**	–	–
S3	BF	TN2510	**–**	**–**	–	–
S4	BF	TN2505	**BR**	**TN7535**	–	–
H1	BF	TN2505	**BF**	**TN2510**	BR	TN2510

Insert Selection Guide • .B..32

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P3–P4	BF	TN2510	**BR**	**TN7525**	BR	TN7535
P5–P6	BF	TN2510	**BR**	**TN7525**	BR	TN7535
M1–M2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
M3	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K1–K2	BF	TN2510	**BF**	**TN2510**	BR	TN7535
K3	BF	TN2505	**BF**	**TN2510**	BR	TN7535
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	BF	TN2510	**–**	**–**	–	–
S3	BF	TN2510	**–**	**–**	–	–
S4	BF	TN2505	**BR**	**TN7535**	–	–
H1	BF	TN2505	**BF**	**TN2510**	BR	TN2510


M270-BF



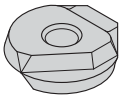
● first choice
○ alternate choice

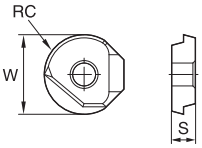
		TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
P		○	○	●	●	●	●
M				○	●	○	○
K		●	●	○	○		○
N							
S					●		
H		●	●				

- -BF geometry is the first choice for all finishing and light operations.

M270 BF

catalogue number	W	S	RC	hm	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
M270BF10	10,00	2,38	5,00	0,08	2012698	2012700	-	-	-	-
M270BF12	12,00	3,18	6,00	0,08	2012718	2012720	2957538	-	-	-
M270BF16	16,00	4,76	8,00	0,08	2012728	2012730	2957541	-	-	-
M270BF20	20,00	4,76	10,00	0,10	2012748	2012750	2957542	-	-	-
M270BF25	25,00	4,76	12,50	0,10	2012758	2012760	-	-	-	-
M270BF32	32,00	4,76	16,00	0,10	2012778	2012780	-	-	-	-


M270-BR



- -BR geometry is the first choice for all semi-finishing and medium-duty applications.

● first choice
○ alternate choice

		TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
P		○	○	●	●	●	●
M				○	●	○	○
K		●	●	○	○		○
N							
S					●		
H		●	●				

■ M270 BR

catalogue number	W	S	RC	hm	TN2505	TN2510	TN6525	TN6540	TN7525	TN7535
M270BR10	10,00	2,38	5,00	0,08	-	2012610	-	-	2012612	2012624
M270BR12	12,00	3,18	6,00	0,08	-	2012630	-	2957539	2012632	2012634
M270BR16	16,00	4,76	8,00	0,08	-	2012640	-	2957540	2012642	2113506
M270BR20	20,00	4,76	10,00	0,10	-	2012658	-	2957543	2012660	2012662
M270BR25	25,00	4,76	12,50	0,10	-	2012668	-	-	2012670	2012672
M270BR32	32,00	4,76	16,00	0,10	-	2012688	-	-	2012690	2012692

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN2510			TN6525			TN6540		
P	1	550	**420**	360	660	**580**	540	410	**320**	280	360	**280**	240
	2	320	**240**	205	410	**370**	330	320	**250**	215	250	**190**	170
	3	320	**240**	205	370	**330**	305	280	**215**	185	215	**170**	140
	4	–	**–**	–	275	**260**	230	235	**170**	145	180	**130**	110
	5	–	**–**	–	330	**300**	275	310	**235**	200	240	**180**	150
	6	–	**–**	–	230	**205**	175	205	**160**	130	160	**120**	100
M	1	–	**–**	–	270	**240**	210	190	**120**	80	130	**80**	60
	2	–	**–**	–	245	**210**	190	120	**80**	50	80	**50**	40
	3	–	**–**	–	190	**175**	150	125	**80**	55	85	**50**	40
K	1	400	**300**	250	420	**360**	300	275	**245**	220	220	**205**	180
	2	540	**365**	280	360	**300**	250	215	**190**	180	175	**155**	140
	3	310	**190**	155	300	**250**	200	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	145	**110**	70	–	**–**	–	–	**–**	–
	2	175	**140**	95	145	**110**	70	–	**–**	–	–	**–**	–
	3	140	**115**	80	115	**80**	45	–	**–**	–	–	**–**	–

Material Group		TN7525			TN7535			TTI25		
P	1	410	**310**	280	545	**475**	445	430	**360**	300
	2	310	**250**	215	335	**305**	275	310	**250**	215
	3	280	**215**	185	305	**275**	245	310	**250**	215
	4	235	**170**	145	230	**210**	190	265	**215**	180
	5	310	**235**	200	310	**275**	250	320	**235**	200
	6	205	**160**	130	190	**160**	130	145	**110**	90
M	1	245	**220**	185	245	**220**	185	480	**310**	215
	2	220	**190**	170	220	**190**	170	325	**205**	145
	3	175	**155**	140	175	**155**	140	320	**210**	145
K	1	380	**280**	240	355	**320**	290	220	**185**	155
	2	325	**240**	200	280	**250**	230	180	**145**	125
	3	240	**200**	170	235	**210**	190	145	**125**	100
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

■ Recommended Starting Feeds [mm] • .B..10

Light Machining	General Purpose	Heavy Machining

At 4,76 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,12	**0,23**	0,42	0,08	**0,16**	0,29	0,06	**0,12**	0,21	0,05	**0,10**	0,18	0,05	**0,10**	0,17	BF
BR	0,19	**0,29**	0,51	0,14	**0,20**	0,35	0,10	**0,15**	0,25	0,09	**0,13**	0,22	0,08	**0,12**	0,20	BR

At 2,38 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,14	**0,27**	0,49	0,10	**0,19**	0,34	0,07	**0,14**	0,25	0,06	**0,12**	0,21	0,06	**0,11**	0,19	BF
BR	0,22	**0,34**	0,61	0,16	**0,24**	0,40	0,12	**0,17**	0,29	0,10	**0,15**	0,25	0,09	**0,14**	0,23	BR

At 1,19 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,18	**0,36**	0,68	0,13	**0,25**	0,45	0,09	**0,18**	0,32	0,08	**0,16**	0,28	0,08	**0,15**	0,25	BF
BR	0,29	**0,46**	0,84	0,21	**0,31**	0,54	0,15	**0,23**	0,39	0,13	**0,20**	0,33	0,12	**0,18**	0,30	BR

At 0,60 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,25	**0,51**	1,02	0,18	**0,34**	0,63	0,13	**0,25**	0,44	0,11	**0,22**	0,38	0,10	**0,20**	0,35	BF
BR	0,41	**0,66**	1,34	0,28	**0,44**	0,76	0,21	**0,31**	0,53	0,18	**0,27**	0,45	0,17	**0,25**	0,41	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..12

Light Machining	General Purpose	Heavy Machining

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BR	0,13	**0,29**	0,43	0,09	**0,20**	0,30	0,07	**0,15**	0,22	0,06	**0,13**	0,19	0,06	**0,12**	0,18	BR
BF	0,21	**0,39**	0,58	0,15	**0,27**	0,40	0,11	**0,20**	0,29	0,10	**0,18**	0,25	0,09	**0,16**	0,23	BF

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BR	0,15	**0,33**	0,50	0,11	**0,24**	0,35	0,08	**0,17**	0,26	0,07	**0,15**	0,22	0,06	**0,14**	0,20	BR
BF	0,24	**0,46**	0,69	0,17	**0,32**	0,47	0,13	**0,23**	0,34	0,11	**0,20**	0,29	0,10	**0,18**	0,27	BF

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BR	0,20	**0,45**	0,68	0,14	**0,31**	0,46	0,11	**0,23**	0,34	0,09	**0,20**	0,29	0,08	**0,18**	0,27	BR
BF	0,32	**0,61**	0,94	0,23	**0,42**	0,62	0,17	**0,31**	0,45	0,15	**0,26**	0,38	0,13	**0,24**	0,35	BF

At 0,63 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BR	0,28	**0,63**	0,99	0,20	**0,43**	0,64	0,15	**0,31**	0,46	0,13	**0,27**	0,40	0,12	**0,25**	0,36	BR
BF	0,45	**0,89**	1,42	0,31	**0,58**	0,87	0,23	**0,42**	0,61	0,20	**0,36**	0,53	0,18	**0,33**	0,48	BF

NOTE: Use "Light Machining" value as starting feed rate.

■ Recommended Starting Feeds [mm] • .B..16

Light Machining	General Purpose	Heavy Machining

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,14	**0,28**	0,45	0,10	**0,20**	0,31	0,08	**0,15**	0,23	0,07	**0,13**	0,20	0,06	**0,12**	0,18	BF
BR	0,21	**0,38**	0,59	0,15	**0,27**	0,41	0,11	**0,20**	0,30	0,10	**0,17**	0,26	0,09	**0,16**	0,24	BR

At 4,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,16	**0,33**	0,52	0,12	**0,23**	0,36	0,09	**0,17**	0,27	0,08	**0,15**	0,23	0,07	**0,14**	0,21	BF
BR	0,24	**0,45**	0,69	0,17	**0,31**	0,48	0,13	**0,23**	0,35	0,11	**0,20**	0,30	0,10	**0,18**	0,28	BR

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,21	**0,44**	0,70	0,15	**0,31**	0,48	0,11	**0,23**	0,35	0,10	**0,20**	0,30	0,09	**0,18**	0,28	BF
BR	0,32	**0,60**	0,94	0,23	**0,42**	0,63	0,17	**0,31**	0,46	0,15	**0,26**	0,40	0,13	**0,24**	0,36	BR

At 1,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,29	**0,61**	0,99	0,21	**0,43**	0,66	0,16	**0,31**	0,48	0,14	**0,27**	0,42	0,12	**0,25**	0,38	BF
BR	0,44	**0,85**	1,38	0,31	**0,57**	0,88	0,23	**0,42**	0,63	0,20	**0,36**	0,54	0,18	**0,33**	0,50	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..20

Light Machining	General Purpose	Heavy Machining

At 10,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,19	**0,24**	0,40	0,13	**0,17**	0,28	0,10	**0,13**	0,21	0,09	**0,11**	0,18	0,08	**0,10**	0,17	BF
BR	0,24	**0,38**	0,65	0,17	**0,27**	0,46	0,13	**0,20**	0,34	0,11	**0,17**	0,30	0,10	**0,16**	0,27	BR

At 5,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,22	**0,28**	0,46	0,15	**0,20**	0,33	0,12	**0,15**	0,24	0,10	**0,13**	0,21	0,09	**0,12**	0,19	BF
BR	0,27	**0,44**	0,76	0,20	**0,31**	0,53	0,15	**0,23**	0,39	0,13	**0,20**	0,34	0,12	**0,18**	0,31	BR

At 2,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,28	**0,37**	0,61	0,20	**0,27**	0,43	0,15	**0,20**	0,32	0,13	**0,17**	0,28	0,12	**0,16**	0,25	BF
BR	0,36	**0,58**	1,01	0,26	**0,41**	0,70	0,19	**0,30**	0,52	0,17	**0,26**	0,45	0,15	**0,24**	0,41	BR

At 1,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,39	**0,51**	0,85	0,28	**0,36**	0,59	0,21	**0,27**	0,44	0,18	**0,23**	0,38	0,17	**0,21**	0,35	BF
BR	0,50	**0,81**	1,44	0,36	**0,56**	0,97	0,26	**0,42**	0,71	0,23	**0,36**	0,61	0,21	**0,33**	0,56	BR

NOTE: Use "Light Machining" value as starting feed rate.

■ Recommended Starting Feeds [mm] • .B..25

Light Machining	General Purpose	Heavy Machining

At 12,50 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,17	**0,31**	0,50	0,13	**0,22**	0,36	0,09	**0,16**	0,26	0,08	**0,14**	0,23	0,08	**0,13**	0,21	BF
BR	0,24	**0,38**	0,65	0,17	**0,27**	0,46	0,13	**0,20**	0,34	0,11	**0,17**	0,30	0,10	**0,16**	0,27	BR

At 6,25 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,20	**0,35**	0,58	0,15	**0,25**	0,41	0,11	**0,19**	0,30	0,09	**0,16**	0,27	0,09	**0,15**	0,24	BF
BR	0,27	**0,44**	0,76	0,20	**0,31**	0,53	0,15	**0,23**	0,39	0,13	**0,20**	0,34	0,12	**0,18**	0,31	BR

At 3,13 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,27	**0,47**	0,77	0,19	**0,33**	0,54	0,14	**0,25**	0,40	0,12	**0,21**	0,35	0,11	**0,20**	0,32	BF
BR	0,36	**0,58**	1,02	0,26	**0,41**	0,70	0,19	**0,30**	0,52	0,17	**0,26**	0,45	0,15	**0,24**	0,41	BR

At 1,56 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,37	**0,65**	1,09	0,26	**0,46**	0,75	0,19	**0,34**	0,55	0,17	**0,29**	0,47	0,15	**0,27**	0,43	BF
BR	0,50	**0,81**	1,44	0,36	**0,56**	0,97	0,26	**0,42**	0,71	0,23	**0,36**	0,61	0,21	**0,33**	0,56	BR

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm] • .B..32

Light Machining	General Purpose	Heavy Machining

At 16,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,17	**0,30**	0,47	0,13	**0,22**	0,34	0,09	**0,16**	0,25	0,08	**0,14**	0,22	0,08	**0,13**	0,20	BF
BR	0,23	**0,38**	0,59	0,17	**0,27**	0,42	0,13	**0,20**	0,31	0,11	**0,17**	0,27	0,10	**0,16**	0,25	BR

At 8,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,20	**0,35**	0,55	0,15	**0,25**	0,39	0,11	**0,19**	0,29	0,09	**0,16**	0,25	0,09	**0,15**	0,23	BF
BR	0,27	**0,43**	0,69	0,19	**0,31**	0,49	0,14	**0,23**	0,36	0,13	**0,20**	0,32	0,12	**0,18**	0,29	BR

At 4,00 Axial Depth of Cut (ap)

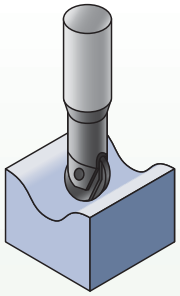
Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,26	**0,46**	0,72	0,19	**0,33**	0,51	0,14	**0,25**	0,38	0,12	**0,21**	0,33	0,11	**0,20**	0,30	BF
BR	0,35	**0,57**	0,92	0,25	**0,41**	0,64	0,19	**0,30**	0,48	0,17	**0,26**	0,41	0,15	**0,24**	0,38	BR

At 2,00 Axial Depth of Cut (ap)

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
BF	0,36	**0,64**	1,01	0,26	**0,45**	0,71	0,19	**0,34**	0,52	0,17	**0,29**	0,45	0,15	**0,27**	0,41	BF
BR	0,49	**0,80**	1,28	0,35	**0,56**	0,89	0,26	**0,42**	0,65	0,23	**0,36**	0,57	0,21	**0,33**	0,52	BR

NOTE: Use "Light Machining" value as starting feed rate.

Selecting the Correct Insert and Cutting Conditions for Your Application

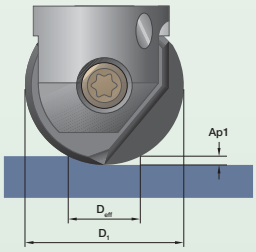


1. Insert Style: Considerations for Selecting the Correct Insert

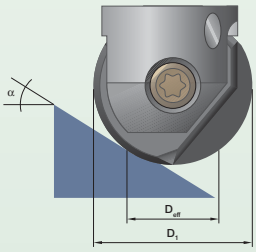
Best Choices for Insert and Grade Selection ● First choice ○ Alternate choice	BR Geometry		BF Geometry
			
Grade	TN7535	TN2510	TN2505
Roughing Operation	●	○	
Finishing Operation		○	●
Low RPM Machine	●	○	
Flat Areas or Face Milling (≤10° inclination)	●	○	
Hard Machining		○	●
Unstable and/or Long Overhangs	●	○	
HSM or 5-Axis Machining (smaller ap/ae values)	●	○	

2. Calculating effective diameter and resulting surface speed

It is important to consider the effective diameter (Deff) when using light depths of cut in order to properly calculate RPM values. Use the following formula when machining flat surfaces or inclinations of 10° or less to find the Deff value, and then use this for RPM calculations as opposed to using the overall insert diameter (D1).



When machining inclinations between 11° and 55°, further modification of vc is required. Apply factor "k" from the given formula to calculate the correct vc (vceff). This corrected value is then used to calculate the proper RPM for the tool.



$$Deff = \sqrt{D1^2-(D1-2Ap1)^2}$$

$$k = \frac{1}{\sin\left[\alpha + \arccos\left(1-(2\,(Ap1/D1))\right)\right]}$$

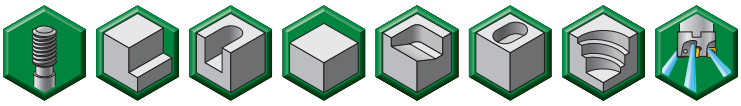
$$v_c eff = v_c \times k$$

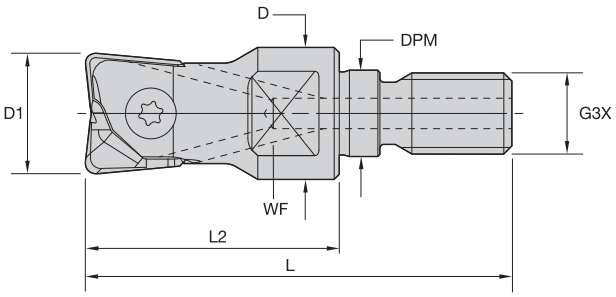
Starting Values for Semi-Finishing in Common Material Types (L/D ratio <3 x D1)

M270 is usually applied for semi-finishing and finishing operations; Ap1/ae conditions depend on the operation. As a general rule: Ap1/ae ≤0,05D.

Material	Tool Diameter																	
	Ø10			Ø12			Ø16			Ø20			Ø25			Ø32		
	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)	max rec. (mm)		fz (mm/ tooth)
	Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae		Ap1	ae	
Soft Steel <250 HB	0,7	0,7	0,2	0,8	0,8	0,2	1,1	1,1	0,27	1,3	1,3	0,27	1,7	1,7	0,3	2,1	2,1	0,3
High-Strength Steel 33–44 HRC	0,5	0,5	0,15	0,6	0,6	0,2	0,8	0,8	0,25	1	1	0,25	1,3	1,3	0,25	1,6	1,6	0,25
Hardened Steel 44–55 HRC	0,3	0,3	0,15	0,4	0,4	0,2	0,5	0,5	0,22	0,7	0,7	0,22	0,8	0,8	0,25	1,1	1,1	0,25
Grey Cast Iron GG25…	1	1	0,2	1,2	1,2	0,25	1,6	1,6	0,25	2	2	0,25	2,5	2,5	0,3	3,2	3,2	0,3
Nodular Cast Iron GGG60…	0,7	0,7	0,2	0,8	0,8	0,25	1,1	1,1	0,25	1,3	1,3	0,25	1,7	1,7	0,3	2,1	2,1	0,3

- Semi-finishing and finishing applications.
- Through tool coolant.
- Secure and rigid insert clamping.







Toroidal • Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L	L2	WF	Z	Z U	inserts	max RPM	coolant supply	kg
3926546	**M270TD012M08**	12	13	8,5	M8	42	25	10	1	2	M270TF12R..	55000	Yes	0,02
3926547	**M270TD016M08**	16	13	8,5	M8	47	30	10	1	2	M270TF16R..	53000	Yes	0,09
3926548	**M270TD020M10**	20	18	10,5	M10	59	40	14	1	2	M270TF20R..	52000	Yes	0,07

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts

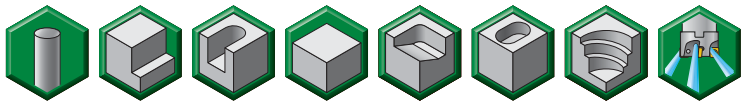


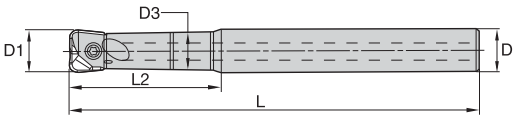


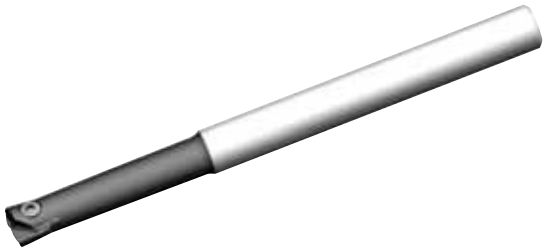
D1	insert screw	Nm	Torx driver
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Semi-finishing and finishing applications.
- Through tool coolant.
- Secure and rigid insert clamping.







Toroidal • Cylindrical Shanks

order number	catalogue number	D1	D	D3	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
3926514	**M270TD010A10L120**	10	10	9	120	45	1	2	M270TF10R..	57000	Yes	0,06
3926515	**M270TD012A12L140**	12	12	11	140	50	1	2	M270TF12R..	55000	Yes	0,09
3926516	**M270TD016A16L160**	16	16	14	160	57	1	2	M270TF16R..	53000	Yes	0,19
3926517	**M270TD020A20L180**	20	20	18	180	70	1	2	M270TF20R..	52000	Yes	0,35

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts

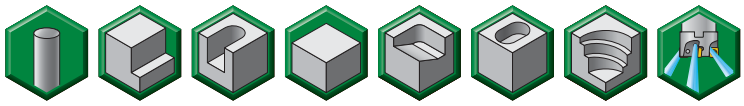


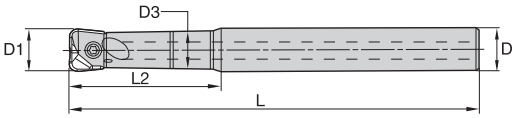


D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- Semi-finishing and finishing applications.
- Through tool coolant.
- Carbide shank for higher rigidity.







Toroidal • Carbide Cylindrical Shanks

order number	catalogue number	D1	D	D3	L	L2	Z	Z U	inserts	max RPM	coolant supply	kg
3926518	**M270TD010A10L120C**	10	10	9	120	45	1	2	M270TF10R..	57000	Yes	0,11
3926519	**M270TD010A10L150C**	10	10	9	150	45	1	2	M270TF10R..	57000	Yes	0,14
3926520	**M270TD012A12L120C**	12	12	11	120	50	1	2	M270TF12R..	55000	Yes	0,15
3926521	**M270TD012A12L160C**	12	12	11	160	50	1	2	M270TF12R..	55000	Yes	0,22
3926522	**M270TD016A16L140C**	16	16	14	140	57	1	2	M270TF16R..	53000	Yes	0,32
3926543	**M270TD016A16L180C**	16	16	14	180	57	1	2	M270TF16R..	53000	Yes	0,44
3926544	**M270TD020A20L150C**	20	20	18	150	70	1	2	M270TF20R..	52000	Yes	0,52
3926545	**M270TD020A20L200C**	20	20	18	200	70	1	2	M270TF20R..	52000	Yes	0,74

NOTE: ZU = Effective teeth.
Z = number of pocket seats.

Spare Parts



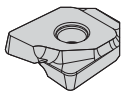


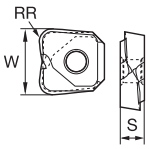
D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	TF	TN2510	**TF**	**TN2525**	TF	TN2525
P3–P4	TF	TN2510	**TF**	**TN2525**	TF	TN2525
P5–P6	TF	TN2510	**TF**	**TN2525**	–	–
M1–M2	TF	TN2510	–	–	–	–
M3	TF	TN2510	–	–	–	–
K1–K2	TF	TN2510	**TF**	**TN2525**	–	–
K3	TF	TN2510	**TF**	**TN2525**	–	–
N1–N2	–	–	–	–	–	–
N3	–	–	–	–	–	–
S1–S2	TF	TN2510	–	–	–	–
S3	TF	TN2510	–	–	–	–
S4	TF	TN2510	–	–	–	–
H1	TF	TN2505	**TF**	**TN2510**	–	–


M270-TF



● first choice
○ alternate choice

P	○	○	●
M			
K	●	●	○
N			
S			
H	●	●	●

- Precision insert for finishing and semi-finishing applications.
- Back draft design to minimise vibration and improve surface finishes.

M270 Toroidal

catalogue number	W	S	RR	hm	TN2505	TN2510	TN2525
M270TF10R05	10,00	2,38	0,50	0,08	-	3374385	3384424
M270TF10R1	10,00	2,38	1,00	0,08	2095682	-	2638760
M270TF12R05	12,00	3,18	0,50	0,08	-	3374387	3384426
M270TF12R1	12,00	3,18	1,01	0,08	-	3374388	3384427
M270TF12R2	12,00	3,18	2,01	0,08	2095640	-	2638761
M270TF16R03	16,00	4,76	0,30	0,08	-	3374389	3384428
M270TF16R05	16,00	4,76	0,50	0,08	-	3374390	3384429
M270TF16R1	16,00	4,76	1,01	0,08	-	3374391	3384430
M270TF16R2	16,00	4,76	2,02	0,08	-	3374392	3384431
M270TF16R3	16,00	4,76	3,04	0,08	-	-	2638762
M270TF20R03	20,00	4,76	0,30	0,08	-	3375713	-
M270TF20R05	20,00	4,76	0,50	0,08	-	3375714	3384453
M270TF20R1	20,00	4,76	1,01	0,08	-	-	3384454
M270TF20R2	20,00	4,76	2,01	0,08	-	3375716	3384455
M270TF20R4	20,00	4,76	4,02	0,08	-	-	2639023

NOTE: Ap1 max is equal to RR.

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN2510			TN2525		
P	1	550	**420**	360	660	**580**	540	550	**420**	360
	2	320	**240**	205	410	**370**	330	320	**240**	205
	3	320	**240**	205	370	**330**	305	320	**240**	205
	4	–	**–**	–	275	**260**	230	–	**–**	–
	5	–	**–**	–	330	**300**	275	–	**–**	–
	6	–	**–**	–	230	**205**	175	–	**–**	–
M	1	–	**–**	–	270	**240**	210	–	**–**	–
	2	–	**–**	–	245	**210**	190	–	**–**	–
	3	–	**–**	–	190	**175**	150	–	**–**	–
K	1	400	**300**	250	420	**360**	300	–	**–**	–
	2	540	**365**	280	360	**300**	250	–	**–**	–
	3	310	**190**	155	300	**250**	200	–	**–**	–
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
	4	–	**–**	–	–	**–**	–	–	**–**	–
H	1	175	**140**	95	145	**110**	70	130	**90**	60
	2	175	**140**	95	145	**110**	70	130	**90**	60
	3	140	**115**	80	115	**80**	45	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

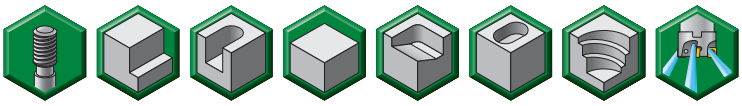
Recommended Starting Feeds [mm]

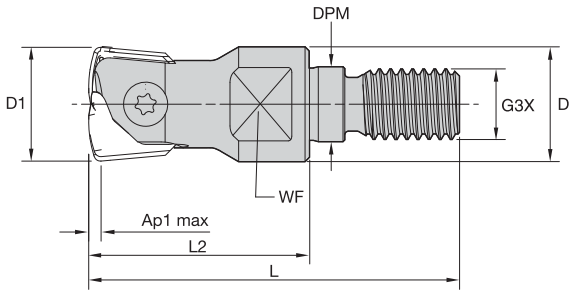
Light Machining	General Purpose	Heavy Machining

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
TF	0,12	**0,37**	0,62	0,09	**0,26**	0,43	0,06	**0,19**	0,31	0,06	**0,17**	0,27	0,05	**0,15**	0,25	TF

NOTE: Use "Light Machining" value as starting feed rate.

- High metal removal rates.
- Excellent in long reach applications.
- Rough and semi-finishing applications.







High-Feed • Screw-On End Mills

order number	catalogue number	D1	D	DPM	G3X	L	L2	WF	Ap1 max	Z	Z U	insert 1	insert 2*	max RPM	coolant supply	kg
3926546	**M270TD012M08**	12	13	8,5	M8	42	25	10	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,02
3926547	**M270TD016M08**	16	13	8,5	M8	47	30	10	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,09
3926548	**M270TD020M10**	20	18	10,5	M10	59	40	14	1,1	1	2	M270HF20	—	52000	Yes	0,07

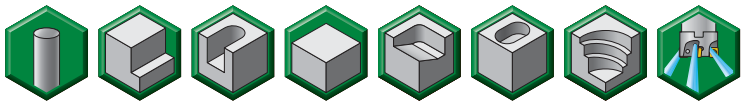
NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

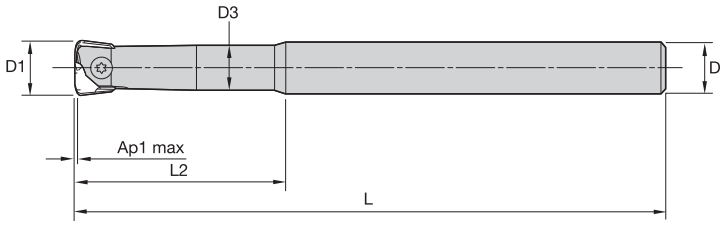
Spare Parts

D1	 insert screw	 Nm	 Torx driver
12	**12748610600**	2	**12148788900**
16	**12748610700**	5	**12148099300**
20	**12748610800**	5	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- High metal removal rates.
- Excellent in long reach applications.
- Rough and semi-finishing applications.







High-Feed • Cylindrical Shanks

order number	catalogue number	D1	D	D3	L	L2	Ap1 max	Z	Z U	insert 1	insert 2*	max RPM	coolant supply	kg
3926514	**M270TD010A10L120**	10	10	9	120	45	0,6	1	2	M270HF10	–	57000	Yes	0,06
3926515	**M270TD012A12L140**	12	12	11	140	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,09
3926516	**M270TD016A16L160**	16	16	14	160	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,19
3926517	**M270TD020A20L180**	20	20	18	180	70	1,1	1	2	M270HF20	–	52000	Yes	0,35

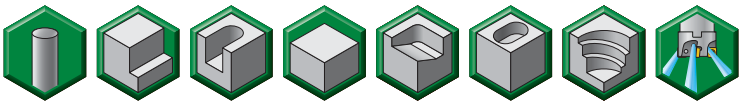
NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

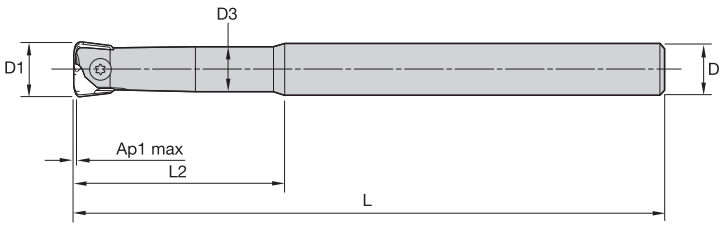
Spare Parts

D1	insert screw	Nm	Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

- High metal removal rates.
- Excellent in long reach applications.
- Carbide shank for higher rigidity.







High-Feed • Carbide Cylindrical Shanks

order number	catalogue number	D1	D	D3	L	L2	Ap1 max	Z	Z U	insert 1	insert 2*	max RPM	coolant supply	kg
3926518	**M270TD010A10L120C**	10	10	9	120	45	0,6	1	2	M270HF10	—	57000	Yes	0,11
3926519	**M270TD010A10L150C**	10	10	9	150	45	0,6	1	2	M270HF10	—	57000	Yes	0,14
3926520	**M270TD012A12L120C**	12	12	11	120	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,15
3926521	**M270TD012A12L160C**	12	12	11	160	50	0,6	1	2	M270HF12	M270HF13	55000	Yes	0,22
3926522	**M270TD016A16L140C**	16	16	14	140	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,32
3926543	**M270TD016A16L180C**	16	16	14	180	57	0,9	1	2	M270HF16	M270HF17	53000	Yes	0,44
3926544	**M270TD020A20L150C**	20	20	18	150	70	1,1	1	2	M270HF20	—	52000	Yes	0,52
3926545	**M270TD020A20L200C**	20	20	18	200	70	1,1	1	2	M270HF20	—	52000	Yes	0,74

NOTE: ZU = Effective teeth.
Z = number of pocket seats.
**D1 = 13mm when using M270HF13; D1 = 17mm when using M270HF17.*

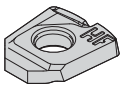
Spare Parts

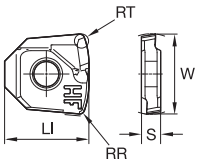
D1	 insert screw	 Nm	 Torx driver
10	**12748610500**	2,0	**12148788900**
12	**12748610600**	2,0	**12148788900**
16	**12748610700**	5,0	**12148099300**
20	**12748610800**	5,0	**12148099300**

NOTE: All spare parts except the insert screws must be ordered separately.

Insert Selection Guide

Material Group	Light Machining		General Purpose		Heavy Machining	
	Geometry	Grade	Geometry	Grade	Geometry	Grade
P1–P2	HF	TN6525	**HF**	**TN6540**	HF	TN6540
P3–P4	HF	TN6525	**HF**	**TN6540**	HF	TN6540
P5–P6	HF	TN6525	**HF**	**TN6540**	HF	TN6540
M1–M2	HF	TN6525	**HF**	**TN6540**	HF	TN6540
M3	HF	TN6525	**HF**	**TN6540**	HF	TN6540
K1–K2	HF	TN2505	**HF**	**TN6525**	–	–
K3	HF	TN2505	**HF**	**TN6525**	–	–
N1–N2	–	–	**–**	**–**	–	–
N3	–	–	**–**	**–**	–	–
S1–S2	HF	TN6525	**HF**	**TN6540**	–	–
S3	HF	TN6525	**HF**	**TN6540**	–	–
S4	HF	TN6525	**HF**	**TN6540**	HF	TN6540
H1	HF	TN2505	**HF**	**TN2505**	HF	TN6525


M270-HF



- High-Feed geometry for roughing and semi-finishing applications at maximum feed rates.
- Exceptional stability, even when long overhang is required.

● first choice
○ alternate choice

P		○	●	●
M			○	●
K		●	○	○
N				
S				●
H		●	○	

High-Feed

catalogue number	W	LI	S	RR	RT	hm	TN2505	TN6525	TN6540
M270HF10	10,00	10,50	2,38	0,63	1,15	0,08	3903944	4145110	3903943
M270HF12	12,00	12,40	3,18	0,75	1,40	0,08	3903946	4145111	3903945
M270HF13	13,00	12,40	3,18	0,75	1,40	0,08	3903948	4145112	3903947
M270HF16	16,00	16,70	4,76	1,00	1,90	0,08	3903950	4145123	3903949
M270HF20	20,00	20,70	4,76	1,25	2,30	0,08	3903954	4145125	3903953

NOTE: RT = Programming radius.

Recommended Starting Speeds [m/min]

Material Group		TN2505			TN6525			TN6540		
P	1	550	**420**	360	410	**320**	280	360	**280**	240
	2	320	**240**	205	320	**250**	215	250	**190**	170
	3	320	**240**	205	280	**215**	185	215	**170**	140
	4	–	**–**	–	235	**170**	145	180	**130**	110
	5	–	**–**	–	310	**235**	200	240	**180**	150
	6	–	**–**	–	205	**160**	130	160	**120**	100
M	1	–	**–**	–	190	**120**	80	130	**80**	60
	2	–	**–**	–	120	**80**	50	80	**50**	40
	3	–	**–**	–	125	**80**	55	85	**50**	40
K	1	400	**300**	250	275	**245**	220	220	**205**	180
	2	540	**365**	280	215	**190**	180	175	**155**	140
	3	310	**190**	155	180	**160**	145	155	**145**	125
N	1	–	**–**	–	–	**–**	–	–	**–**	–
	2	–	**–**	–	–	**–**	–	–	**–**	–
	3	–	**–**	–	–	**–**	–	–	**–**	–
S	1	–	**–**	–	–	**–**	–	50	**35**	30
	2	–	**–**	–	–	**–**	–	25	**20**	10
	3	–	**–**	–	–	**–**	–	70	**40**	30
	4	–	**–**	–	–	**–**	–	60	**30**	25
H	1	175	**140**	95	–	**–**	–	–	**–**	–
	2	175	**140**	95	–	**–**	–	–	**–**	–
	3	140	**115**	80	–	**–**	–	–	**–**	–

*NOTE: FIRST choice starting speeds are in **bold** type.*
As the average chip thickness increases, the speed should be decreased.

Recommended Starting Feeds

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 0,60 Axial Depth of Cut (ap) • HF10

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,01	**1,57**	–	0,67	**0,97**	1,41	0,48	**0,69**	0,97	0,42	**0,59**	0,83	0,38	**0,54**	0,75	HF

At 0,60 Axial Depth of Cut (ap) • HF12

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	0,91	**1,53**	2,81	0,61	**0,96**	1,43	0,45	**0,69**	0,99	0,39	**0,59**	0,85	0,35	**0,54**	0,77	HF

At 0,60 Axial Depth of Cut (ap) • HF13

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	0,94	**1,58**	2,82	0,64	**1,00**	1,49	0,46	**0,71**	1,03	0,40	**0,61**	0,88	0,37	**0,56**	0,80	HF

NOTE: Use "Light Machining" value as starting feed rate.

Recommended Starting Feeds [mm]

Light Machining	General Purpose	Heavy Machining

At 0,90 Axial Depth of Cut (ap) • HF16

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,03	**1,60**	3,34	0,69	**1,00**	1,50	0,50	**0,71**	1,03	0,43	**0,61**	0,88	0,39	**0,56**	0,80	HF

At 0,90 Axial Depth of Cut (ap) • HF17

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,06	**1,63**	3,00	0,71	**1,03**	1,52	0,51	**0,73**	1,05	0,44	**0,63**	0,90	0,40	**0,57**	0,82	HF

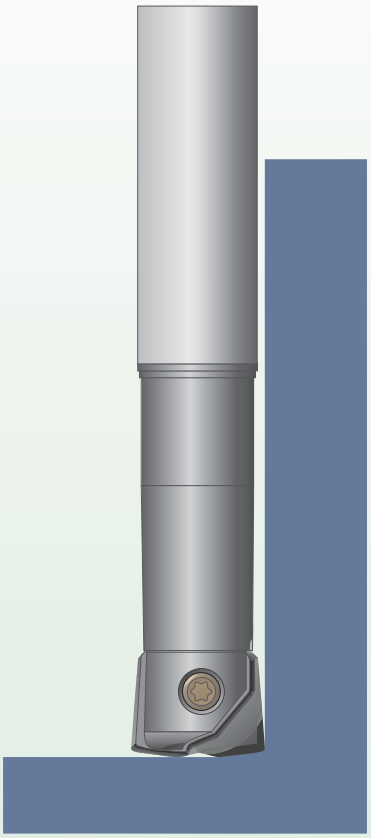
At 1,10 Axial Depth of Cut (ap) • HF20

Insert Geometry	Programmed Feed per Tooth (fz) as a % of Radial Depth of Cut (ae)															Insert Geometry
	5%			10%			20%			30%			40–100%			
HF	1,01	**1,69**	2,74	0,69	**1,09**	1,57	0,50	**0,78**	1,10	0,44	**0,67**	0,94	0,40	**0,61**	0,86	HF

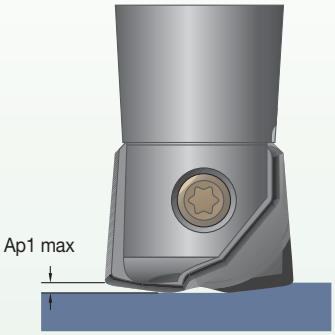
NOTE: Use "Light Machining" value as starting feed rate.

Applying High-Feed Tools

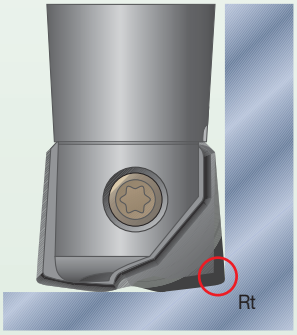
The high-feed concept bases its strategy in small depth of cut and high fz values, which results in a higher MRR and productivity with low radial forces.



Recommended when long overhang is necessary due to lower radial forces. Maximum L/D ratio of 10 x D.



Small Ap1 values and higher feed rate generate lower cutting forces versus traditional milling strategies.



For CAM programming, the tools can be programmed as a toroidal tool type by using the Rt value as the insert radius.

L/D ratio	% of Ap1 max to reduce	% of vc to reduce
<4	0%	0%
4<L/D<7	55–65%	10–15%
>8	65–75%	20–30%

General Programming Information for Applying M270 High-Feed

tool diameter	Ø10	Ø12	Ø13	Ø16	Ø17	Ø20
recommended starting Ap1 (mm)	0,40	0,40	0,40	0,60	0,60	0,75
Rt CAM programming	1,15	1,40	1,40	1,90	1,90	2,30
fz recommended for general purpose	0,45	0,55	0,55	0,60	0,60	0,70
fz recommended for 45 HRC (approx.)	0,40	0,45	0,45	0,55	0,55	0,65
fz recommended for 55 HRC (approx.)	0,30	0,35	0,35	0,45	0,45	0,50

NOTE: Use two effective teeth for feed calculations.
For materials above 45 HRC, we recommend adjusting the ae max to 55% of cutting diameter and using no more than 50% of Ap1 max.
While centre cutting is possible, we recommend using a ramp angle of 0.5°–1.0° to ensure smooth operation.

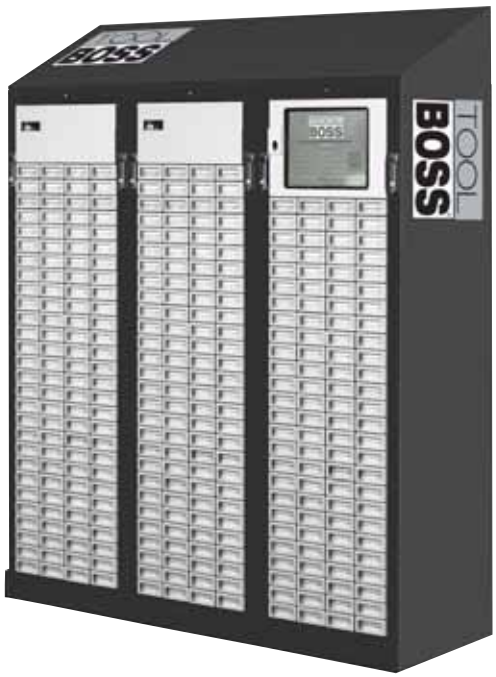


ToolBOSS™

ToolBOSS Vending Solutions

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

- Cut tooling inventory by 50% or more.
- Decrease spending on tooling by up to 30%.
- Reduce administrative costs by as much as 90%.



Customer Offering

Shared Rewards

Free use of ToolBOSS vending machine combined with a comprehensive maintenance and service package based on agreed sales targets for specified contract terms.

Direct Purchase of Equipment

ToolBOSS vending machines are available for purchase. Maintenance and service packages available with annual agreements.

For more information, please contact us at:
Tel: 888 281 8080
na-help.desk@toolboss.com
toolboss.com

NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

WIDIA™



Solid End Milling

Solid End Milling Introduction N2–N21
High-Performance Solid Carbide End Mills O1–O212
General Purpose Solid Carbide End Mills P1–P44
High-Performance High-Speed Steel (HSS-E/PM) Q1–Q13
Burs R1–R18



End Mills									
Z = number of teeth		Fine Finishing	Finishing	Roughing	Slot Milling	Plunging	Contour Milling	Peel Milling	Trochoidal Milling
end mill Z = 1		○	○	●	●	●	○	○	○
end mill Z = 2		○	○	◑	●	●	○	○	○
end mill Z = 3		○	◑	◑	●	◑	○	○	○
end mill Z = 4/5		◑	●	●	●*	○	○	●	●
multi-flute cutter Z = 6-8		●	●	○	○	○	○	●	●
Ball Nose and Torus End Mills									
ball nose end mill Z = 2					●		●		
ball nose end mill Z = 4					◑		●		

**VariMill™/VariMill™ GP Only*

● first choice

◑ suitable with limitations

○ not recommended

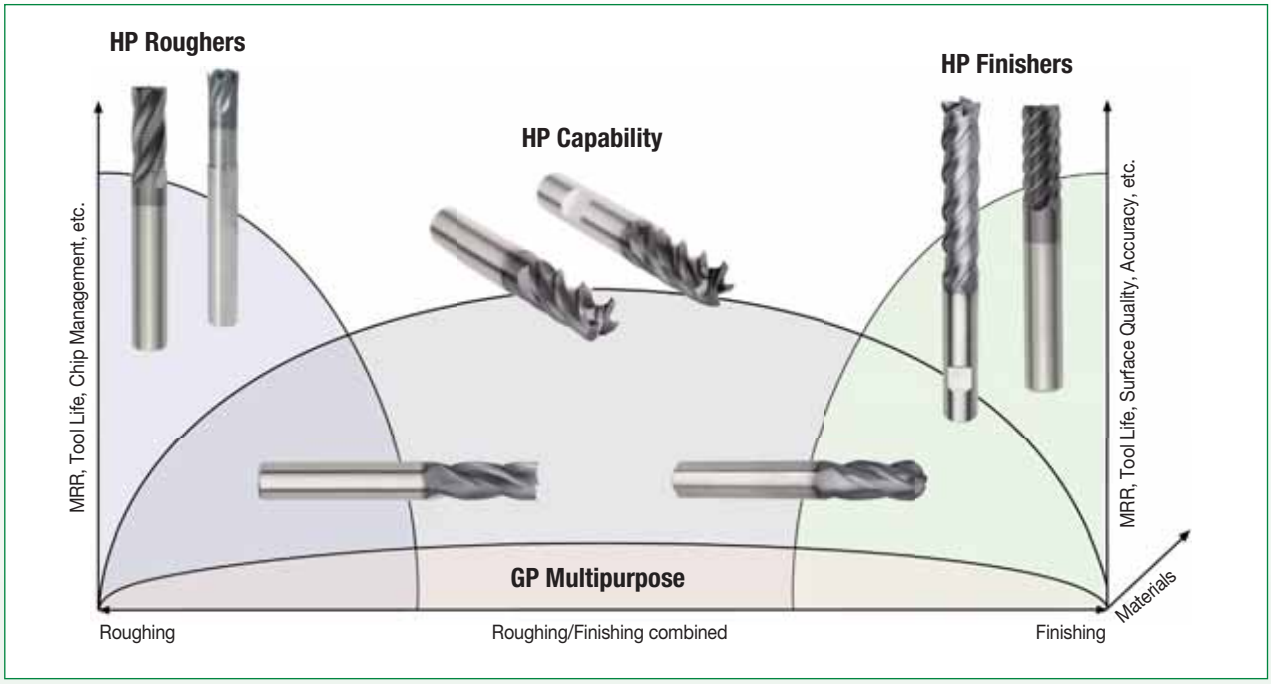
Always select a tool with the shortest possible flute length whenever possible. This will increase the stability of the tool and give the best results.

When selecting an end mill, the following machining factors will affect your selection of the correct end mill for your application:

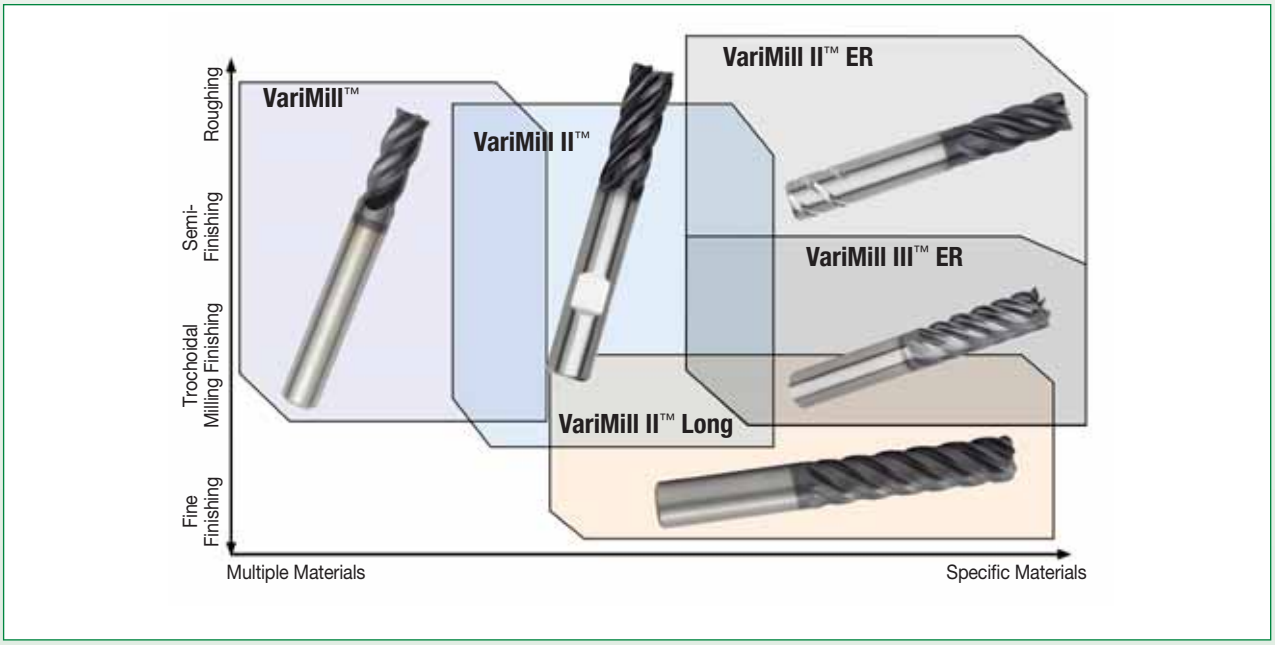
1. Tool overhang.
2. Coolant flow.
3. Machine and setup stability.
4. Machine power and torque.
5. Material to be machined.
6. Machine adaptor size (CV40, CV50, HSK63, etc.).
7. See Tool Reference Guides on pages N6–N15.

Type of Cut	Materials	Recommended Series																									Page Reference
		P							M			K			N						S				H				
		Steels & Alloyed Steels							Stainless Steel			Cast Iron			Non-Ferrous						High-Temp Alloys & Titanium				Hardened Materials				
		0	1	2	3	4	5	6	1	2	3	1	2	3	1	2	3	4	5	6	1	2	3	4	1	2	3	4	
	Roughing																												
	DQ13	■	■	■	■	■	■	■	■	■	■	■	■	■															O54
	4U40, 4U70						■	■	■	■	■										■	■	■	■	■	■	■	■	O59–O60
	X-Feed™ 70N6				■	■																			■	■			O152
	X-Feed 70N7																										■	■	O153
	4909, 4979														■	■	■	■	■	■									O140–O141
	Semi-Finishing																												
	VariMill I™ — 4777	■	■	■	■	■			■	■	■	■	■	■															O4–O5
	VariMill II™ — 577C		■	■	■	■	■	■	■	■	■	■	■																O24
	VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■				O32
	VariMill III™ ER — 771E, 772E						■	■	■	■	■										■	■	■	■	■				O45
	Vision Plus™ — 7505				■	■																			■	■	■	■	O180–O181
	AluSurf™ 5102, 5103														■	■	■	■	■	■									O126–O127
	Finishing																												
	D507, D517, D518	■	■	■	■	■	■	■	■	■	■	■	■								■	■	■	■	■				O92, O95
	7515, 7525				■	■																			■	■	■	■	O180–O181
	VariMill III ER — 77NE, 771E, 772E						■	■	■	■	■										■	■	■	■	■				O44–O45
	AluSurf 5102, 5103														■	■	■	■	■	■									O126–O127
	Finishing Pockets																												
	VariMill I — 4777	■	■	■	■	■			■	■	■	■	■	■							■	■	■	■	■				O4–O5
	VariMill II — 57NC				■	■	■	■	■	■	■	■									■	■	■	■					O25–O26
	VariMill II ER — 57NE						■	■	■	■	■										■	■	■	■	■				O33
	VariMill III ER — 77NE						■	■	■	■	■										■	■	■	■	■				O44
	75N5, 75N8				■	■																			■	■	■	■	O184–O186
	AluSurf 51N3														■	■	■	■	■	■									O128
	Long Wall Milling																												
	VariMill II Long — 5718	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■	■			O38–O39
	VariMill III ER — 772E						■	■	■	■	■										■	■	■	■	■				O45
	3D Ball Nose																												
	VariMill I — 47N0	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■				O12
	7050, 7060				■	■																			■	■	■	■	O189
	HPC/Peel Milling																												
	VariMill I — 4777, 4778	■	■	■	■	■			■	■	■	■	■	■							■	■	■	■					O4–O6
	VariMill II — 577C			■	■	■	■	■	■	■	■	■													■	■			O24
	VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■				O32
	VariMill II Long — 5718	■	■	■	■	■	■		■	■	■	■	■	■							■	■	■	■	■				O38–O39
	VariMill III ER — 77NE, 771E, 772E						■	■	■	■	■										■	■	■	■	■				O44–O45
	AluSurf 5102, 5103														■	■	■	■	■	■									O126–O127
	Trochoidal Milling																												
	VariMill I — 4777, 4778	■	■	■	■	■			■	■	■	■	■	■															O4–O6
	VariMill II — 577C			■	■	■	■		■	■	■	■	■								■	■	■	■	■	■	■		O24
	VariMill II ER — 577E						■	■	■	■	■										■	■	■	■	■	■	■		O32
	VariMill III ER — 771E, 772E						■	■	■	■	■										■	■	■	■	■	■	■		O45
	AluSurf 5102, 5103														■	■	■	■	■	■									O126–O127

Best Selection Per Application



Best Selection For Trochoidal/High-Speed Machining Concepts



Recommended Adaptors per End Mill Platform

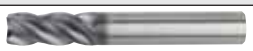
SCEM Platform	Recommended Adaptors	
	First Choice	Alternate Choice
VariMill I™	HydroForce™	Shrink Fit
VariMill II™/VariMill II™ ER	HydroForce	Shrink Fit
VariMill III™ ER	HydroForce	Shrink Fit
VariMill II™ Long	HydroForce	Shrink Fit
High-Performance Finishers	HydroForce	Shrink Fit
High-Performance Roughers	HydroForce	Weldon Adaptor
AluSurf™/Arcut™/Aluminium Tools	HydroForce	Shrink Fit
VisionPlus™/VisionPlus X-Feed™	HydroForce	Shrink Fit
VariMill GP	Shrink Fit	Weldon Adaptor
HSS/WavCut™	Weldon Adaptor	–

Select Adaptor per Technical Data/Characteristics

Technical data/characteristics	Toolholders				
	HydroForce high torque	Shrink Fit	Milling chuck	ER collet chuck	Weldon® adaptor
torque transmission	★★★★★	★★★★	★★★★★	★★	★★★★★
radial runout (T.I.R.)[1]	★★★★★	★★★★★	★★★★	★★★	★
radial rigidity[2]	★★★★	★★★★★	★★★	★★★	★★★
tool length adjustment	★★★★★	★★★★	★	★★★★	★★
tool shank tolerance requirement	★★★★	★★	★★★	★★★★★	★★★
through coolant	★★★★★	★★★★★	★★★	★★★	★★
minimum quantity lubrication (MQL)	★★★★★	★★★★★	★	★	★
dampening capability	★★★★★	★	★★★	★★★	★★★
shank diameter range[3]	★★★★★	★	★★★★★	★★★★★	★
cost of toolholder	★★	★★★	★	★★★★	★★★★★
low requirement of external devices[4]	★★★★★	★	★★★★	★★★★	★★★★★
ease of handling	★★★★★	★★★	★★	★★★★	★★★★
dust resistance	★★★★★	★★★★★	★★★	★★★	★★★★
high-speed capability	★★★★★	★★★★★	★★★	★★★	★
balancing accuracy	★★★★★	★★★★★	★★★	★★★	★

[1] Radial runout may affect tool life.
[2] Radial rigidity for Weldon holder is low at a direction perpendicular to the screw.
[3] Accepts different shank diameters through the use of reduction sleeves or due to collapse range.
[4] Collet chucks and milling chucks may require the use of a torque or special wrench; Shrink Fit adaptor requires a shrinking unit.

● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Solid Carbide End Mills • VariMill™											
VariMill I™											
	4777	4–25	4	Yes			X				
	4778	4–25	4	Yes			X				
	4717	6–20	4	Yes				X			
	4727	12–20	4	Yes				X			
	47N7 ALTIN	4–20	4	Yes			X				
	47N7 TIALN	4–20	4	Yes				X			
	47N6	6–20	4	Yes				X			
	47N0	5–20	4	Yes			X				
VariMill II™											
	577C	4–25	5	Yes			X				
	57NC	6–25	5	Yes			X				
VariMill II™ ER											
	577E	10–25	5	Yes			X				
	57NE	10–25	5	Yes			X				
VariMill II™ Long											
	5718	6–25	5	No			X				
VariMill III™ ER											
	77NE	10–20	7	Yes			X				
	771E/772E	10–20	7	Yes			X				
High-Performance Solid Carbide End Mills • Roughing											
	DQ13	3–20	3	Yes			X				
	49H6	8–20	3/4	Yes				X			
	422152/422150	6–25	4	Yes			X				
	4976	4–25	3/4/5	Yes			X				
	422824/422820	6–25	4	Yes				X			
	4U40	6–25	4/6	Yes			X				
	4U70	6–25	4/6	Yes			X				
	49N6	4–25	3/4/5	Yes			X				
	4969	5–20	3/4	Yes				X			
	422813/022813	6–25	3	Yes	X			X			
	422818	6–20	4	Yes	X			X			
	422846	6–25	4/6	Yes	X			X			
	4906	4–25	3/4/5	Yes		X		X			
	4966	5–25	3/4	Yes		X		X			

P				M	K	N		S				H		Page References	
1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
High-Performance Solid Carbide End Mills • VariMill™ *(continued)*															
VariMill I™ *(continued)*															
●	●	○	○	●	●			○	○	○	○	○		O4–O5	O13
●	●	●	●	●	○			○	●	●	●	●		O6	O14
●	●	●	●	●	○			●	●	●	●	●		O7	O15
●	●	●	●	●	○			●	●	●	●	●		O8	O16
●	●	●	●	●	○			●	●	●	●	●		O9–O10	O17
●	●	○	○	●	○			○	○	○	○	○		O9–O10	O18
●	●	○	○	●	○			○	○	○	○	○		O11	O19
●	●	○	○	●	●			○	○	○	○	○		O12	O20
VariMill II™ *(continued)*															
●	●	○	○	●	●			○	○	○	○	○		O24	O27
○	●	●	●	●	○			○	●	●	●	●		O25–O26	O28
VariMill II™ ER *(continued)*															
○	○	●	●	●	○			●	●	●	●	●		O32	O34
○	○	●	●	●	○			●	●	●	●	●		O33	O35
VariMill II™ Long *(continued)*															
●	●	●	●	●	○			○	●	●	●	●		O38–O39	O40
VariMill III™ ER *(continued)*															
		○	○	○					●	●	●	○		O44	O46
		○	○	○					●	●	●	○		O45	O47–O048
High-Performance Solid Carbide End Mills • Roughing *(continued)*															
●	●	●	○	○	○			○	○	○	○	○		O54	O68
●	●	●	○	●	●			●	●	●	●	○		O55	O69
●	●	●			●			○	○	○	○	○		O56	O70
●	●	○	○	●	●			○	○	○	○	○		O57	O71
●	●	○	○	●	●			○	○	○	○	○		O58	O72
○	●	●	●	●	○			○	○	○	○	○		O59	O73
○	●	●	●	●	○			○	○	○	○	○		O60	O74
●	●	○	○	○	●			○	○	○	○	○		O61	O75
●	●	○	○	○	●			○	○	○	○	○		O62	O76
●	●			●	●									O63	O77
●	●			●	●									O64	O78
●	●			●	●									O65	O79
●	●	●	●	●	●	○		○	○	○	○	○		O66	O80
●	●	●	●	●	●	●		○	○	○	○	○		O67	O81

● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Solid Carbide End Mills • Finishing											
	4001 JJ	1–20	2	Yes			X				
	D503/D513	2–20	3	Yes	X	X		X			
	DC03	3–20	3	Yes				X			
	4503 JJ	1–20	3	Yes			X				
	422802/322802/022802	2–20	3	Yes	X	X		X			
	4603	3–20	3	Yes				X			
	D507/D517	6–20	6	Yes			X				
	422826/422822	6–25	6/8	No			X				
	422827	6–25	6/8	No			X				
	D518	4–25	4/6/8	Yes			X				
	026621	8–20	4/6/8	No	X						
	024112	6–10	2	Yes						X	
	024111	2–12	2	Yes						X	
High-Performance Solid Carbide End Mills • Micro End Mills											
	423007/023007	0,4–3,0	2	Yes	X		X				
	4632	0,4–2,0	2	Yes	X			X			
	4633	0,4–3,0	3	Yes	X			X			
	4651	1,0–2,0	2	Yes	X	X		X			
High-Performance Solid Carbide End Mills • Aluminium											
AluSurf™											
	5102	1,5–20	2	Yes	X						
	5103	3–20	3	Yes	X						
	51N3	6–20	3	Yes	X						
High-Performance Aluminium											
	524149	3–12	1	Yes					X		
	022849	2–12	1	Yes	X						
	D502	3–20	2	Yes	X			X			
	022814/022817	4–20	2	Yes	X						
	4102	1,0–20	2	Yes	X						
	524152/022852	3–16	2	Yes	X				X		
	024101	6–10	2	Yes							X
	4103	3–20	3	Yes	X	X					

P				M	K	N		S				H		Page References	
1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
High-Performance Solid Carbide End Mills • Finishing *(continued)*															
●	●			●		○								O84	O99
●	●	○	○	●	●			●	●	●	●	○		O85	O100–O101
●	●	○	○	○	○			●	●	●	●	○		O86	O102
●	●	○	○	●	○			○	○	○	○	○		O87	O103
●	●	●	●	●	●			●	●	●	●	○		O88–O90	O104
●	●	○	○	●	●			●	●	●	●	○		O91	O105
●	●	○	○	●	●			○	○	○	○	○		O92	O106–O107
●	●			●	●									O93	O108
●	●	●	●	●	●			●	●	●	●	○		O94	O109
●	●	●	●	●	○			○	○	○	○			O95	O110
●	●	○	○		●									O96	O111
						●								O97	O112
						●								O98	O113
High-Performance Solid Carbide End Mills • Micro End Mills *(continued)*															
●	●	●	●	●	●	●	●	○	○	○				O116	O120
●	●	●	●	●	●	●								O117	O121
●	●	●	●	●	●	●								O118	O122
●	●	●	●	●	●	●								O119	O123
High-Performance Solid Carbide End Mills • Aluminium *(continued)*															
AluSurf™ *(continued)*															
						●	○							O126	O129
						●	○							O127	O129
						●	○							O128	O129
High-Performance Aluminium *(continued)*															
						●	●							O132	O144
						●	○							O133	O144
						●	○							O134	O144
						●	○							O135	O145
						●	○							O136	O145
						●	●							O137	O146
						●	○							O138	O146
						●	○							O139	O147

● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance Aluminium *(continued)*											
	4909	6–25	3	Yes	X						
	4979	6–25	3	Yes	X	X					
	49N9	6–20	3	Yes	X						
	49G9	8–25	3	Yes		X					
High-Performance Solid Carbide End Mills • Hard Materials											
VisionPlus™ X-Feed™											
	70N6/71N6	6–20	6	No			X				
	70N7	6–20	6	No			X				
VisionPlus™ Micro											
	7N02/7N12/7N22	0,3–3,1	2	Yes			X	X			
	423034	0,5–3,0	2	Yes			X				
	7N01	0,3–6,0	2	Yes			X	X			
	7N21	0,5–3,0	2	Yes				X			
VisionPlus™											
	75N2	3–12	2	Yes				X			
	422875	2–12	2	Yes			X				
	7151	1–20	2	Yes				X			
	7061	1–12	2	Yes				X			
	70N1	1–12	2	Yes				X			
	422869/422868	1–16	2	Yes			X				
	422870	2–12	2	Yes			X				
	422873	6–10	2	Yes			X				
	7505/7545/7515/7525	3–25	4/5/6	Yes				X			
	7585/7595	3–25	4/5	Yes				X			
	75N5	3–25	4/5	Yes				X			
	75N8	6–12	6	Yes				X			
	422876/422878	4–12	4	Yes			X				
	7150	2–20	4	Yes				X			
	7050/7060	2–20	4	Yes				X			
	422871	3–10	4	Yes			X				
	D618	3–20	4/6	Yes				X			
	422837/422831	6–25	6/8	No			X				
	7670	4–25	3/4/6	Yes				X			

P				M	K	N		S				H		Page References	
1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
High-Performance Aluminium *(continued)*															
						●	○							O140	O147
						●	○							O141	O148
						●	○							O142	O148
						●	○							O143	O149
High-Performance Solid Carbide End Mills • Hard Materials *(continued)*															
VisionPlus™ X-Feed™ *(continued)*															
		○										●		O152	O154
												●	●	O153	O155
VisionPlus™ Micro *(continued)*															
○	●	○			○							●	○	O160–O163	O167
○	○											●	○	O164	O168
○	○											●	○	O165	O169
○	○											●	○	O166	O170
VisionPlus™ *(continued)*															
○	○											●	○	O172	O194
○	○											●	○	O173	O194
○	○											●	○	O174	O195
○	○											●	○	O175	O195
○	○											●	○	O176	O196
○	●											●	○	O177	O196
○	●											●	○	O178	O197
○	●											●	○	O179	O197
○	○											●	○	O180–O181	O198–O199
○	○											●	○	O182–O183	O199
○	○											●	○	O184–O185	O200
○	○											●	○	O186	O200
○	●											●	○	O187	O201
○	○											●	○	O188	O201
○	○											●	○	O189	O202
○	○											●	○	O190	O202
○	○											●	○	O191	O203
○	●											●	○	O192	O203
○	○	○	○	○	○							●	○	O193	O204

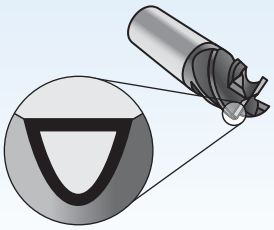
● first choice
○ alternate choice

	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
General Purpose Solid Carbide End Mills • Roughing/Finishing											
NINA™											
	423002/323002/ 423001/323001	2–12	3	Yes		X		X			
	423004/423003	4–12	4	Yes			X				
	423048/423047	2–12	2	Yes			X				
	423039/423038	2–12	2	Yes			X				
	423036/423037	6–10	4	No			X	X			
VariMill™ GP • 2-Flute											
	D002/D012	2–20	2	Yes	X			X			
	2819	3–20	2	Yes	X			X			
	4002/4012	1–20	2	Yes				X			
	D001/D011	2–20	2	Yes				X			
	2838	2–20	2	Yes	X			X			
	4001/4011/4021	1–20	2	Yes	X			X			
VariMill GP • 4-Flute											
	D004/D014	2–20	4	Yes	X			X			
	2528	4–20	4	Yes	X			X			
	4004/4014/4024	1–20	4	Yes	X			X			
	D010	3–20	4	Yes	X			X			
	2848	4–20	4	Yes	X			X			
	4000/4010	2–20	4	Yes				X			

P				M	K	N		S				H		Page References	
1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
General Purpose Solid Carbide End Mills • Roughing/Finishing *(continued)*															
NINA™ *(continued)*															
●	●	●	●	●	●	●	●							P4	P9
●	●	●	●	●	●									P5	P9
●	●	●	●	●	●									P6	P10
●	●	●	●	●	●									P7	P10
●	●	●	●	●	●	●	●	●	●	●	●	●		P8	P11
VariMill™ GP • 2-Flute *(continued)*															
●	●	●	●	●	●									P14–P15	P23
●	●	●	●	●	●									P16	P23
●	●	●	●	●	●									P17–P18	P23–P24
●	●	●	●	●	●									P19	P25
●	●	●	●	●	●									P20	P25
●	●	●	●	●	●									P21–P22	P25–P26
VariMill GP • 4-Flute *(continued)*															
●	●	●	●	●	●									P32–P33	P40–P41
●	●	●	●	●	●									P34	P41
●	●	●	●	●	●									P35–P36	P40–P41
●	●	●	●	●	●									P37	P42
●	●	●	●	●	●									P38	P42
●	●	●	●	●	●									P39	P42–P43

● first choice ○ alternate choice	Series	Range of Diameter Ø min– Ø max mm	Number of Flutes	Cutting Centre	Uncoated	TiCN	AlTiN	TiAlN	DCL TiB_2	Diamond	PCD
High-Performance High-Speed Steel (HSS-E-PM) • Roughing											
WavCut™											
	664W/660W/661W	25–50	5/6/8	Yes	X						
High-Performance High-Speed Steel											
	6N06	6–30	4/5/6	Yes				X			
	6N70	6–32	4/6	Yes				X			
	6NL6	10–25	4/6	Yes				X			
High-Performance HSS-E/PM End Mills • Finishing											
	1N0M JJ	3–22	4	Yes				X			
	1N77	6–30	4	Yes		X					

P				M	K	N		S				H		Page References	
1 2 3	4	5	6	1 2 3	1 2 3	1 2 3 4 5	6	1	2	3	4	1 2	3 4		
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron	Non-Ferrous	Graphite	Iron Based	Nickel Based	Pure Titanium	Titanium Alloys	Hardened Steels H1 = <48 HRC H2 = 48–55	H3 = 56–60 HRC H4 = >60 HRC	Product Information	Cutting Data
High-Performance High-Speed Steel (HSS-E-PM) • Roughing *(continued)*															
WavCut™ (continued)															
		○		●						●	●			Q4	Q10
High-Performance High-Speed Steel *(continued)*															
●	●	●	●	●	●			●	●	●	●			Q5	Q10
●	●	●	●	●	●			●	●	●	●			Q6	Q11
●	●	●	●	●	●			●	●	●	●			Q7	Q11
High-Performance HSS-E/PM End Mills • Finishing *(continued)*															
●	●	●	●	●	●			●	●	●	●			Q8	Q12
●	●	●	●	●	●			●	●	●	●			Q9	Q13



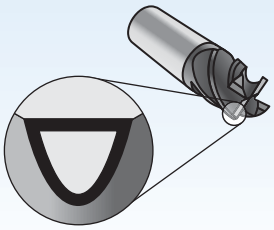
Coatings provide high-speed capability and are engineered for roughing to finishing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
Uncoated, Unocoated -WW, -JJ	Carbide grade made from high-quality, micrograin materials for cutting all types of workpiece materials. Very high toughness ensures a controlled wear rate. The micrograin structure enables extremely sharp cutting edges.	P	P	P	P	P	P	P	P	
		M	M	M	M	M	M	M		
		K	K	K	K	K	K			
		N	N	N	N	N	N			
		S	S	S	S	S	S			
WP15PE	Coated carbide grade with thick PVD coating and optimised chemistry and process for increased wear resistance. Outstanding protection in milling of steels to mitigate crater, DOCN (depth-of-cut notching), and flank wear. Excellent performance up to 52 HRC.	P	P	P	P	P				
		M	M	M	M	M				
		K	K	K	K	K				
WS15PE	PVD coated carbide grade with optimised chemistry and process for increased wear resistance. State-of-the art post-coat treatment reduces friction and helps manage heat when cutting super alloys.									
		S	S	S	S					
		H	H	H	H					
TiN-TT, -TW	This TiN PVD coated grade offers well-balanced machining performance for general purpose applications. This grade offers great versatility at intermediate Metal Removal Rates (MRR).	P	P	P	P	P	P	P	P	
		M	M	M	M	M	M	M	M	
		K	K	K	K	K	K	K	K	
		N	N	N	N	N	N	N	N	
		S	S	S	S	S	S	S	S	
TiAlN-LT1, -LW1	Ultra-fine grain carbide grade with TiAlN PVD multilayer coating for high-performance machining of most materials. This grade is especially designed for dry milling hardened steels due to its unique combination of a high hardness substrate and tough multilayer coating.	P	P	P	P	P	P			
		H	H	H	H	H	H			
TiAlN-RT1, -RW1	Ultra-fine carbide grade with TiAlN PVD coating. This grade is a high-performance grade for finishing operations, especially for hardened steels. This grade is characterised by high hardness and wear resistance.	P	P	P	P	P	P			
		H	H	H	H	H				
TiCN-CT, -CW, -CJ	General purpose coated carbide grade with TiCN PVD coating for use at intermediate cutting speeds. For universal use due to its high wear resistance and hardness. Only use wet or with MQL (Minimum Quantity Lubrication).	P	P	P	P	P	P	P	P	
		M	M	M	M	M	M	M	M	
		K	K	K	K	K	K	K	K	
		N	N	N	N	N	N	N	N	
		H	H	H	H	H	H	H	H	

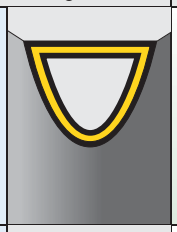
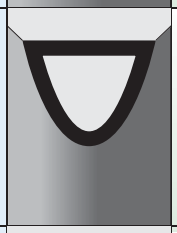
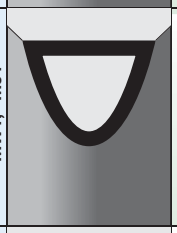
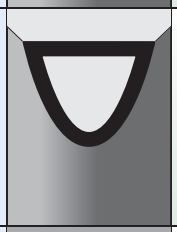
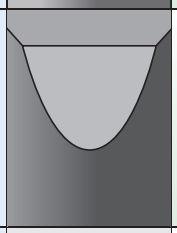
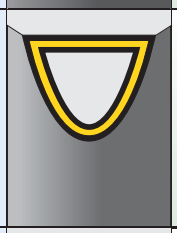
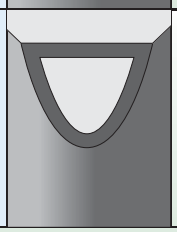


Coatings provide high-speed capability and are engineered for roughing to finishing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
TiAlN-LT, -LW		Coated carbide grade with PVD multilayer coating. This grade is designed for dry milling most types of material, apart from the hardened variety. This grade is characterised by excellent toughness and wear resistance. It provides outstanding protection against cratering and abrasion.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
TiAlN-RT, -RW,-RJ		Universal carbide grade with TiAlN PVD coating. This grade is a high-performance grade for finishing operations and is characterised by high hardness and wear resistance.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
AlTiN-MT1, -MW1, -MJ1		AlTiN PVD coated ultra-fine carbide grade. The combination between hard substrate and wear-resistant coating provides outstanding performance in high-feed milling of hardened materials (58–65 HRC).	H			■	■	■				
AlTiN-MT, -MW		Coated fine-grain grade with AlTiN PVD coating. This grade is a thin, hard PVD coating particularly suitable for cutting steel, cast iron, stainless steel (wet), and titanium (wet) with high metal removal rates. This grade can be used for materials with hardness up to 52 HRC.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
			S				■	■	■	■		
KC10F		High-quality submicron carbide grade for high-performance machining of non-ferrous alloys. Excellent toughness ensures a controlled wear rate and the submicron structure enables extremely sharp cutting edges.	N			■	■	■	■	■		
K30F-DCF		Coated carbide grade with PVD multilayer coating. K30F-DCF is designed for dry milling most types of material, apart from the hardened variety. This grade is characterised by excellent hardness and wear resistance. It provides outstanding protection against cratering and abrasion.	P				■	■	■	■		
			M				■	■	■	■		
			K				■	■	■	■		
K30F-TiCN		General purpose coated carbide grade with TiCN PVD coating for use at intermediate cutting speeds. For universal use due to its high wear resistance and hardness. Only use wet or with MQL (Minimum Quantity Lubrication).	P		■	■	■	■				
			M		■	■	■	■				
			K		■	■	■	■				
			N		■	■	■	■				

Victory™ Grades for High-Performance
Solid Carbide End Mills

Victory



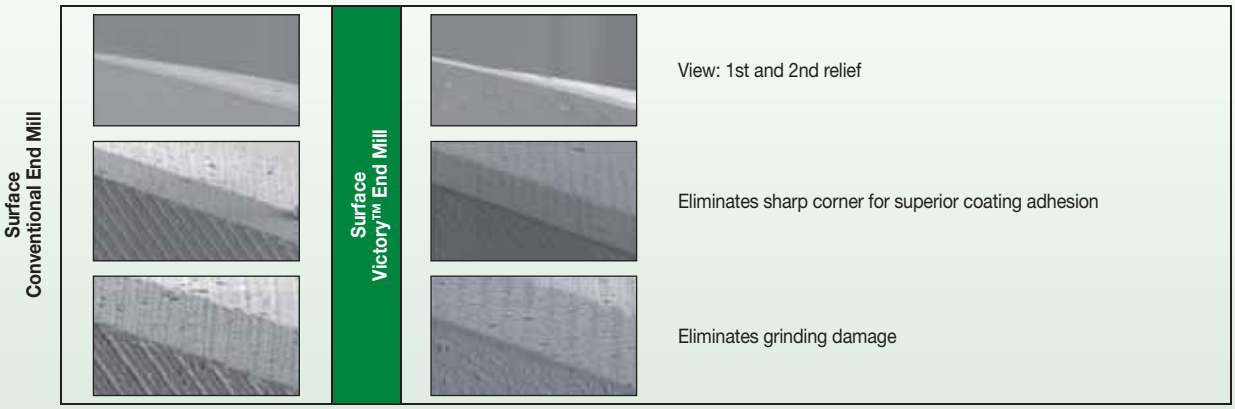
WIDIA™ has taken the next step in solid carbide end mill innovation by introducing the Victory™ Grades WP15PE™ and WS15PE™. Victory combines state-of-the-art surface treatments and proprietary edge technology with the successful market-leading WIDIA geometries, delivering significant improvement to tool life and Metal Removal Rates (MRR). The new Victory Grades can be found across the entire high-performance offering, which includes the VariMill™ family, high-performance roughers, and high-performance finishers.

Features and Benefits

- Innovative edge preparation providing consistent tool life by eliminating most edge microchipping caused by grinding.
- Advanced post-coat finish reducing chip build-up and improving chip flow.
- First-time use of Victory Grade nomenclature for better identification of grades.
- Centre cutting addition on VariMill II™.

Innovative Advantage of Victory™ Grades

WIDIA VICTORY



WP15PE™	WS15PE™
W = WIDIA™	W = WIDIA
P = Steels	S = High-Temp Alloys
15 = Application Range (Medium to Roughing)	15 = Application Range (Medium to Roughing)
P = Carbide + PVD	P = Carbide + PVD
E = Solid End Mills	E = Solid End Mills
Primary Materials	**Primary Materials**
P0 through P4 Steels	S1 through S4 High-Temp Alloys
M1 through M3 Austenitic Stainless Steels	P5 through P6 Ferritic and Martensitic Stainless Steels
K1 through K3 Cast Irons	H1 Hardened Steels
H1 Hardened Steels	
Secondary Materials	**Secondary Materials**
S1 through S4 High-Temp Alloys	M1 through M3 Austenitic Stainless Steels
H2 Hardened Steels	H2 Hardened Steels

The new Victory grades are spread across the high-performance offering, including high-performance roughers, high-performance finishers, and select VariMill™ platforms.

WIDIA VICTORY

Metric	series	Victory Grade		● first choice ○ alternate choice					
		WP15PE	WS15PE	P	M	K	N	S	H
VariMill I™	477, 47N0	✓		●	●	●		○	○
VariMill II™	577C	✓		●	●	●		○	○
VariMill II™	57NC		✓	○	○			●	○
VariMill II™ ER	577E, 57NE		✓	○	○			●	○
HP Roughers	DQ13, 4976, 4U40, 4U70	✓		●	●	●		○	○
HP Finishers	4001JJ, 4503JJ, D507, D518	✓		●	●	●		○	○

How do the new Victory Catalogue numbers work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.

OLD Grade Nomenclature • Metric

Series Number

5	77	7	250
	Series		Cutting Diameter
	5 = 5-Flute Carbide **4** = 4-Flute Carbide		**010** = 1mm **020** = 2mm **030** = 3mm **040** = 4mm **050** = 5mm **060** = 6mm **070** = 7mm **080** = 8mm **090** = 9mm **100** = 10mm **120** = 12mm **140** = 14mm **160** = 16mm **180** = 18mm **200** = 20mm **250** = 25mm **320** = 32mm

NEW Victory Nomenclature • Metric

Series Number

577	C	250	0	8	W
Series	Special Designation	Cutting Diameter	Corner Condition	Shank Diameter	Shank Style
5 = 5-Flute Carbide **4** = 4-Flute Carbide	**C** = Centre Cutting	**010** = 1mm **020** = 2mm **030** = 3mm **040** = 4mm **050** = 5mm **060** = 6mm **070** = 7mm **080** = 8mm **090** = 9mm **100** = 10mm **120** = 12mm **140** = 14mm **160** = 16mm **180** = 18mm **200** = 20mm **250** = 25mm **320** = 32mm	**0 & Z** = Sharp **1** = 0,75 **2** = 0,50 **3** = 1,00 **4** = 1,50 **5** = 2,00 **6** = 2,50 **7** = 3,00 **8** = 4,00	**2** = 6mm **3** = 8mm **4** = 10mm **5** = 12mm **6** = 16mm **7** = 20mm **8** = 25mm **9** = 32mm	**T** = Plain **W** = Weldon® **V** = SAFE-λOCK®

By referencing this easy-to-use guide, you can identify the correct product to meet your needs.

OLD Grade Nomenclature • Metric

0	8	M	W
Corner Condition	Shank Diameter	Grade	Shank Style
0 = Sharp **1** = Radius	**2** = 6mm **3** = 8mm **4** = 10mm **5** = 12mm **6** = 16mm **7** = 20mm **8** = 25mm **9** = 32mm	**L** = TiAlN **M** = AlTiN **C** = TiCN **R** = TiAlN **J** = Uncoated	**T** = Plain **W** = Weldon® **J** = JIS

NEW Victory Nomenclature • Metric

W	P	15	P	E
Brand	ISO Material Code	Wear Range	Coating Type	Product Family
WIDIA™	**P** = Steel **S** = High-Temperature Alloys	**15** = High Wear	**P** = PVD	**E** = End Mill



Reconditioning Services

WIDIA™ Reconditioning Services Optimise the Total Value of Metalcutting Tools Throughout Their Entire Life

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

- Local support you can trust.
- Rapid turnaround to minimise inventory.
- Like-new performance continues delivering productivity.
- Application support throughout the tool lifecycle.
- WIDIA proprietary geometry specifications after each regrind.
- WIDIA certified coatings.
- Easy logistics through the reconditioning process.

Simple Logistics

Our unique reconditioning program simplifies sending and receiving reconditioned tools to reduce shipping time and increase on-hand inventory.

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.





Global Reconditioning Network



To locate a Reconditioning Center near you, visit **widia.com/services.**

WIDIA™

WIDIA™



Solid End Milling • High-Performance Solid Carbide End Mills

VariMill O2–O48
Roughing O50–081
Finishing O82–O113
Micro Solid Carbide End Mills O114–O123
Aluminium O124–O149
Hard Materials O150–O205
Trochoidal Milling O206–O212

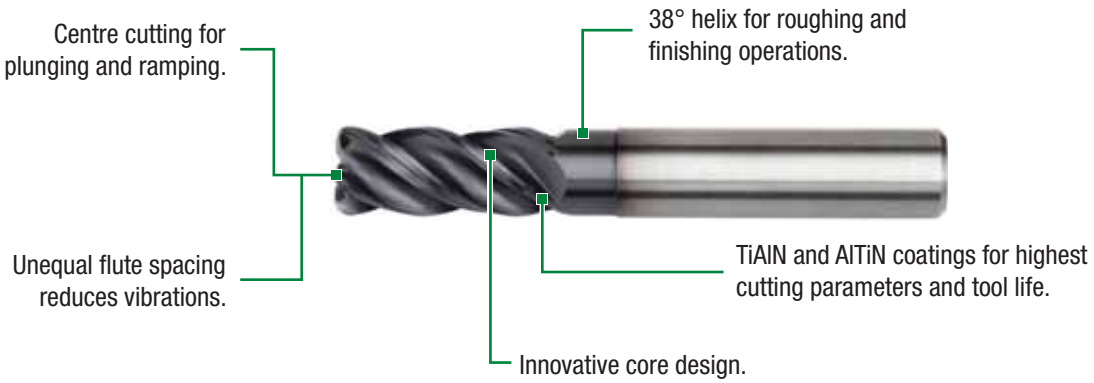


VariMill I



VariMill I offers plunging, slotting, and profiling at the highest possible feed rates for a wide range of materials. They are designed to provide maximum Metal Removal Rates (MRR) and to achieve superior surface conditions. A wide range of diameters and corner configurations, such as chamfer, radii, and sharp edges, are available from stock.

- High-performance universal tools for almost all workpiece materials.
- Roughing and finishing with one tool.
- Various length-of-cut, long reach and necked versions, ball nose, corner chamfer, and corner radius available.



VariMill I™ Series

- Increase your output with less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing required.
- Less passes due to 1 x D slotting capability (not recommended for 4717 and 4727).

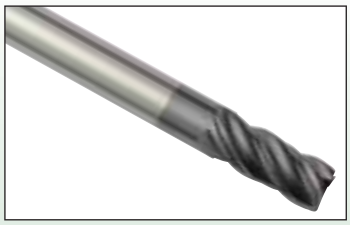
4777 Series

- High metal removal rates and tool life in:
  - — Stainless steels, steels, and alloyed steels.
  - — High-temperature alloys and titanium.



4778 AlTiN Series

- Titanium geometry design.
- Corner radii.



4717 Series

- Stainless steel and steel geometry design.
- 3,5 x D length-of-cut.
- Less passes necessary for long wall machining.



4727 TiAlN Series

- Stainless steel and steel geometry design.
- 5–6 x D length-of-cut.
- Less passes necessary for long wall machining.



47N7 TiAlN Series

- Stainless steel and steel geometry design.
- Radii corner and neck design for cutting depths requiring additional passes.



47N7 AlTiN Series

- Titanium and stainless steel geometry design.
- Radii corner and neck design for cutting depths requiring additional passes.



47N6 Series

- Stainless steel and steel geometry design.
- Benefit from long reach and neck design for deep cavities.

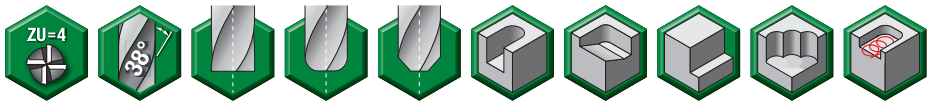


47N0 Series

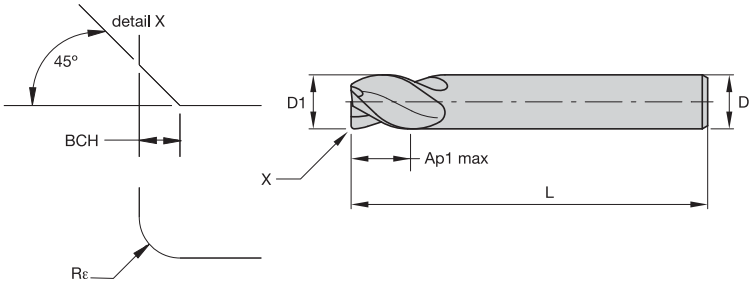
- Stainless steel and steel geometry design.
- Centre cutting ball nose.



- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





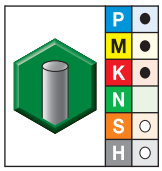


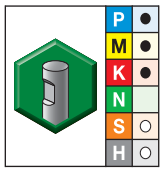
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4777 • VariMill • Victory Grades



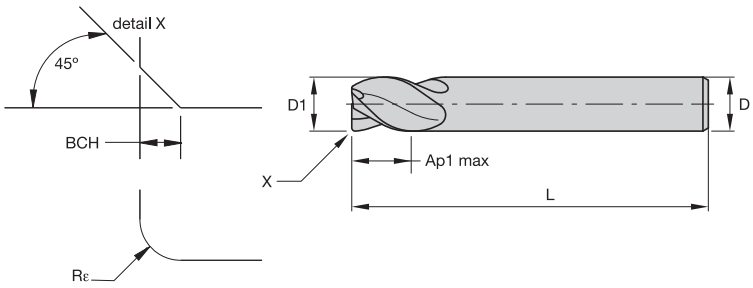


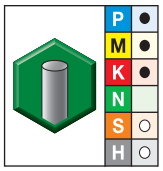
● first choice
○ alternate choice

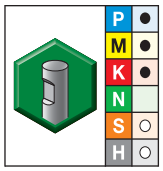
grade WP15PE AlTiN		grade WP15PE AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5576753	477704001T		–	4,0	6	12,00	55	0,20	–
5576751	477704002T	5576752	477704002W	4,0	6	12,00	55	–	0,40
5576754	4777040Z2T		–	4,0	6	12,00	55	–	–
5576755	477705002T	5576756	477705002W	5,0	6	13,00	57	–	0,40
5576757	477705012T		–	5,0	6	13,00	57	0,20	–
5576758	4777050Z2T		–	5,0	6	13,00	57	–	–
5576759	477706002T	5576760	477706002W	6,0	6	13,00	57	–	0,40
5576761	477706012T		–	6,0	6	13,00	57	0,20	–
5576762	4777060Z2T		–	6,0	6	13,00	57	–	–
5576763	477707003T	5576764	477707003W	7,0	8	16,00	63	–	0,40
5576765	477707013T		–	7,0	8	16,00	63	0,20	–
5576766	4777070Z3T		–	7,0	8	16,00	63	–	–
5576767	477708003T	5576768	477708003W	8,0	8	16,00	63	–	0,40
5576769	477708013T		–	8,0	8	16,00	63	0,20	–
5576770	4777080Z3T		–	8,0	8	16,00	63	–	–
5576771	477709004T	5576772	477709004W	9,0	10	19,00	72	–	0,50
5576773	477709014T		–	9,0	10	19,00	72	0,20	–
5576774	4777090Z4T		–	9,0	10	19,00	72	–	–
5576775	477710004T	5576776	477710004W	10,0	10	22,00	72	–	0,50
5576777	477710024T		–	10,0	10	22,00	72	0,30	–

(continued)

(Series 4777 • VariMill • Victory Grades — continued)



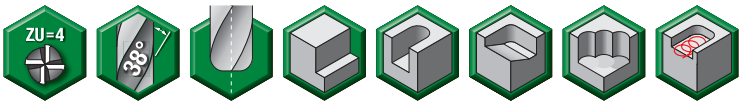




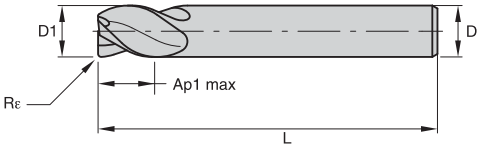
● first choice
○ alternate choice

grade WP15PE AlTiN		grade WP15PE AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5576778	4777100Z4T		–	10,0	10	22,00	72	–	–
5576779	4777110Z5T		–	11,0	12	26,00	83	–	–
5576790	477712005T	5576791	477712005W	12,0	12	26,00	83	–	0,50
5576792	477712025T		–	12,0	12	26,00	83	0,30	–
5576793	4777120Z5T		–	12,0	12	26,00	83	–	–
5576794	477714015T	5576795	477714014W	14,0	14	26,00	83	–	0,50
5576796	477716006T	5576797	477716006W	16,0	16	32,00	92	–	0,50
5576798	477716026T		–	16,0	16	32,00	92	0,30	–
5576799	4777160Z6T		–	16,0	16	32,00	92	–	–
5576810	477718018T	5576811	477718018W	18,0	18	32,00	92	–	0,50
5576812	477720007T	5576813	477720007W	20,0	20	38,00	104	–	0,50
5576814	47772002T		–	20,0	20	38,00	104	0,30	–
5576816	477725008T	5576817	477725008W	25,0	25	45,00	121	–	0,50

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



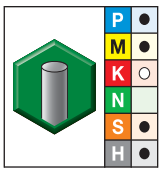


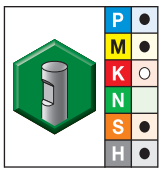


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 4778 • VariMill

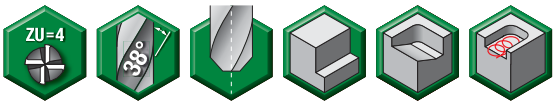




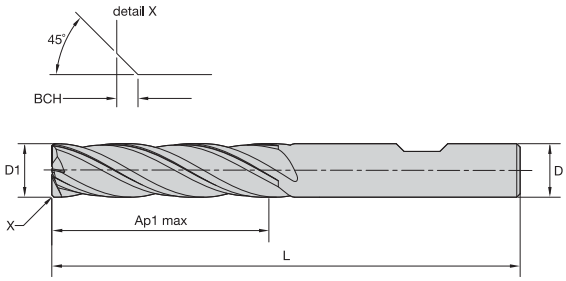
● first choice
○ alternate choice

grade AlTiN-MT AlTiN		grade AlTiN-MW AlTiN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
2545563	477804002MT	3592826	477804002MW	4,0	6	12,00	55	0,20
2545564	477805002MT	3592827	477805002MW	5,0	6	13,00	57	0,20
2545565	477806002MT	3592828	477806002MW	6,0	6	13,00	57	0,20
2545570	477807003MT	3592829	477807003MW	7,0	8	16,00	63	0,20
2545603	477808003MT	3592830	477808003MW	8,0	8	16,00	63	0,20
2545605	477809004MT	3592831	477809004MW	9,0	10	19,00	72	0,20
2601245	477810004MT	3592832	477810004MW	10,0	10	22,00	72	0,30
2601246	477812005MT	3592833	477812005MW	12,0	12	26,00	83	0,30
2601248	477814014MT	3592834	477814014MW	14,0	14	26,00	83	0,30
2601249	477816006MT	3592835	477816006MW	16,0	16	32,00	92	0,30
2601250	477818018MT	3592836	477818018MW	18,0	18	32,00	92	0,30
2601251	477820007MT	3592837	477820007MW	20,0	20	38,00	104	0,30
2601252	477825008MT	3592838	477825008MW	25,0	25	45,00	121	0,30

- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



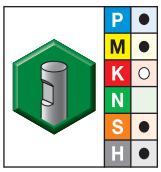




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

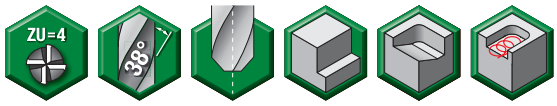
Series 4717 • VariMill • Extended Length of Cut



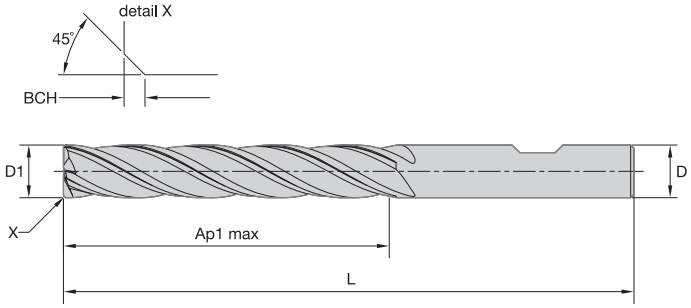
● first choice
○ alternate choice

grade TiAlN-LW TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
3641112	471706002LW	6,0	6	32,00	76	0,40
3641113	471708003LW	8,0	8	32,00	87	0,40
3641114	471710004LW	10,0	10	38,00	89	0,50
3641115	471712005LW	12,0	12	51,00	100	0,50
3641116	471716006LW	16,0	16	57,00	125	0,50
3641117	471720007LW	20,0	20	57,00	125	0,50

- Unequal flute spacing.
- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



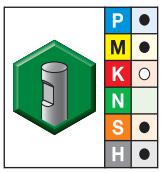




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

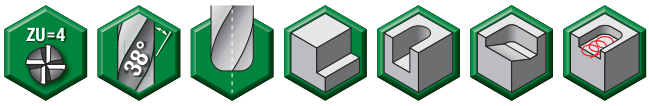
Series 4727 • VariMill • Extended Length of Cut



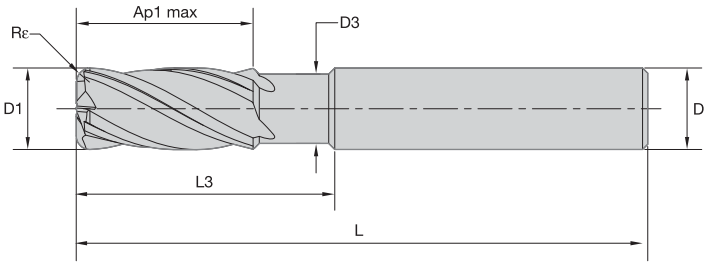
● first choice
○ alternate choice

grade TiAlN-LW TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
3641118	472712005LW	12,0	12	76,00	125	0,50
3641119	472716006LW	16,0	16	76,00	150	0,50
3641120	472720007LW	20,0	20	102,00	175	0,50

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



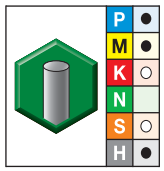


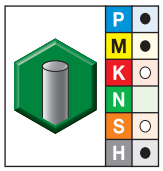


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 47N7 • VariMill • With Neck



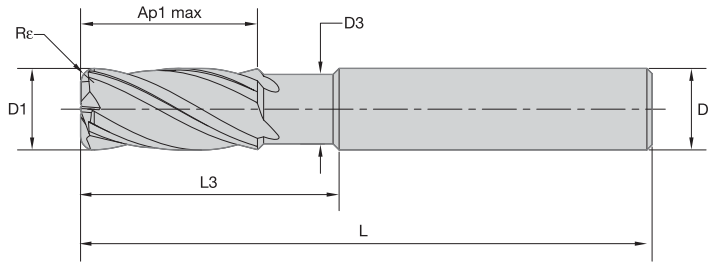


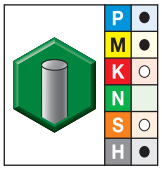
● first choice
○ alternate choice

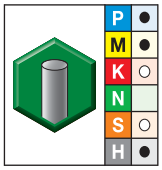
grade AlTiN-MT AlTiN		grade TiAlN-LT TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
	–	3462450	47N704002LT	4,0	6	3,60	12,00	16,00	55	0,40
3462452	47N704012MT	3462451	47N704012LT	4,0	6	3,60	12,00	16,00	55	0,50
	–	3462453	47N704022LT	4,0	6	3,60	12,00	16,00	55	1,00
	–	3462454	47N705002LT	5,0	6	4,60	13,00	18,00	57	0,50
3462456	47N705012MT	3462455	47N705012LT	5,0	6	4,60	13,00	18,00	57	1,00
3462458	47N706002MT	3462457	47N706002LT	6,0	6	5,50	13,00	21,00	57	0,50
3462460	47N706012MT	3462459	47N706012LT	6,0	6	5,50	13,00	21,00	57	1,00
	–	3462461	47N706022LT	6,0	6	5,50	13,00	21,00	57	1,50
3462463	47N708003MT	3462462	47N708003LT	8,0	8	7,50	16,00	27,00	63	0,50
3462465	47N708013MT	3462464	47N708013LT	8,0	8	7,50	16,00	27,00	63	1,00
	–	3462466	47N708023LT	8,0	8	7,50	16,00	27,00	63	1,50
	–	3462467	47N708033LT	8,0	8	7,50	16,00	27,00	63	2,00
3462469	47N710004MT	3462468	47N710004LT	10,0	10	9,50	22,00	32,00	72	0,50
3462471	47N710014MT	3462470	47N710014LT	10,0	10	9,50	22,00	32,00	72	1,00
	–	3462472	47N710024LT	10,0	10	9,50	22,00	32,00	72	1,50
3462474	47N710034MT	3462473	47N710034LT	10,0	10	9,50	22,00	32,00	72	2,00
3462476	47N712005MT	3462475	47N712005LT	12,0	12	11,50	26,00	38,00	83	0,50
3462478	47N712015MT	3462477	47N712015LT	12,0	12	11,50	26,00	38,00	83	1,00
	–	3462479	47N712025LT	12,0	12	11,50	26,00	38,00	83	1,50
3462481	47N712035MT	3462480	47N712035LT	12,0	12	11,50	26,00	38,00	83	2,00

(continued)

(Series 47N7 • VariMill • With Neck — continued)



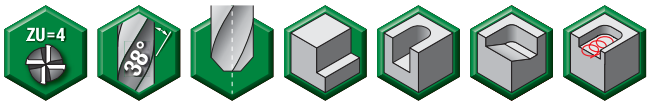




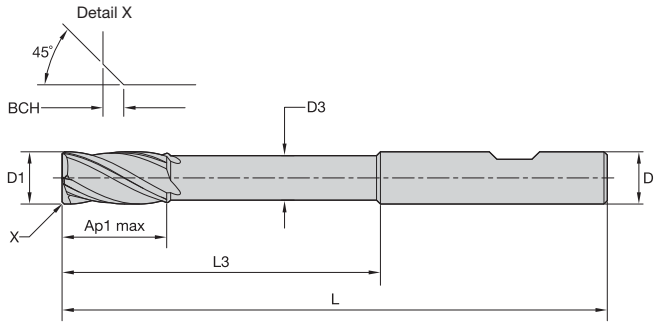
● first choice
○ alternate choice

grade AlTiN-MT AlTiN		grade TiAlN-LT TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
3462483	47N712045MT	3462482	47N712045LT	12,0	12	11,50	26,00	38,00	83	4,00
3462485	47N716006MT	3462484	47N716006LT	16,0	16	15,00	32,00	44,00	92	1,00
3462487	47N716016MT	3462486	47N716016LT	16,0	16	15,00	32,00	44,00	92	2,00
3462489	47N716026MT	3462488	47N716026LT	16,0	16	15,00	32,00	44,00	92	4,00
3462491	47N720007MT	3462490	47N720007LT	20,0	20	19,00	38,00	55,00	104	1,00
3462493	47N720017MT	3462492	47N720017LT	20,0	20	19,00	38,00	55,00	104	2,00
3462495	47N720027MT	3462494	47N720027LT	20,0	20	19,00	38,00	55,00	104	4,00

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.



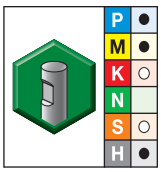




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

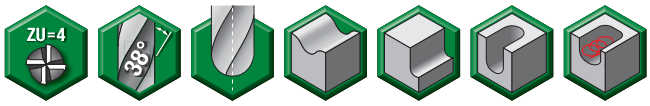
Series 47N6 • VariMill • Extended Reach with Neck



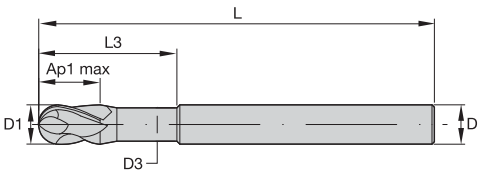
● first choice
○ alternate choice

grade TiAlN-LW TiAlN								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH
4067705	47N606002LW	6,0	6	5,50	12,00	42,00	100	0,40
4067706	47N608003LW	8,0	8	7,30	16,00	62,00	100	0,40
4067707	47N610004LW	10,0	10	9,10	20,00	60,00	100	0,50
4067708	47N612005LW	12,0	12	11,00	24,00	73,00	125	0,50
4067709	47N616006LW	16,0	16	14,56	32,00	100,00	150	0,50
4067710	47N620007LW	20,0	20	18,20	40,00	98,00	175	0,50

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





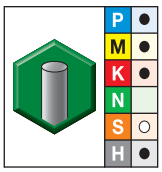


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 47N0 • VariMill • Ball Nose • Victory Grades

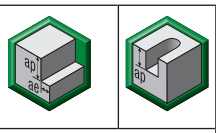


● first choice
○ alternate choice

grade WP15PE AlTiN							
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
5576818	47N005002T	5,0	6	4,70	9,00	15,00	57
5576819	47N006002T	6,0	6	5,64	10,00	15,00	57
5576820	47N008003T	8,0	8	7,52	12,00	20,00	63
5576821	47N010004T	10,0	10	9,40	14,00	25,00	72
5576822	47N012005T	12,0	12	11,28	16,00	30,00	83
5576823	47N016006T	16,0	16	15,04	22,00	38,00	92
5576824	47N020007T	20,0	20	18,80	26,00	50,00	104

■ Series 4777 • VariMill • Victory Grades

WIDIA VICTORY





Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4778 • VariMill







Material Group		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	4,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4717 • VariMill





Material Group		Side Milling (A)										Recommended feed per tooth (fz = mm/th) for side milling (A).						
		Finishing					Roughing											
		A		TiAlN Cutting Speed — vc m/min			A		TiAlN Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	1	Ap1 max	0,05 x D*	300	–	400	Ap1 max	0,2 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,114
	2	Ap1 max	0,05 x D*	280	–	380	Ap1 max	0,2 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,092	0,114
	3	Ap1 max	0,05 x D*	240	–	320	Ap1 max	0,2 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,079	0,101
	4	Ap1 max	0,05 x D*	180	–	300	Ap1 max	0,2 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,070	0,088
	5	Ap1 max	0,05 x D*	120	–	200	Ap1 max	0,2 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,081
	6	Ap1 max	0,05 x D*	100	–	150	Ap1 max	0,2 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,052	0,065
M	1	Ap1 max	0,05 x D*	180	–	230	Ap1 max	0,2 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,101
	2	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,081
	3	Ap1 max	0,05 x D*	120	–	140	Ap1 max	0,2 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,065
K	1	Ap1 max	0,05 x D*	240	–	300	Ap1 max	0,2 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,114
	2	Ap1 max	0,05 x D*	220	–	260	Ap1 max	0,2 x D	110	–	130	fz	0,036	0,050	0,061	0,070	0,079	0,101
	3	Ap1 max	0,05 x D*	200	–	260	Ap1 max	0,2 x D	100	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,081
S	1	Ap1 max	0,05 x D*	100	–	180	Ap1 max	0,2 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,101
	2	Ap1 max	0,05 x D*	50	–	80	Ap1 max	0,2 x D	25	–	40	fz	0,036	0,050	0,061	0,070	0,079	0,101
	3	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,019	0,026	0,032	0,037	0,042	0,054
	4	Ap1 max	0,05 x D*	100	–	120	Ap1 max	0,2 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,074
H	1	Ap1 max	0,05 x D*	160	–	280	Ap1 max	0,2 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,088

**For cutting data above, use ae ≤ 0,8mm.*

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.
For finishing, increase feed per tooth by 20%.

Series 4727 • VariMill





Material Group		Side Milling (A)										Recommended feed per tooth (fz = mm/th) for side milling (A).			
		Finishing					Roughing								
		A		TiAlN			A		TiAlN						
				Cutting Speed – vc m/min					Cutting Speed – vc m/min				D1 – Diameter		
		ap	ae	min		max	ap	ae	min		max	mm	12,0	16,0	20,0
P	1	Ap1 max	0,05 x D*	300	–	400	Ap1 max	0,2 x D	150	–	200	fz	0,083	0,101	0,114
	2	Ap1 max	0,05 x D*	280	–	380	Ap1 max	0,2 x D	140	–	190	fz	0,083	0,101	0,114
	3	Ap1 max	0,05 x D*	240	–	320	Ap1 max	0,2 x D	120	–	160	fz	0,070	0,087	0,101
	4	Ap1 max	0,05 x D*	180	–	300	Ap1 max	0,2 x D	90	–	150	fz	0,062	0,077	0,088
	5	Ap1 max	0,05 x D*	120	–	200	Ap1 max	0,2 x D	60	–	100	fz	0,056	0,070	0,081
	6	Ap1 max	0,05 x D*	100	–	150	Ap1 max	0,2 x D	50	–	75	fz	0,047	0,057	0,065
M	1	Ap1 max	0,05 x D*	180	–	230	Ap1 max	0,2 x D	90	–	115	fz	0,070	0,087	0,101
	2	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,056	0,070	0,081
	3	Ap1 max	0,05 x D*	120	–	140	Ap1 max	0,2 x D	60	–	70	fz	0,047	0,057	0,065
K	1	Ap1 max	0,05 x D*	240	–	300	Ap1 max	0,2 x D	120	–	150	fz	0,083	0,101	0,114
	2	Ap1 max	0,05 x D*	220	–	260	Ap1 max	0,2 x D	110	–	130	fz	0,070	0,087	0,101
	3	Ap1 max	0,05 x D*	200	–	260	Ap1 max	0,2 x D	100	–	130	fz	0,056	0,070	0,081
S	1	Ap1 max	0,05 x D*	100	–	180	Ap1 max	0,2 x D	50	–	90	fz	0,070	0,087	0,101
	2	Ap1 max	0,05 x D*	50	–	80	Ap1 max	0,2 x D	25	–	40	fz	0,070	0,087	0,101
	3	Ap1 max	0,05 x D*	120	–	160	Ap1 max	0,2 x D	60	–	80	fz	0,037	0,046	0,054
	4	Ap1 max	0,05 x D*	100	–	120	Ap1 max	0,2 x D	50	–	60	fz	0,052	0,064	0,074
H	1	Ap1 max	0,05 x D*	160	–	280	Ap1 max	0,2 x D	80	–	140	fz	0,062	0,077	0,088

**For cutting data above, use ae ≤ 0,8mm.*

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.
For finishing, increase feed per tooth by 20%.

Series 47N7 AlTiN • VariMill • With Neck







Material Group		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min	–	max	mm	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 47N7 TiAlN • VariMill • With Neck







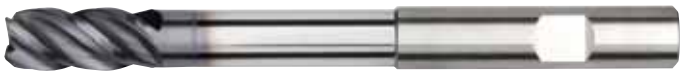
Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	3	1,5 x D	0,5 x D	1 x D	100	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,046	0,054
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 47N6 • VariMill • With Neck







Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	0	1,5 x D	0,2 x D	0,5 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114
	1	1,5 x D	0,2 x D	0,5 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,2 x D	0,5 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,101	0,114
	3	1,5 x D	0,2 x D	0,5 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101
	4	1,5 x D	0,2 x D	0,5 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088
	5	1,5 x D	0,2 x D	0,5 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081
	6	1,5 x D	0,2 x D	0,5 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065
M	1	1,5 x D	0,2 x D	0,5 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,2 x D	0,5 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081
	3	1,5 x D	0,2 x D	0,5 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065
K	1	1,5 x D	0,2 x D	0,5 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114
	2	1,5 x D	0,2 x D	0,5 x D	110	–	130	fz	0,036	0,050	0,061	0,070	0,087	0,101
	3	1,5 x D	0,2 x D	0,5 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081
S	1	1,5 x D	0,2 x D	0,5 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101
	2	1,5 x D	0,1 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054
	3	1,5 x D	0,2 x D	0,5 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081
	4	1,5 x D	0,2 x D	0,5 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074
H	1	1,5 x D	0,1 x D	0,3 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 47N0 • With Neck • VariMill • Victory Grades





Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,25 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1,25 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,5 x D	1 x D	140	–	190	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1,25 x D	0,5 x D	1 x D	120	–	160	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1,25 x D	0,5 x D	0,75 x D	90	–	150	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1,25 x D	0,5 x D	1 x D	60	–	100	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1,25 x D	0,5 x D	0,75 x D	50	–	75	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,25 x D	0,5 x D	1 x D	90	–	115	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,5 x D	1 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,25 x D	0,5 x D	1 x D	60	–	70	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,25 x D	0,5 x D	1 x D	120	–	150	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,5 x D	1 x D	110	–	140	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1,25 x D	0,5 x D	1 x D	110	–	130	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1 x D	0,3 x D	0,3 x D	50	–	90	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1,25 x D	0,5 x D	1 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,25 x D	0,5 x D	1 x D	50	–	60	fz	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,25 x D	0,5 x D	0,75 x D	80	–	140	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

HydroForce™ HT Chuck



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

HydroForce™ HT Chuck High Torque for High Metal Removal Rates (MRR) and Superior Surface Finish

- HydroForce gives you an unmatched combination of accuracy and clamping forces.
- Compact and stable design.
- Advanced hydraulic clamping with lowest runout and superior vibration dampening.
- Balanced quality to lower vibration, especially at high speeds.
- Focused and flexible product offering.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com**.

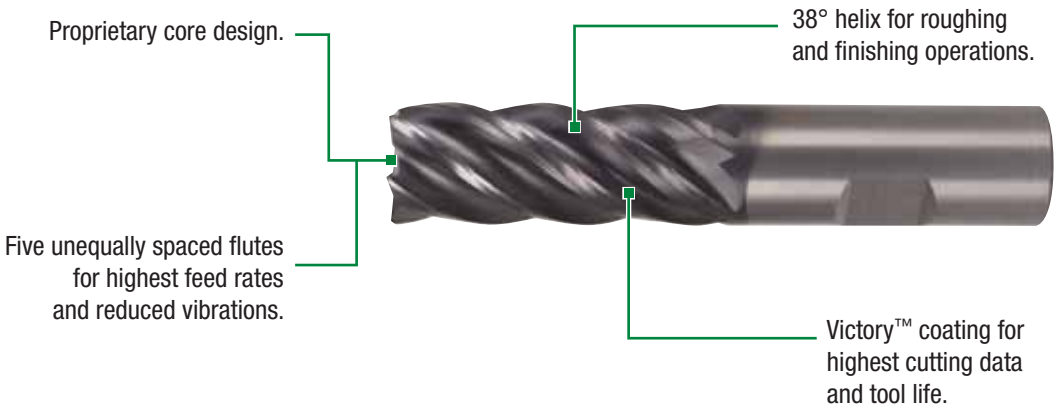
WIDIA™

VariMill II



VariMill II end mills are the proven leader in the field of high-performance, chatter-free machining. They are designed to provide maximum metal removal rates and to achieve supreme surface conditions. Utilising an innovative and proprietary design with unequal flute spacing, VariMill II carbide end mills provide users with the most versatile technology available, capable of outperforming other high-performance tools.

- 1 x D slotting in titanium and stainless steels with five unequally spaced flutes.
- Roughing and finishing with one tool.
- Various lengths-of-cut; necked and corner radius versions available.



WIDIA VICTORY

VariMill II™ Series

- Five unequally spaced flutes boosting your output with higher feed rates.
- Centre cutting.
- Roughing and finishing with one tool.
- Less passes due to 1 x D slotting capability on almost all materials, including titanium.

577C Series

- Highest metal removal rates and tool life in:
  - — Stainless steels, steels, and alloyed steels.
  - — Cast iron.
  - — High-temperature alloys and titanium.
- Corner radii and sharp edges.

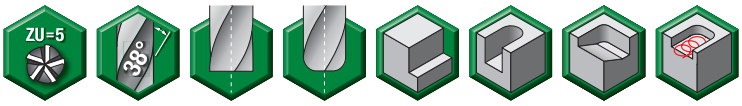


57NC Series

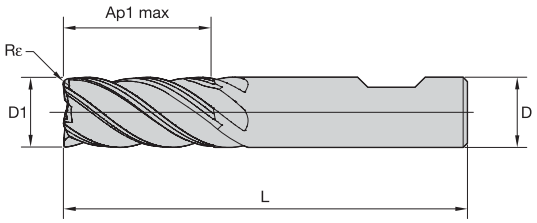
- Titanium and stainless steel geometry design.
- Radii corner and neck design for depths requiring additional passes.



- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Slotting up to 1 x D.
- Standard items listed. Additional styles and coatings made-to-order.





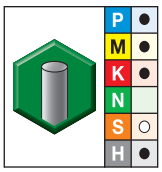


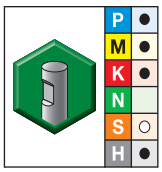
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 577C • VariMill II • With Centre Cut • Victory Grades





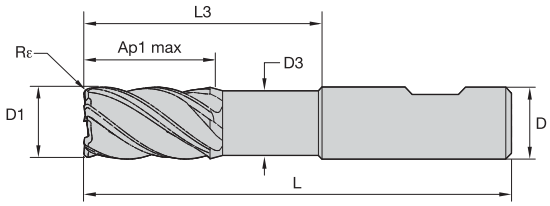
● first choice
○ alternate choice

grade WP15PE AlTiN		grade WP15PE AlTiN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5578866	577C04002T	5578867	577C04002W	4,0	6	11,00	55	0,25
5578868	577C04012T		–	4,0	6	11,00	55	–
5578990	577C05002T	5578991	577C05002W	5,0	6	13,00	57	0,25
5578992	577C06002T	5578993	577C06002W	6,0	6	13,00	57	0,40
5578994	577C06012T		–	6,0	6	13,00	57	–
5578995	577C07003T	5578996	577C07003W	7,0	8	16,00	63	0,40
5578997	577C08003T	5578998	577C08003W	8,0	8	19,00	63	0,50
5578999	577C08013T		–	8,0	8	19,00	63	–
5579021	577C09004T	5579022	577C09004W	9,0	10	19,00	72	0,50
5579023	577C10004T	5579024	577C10004W	10,0	10	22,00	72	0,50
5579025	577C10014T		–	10,0	10	22,00	72	–
5579026	577C12005T	5579027	577C12005W	12,0	12	26,00	83	0,75
5579028	577C12015T		–	12,0	12	26,00	83	–
5579029	577C14004T	5579040	577C14004W	14,0	14	26,00	83	0,75
5579041	577C14014T		–	14,0	14	26,00	83	–
5579042	577C16006T	5579043	577C16006W	16,0	16	32,00	92	0,75
5579044	577C16016T		–	16,0	16	32,00	92	–
5579045	577C18008T	5579046	577C18008W	18,0	18	32,00	92	0,75
5579047	577C20007T	5579048	577C20007W	20,0	20	38,00	104	0,75
5579049	577C20017T		–	20,0	20	38,00	104	–
5579060	577C25008T	5579061	577C25008W	25,0	25	45,00	121	0,75

- Unequal flute spacing.
- Centre cutting.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Slotting up to 1 x D.
- Standard items listed. Additional styles and coatings made-to-order.





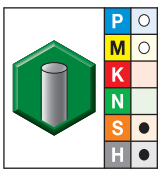


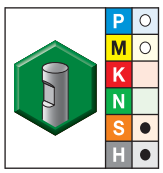
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3-6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 57NC • VariMill II • With Neck • With Centre Cut • Victory Grades



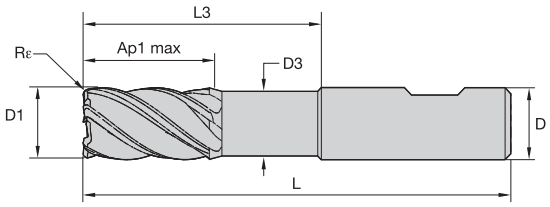


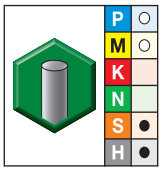
● first choice
○ alternate choice

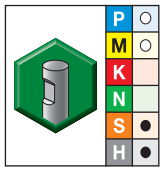
WS15PE AlTiN		WS15PE AlTiN								
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5598906	57NC06002T		–	6,0	6	5,64	13,00	18,00	63	–
5598907	57NC06022T	5598908	57NC06022W	6,0	6	5,64	13,00	18,00	63	0,50
5598909	57NC06032T	5599070	57NC06032W	6,0	6	5,64	13,00	18,00	63	1,00
	–	5599071	57NC06042W	6,0	6	5,64	13,00	18,00	63	1,50
5599072	57NC08003T		–	8,0	8	7,52	19,00	24,00	76	–
5599073	57NC08023T	5599074	57NC08023W	8,0	8	7,52	19,00	24,00	76	0,50
5599075	57NC08033T	5599076	57NC08033W	8,0	8	7,52	19,00	24,00	76	1,00
	–	5599077	57NC08053W	8,0	8	7,52	19,00	24,00	76	2,00
5599078	57NC10004T		–	10,0	10	9,40	22,00	30,00	76	–
5599079	57NC10024T	5599080	57NC10024W	10,0	10	9,40	22,00	30,00	76	0,50
5599081	57NC10034T	5599082	57NC10034W	10,0	10	9,40	22,00	30,00	76	1,00
5599083	57NC10054T	5599084	57NC10054W	10,0	10	9,40	22,00	30,00	76	2,00
5599085	57NC12005T		–	12,0	12	11,28	26,00	36,00	83	–
5599086	57NC12025T	5599087	57NC12025W	12,0	12	11,28	26,00	36,00	83	0,50
5599088	57NC12035T	5599089	57NC12035W	12,0	12	11,28	26,00	36,00	83	1,00
5599090	57NC12055T	5599091	57NC12055W	12,0	12	11,28	26,00	36,00	83	2,00
5599092	57NC16006T		–	16,0	16	15,04	32,00	48,00	100	–
5599093	57NC16026T	5598905	57NC16026W	16,0	16	15,04	32,00	48,00	100	0,50
5599094	57NC16036T	5599095	57NC16036W	16,0	16	15,04	32,00	48,00	100	1,00
5599096	57NC16056T	5599097	57NC16056W	16,0	16	15,04	32,00	48,00	100	2,00

(continued)

(Series 57NC • VariMill II • With Neck • With Centre Cut • Victory Grades — continued)







● first choice
○ alternate choice

WS15PE AlTiN		WS15PE AlTiN								
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5599098	57NC16076T	5599099	57NC16076W	16,0	16	15,04	32,00	48,00	100	3,00
5599100	57NC20007T		–	20,0	20	18,80	38,00	60,00	115	–
5599101	57NC20027T	5599102	57NC20027W	20,0	20	18,80	38,00	60,00	115	0,50
5599103	57NC20037T	5599104	57NC20037W	20,0	20	18,80	38,00	60,00	115	1,00
5599105	57NC20057T	5599106	57NC20057W	20,0	20	18,80	38,00	60,00	115	2,00
5599107	57NC20077T	5599108	57NC20077W	20,0	20	18,80	38,00	60,00	115	3,00
5599109	57NC20087T	5599110	57NC20087W	20,0	20	18,80	38,00	60,00	115	4,00
5599111	57NC25008T		–	25,0	25	23,50	45,00	75,00	135	–
5599112	57NC25028T	5599113	57NC25028W	25,0	25	23,50	45,00	75,00	135	0,50
5599114	57NC25038T	5599115	57NC25038W	25,0	25	23,50	45,00	75,00	135	1,00
5599116	57NC25058T	5599117	57NC25058W	25,0	25	23,50	45,00	75,00	135	2,00
5599118	57NC25078T	5599119	57NC25078W	25,0	25	23,50	45,00	75,00	135	3,00
5599120	57NC25088T	5599121	57NC25088W	25,0	25	23,50	45,00	75,00	135	4,00

■ Series 577C • VariMill II • Victory Grades

WIDIA VICTORY







Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed – vc m/min				D1 – Diameter								
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	1,5 x D	0,5 x D	0,75 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 57NC • VariMill II • With Neck • Victory Grades

WIDIA VICTORY





Material Group		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

X-Feed™ End Mills for High-Feed Milling



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Specifically engineered to machine hardened steel up to 67 HRC at extreme speeds and feeds

- Unique tool with new 6-flute style for high productivity.
- Necked shanks provide extended reach in deep cavities.
- High feed rates, up to 0,6mm per tooth on a 20mm tool.
- Machine hardened materials at 2–3x the metal removal rate of competitive end mills.
- Wide range of cutting diameters: down to 6mm for small and medium pocket work.
- Innovative new geometry maximises metal removal rates.
- High metal removal rates and lower manufacturing costs.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com.**

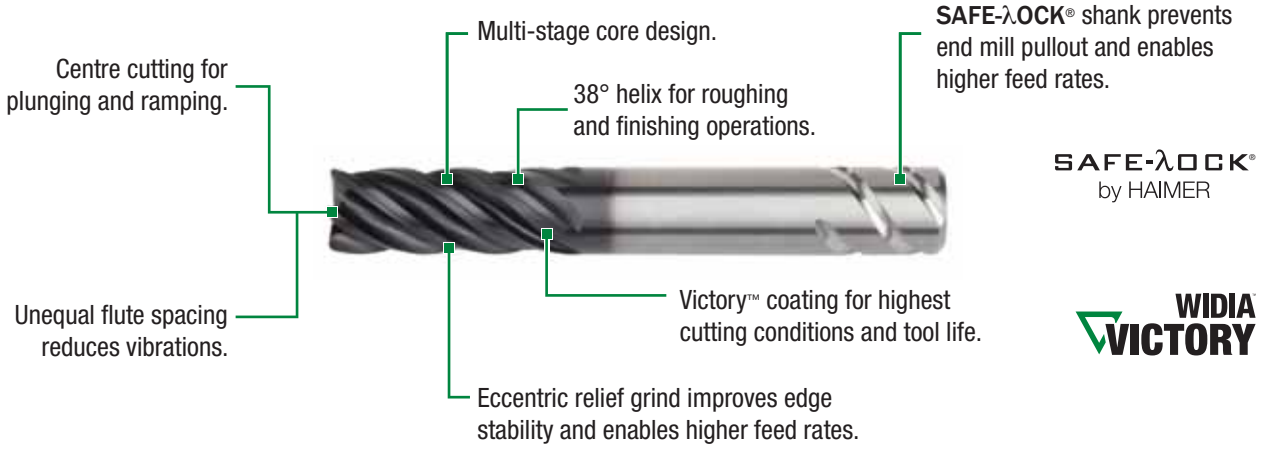
WIDIA™

VariMill II ER



Engineered with Eccentric Relief (ER) grind at the cutting edges for greater edge strength, enabling higher metal removal rates and increased productivity. The new VariMill II ER is the first WIDIA™ off-the-shelf end mill available with **SAFE-λOCK®** by HAIMER, providing excellent stability, eliminating end mill pullout, and increasing concentric tool clamping. Though primarily designed for roughing and finishing applications in the aerospace industry, VariMill II ER can be used as a solution for any titanium or stainless steel application and is capable of slotting, ramping, and plunging.

- High-performance tools for titanium and stainless steel workpiece materials.
- Roughing and finishing with one tool, lowering tool costs.
- Various radius and necked versions available.
- Standard offering with **SAFE-λOCK®** by HAIMER.



SAFE-λOCK® by HAIMER

WIDIA VICTORY

VariMill II™ ER Series

- Unique geometry providing increased tool life and higher metal removal rates in difficult-to-machine workpiece materials.
- Increased output due to fewer tool changes and higher metal removal rates.
- Roughing and finishing with one tool, lowering tool costs.
- 1 x D slotting capability requires less passes, increasing productivity.

577E Series

- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.



57NE Series

- Eccentric relief for edge stability and strength.
- Extensive radii corner offering.
- Neck design for depths requiring additional passes.

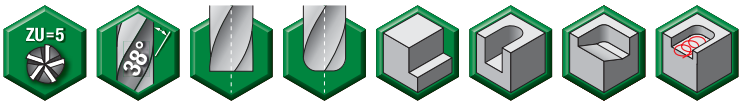




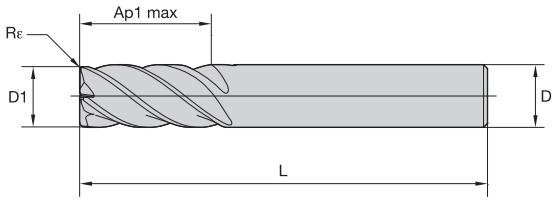
Application Example
Side milling of INCONEL® 718 component.

Workpiece material:	INCONEL 718
Tool:	D = 16mm
Cutting data:	ap = 27,43mm
	ae = 1,3mm
	vc = 19,8 m/min
	fz = 0,05 mm/th
Result:	Increased tool life from 2 years to 5.

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





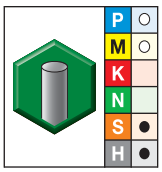


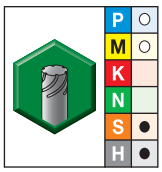
End Mill Tolerances

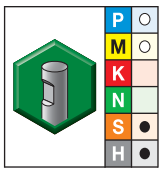
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 577E • VariMill II ER • Victory Grades



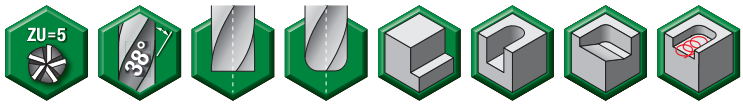




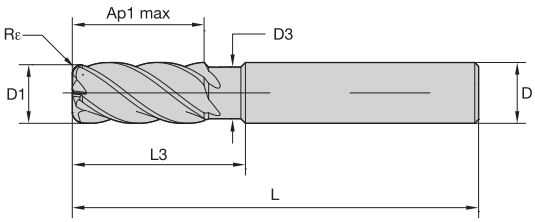
● first choice
○ alternate choice

WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5599171	577E10004T		–		–	10,0	10	22,00	72	–
5599172	577E10024T		–	5599173	577E10024W	10,0	10	22,00	72	0,50
–		5599174	577E12005V		–	12,0	12	26,00	83	–
–		5599175	577E12015V	5599176	577E12015W	12,0	12	26,00	83	0,75
–		5599177	577E16006V		–	16,0	16	32,00	92	–
–		5599178	577E16016V	5599179	577E16016W	16,0	16	32,00	92	0,75
–		5599180	577E20007V		–	20,0	20	38,00	104	–
–		5599181	577E20017V	5599182	577E20017W	20,0	20	38,00	104	0,75
–		5599183	577E25018V	5599184	577E25018W	25,0	25	45,00	121	0,75

- Unequal flute spacing.
- Centre cutting.
- Optimised geometry for titanium machining.
- Single tool for both roughing and finishing operations requiring fewer setups.
- Standard items listed. Additional styles and coatings made-to-order.





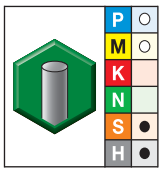


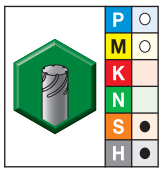
End Mill Tolerances

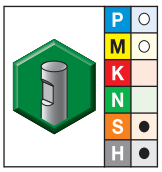
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 57NE • VariMill II ER • With Neck • Victory Grades







● first choice
○ alternate choice

WS15PE AlTiN order #	WS15PE AlTiN catalogue #	WS15PE AlTiN order #	WS15PE AlTiN catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
5599122	57NE10004T		–		–	10,0	10	9,40	22,00	30,00	76	–
5599123	57NE10024T		–	5599124	57NE10024W	10,0	10	9,40	22,00	30,00	76	0,50
5599125	57NE10034T		–	5599126	57NE10034W	10,0	10	9,40	22,00	30,00	76	1,00
5599127	57NE10054T		–	5599128	57NE10054W	10,0	10	9,40	22,00	30,00	76	2,00
	–	5599129	57NE12005V		–	12,0	12	11,28	26,00	36,00	83	–
	–	5599130	57NE12025V	5599131	57NE12025W	12,0	12	11,28	26,00	36,00	83	0,50
	–	5599132	57NE12035V	5599133	57NE12035W	12,0	12	11,28	26,00	36,00	83	1,00
	–	5599134	57NE12055V	5599135	57NE12055W	12,0	12	11,28	26,00	36,00	83	2,00
	–	5599136	57NE16006V		–	16,0	16	15,04	32,00	48,00	100	–
	–	5599137	57NE16026V	5599138	57NE16026W	16,0	16	15,04	32,00	48,00	100	0,50
	–	5599139	57NE16036V	5599140	57NE16036W	16,0	16	15,04	32,00	48,00	100	1,00
	–	5599141	57NE16056V	5599142	57NE16056W	16,0	16	15,04	32,00	48,00	100	2,00
	–	5599143	57NE20007V		–	20,0	20	18,80	38,00	60,00	115	–
	–	5599144	57NE20027V	5599145	57NE20027W	20,0	20	18,80	38,00	60,00	115	0,50
	–	5599146	57NE20037V	5599147	57NE20037W	20,0	20	18,80	38,00	60,00	115	1,00
	–	5599148	57NE20057V	5599149	57NE20057W	20,0	20	18,80	38,00	60,00	115	2,00
	–	5599160	57NE20087V	5599161	57NE20087W	20,0	20	18,80	38,00	60,00	115	4,00
	–	5599162	57NE25008V		–	25,0	25	23,50	45,00	75,00	135	–
	–	5599163	57NE25028V	5599164	57NE25028W	25,0	25	23,50	45,00	75,00	135	0,50
	–	5599165	57NE25038V	5599166	57NE25038W	25,0	25	23,50	45,00	75,00	135	1,00
	–	5599167	57NE25058V	5599168	57NE25058W	25,0	25	23,50	45,00	75,00	135	2,00
	–	5599169	57NE25088V	5599170	57NE25088W	25,0	25	23,50	45,00	75,00	135	4,00

■ Series 577E • VariMill II ER • Victory Grades





Material Group		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,040	0,047	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	1 x D	25	–	40	fz	0,048	0,056	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 57NE • VariMill II ER • With Neck • Victory Grades

WIDIA VICTORY





Material Group		Side Milling (A) and Slotting (B)			WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	10,0	12,0	16,0	18,0	20,0	25,0
P	5	1,5 x D	0,5 x D	1 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081	0,091
	6	1,5 x D	0,5 x D	0,75 x D	50	–	75	fz	0,040	0,047	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,5 x D	1 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081	0,091
	3	1,5 x D	0,5 x D	1 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065	0,071
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	50	fz	0,032	0,037	0,046	0,050	0,054	0,061
	3	1,5 x D	0,3 x D	1 x D	40	–	90	fz	0,048	0,056	0,070	0,076	0,081	0,091
	4	1,5 x D	0,5 x D	1 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,5 x D	0,75 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088	0,098
	2	1,5 x D	0,2 x D	0,5 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065	0,071

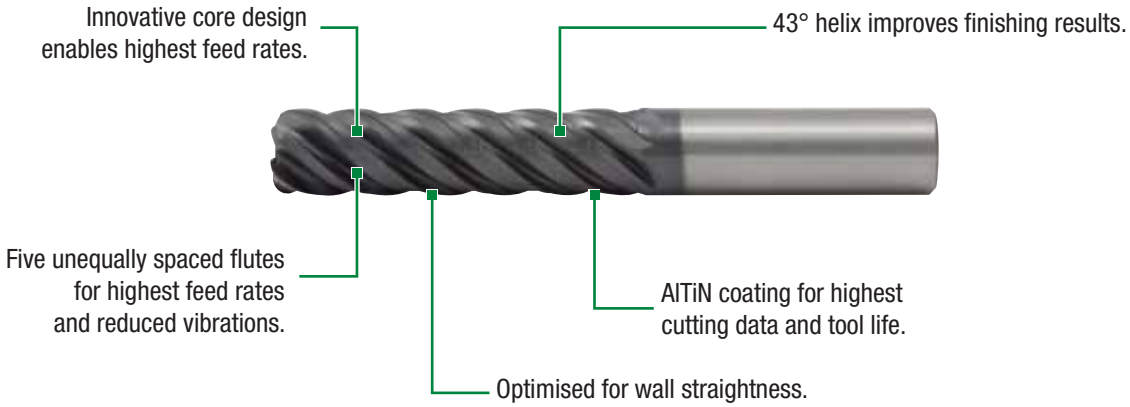
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

VariMill II Long



Designed to achieve highest surface quality and tool life in titanium, stainless steels, and steels. Innovative core and tool geometry design enable chatter-free corner machining in one pass. VariMill II Long covers 4 x D lengths-of-cut for semi-finishing and fine finishing operations with radii and sharp corner versions from stock.

- Tailored 43° helix improves surface finish.
- Less passes in side milling with 4 x D length-of-cut capability.
- One tool for semi-finishing and fine finishing operations.
- No need for feed rate reduction when machining corners.

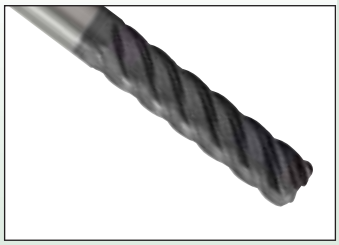


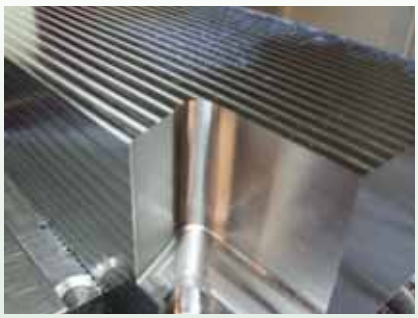
VariMill II™ Long Series

- Achieve excellent surface finish and outstanding wall straightness.
- Benefit from high accuracy even with thin wall machining.
- Simplify your programming of cavities by keeping the feed rate and radial engagement constant.

5718 Series

- Highest surface quality and tool life in:
  - — Titanium
  - — Stainless steels
- Corner radii and sharp edges.
- 4 x D length of cut.





Application Example

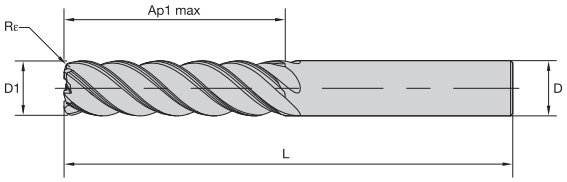
Side milling 60° angled corner with constant feed rate.

Workpiece material:	Titanium 6Al-4V
Tool:	D = 15,875mm
Cutting data:	ap = 63mm
	ae = 0,5mm
	vc = 100 m/min
	fz = 0,06 mm/z
Result:	Surface finish Ra 0,4 µm

- Unequal flute spacing.
- Non-centre cutting.
- For finishing and semi-finishing applications.
- Standard items listed. Additional styles and coatings made-to-order.



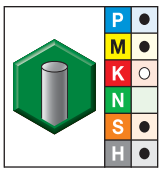




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 5718 • VariMill II Long • 4 x D Length of Cut

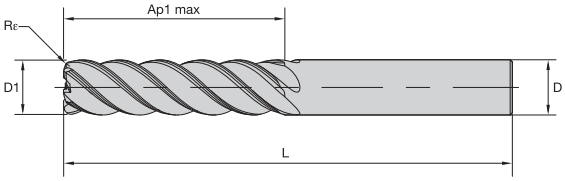


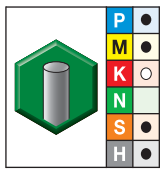
● first choice
○ alternate choice

grade AlTiN-MT AlTiN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5096566	571806002MT	6,0	6	24,00	76	–
5096567	571806012MT	6,0	6	24,00	76	0,50
5096568	571806022MT	6,0	6	24,00	76	1,00
5096569	571808003MT	8,0	8	32,00	76	–
5096660	571808013MT	8,0	8	32,00	76	0,50
5096661	571808023MT	8,0	8	32,00	76	1,00
4124297	571810004MT	10,0	10	40,00	100	–
5096662	571810014MT	10,0	10	40,00	100	0,50
5096664	571810034MT	10,0	10	40,00	100	2,00
5096665	571810044MT	10,0	10	40,00	100	2,50
4124298	571812005MT	12,0	12	48,00	125	–
5096667	571812025MT	12,0	12	48,00	125	1,00
5096668	571812035MT	12,0	12	48,00	125	2,00
5096669	571812045MT	12,0	12	48,00	125	2,50
4124299	571814014MT	14,0	14	56,00	120	–
5096752	571814024MT	14,0	14	56,00	120	1,00
5096753	571814034MT	14,0	14	56,00	120	2,00
5096754	571814044MT	14,0	14	56,00	120	3,00
5096755	571814054MT	14,0	14	56,00	120	4,00
4124300	571816006MT	16,0	16	64,00	141	–

(continued)

(Series 5718 • VariMill II Long • 4 x D Length of Cut — continued)





● first choice
○ alternate choice

order #	catalogue #	grade AlTiN-MT AlTiN	D1	D	length of cut Ap1 max	length L	Rε
5096756	571816016MT		16,0	16	64,00	141	0,50
5096757	571816026MT		16,0	16	64,00	141	1,00
5096758	571816036MT		16,0	16	64,00	141	2,00
5096759	571816046MT		16,0	16	64,00	141	3,00
5096800	571816056MT		16,0	16	64,00	141	4,00
4124301	571818018MT		18,0	18	72,00	150	–
5096801	571818028MT		18,0	18	72,00	150	1,00
5096802	571818038MT		18,0	18	72,00	150	2,00
5096803	571818048MT		18,0	18	72,00	150	3,00
5096804	571818058MT		18,0	18	72,00	150	4,00
4124302	571820007MT		20,0	20	80,00	150	–
5096805	571820017MT		20,0	20	80,00	150	0,50
5096806	571820027MT		20,0	20	80,00	150	1,00
5096807	571820037MT		20,0	20	80,00	150	2,00
5096808	571820047MT		20,0	20	80,00	150	3,00
5096809	571820057MT		20,0	20	80,00	150	4,00
4124323	571825008MT		25,0	25	100,00	170	–
5096860	571825018MT		25,0	25	100,00	170	0,50
5096861	571825028MT		25,0	25	100,00	170	1,00
5096862	571825038MT		25,0	25	100,00	170	2,00
5096863	571825048MT		25,0	25	100,00	170	3,00
5096864	571825058MT		25,0	25	100,00	170	4,00

Series 5718 • VariMill II Long • 4 x D Length of Cut

Material Group																
		Side Milling (A)		AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		Cutting Speed – vc m/min				D1 – Diameter								
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	Ap1 max	0,05 x D*	300	–	400	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	1	Ap1 max	0,05 x D*	300	–	400	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	2	Ap1 max	0,05 x D*	280	–	380	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	3	Ap1 max	0,05 x D*	240	–	320	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	4	Ap1 max	0,05 x D*	180	–	300	fz	0,039	0,054	0,065	0,075	0,084	0,092	0,099	0,106	0,117
	5	Ap1 max	0,05 x D*	120	–	200	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	6	Ap1 max	0,05 x D*	100	–	150	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085
M	1	Ap1 max	0,05 x D*	180	–	230	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	2	Ap1 max	0,05 x D*	120	–	160	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	3	Ap1 max	0,05 x D*	120	–	140	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085
K	1	Ap1 max	0,05 x D*	240	–	300	fz	0,053	0,072	0,086	0,099	0,111	0,121	0,130	0,137	0,149
	2	Ap1 max	0,05 x D*	220	–	280	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	3	Ap1 max	0,05 x D*	220	–	260	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
S	1	Ap1 max	0,05 x D*	100	–	180	fz	0,044	0,060	0,073	0,084	0,095	0,105	0,113	0,121	0,137
	2	Ap1 max	0,05 x D*	50	–	80	fz	0,023	0,032	0,038	0,045	0,050	0,056	0,060	0,065	0,074
	3	Ap1 max	0,05 x D*	120	–	160	fz	0,035	0,048	0,058	0,067	0,076	0,084	0,091	0,097	0,109
	4	Ap1 max	0,05 x D*	100	–	120	fz	0,031	0,044	0,053	0,062	0,070	0,077	0,083	0,089	0,100
H	1	Ap1 max	0,05 x D*	160	–	280	fz	0,039	0,054	0,065	0,075	0,084	0,092	0,099	0,106	0,117
	2	Ap1 max	0,06 x D*	140	–	240	fz	0,030	0,040	0,048	0,056	0,062	0,068	0,073	0,078	0,085

** For the above cutting data, do not exceed an overall ae of 0,8mm.*

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machinining centres, please adjust parameters accordingly on >12mm diameters.

Designed to significantly reduce machining time in aluminium!



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

AluSurf™ Carbide End Mills for High Metal Removal Rates and Superior Surface Finishes

- Use only one tool for roughing and finishing operations.
- Slotting is effective up to full, 1 x D axial depth; side milling (profiling) is effective up to 0.5 x D, radial by 1.5 x D axial depth.
- Three-flute series uses unequal flute spacing for chatter-free performance.
- Effective in a full range of machine speeds.
- Multiple corner radii and extended neck configurations are available as standard.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com.**

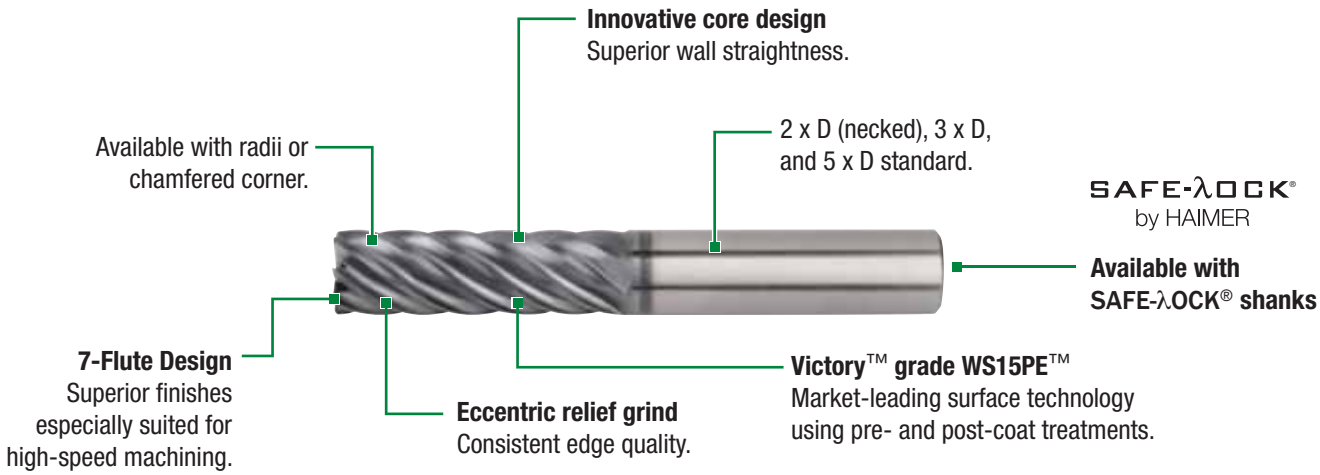
WIDIA™



VariMill III ER

The trend towards more efficiency and increased productivity using high-speed machining techniques such as trochoidal and peel milling will continue to be a focus for aerospace components. The new VariMill III ER is designed to provide the highest Metal Removal Rates (MRR) and extended tool life in the most demanding materials in the aerospace industry. VariMill III ER is designed to be applied in titanium and stainless steel workpiece materials for both semi-finishing and finishing applications.

- 7-flute eccentric relief design provides edge strength along with high productivity.
- Superior surface finishes and wall straightness capability from specialised core.
- Finishing and semi-finishing at up to 30% of the diameter with one tool.
- First choice for high-speed machining in difficult-to-cut workpiece materials.



WIDIA VICTORY

VariMill III™ ER Series

- Seven unequally spaced flutes provide the maximum output and surface quality.
- Eccentric relief for edge strength and stability.
- Semi-finishing and finishing with one tool.
- Victory™ grade WS15PE™ for increased heat and wear resistance.

77NE Series

- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 2 x D length of cut.
- Necked 5 x D reach.
- Centre cutting.



772E Series

- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 5 x D length of cut.
- Centre cutting.
- **SAFE-λOCK®**.



771E Series

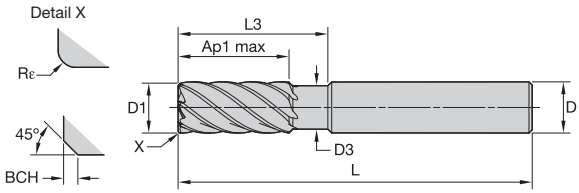
- Titanium and stainless steel geometry design.
- Corner radii and chamfered corners.
- 3 x D length of cut.
- Centre cutting.



- Unequal flute spacing.
- Centre cutting.
- Ramping angle 3°.
- Optimised for difficult-to-machine workpiece materials.
- Semi-finishing to finishing applications.
- High-speed machining capability.
- Standard items listed. Additional styles and coatings made-to-order.





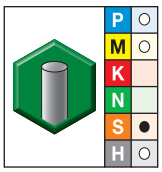


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 77NE • VariMill III ER • With Neck • Victory Grades



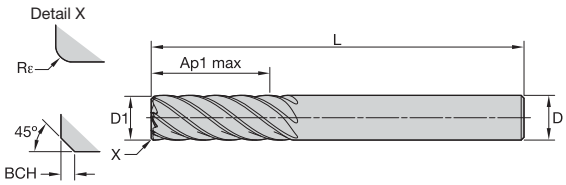
● first choice
○ alternate choice

WS15PE AlTiN									
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	BCH
5978039	77NE10004T	10,0	10	9,40	22,00	30,00	76	–	0,50
5978040	77NE10024T	10,0	10	9,40	22,00	30,00	76	0,50	–
5978096	77NE12005T	12,0	12	11,28	26,00	36,00	83	–	0,50
5978097	77NE12025T	12,0	12	11,28	26,00	36,00	83	0,50	–
5978104	77NE16006T	16,0	16	15,04	32,00	48,00	100	–	0,50
5978105	77NE16026T	16,0	16	15,04	32,00	48,00	100	0,50	–
5978112	77NE20007T	20,0	20	18,80	38,00	60,00	115	–	0,50
5978113	77NE20027T	20,0	20	18,80	38,00	60,00	115	0,50	–

- Unequal flute spacing .
- Centre cutting.
- Ramping angle 3°.
- Optimised for difficult-to-machine workpiece materials.
- Semi-finishing to finishing applications.
- High-speed machining capability.
- Standard items listed. Additional styles and coatings made-to-order.





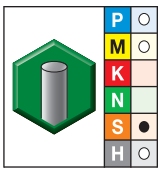


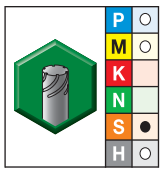
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 771E 772E • VariMill III ER • Victory Grades





● first choice
○ alternate choice

WS15PE AlTiN		WS15PE AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	BCH
5978092	771E10004T		–	10,0	10	30,00	76	–	0,50
5978093	771E10024T		–	10,0	10	30,00	76	0,50	–
5978094	772E10004T		–	10,0	10	50,00	100	–	0,50
5978095	772E10024T		–	10,0	10	50,00	100	0,50	–
5978098	771E12005T		–	12,0	12	36,00	100	–	0,50
5978099	771E12025T		–	12,0	12	36,00	100	0,50	–
5978100	772E12005T	5978102	772E12005V	12,0	12	60,00	125	–	0,50
5978101	772E12025T	5978103	772E12025V	12,0	12	60,00	125	0,50	–
5978106	771E16006T		–	16,0	16	48,00	110	–	0,50
5978107	771E16026T		–	16,0	16	48,00	110	0,50	–
5978108	772E16006T	5978110	772E16006V	16,0	16	80,00	141	–	0,50
5978109	772E16026T	5978111	772E16026V	16,0	16	80,00	141	0,50	–
5978114	771E20007T		–	20,0	20	60,00	125	–	0,50
5978115	771E20027T		–	20,0	20	60,00	125	0,50	–
5978116	772E20007T	5978118	772E20007V	20,0	20	100,00	166	–	0,50
5978117	772E20027T	5978119	772E20027V	20,0	20	100,00	166	0,50	–

■ Series 77NE • VariMill III ER • With Neck • Semi-Finishing • Victory Grades



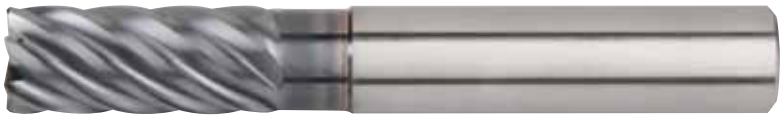


Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	Ap1 max	0,3 x D	90	–	150	fz	0,054	0,062	0,077	0,083	0,088
	5	Ap1 max	0,3 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081
M	1	Ap1 max	0,3 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101
	2	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	3	Ap1 max	0,3 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065
S	1	Ap1 max	0,3 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101
	2	Ap1 max	0,3 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054
	3	Ap1 max	0,3 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	4	Ap1 max	0,3 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074
H	1	Ap1 max	0,3 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088
	2	Ap1 max	0,3 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 77NE • VariMill III ER • With Neck • Finishing • Victory Grades





Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	Ap1 max	0,06 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
	5	Ap1 max	0,06 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
M	1	Ap1 max	0,06 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
	2	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	3	Ap1 max	0,06 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
S	1	Ap1 max	0,06 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
	2	Ap1 max	0,06 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	Ap1 max	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	4	Ap1 max	0,06 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	Ap1 max	0,06 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
	2	Ap1 max	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 771E • VariMill III ER • Semi-Finishing • Victory Grades

WIDIA VICTORY




Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).				
		A		Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	3 x D	0,2 x D	90	–	150	fz	0,054	0,062	0,077	0,083	0,088
	5	3 x D	0,2 x D	60	–	100	fz	0,048	0,056	0,070	0,076	0,081
M	1	3 x D	0,2 x D	90	–	115	fz	0,061	0,070	0,087	0,095	0,101
	2	3 x D	0,2 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	3	3 x D	0,2 x D	60	–	70	fz	0,040	0,047	0,057	0,061	0,065
S	1	3 x D	0,2 x D	50	–	90	fz	0,061	0,070	0,087	0,095	0,101
	2	3 x D	0,2 x D	25	–	40	fz	0,032	0,037	0,046	0,050	0,054
	3	3 x D	0,2 x D	60	–	80	fz	0,048	0,056	0,070	0,076	0,081
	4	3 x D	0,2 x D	50	–	60	fz	0,045	0,052	0,064	0,069	0,074
H	1	3 x D	0,2 x D	80	–	140	fz	0,054	0,062	0,077	0,083	0,088
	2	3 x D	0,2 x D	70	–	120	fz	0,040	0,047	0,057	0,061	0,065

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 771E • VariMill III ER • Finishing • Victory Grades

WIDIA VICTORY




Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).				
		A		Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	4	3 x D	0,06 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
	5	3 x D	0,06 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
M	1	3 x D	0,06 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
	2	3 x D	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	3	3 x D	0,06 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
S	1	3 x D	0,06 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
	2	3 x D	0,06 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	3 x D	0,06 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	4	3 x D	0,06 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	3 x D	0,06 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
	2	3 x D	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 772E • VariMill III ER • Finishing • Victory Grades





Material Group		Side Milling (A)		WS15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	10,0	12,0	16,0	18,0	20,0
P	0	5 x D	0,05 x D	300	–	400	fz	0,086	0,099	0,121	0,130	0,137
	1	5 x D	0,05 x D	300	–	400	fz	0,086	0,099	0,121	0,130	0,137
	2	5 x D	0,05 x D	280	–	380	fz	0,086	0,099	0,121	0,130	0,137
	3	5 x D	0,05 x D	240	–	320	fz	0,073	0,084	0,105	0,113	0,121
	4	5 x D	0,05 x D	180	–	300	fz	0,065	0,075	0,092	0,099	0,106
	5	5 x D	0,05 x D	120	–	200	fz	0,058	0,067	0,084	0,091	0,097
	6	5 x D	0,05 x D	100	–	150	fz	0,048	0,056	0,068	0,073	0,078
M	1	5 x D	0,05 x D	180	–	230	fz	0,073	0,084	0,105	0,113	0,121
	2	5 x D	0,05 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	3	5 x D	0,05 x D	120	–	140	fz	0,048	0,056	0,068	0,073	0,078
K	1	5 x D	0,05 x D	240	–	300	fz	0,086	0,099	0,121	0,130	0,137
	2	5 x D	0,05 x D	220	–	280	fz	0,073	0,084	0,105	0,113	0,121
	3	5 x D	0,05 x D	220	–	260	fz	0,058	0,067	0,084	0,091	0,097
S	1	5 x D	0,05 x D	100	–	180	fz	0,073	0,084	0,105	0,113	0,121
	2	5 x D	0,05 x D	50	–	80	fz	0,038	0,045	0,056	0,060	0,065
	3	5 x D	0,05 x D	120	–	160	fz	0,058	0,067	0,084	0,091	0,097
	4	5 x D	0,05 x D	100	–	120	fz	0,053	0,062	0,077	0,083	0,089
H	1	5 x D	0,05 x D	160	–	280	fz	0,065	0,075	0,092	0,099	0,106
	2	5x D	0,06 x D	140	–	240	fz	0,048	0,056	0,068	0,073	0,078

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Putting your round tools in a position to succeed



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Precision Collet Chuck

- Minimises runout to dramatically boost performance.
- Creates an upsurge in tool life.
- Eliminates pullout with **SAFE-λOCK®** by HAIMER option.
- Chatter-free refined balancing to G2.5@25,000 RPM.
- Extreme versatility for use with most rotating applications.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com.**

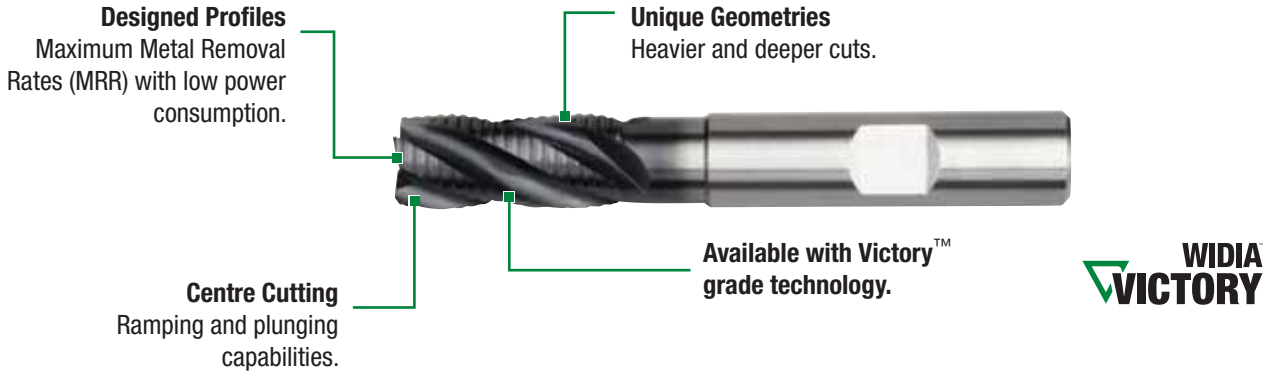
WIDIA™



HP ROUGHER

Special proprietary carbide substrates and state-of-the-art surface technology, combined with unique geometries, provides end users with the capability to significantly reduce machining time with heavier and deeper cuts, fewer passes, and faster surface speed. WIDIA™ geometries are uniquely formed and fine-tuned to optimise chip form, size, and evacuation generated by a given workpiece material.

- For all ferrous workpiece materials.
- Low power consumption at high speeds with long tool life.
- Provides maximum metal removal rates in both slotting and profiling operations.
- Alternative solution for productivity gains on light machines.



WIDIA VICTORY

High-Performance Solid Carbide Roughers

- Reduce machine time with heavier, deeper cuts requiring fewer passes.
- Lower power consumption at higher speeds providing productivity even when horsepower may be limited.
- Maximum Metal Removal Rates (MRR) in both slotting and profiling.
- Uniquely designed profiles to optimise chip form in given workpiece materials.

DQ13 Series

- Centre Cutting.
- 3-flute.
- 35° helix.
- Chipbreaker pitch.
- Victory™ grade.
- DIN 6527.



422824 422820 Series

- Centre cutting.
- 4-flute.
- 30° helix.
- Flat shallow pitch.



49H6 Series

- Centre cutting.
- 20° helix.
- Fine pitch.
- Through coolant.



4U40 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Unequal flute spacing.
- Flat shallow pitch.
- Victory™ grade.



422152 422150 Series

- Centre cutting.
- 4-flute.
- 25° helix.
- Cord profile.
- Steels and cast irons.
- DIN 6527.



4U70 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Unequal flute spacing.
- Flat and shallow pitch.
- Victory™ grade.



4976 Series

- Centre cutting.
- 3-, 4-, and 5-flutes.
- 30° helix.
- Unequal flute spacing.
- Flat shallow pitch.
- Victory™ grade.



49N6 Series

- Centre cutting.
- 3- and 4-flutes.
- 30° helix.
- With neck.
- Flat and shallow pitch.



(continued)

High-Performance Solid Carbide Roughers *(continued)*

4969 Series

- Centre cutting.
- 3- and 4-flutes.
- 45° helix.
- Flat shallow pitch.
- Ball nose.



422846 022846 Series

- Centre cutting.
- 4- and 6-flutes.
- 45° helix.
- Flat shallow pitch.
- Steels and cast irons.
- DIN 6527.



422813 022813 Series

- Centre cutting.
- 3-flute.
- 30° helix.
- Flat shallow pitch.
- DIN 6527.



4906 Series

- Centre cutting.
- 4-, 5-, and 6-flutes.
- 20° helix.
- Fine pitch.
- Universal applications.



422818 022818 Series

- Centre cutting.
- 4-flute.
- 30° helix.
- Flat shallow pitch.
- Steels and cast irons.
- DIN 6527.



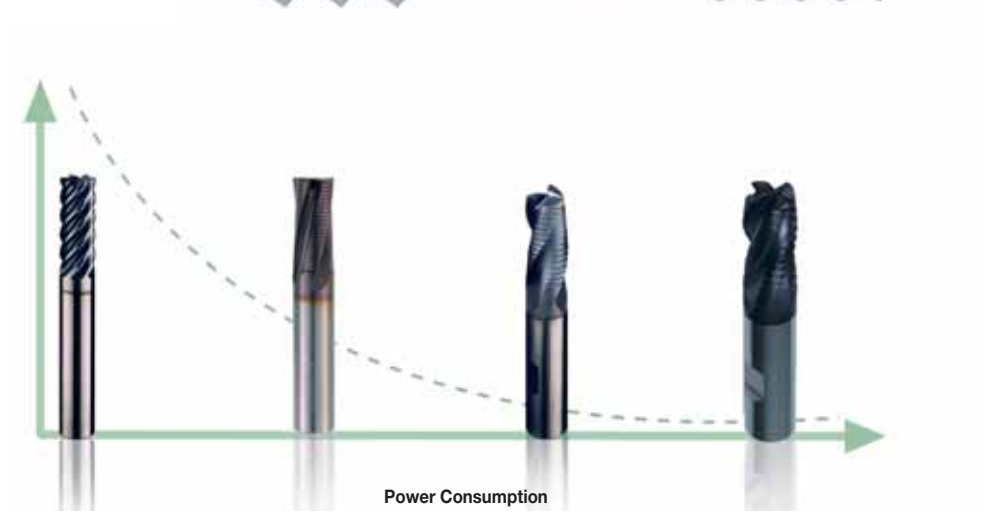
4966 Series

- Centre cutting.
- 3- and 4-flutes.
- 20° helix.
- Fine pitch.
- Ball nose.
- Universal applications.



Rougher Profiles

Finishing End Mill	Fine-Profile Rougher	Semi-Finishing End Mill	Coarse Profile Rougher
Straight cutting edge Ra = 0,5–0,8 Rz = 4–6	Cord profile Ra = 12–14 Rz = 90–110	Flat profile Ra = 2,5–3,5 Rz = 20–25	Roughing profile Ra = 2,5–3,5 Rz = 20–25





Coarse profile
For slotting, pocketing, and heavy profile cuts in ferrous materials.



Fine profile
For profile cuts and shallow slots (less than .50) in ferrous materials.



Extra-Fine profile
For profiling cuts in medium to hard steels.



Chamfered profile
For machining non-ferrous materials.



Flat shallow profile
For machining alloyed steels, stainless steels, high-temp alloys, titanium, and hard materials.

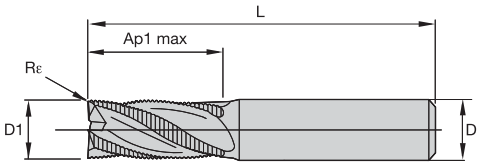


Chipbreaker profile
For roughing and semi-finishing.

- Centre cutting.
- Chipbreaker pitch.
- Standard items listed. Additional styles and coatings made-to-order.





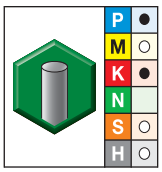


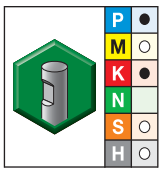
End Mill Tolerances

D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3–6	0/-0,075	> 3–6	0/-0,008
> 6–10	0/-0,09	> 6–10	0/-0,009
> 10–18	0/-0,11	> 10–18	0/-0,011
> 18–30	0/-0,13	> 18–30	0/-0,013

WIDIA VICTORY

Series DQ13 • Victory Grades





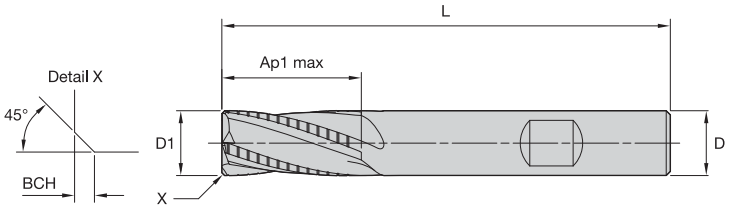
● first choice
○ alternate choice

grade WP15PE AlTiN		grade WP15PE AlTiN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
5560534	DQ1303002T	5560536	DQ1303002W	3,0	6	7,00	54	0,25
5560535	DQ1304002T	5560537	DQ1304002W	4,0	6	8,00	57	0,25
–		5560538	DQ1305002W	5,0	6	10,00	57	0,25
–		5560539	DQ1306002W	6,0	6	10,00	57	0,45
–		5560700	DQ1307003W	7,0	8	13,00	63	0,45
–		5560701	DQ1308003W	8,0	8	16,00	63	0,45
–		5560702	DQ1310004W	10,0	10	19,00	72	0,45
–		5560703	DQ1312005W	12,0	12	22,00	83	0,45
–		5560704	DQ1314014W	14,0	14	22,00	83	0,45
–		5560705	DQ1316006W	16,0	16	32,00	92	0,45
–		5560706	DQ1318018W	18,0	18	32,00	92	0,45
–		5560707	DQ1320007W	20,0	20	38,00	104	0,45

- Centre cutting.
- Fine pitch.
- TiAlN-LW = Multilayer.
- TiAlN-RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



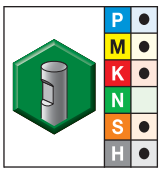


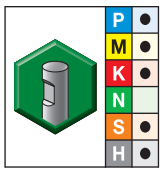


End Mill Tolerances

D1	tolerance h11 + / -	D	tolerance h6 + / -
≤ 3	0/-0,060	≤ 3	0/-0,006
> 3–6	0/-0,075	> 3–6	0/-0,008
> 6–10	0/-0,09	> 6–10	0/-0,009
> 10–18	0/-0,11	> 10–18	0/-0,011
> 18–30	0/-0,13	> 18–30	0/-0,013

Series 49H6





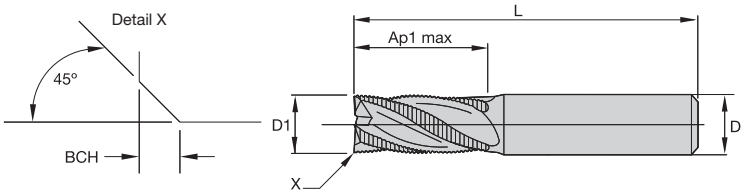
● first choice
○ alternate choice

grade TiAlN-LW TiAlN		grade TiAlN-RW TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1657259	49H608003LW	1657260	49H608003RW	8,0	8	16,00	63	0,30	3
1657263	49H610004LW	1657264	49H610004RW	10,0	10	22,00	72	0,50	4
	–	1657268	49H612005RW	12,0	12	26,00	83	0,50	4
1968206	49H614014LW		–	14,0	14	26,00	83	0,50	4
1657273	49H616006LW	1657274	49H616006RW	16,0	16	32,00	92	0,50	4
1657277	49H618018LW	1657278	49H618018RW	18,0	18	32,00	92	0,50	4
1657281	49H620007LW	1657282	49H620007RW	20,0	20	38,00	104	0,50	4

- Centre cutting.
- Cord profile.
- Standard items listed. Additional styles and coatings made-to-order.



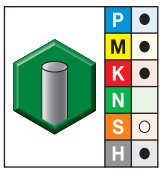


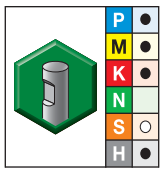


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422150 422152





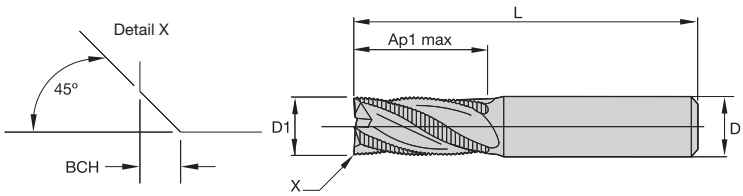
● first choice
○ alternate choice

grade K30F-DCHP TiAlN		grade K30F-DCHP TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2630665	422150-000060	2630679	422152-000060	6,0	6	13,00	57	0,10
2630667	422150-000080	2630680	422152-000080	8,0	8	19,00	63	0,20
2630669	422150-000100	2630713	422152-000100	10,0	10	22,00	72	0,30
2630670	422150-000120	2630714	422152-000120	12,0	12	26,00	83	0,30
2630672	422150-000160	2630717	422152-000160	16,0	16	32,00	92	0,40
2630675	422150-000200	2630718	422152-000200	20,0	20	38,00	104	0,40
2630677	422150-000250	2630719	422152-000250	25,0	25	45,00	121	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.





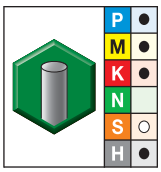


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

WIDIA VICTORY

Series 4976 • Victory Grades



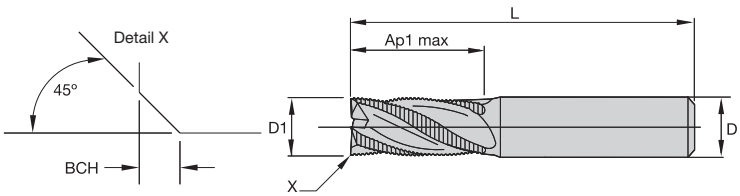
● first choice
○ alternate choice

grade WP15PE AlTiN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
5560708	497604002T	4,0	6	8,00	57	0,30	3
5560709	497605002T	5,0	6	13,00	57	0,30	3
5560710	497606002T	6,0	6	13,00	57	0,30	3
5560711	497608003T	8,0	8	16,00	63	0,30	3
5560712	497610004T	10,0	10	22,00	72	0,50	4
5560713	497612005T	12,0	12	26,00	83	0,50	4
5560714	497614014T	14,0	14	26,00	83	0,50	4
5560715	497616006T	16,0	16	32,00	92	0,50	4
5560716	497618018T	18,0	18	32,00	92	0,50	4
5560717	497620007T	20,0	20	38,00	104	0,50	4
5560718	497625008T	25,0	25	45,00	121	0,50	5

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



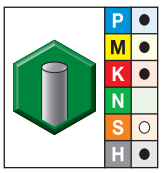


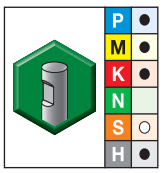


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422820 422824





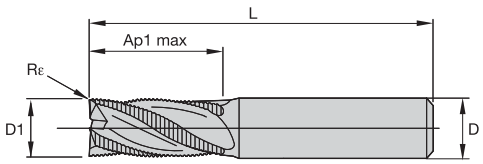
● first choice
○ alternate choice

grade K30F-DCHP TiAlN		grade K30F-DCHP TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2628396	422820-000060	2628451	422824-000060	6,0	6	18,00	62	0,10
2628397	422820-000080	2628473	422824-000080	8,0	8	24,00	68	0,20
2628400	422820-000100	2628475	422824-000100	10,0	10	30,00	80	0,30
2628401	422820-000120	2628477	422824-000120	12,0	12	36,00	93	0,30
2628446	422820-000160	2628478	422824-000160	16,0	16	48,00	108	0,40
2628447	422820-000200	2628481	422824-000200	20,0	20	60,00	126	0,40
2628448	422820-000250	2628482	422824-000250	25,0	25	75,00	150	0,40

- Centre cutting.
- Flat shallow pitch.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.





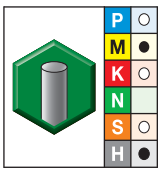


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

WIDIA VICTORY

Series 4U40 • Victory Grades



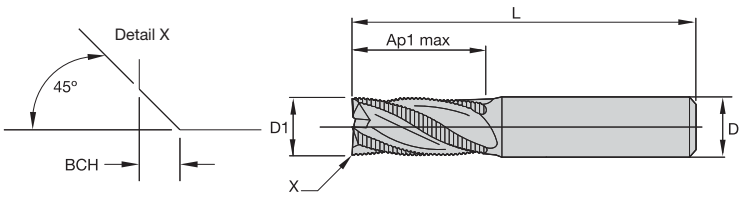
● first choice
○ alternate choice

grade WP15PE AlTiN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
5583159	4U4006002T	6,0	6	6,00	57	0,75	4
5583420	4U4008003T	8,0	8	8,00	63	0,75	4
5583421	4U4010004T	10,0	10	10,00	72	0,75	4
5583422	4U4012005T	12,0	12	12,00	83	1,00	4
5583423	4U4016006T	16,0	16	16,00	92	1,00	6
5583424	4U4020007T	20,0	20	20,00	104	1,25	6
5583425	4U4025008T	25,0	25	25,00	121	1,25	6

- Centre cutting.
- Flat shallow pitch.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.





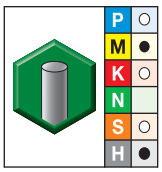


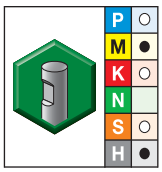
End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

WIDIA VICTORY

Series 4U70 • Victory Grades

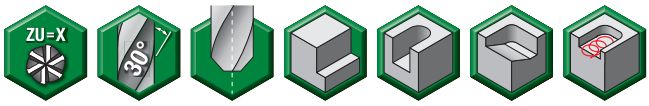




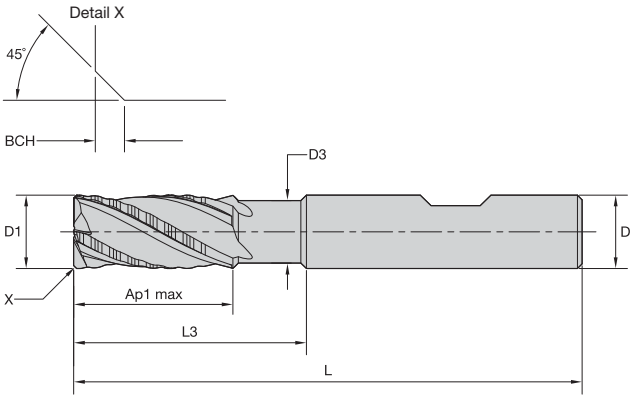
● first choice
○ alternate choice

grade WP15PE AlTiN		grade WP15PE AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
5583426	4U7006002T	5583436	4U7006002W	6,0	6	13,00	57	0,30	4
5583427	4U7008003T	5583437	4U7008003W	8,0	8	16,00	63	0,40	4
5583428	4U7010004T	5583438	4U7010004W	10,0	10	22,00	72	0,50	4
5583429	4U7012005T	5583439	4U7012005W	12,0	12	26,00	83	0,50	4
5583430	4U7016006T	5583440	4U7016006W	16,0	16	32,00	92	0,60	6
5583431	4U7016046T		–	16,0	16	32,00	92	0,60	4
5583432	4U7020007T	5583441	4U7020007W	20,0	20	38,00	104	1,00	6
5583433	4U7020047T		–	20,0	20	38,00	104	1,00	4
5583434	4U7025008T	5583442	4U7025008W	25,0	25	45,00	121	1,12	6
5583435	4U7025048T		–	25,0	25	45,00	121	1,12	4

- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.



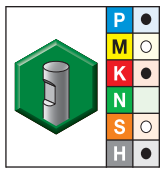




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

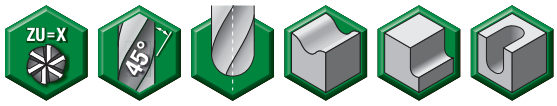
Series 49N6 • With Neck



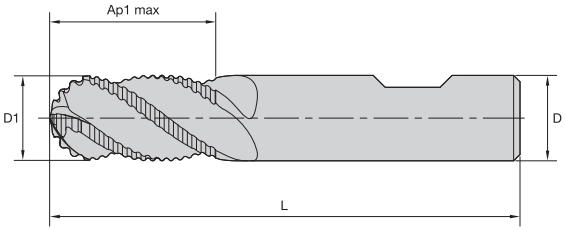
● first choice
○ alternate choice

order #	catalogue #	grade AlTiN-MW AlTiN D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
3474583	49N604002MW	4,0	6	–	8,00	8,00	57	0,30	3
3474584	49N605002MW	5,0	6	–	13,00	13,00	57	0,30	3
3474585	49N606002MW	6,0	6	6	13,00	21,00	57	0,30	3
3474587	49N608003MW	8,0	8	8	16,00	27,00	63	0,30	3
3474589	49N610004MW	10,0	10	10	22,00	32,00	72	0,50	4
3474591	49N612005MW	12,0	12	11	26,00	38,00	83	0,50	4
3474593	49N614014MW	14,0	14	13	26,00	38,00	83	0,50	4
3474594	49N616006MW	16,0	16	15	32,00	44,00	92	0,50	4
3474595	49N618018MW	18,0	18	17	32,00	44,00	92	0,50	4
3474596	49N620007MW	20,0	20	19	38,00	54,00	104	0,50	4
3474597	49N625008MW	25,0	25	24	45,00	65,00	121	0,50	5

- Centre cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.
- Roughing profile also on radii portion of end mill.



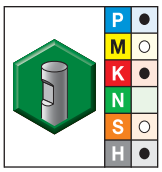




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 4969



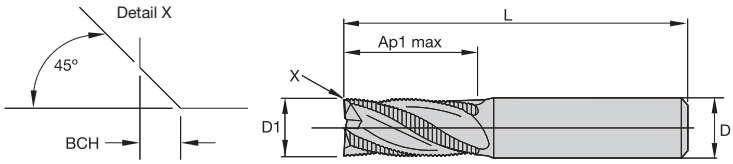
● first choice
○ alternate choice

grade TiAlN-LW TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
3881115	496905002LW	5,0	6	13,00	57	3
3881116	496906002LW	6,0	6	13,00	57	3
3881117	496908003LW	8,0	8	16,00	63	4
3881118	496910004LW	10,0	10	22,00	72	4
3881119	496912005LW	12,0	12	26,00	83	4
3881120	496914014LW	14,0	14	26,00	83	4
3881121	496916006LW	16,0	16	32,00	92	4
3881122	496918018LW	18,0	18	32,00	92	4
3881123	496920007LW	20,0	20	38,00	104	4

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



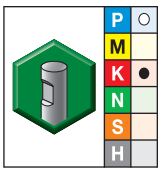


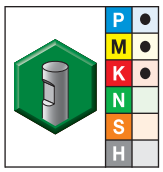


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022813 422813





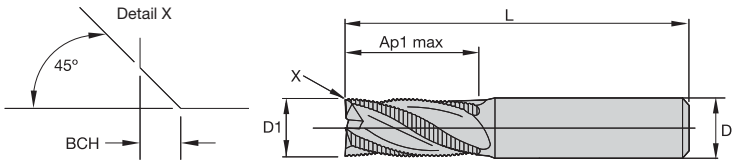
● first choice
○ alternate choice

grade K30F uncoated		grade K30F-DCF TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332360	022813-000060	2342043	422813-000060	6,0	6	10,00	57	0,10
2332361	022813-000080	2342045	422813-000080	8,0	8	16,00	63	0,20
2332362	022813-000100	2342047	422813-000100	10,0	10	19,00	72	0,30
2332363	022813-000120	2342049	422813-000120	12,0	12	22,00	83	0,30
2332364	022813-000160	2342051	422813-000160	16,0	16	26,00	92	0,40
2332365	022813-000200	2342053	422813-000200	20,0	20	32,00	104	0,40
2332366	022813-000250	2342055	422813-000250	25,0	25	45,00	121	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



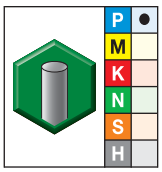


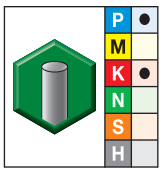


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022818 422818





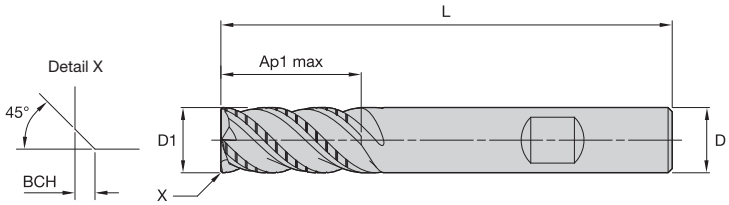
● first choice
○ alternate choice

grade K30F uncoated		grade K30F-DCF TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332420	022818-000060	2342154	422818-000060	6,0	6	13,00	57	0,10
2332421	022818-000080	2342156	422818-000080	8,0	8	19,00	63	0,20
2332422	022818-000100	2342158	422818-000100	10,0	10	22,00	72	0,30
2332423	022818-000120	2342160	422818-000120	12,0	12	26,00	83	0,30
2332425	022818-000160	2342162	422818-000160	16,0	16	32,00	92	0,40
2332427	022818-000200	2342164	422818-000200	20,0	20	38,00	104	0,40

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



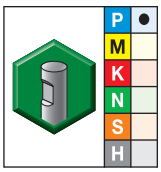


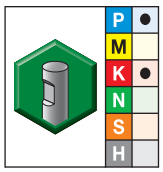


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,04	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022846 422846





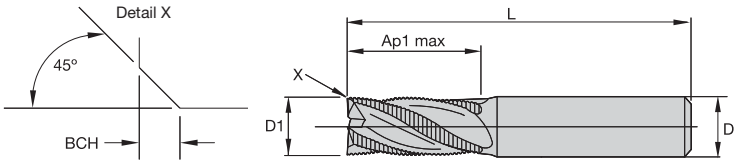
● first choice
○ alternate choice

grade K30F uncoated		grade K30F-DCF TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2332652	022846-000060	2342676	422846-000060	6,0	6	13,00	57	0,10	4
2332653	022846-000080	2342678	422846-000080	8,0	8	19,00	63	0,20	4
2332654	022846-000100	2342680	422846-000100	10,0	10	22,00	72	0,30	4
2332655	022846-000120	2342684	422846-000120	12,0	12	26,00	83	0,30	4
2332656	022846-000160	2342686	422846-000160	16,0	16	32,00	92	0,40	6
2332657	022846-000200	2342688	422846-000200	20,0	20	38,00	104	0,40	6
2332658	022846-000250	2342690	422846-000250	25,0	25	45,00	121	0,40	6

- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



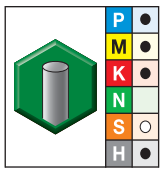


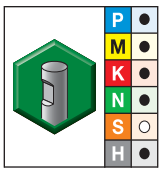


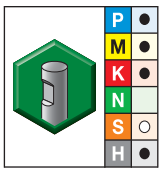
End Mill Tolerances

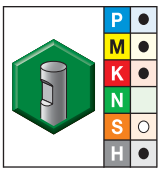
D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 4906









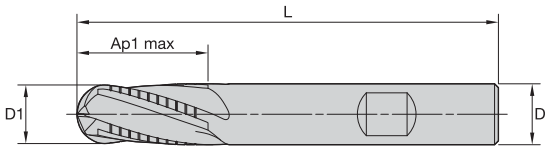
● first choice
○ alternate choice

grade TiAlN-RT TiAlN		grade TiCN-CW TiCN		grade TiAlN-LW TiAlN		grade TiAlN-RW TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1657001	490604002RT	1656997	490604002CW	1657000	490604002LW	1657002	490604002RW	4,0	6	11,00	55	0,30	3
1657009	490605002RT	1657007	490605002CW	1657008	490605002LW	1657010	490605002RW	5,0	6	13,00	57	0,30	3
1657018	490606002RT	1657016	490606002CW	1657017	490606002LW	1657019	490606002RW	6,0	6	13,00	57	0,30	3
3133084	490607003RT	1657023	490607003CW	1657024	490607003LW	1657025	490607003RW	7,0	8	16,00	63	0,30	3
1657033	490608003RT	1657031	490608003CW	1657032	490608003LW	1657034	490608003RW	8,0	8	16,00	63	0,30	3
3133085	490609004RT	1657039	490609004CW	1657040	490609004LW	1657041	490609004RW	9,0	10	19,00	72	0,50	4
1657050	490610004RT	1657048	490610004CW	1657049	490610004LW	1657051	490610004RW	10,0	10	22,00	72	0,50	4
3133086	490611005RT	1657055	490611005CW	1968092	490611005LW	1657056	490611005RW	11,0	12	26,00	83	0,50	4
1657063	490612005RT	1657061	490612005CW	1657062	490612005LW	1657064	490612005RW	12,0	12	26,00	83	0,50	4
3133087	490613014RT	1657068	490613014CW	1968204	490613014LW	1657069	490613014RW	13,0	14	26,00	83	0,50	4
1657084	490614014RT	1570244	490614014CW	1657083	490614014LW	1657085	490614014RW	14,0	14	26,00	83	0,50	4
1657096	490616006RT	1657094	490616006CW	1657095	490616006LW	1657097	490616006RW	16,0	16	32,00	92	0,50	4
1657104	490618018RT	1657102	490618018CW	1657103	490618018LW	1657105	490618018RW	18,0	18	32,00	92	0,50	4
1657112	490620007RT	1657110	490620007CW	1657111	490620007LW	1657113	490620007RW	20,0	20	38,00	104	0,50	4
1657120	490625008RT	1657118	490625008CW	1657119	490625008LW	1657121	490625008RW	25,0	25	45,00	121	0,50	5

- Centre cutting.
- Fine pitch.
- LW = Multilayer.
- RW = Monolayer.
- Standard items listed. Additional styles and coatings made-to-order.



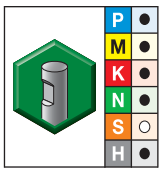


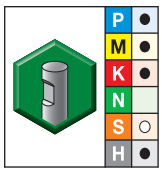


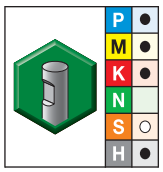
End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/-0,006
> 3–6	-0,030/-0,105	> 3–6	0/-0,008
> 6–10	-0,040/-0,130	> 6–10	0/-0,009
> 10–18	-0,050/-0,160	> 10–18	0/-0,011
> 18–30	-0,065/-0,195	> 18–30	0/-0,013

Series 4966



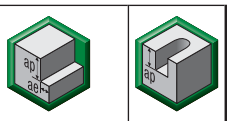




● first choice
○ alternate choice

grade TiCN-CW TiCN		grade TiAlN-LW TiAlN		grade TiAlN-RW TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
1657191	496605002CW	1657192	496605002LW	1657193	496605002RW	5,0	6	13,00	57	3
1657196	496606002CW	1657197	496606002LW	1657198	496606002RW	6,0	6	13,00	57	3
1657201	496608003CW	1657202	496608003LW	1657203	496608003RW	8,0	8	16,00	63	3
1657206	496610004CW	1657207	496610004LW	1657208	496610004RW	10,0	10	22,00	72	4
1657211	496612005CW	1657212	496612005LW	1657213	496612005RW	12,0	12	26,00	83	4
	–	1657217	496614014LW	1657218	496614014RW	14,0	14	26,00	83	4
1657221	496616006CW	1657222	496616006LW	1657223	496616006RW	16,0	16	32,00	92	4
1657227	496618018CW		–		–	18,0	18	32,00	92	4
1657232	496620007CW		–	1657234	496620007RW	20,0	20	38,00	104	4
1657237	496625008CW		–	1657239	496625008RW	25,0	25	45,00	121	4

Series DQ13 • Victory Grades





Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	7,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1 x D	0,5 x D	0,75 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1 x D	0,5 x D	0,75 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1 x D	0,5 x D	0,75 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1 x D	0,5 x D	0,75 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1 x D	0,5 x D	0,5 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,039	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1 x D	0,5 x D	0,75 x D	60	–	100	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1 x D	0,4 x D	0,5 x D	50	–	75	fz	0,012	0,016	0,020	0,025	0,029	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1 x D	0,5 x D	0,75 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1 x D	0,4 x D	0,75 x D	60	–	70	fz	0,012	0,016	0,020	0,025	0,029	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1 x D	0,5 x D	0,75 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,052	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1 x D	0,5 x D	0,75 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1 x D	0,4 x D	0,75 x D	110	–	130	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1 x D	0,3 x D	0,4 x D	50	–	90	fz	0,017	0,023	0,030	0,036	0,043	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,009	0,013	0,016	0,019	0,023	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,035	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1 x D	0,4 x D	0,75 x D	50	–	60	fz	0,011	0,016	0,021	0,026	0,031	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1 x D	0,2 x D	0,3 x D	80	–	140	fz	0,016	0,021	0,027	0,033	0,039	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 49H6





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
	3	1,0 x D	0,4 x D	0,75 x D	120	–	160	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,0 x D	0,3 x D	0,5 x D	90	–	150	fz	0,036	0,043	0,050	0,056	0,061	0,066	0,070
	5	1,0 x D	0,4 x D	0,75 x D	60	–	100	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
M	1	1,0 x D	0,4 x D	0,75 x D	90	–	115	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	2	1,0 x D	0,4 x D	0,75 x D	60	–	80	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
	3	1,0 x D	0,4 x D	0,75 x D	60	–	70	fz	0,027	0,032	0,037	0,042	0,046	0,049	0,052
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,048	0,058	0,066	0,074	0,081	0,086	0,091
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,5 x D	0,4 x D	1 x D	110	–	130	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
S	1	1,5 x D	0,5 x D	0,75 x D	50	–	90	fz	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,5 x D	0,5 x D	0,75 x D	60	–	80	fz	0,032	0,039	0,045	0,051	0,056	0,060	0,065
H	1	1,0 x D	0,3 x D	0,5 x D	80	–	140	fz	0,036	0,043	0,050	0,056	0,061	0,066	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 422150 422152







Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min			D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
	3	1,5 x D	0,4 x D	1 x D	120	–	160	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
	4	1,5 x D	0,4 x D	0,75 x D	90	–	150	fz	0,023	0,030	0,037	0,045	0,055	0,063	0,068
	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,021	0,027	0,033	0,040	0,050	0,058	0,064
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,031	0,041	0,049	0,060	0,073	0,082	0,087
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,021	0,027	0,033	0,040	0,050	0,058	0,064
S	1	1,5 x D	0,5 x D	1 x D	50	–	90	fz	0,025	0,034	0,041	0,051	0,063	0,073	0,080
H	1	1,5 x D	0,3 x D	0,75 x D	80	–	140	fz	0,023	0,030	0,037	0,045	0,055	0,063	0,068

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Low cutting force through chipbreaker for use with unstable clamping and components.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4976 • Victory Grades

WIDIA VICTORY

Material Group																			
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	1,5 x D	0,4 x D	0,75 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
M	1	1,5 x D	0,4 x D	0,75 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,4 x D	0,75 x D	60	–	70	fz	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,4 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	1,5 x D	0,3 x D	0,75 x D	50	–	90	fz	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,3 x D	0,75 x D	50	–	60	fz	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 422820 422824







Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN Cutting Speed — vc m/min			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. D1 — Diameter						
		A		B										
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	3 x D	0,25 x D	0,7 x D	150	–	200	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
	2	3 x D	0,25 x D	0,5 x D	140	–	190	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
	3	3 x D	0,25 x D	0,5 x D	120	–	160	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
	4	3 x D	0,25 x D	0,25 x D	90	–	150	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,075
	5	3 x D	0,25 x D	0,25 x D	60	–	100	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070
	6	3 x D	0,25 x D	0,25 x D	50	–	75	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,054
M	1	3 x D	0,25 x D	0,5 x D	80	–	100	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
	3	3 x D	0,25 x D	0,5 x D	60	–	80	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,054
K	1	3 x D	0,25 x D	0,5 x D	120	–	160	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,095
	2	3 x D	0,25 x D	0,5 x D	110	–	140	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
	3	3 x D	0,25 x D	0,5 x D	100	–	130	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070
S	1	3 x D	0,25 x D	0,5 x D	50	–	90	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,087
H	1	3 x D	0,25 x D	0,5 x D	80	–	140	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,075

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4U40 • Victory Grades

WIDIA VICTORY

Material Group														
		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	0,8 x D	0,5 x D	0,75 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	0,8 x D	0,4 x D	0,5 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	0,8 x D	0,5 x D	0,75 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	0,8 x D	0,4 x D	0,5 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	0,8 x D	0,5 x D	0,75 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	0,8 x D	0,4 x D	0,75 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	0,8 x D	0,5 x D	0,75 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	0,8 x D	0,5 x D	0,75 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	0,8 x D	0,4 x D	0,75 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	0,8 x D	0,4 x D	0,75 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	0,8 x D	0,25 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	0,8 x D	0,3 x D	0,5 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	0,8 x D	0,5 x D	0,5 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	2	0,8 x D	0,2 x D	0,3 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
	3	0,8 x D	0,15 x D	0,2 x D	60	–	90	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4U70 • Victory Grades







Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	1 x D	0,5 x D	0,75 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	1 x D	0,3 x D	0,75 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	1 x D	0,5 x D	0,75 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	1 x D	0,3 x D	0,3 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	1 x D	0,5 x D	0,75 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1 x D	0,5 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	1 x D	0,5 x D	0,75 x D	60	–	70	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	1 x D	0,5 x D	1 x D	120	–	150	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	1 x D	0,5 x D	1 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	1 x D	0,5 x D	1 x D	110	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	1 x D	0,3 x D	0,75 x D	50	–	90	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	1 x D	0,3 x D	0,3 x D	25	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	1 x D	0,4 x D	0,75 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	1 x D	0,4 x D	0,75 x D	50	–	60	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	1 x D	0,3 x D	0,3 x D	80	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	2	1 x D	0,2 x D	0,2 x D	70	–	120	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
	3	1 x D	0,2 x D	0,2 x D	60	–	90	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 49N6

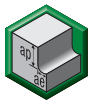




Material Group		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	4	1,5 x D	0,3 x D	0,5 x D	90	–	150	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083
	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
M	1	1,5 x D	0,4 x D	0,75 x D	80	–	100	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,040	0,044	0,048	0,052	0,055	0,060
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
S	1	1,5 x D	0,4 x D	0,75 x D	50	–	90	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4969



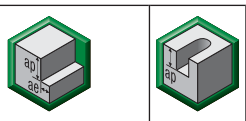


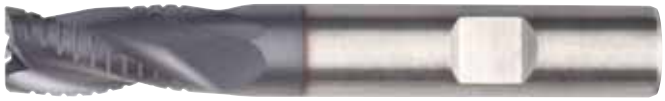


Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
	1	1,5 x D	0,5 x D	1 x D	150	–	200	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
	2	1,5 x D	0,5 x D	1 x D	140	–	190	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
	3	1,5 x D	0,4 x D	0,75 x D	120	–	160	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,082	0,088	0,098
	5	1,5 x D	0,4 x D	0,75 x D	60	–	100	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,4 x D	0,75 x D	80	–	100	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
	2	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,5 x D	1 x D	120	–	160	fz	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,107	0,114	0,124
	2	1,5 x D	0,4 x D	1 x D	110	–	140	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
	3	1,5 x D	0,4 x D	1 x D	100	–	130	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
S	1	1,5 x D	0,4 x D	0,75 x D	50	–	90	fz	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,094	0,101	0,114
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,4 x D	0,75 x D	60	–	80	fz	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,075	0,081	0,091
	4	1,5 x D	0,3 x D	0,75 x D	50	–	60	fz	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,082	0,088	0,098
	2	1,5 x D	0,2 x D	0,2 x D	70	–	120	fz	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
	3	1,5 x D	0,2 x D	0,2 x D	60	–	90	fz	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022813 422813

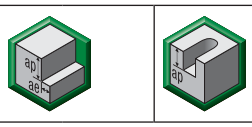




Material Group		Side Milling (A) and Slotting (B)			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Uncoated			TiAlN										
					Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
	2	1 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
	3	1 x D	0,5 x D	1 x D	–	–	–	120	–	160	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
	4	1 x D	0,4 x D	1 x D	–	–	–	90	–	150	fz	0,024	0,032	0,039	0,048	0,059	0,067	0,076
M	1	1 x D	0,4 x D	0,75 x D	–	–	–	80	–	100	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
	2	1 x D	0,4 x D	0,5 x D	–	–	–	60	–	80	fz	0,018	0,024	0,029	0,036	0,044	0,050	0,056
K	1	1 x D	0,5 x D	1 x D	48	–	64	120	–	160	fz	0,032	0,043	0,052	0,063	0,077	0,087	0,097
	2	1 x D	0,4 x D	1 x D	44	–	56	110	–	140	fz	0,026	0,036	0,044	0,054	0,067	0,077	0,088
	3	1 x D	0,4 x D	1 x D	40	–	52	100	–	130	fz	0,021	0,029	0,035	0,043	0,053	0,062	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022818 422818





Material Group		Side Milling (A) and Slotting (B)			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Uncoated			TiAlN									
					Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	1	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,041	0,049	0,060	0,073	0,082
	2	1,5 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,033	0,041	0,049	0,060	0,073	0,082
	3	1,5 x D	0,4 x D	1 x D	–	–	–	120	–	160	fz	0,027	0,034	0,041	0,051	0,063	0,073
	4	1,5 x D	0,4 x D	0,75 x D	–	–	–	90	–	150	fz	0,024	0,030	0,037	0,045	0,055	0,063
K	1	1,5 x D	0,5 x D	1 x D	–	–	–	120	–	160	fz	0,033	0,041	0,049	0,060	0,073	0,082
	2	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	140	fz	0,027	0,034	0,041	0,051	0,063	0,073
	3	1,5 x D	0,4 x D	1 x D	–	–	–	100	–	130	fz	0,021	0,027	0,033	0,040	0,050	0,058

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022846 422846

Material Group																	
		Side Milling (A) and Slotting (B)			K30F			K30F-DCF			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Uncoated			TiAlN									
					Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	1	1,5 x D	0,5 x D	1 x D	60	–	80	150	–	200	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	2	1,5 x D	0,5 x D	1 x D	56	–	76	140	–	190	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	3	1,5 x D	0,4 x D	1 x D	–	–	–	120	–	160	fz	0,027	0,038	0,045	0,053	0,065	0,076	0,085
	4	1,5 x D	0,4 x D	0,75 x D	–	–	–	90	–	150	fz	0,025	0,034	0,041	0,047	0,058	0,066	0,073
	5	1,5 x D	0,4 x D	0,75 x D	–	–	–	60	–	100	fz	0,022	0,030	0,036	0,042	0,052	0,061	0,068
K	1	1,5 x D	0,5 x D	1 x D	–	–	–	120	–	150	fz	0,033	0,045	0,054	0,062	0,076	0,086	0,093
	2	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	140	fz	0,027	0,038	0,045	0,053	0,065	0,076	0,085
	3	1,5 x D	0,4 x D	1 x D	–	–	–	110	–	130	fz	0,022	0,030	0,036	0,042	0,052	0,061	0,068

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4906







Material Group		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	1	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,5 x D	1 x D	112	–	152	140	–	190	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	3	1,5 x D	0,4 x D	0,75 x D	96	–	128	120	–	160	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	4	1,5 x D	0,3 x D	0,3 x D	72	–	120	90	–	150	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083
	5	1,5 x D	0,4 x D	0,75 x D	48	–	80	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
M	1	1,5 x D	0,4 x D	0,75 x D	72	–	92	90	–	115	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	2	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
	3	1,5 x D	0,4 x D	0,75 x D	48	–	56	60	–	70	fz	0,014	0,017	0,021	0,029	0,034	0,040	0,044	0,048	0,052	0,055	0,060
K	1	1,5 x D	0,5 x D	1 x D	96	–	120	120	–	150	fz	0,024	0,031	0,037	0,051	0,061	0,070	0,079	0,086	0,092	0,097	0,105
	2	1,5 x D	0,4 x D	1 x D	88	–	112	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,4 x D	1 x D	88	–	104	110	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
S	1	1,5 x D	0,4 x D	0,75 x D	40	–	72	50	–	90	fz	0,020	0,025	0,031	0,043	0,051	0,060	0,067	0,074	0,080	0,086	0,097
	3	1,5 x D	0,3 x D	0,3 x D	48	–	64	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,048	0,054	0,059	0,064	0,069	0,077
H	1	1,5 x D	0,3 x D	0,3 x D	64	–	112	80	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,053	0,060	0,065	0,070	0,075	0,083

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4966







Material Group		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	min		max	mm	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
	1	1,5 x D	0,5 x D	1 x D	120	–	160	150	–	200	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
	2	1,5 x D	0,5 x D	1 x D	112	–	152	140	–	190	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
	3	1,5 x D	0,4 x D	0,75 x D	96	–	128	120	–	160	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
	4	1,5 x D	0,3 x D	0,5 x D	72	–	120	90	–	150	fz	0,022	0,027	0,037	0,044	0,051	0,063	0,068	0,072	0,080
	5	1,5 x D	0,4 x D	0,75 x D	48	–	80	60	–	100	–	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
M	1	1,5 x D	0,4 x D	0,75 x D	72	–	92	90	–	115	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
	2	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
	3	1,5 x D	0,4 x D	0,75 x D	48	–	56	60	–	70	fz	0,017	0,020	0,028	0,033	0,038	0,047	0,050	0,053	0,058
K	1	1,5 x D	0,5 x D	1 x D	96	–	120	120	–	150	fz	0,030	0,036	0,049	0,059	0,068	0,083	0,089	0,093	0,101
	2	1,5 x D	0,4 x D	1 x D	88	–	112	110	–	140	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
	3	1,5 x D	0,4 x D	1 x D	88	–	104	110	–	130	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
S	1	1,5 x D	0,4 x D	0,75 x D	40	–	72	50	–	90	fz	0,024	0,030	0,041	0,050	0,058	0,072	0,077	0,083	0,093
	3	1,5 x D	0,4 x D	0,75 x D	48	–	64	60	–	80	fz	0,020	0,024	0,033	0,040	0,046	0,057	0,062	0,066	0,075
H	1	1,5 x D	0,3 x D	0,5 x D	64	–	112	80	–	140	fz	0,022	0,027	0,037	0,044	0,051	0,063	0,068	0,072	0,080

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

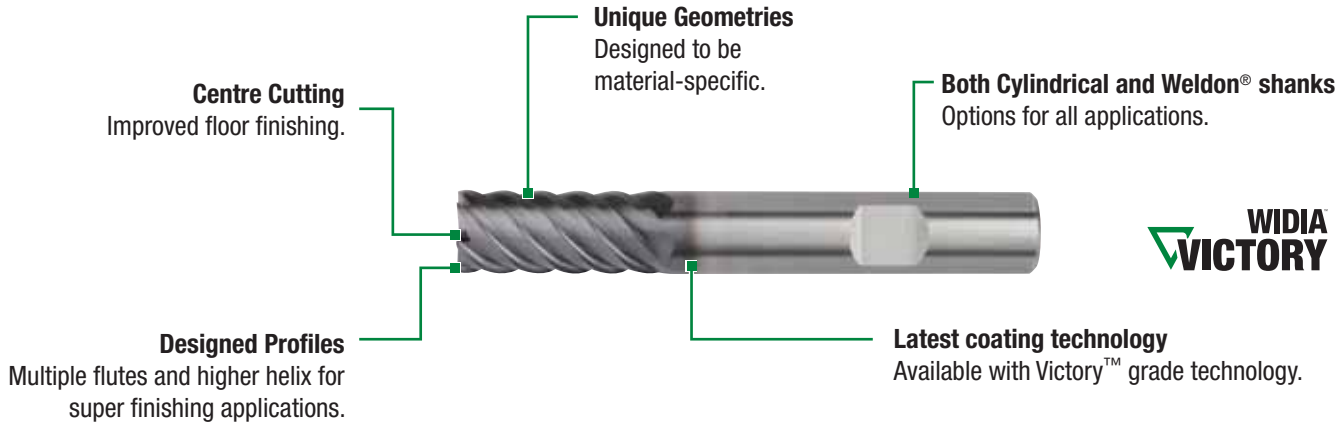
High-Performance Finishing
Solid Carbide End Mills

HP Finishers



Only the finest carbide substrates with market-leading geometries and state-of-the-art surface technology are used to ensure the very best quality finishing end mills are produced. These tools are fully compliant with NAS, DIN, and JIS specifications. Whether you require higher metal removal rates, improved surface fi nishes, fewer passes, or longer tool life, WIDIA™ high-performance fi nishing end mills deliver the reliability and consistency you can depend on during your critical finishing operations.

- Specific geometries targeted for steels, stainless steels, high-temperature alloys, and titanium.
- Stub, regular, long, and extra long lengths for all applications.
- Special designs with higher number of flutes and increased helix angles for super finishing applications.
- Latest coating technology, including Victory™ grades.



High-Performance Solid Carbide Finishing

- Specifically designed geometries for finishing in a wide range of materials.
- Higher number of flutes and higher helix angles for super finishing applications.
- High Metal Removal Rates (MRR) requiring fewer passes and longer tool life while providing superior surface finishes.

4001 JJ Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- JIS.
- Victory™ grade WP15PE™.



DC03 Series

- Centre cutting.
- 3-flute.
- 35° helix.
- Corner radius.
- DIN 6527.



422802/322802/022802 Series

- Centre cutting.
- 3-flute.
- 45° helix.
- Chamfered corner.
- DIN 6527.
- Universal application.



D507 D517 Series

- Centre cutting.
- 6-flute.
- 45° helix.
- DIN 6527.
- Light finishing.



422827 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- Chamfered corner.



026621 Series

- Non-centre cutting.
- 4-, 6-, and 8-flutes.
- 45° helix.
- Chamfer corner.
- DIN 6527.
- Finishing of steels and cast irons.
- Cermet construction.



024111 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Ball nose.
- Diamond coating.
- Non-ferrous applications.



D503 D513 Series

- Centre cutting.
- 3-flute.
- 45° helix.
- DIN 6527.



4503 JJ Series

- Centre cutting.
- 3-flute.
- 45° helix.
- JIS.
- Victory grade WP15PE.



4603 Series

- Centre cutting.
- 3-flute.
- 60° helix.
- Light finishing.



422826 422822 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- DIN 6527.
- Light finishing.



D518 Series

- Centre cutting.
- 4-, 6-, and 8-flutes.
- 50° helix.
- DIN 6527.
- Super finishing applications.



024112 Series

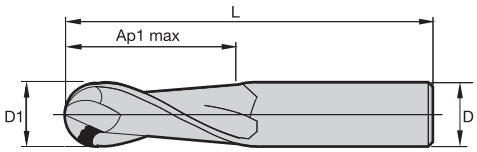
- Centre cutting.
- 2-flute.
- 20° helix.
- Torus style.
- Diamond coating.
- Non-ferrous applications.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





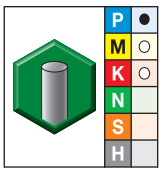


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4001 JJ • Victory Grades



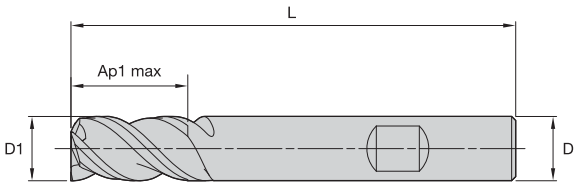
● first choice
○ alternate choice

grade WP15PE AlTiN							
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
5559146	400101001T	1,0	4	–	3,00	3	50
5559147	400101501T	1,5	4	–	3,00	3	50
5559148	400102001T	2,0	4	–	3,00	3	50
5559149	400103002T	3,0	6	–	9,50	10	58
5559160	400104002T	4,0	6	–	12,00	12	76
5559161	400105002T	5,0	6	–	14,00	14	76
5559162	400106002T	6,0	6	5,6	16,00	40	100
5559163	400108003T	8,0	8	7,5	20,00	40	100
5559164	400110004T	10,0	10	9,4	22,00	35	100
5559165	400112005T	12,0	12	11,3	25,00	50	125
5559166	400114005T	14,0	14	13,2	32,00	57	125
5559167	400116006T	16,0	16	15,0	32,00	60	150
5559168	400118006T	18,0	18	16,9	38,00	60	150
5559169	400120007T	20,0	20	18,8	38,00	60	150

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



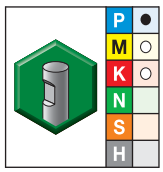


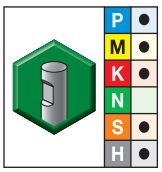


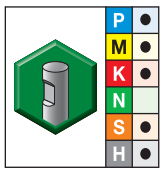
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series D503 D513







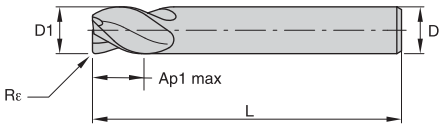
● first choice
○ alternate choice

grade UNCOATED-WW		grade TiCN-CW TiCN		grade TiAlN-RW TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1661576	D50302002WW	1661573	D50302002CW	1661574	D50302002RW	2,0	6	3,00	50
1661580	D50303002WW	1661577	D50303002CW	1661578	D50303002RW	3,0	6	4,00	50
1661682	D51303002WW		–	1661680	D51303002RW	3,0	6	7,00	57
1661585	D50304002WW	1661582	D50304002CW	1661583	D50304002RW	4,0	6	5,00	54
1661686	D51304002WW		–	1661684	D51304002RW	4,0	6	8,00	57
1661590	D50305002WW	1661587	D50305002CW	1661588	D50305002RW	5,0	6	6,00	54
1661690	D51305002WW		–	1661688	D51305002RW	5,0	6	10,00	57
1661595	D50306002WW	1661592	D50306002CW	1661593	D50306002RW	6,0	6	7,00	54
1661694	D51306002WW		–	1661692	D51306002RW	6,0	6	10,00	57
1661605	D50308003WW	1661601	D50308003CW	1661603	D50308003RW	8,0	8	9,00	58
1661703	D51308003WW		–	1661701	D51308003RW	8,0	8	16,00	63
1661614	D50310004WW	1661611	D50310004CW	1661612	D50310004RW	10,0	10	11,00	66
1661712	D51310004WW		–	1661710	D51310004RW	10,0	10	19,00	72
1661619	D50312005WW		–	1661617	D50312005RW	12,0	12	12,00	73
1661717	D51312005WW		–	1661715	D51312005RW	12,0	12	22,00	83
	–		–	1661622	D50314014RW	14,0	14	14,00	75
	–		–	1661720	D51314014RW	14,0	14	22,00	83
1661629	D50316006WW		–	1661627	D50316006RW	16,0	16	16,00	82
1661727	D51316006WW		–	1661725	D51316006RW	16,0	16	26,00	92
1661732	D51318018WW		–	1661730	D51318018RW	18,0	18	26,00	92
	–		–	1661636	D50320007RW	20,0	20	20,00	92
1661737	D51320007WW		–	1661735	D51320007RW	20,0	20	32,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



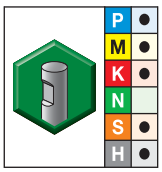




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series DC03



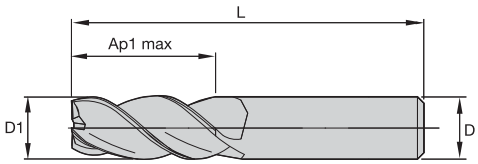
● first choice
○ alternate choice

grade TiAlN-LW TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1661856	DC0303002LW	3,0	6	4,00	50	0,25
1661858	DC0304002LW	4,0	6	5,00	54	0,25
1661860	DC0305002LW	5,0	6	6,00	54	0,25
1661862	DC0306002LW	6,0	6	7,00	54	0,45
1661866	DC0308003LW	8,0	8	9,00	58	0,45
1661868	DC0310004LW	10,0	10	11,00	66	0,45
1661870	DC0312005LW	12,0	12	12,00	73	0,45
1661872	DC0314014LW	14,0	14	14,00	75	0,45
1661874	DC0316006LW	16,0	16	16,00	82	0,45
1661876	DC0318018LW	18,0	18	18,00	84	0,45
1661878	DC0320007LW	20,0	20	20,00	92	0,45

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





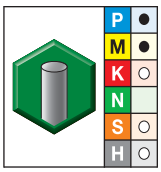


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series 4503 JJ • Victory Grades



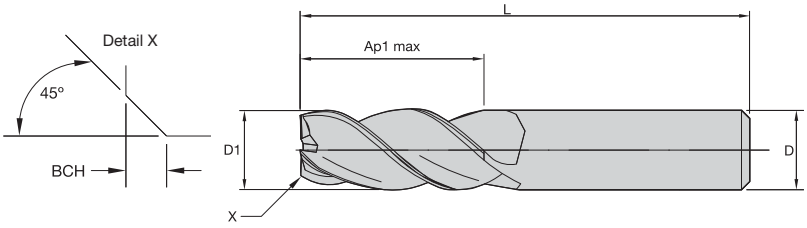
● first choice
○ alternate choice

grade WP15PE AlTiN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
5559170	450301001T	1,0	4	3,00	50
5559171	450301501T	1,5	4	3,00	50
5559172	450302001T	2,0	4	3,00	50
5559173	450302501T	2,5	4	4,00	50
5559174	450302511T	2,5	4	5,00	50
5559175	450303002T	3,0	6	8,00	50
5559176	450303502T	3,5	6	12,00	50
5559177	450304002T	4,0	6	12,00	50
5559178	450304502T	4,5	6	14,00	50
5559179	450305002T	5,0	6	14,00	50
5559180	450306002T	6,0	6	16,00	50
5559181	450308003T	8,0	8	20,00	63
5559182	450310004T	10,0	10	22,00	76
5559183	450312005T	12,0	12	25,00	76
5559184	450316006T	16,0	16	32,00	89
5559185	450320007T	20,0	20	38,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



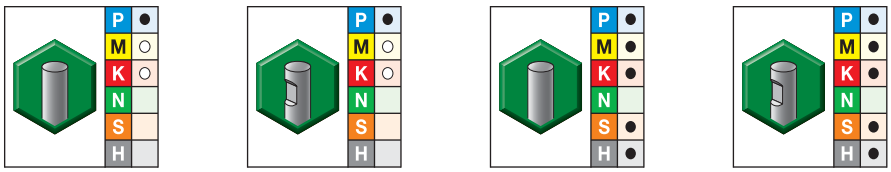




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 022801 022804 022802 322806 322801 322804 322802 422806

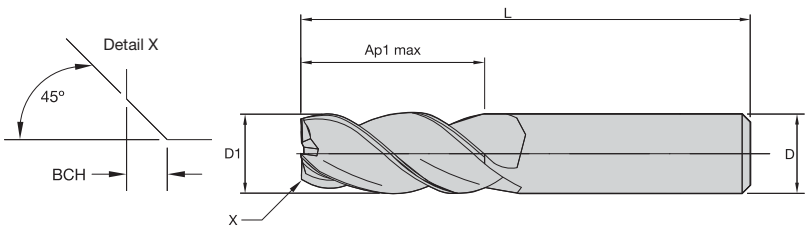


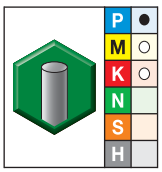
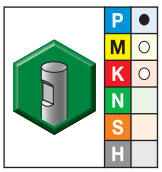
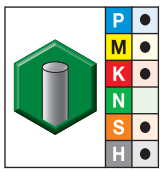
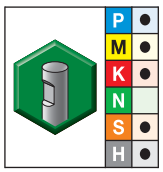
● first choice
○ alternate choice

grade K30F uncoated		grade K30F uncoated		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332115	022801-000020	2332132	022802-000020	2335347	322801-000020	2335365	322802-000020	2,0	6	3,00	50	0,10
3048459	022804-000020	3048480	022806-000020	3048485	322804-000020	3048488	322806-000020	2,0	6	6,00	57	0,10
2332116	022801-000025	2332133	022802-000025	2335348	322801-000025	2335366	322802-000025	2,5	6	3,00	50	0,10
3048461	022804-000025	3048483	022806-000025	3048486	322804-000025	3048489	322806-000025	2,5	6	7,00	57	0,10
2332117	022801-000030	2332135	022802-000030	2335349	322801-000030	2335368	322802-000030	3,0	6	4,00	50	0,10
2332153	022804-000030	2345784	022806-000030	2335388	322804-000030	2335403	322806-000030	3,0	6	7,00	57	0,10
2332118	022801-000035	2332136	022802-000035	2335350	322801-000035	2335369	322802-000035	3,5	6	4,00	50	0,10
2332154	022804-000035	2332170	022806-000035	2335389	322804-000035	2335404	322806-000035	3,5	6	7,00	57	0,10
2332119	022801-000040	2332137	022802-000040	2335351	322801-000040	2335370	322802-000040	4,0	6	5,00	54	0,10
2332155	022804-000040	2332171	022806-000040	2335390	322804-000040	2335406	322806-000040	4,0	6	8,00	57	0,10
	–	2332138	022802-000045	2335352	322801-000045	2335371	322802-000045	4,5	6	5,00	54	0,10
2332156	022804-000045	2332172	022806-000045	2335391	322804-000045	2335407	322806-000045	4,5	6	8,00	57	0,10
2332121	022801-000050	2332139	022802-000050	2335353	322801-000050	2335372	322802-000050	5,0	6	6,00	54	0,10
2332157	022804-000050	2332173	022806-000050	2335392	322804-000050	2335408	322806-000050	5,0	6	10,00	57	0,10
2332122	022801-000060	2332140	022802-000060	2335354	322801-000060	2335374	322802-000060	6,0	6	7,00	54	0,10
2332158	022804-000060	2332174	022806-000060	2335393	322804-000060	2335409	322806-000060	6,0	6	10,00	57	0,10
2332123	022801-000070		–	2335355	322801-000070	2335376	322802-000070	7,0	8	8,00	58	0,20
2332159	022804-000070	2332175	022806-000070	2335394	322804-000070	2335410	322806-000070	7,0	8	13,00	63	0,20
2332124	022801-000080		–	2335356	322801-000080	2335378	322802-000080	8,0	8	9,00	58	0,20
2332160	022804-000080	2332176	022806-000080	2335395	322804-000080	2335411	322806-000080	8,0	8	16,00	63	0,20

(continued)

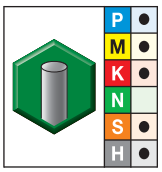
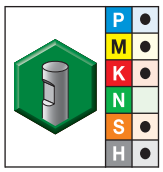
(Series 022801 022804 022802 322806 322801 322804 322802 422806 — continued)



grade K30F uncoated		grade K30F uncoated		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332125	022801-000090	2332143	022802-000090	2335357	322801-000090	2335379	322802-000090	9,0	10	10,00	66	0,20
2332161	022804-000090	2332177	022806-000090	2335396	322804-000090	2335412	322806-000090	9,0	10	16,00	72	0,20
–		2332144	022802-000100	2335358	322801-000100	2335381	322802-000100	10,0	10	11,00	66	0,30
2332162	022804-000100	2332178	022806-000100	2335397	322804-000100	2335413	322806-000100	10,0	10	19,00	72	0,30
2332127	022801-000120	–		2335360	322801-000120	2335383	322802-000120	12,0	12	12,00	73	0,30
2332163	022804-000120	2332179	022806-000120	2335398	322804-000120	2335415	322806-000120	12,0	12	22,00	83	0,30
–		2332147	022802-000140	2335361	322801-000140	2335384	322802-000140	14,0	14	14,00	75	0,30
2332164	022804-000140	2332180	022806-000140	2335399	322804-000140	2335417	322806-000140	14,0	14	22,00	83	0,30
–		–		2335362	322801-000160	2335385	322802-000160	16,0	16	16,00	82	0,40
2332165	022804-000160	2332181	022806-000160	2335400	322804-000160	2335420	322806-000160	16,0	16	26,00	92	0,40
–		–		2335363	322801-000180	2335386	322802-000180	18,0	18	18,00	84	0,40
–		2332182	022806-000180	2335401	322804-000180	2335421	322806-000180	18,0	18	26,00	92	0,40
2332131	022801-000200	2332150	022802-000200	2335364	322801-000200	2335387	322802-000200	20,0	20	20,00	92	0,40
2332167	022804-000200	2332183	022806-000200	2335402	322804-000200	2335422	322806-000200	20,0	20	32,00	104	0,40

Series 422801 422804 422802 422806

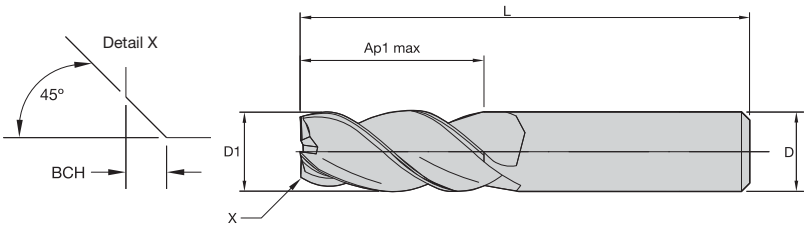



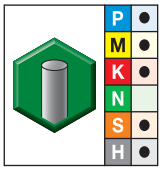
● first choice
○ alternate choice

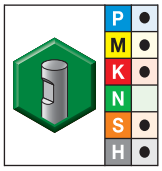
grade K30F-DCF TiAlN		grade K30F-DCF TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2341532	422801-000020	2341566	422802-000020	2,0	6	3,00	50	0,10
3048490	422804-000020	3048492	422806-000020	2,0	6	6,00	57	0,10
2341534	422801-000025	2341568	422802-000025	2,5	6	3,00	50	0,10
3048491	422804-000025	3048503	422806-000025	2,5	6	7,00	57	0,10
2341536	422801-000030	2341570	422802-000030	3,0	6	4,00	50	0,10
2341603	422804-000030	2341634	422806-000030	3,0	6	7,00	57	0,10
2341538	422801-000035	2341573	422802-000035	3,5	6	4,00	50	0,10
2341606	422804-000035	2341636	422806-000035	3,5	6	7,00	57	0,10

(continued)

(Series 422801 422804 422802 422806 — continued)







● first choice
○ alternate choice

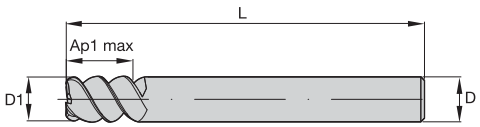
grade K30F-DCF TiAlN		grade K30F-DCF TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2341540	422801-000040	2341575	422802-000040	4,0	6	5,00	54	0,10
2341608	422804-000040	2341638	422806-000040	4,0	6	8,00	57	0,10
2341542	422801-000045	2341577	422802-000045	4,5	6	5,00	54	0,10
2341610	422804-000045	2341640	422806-000045	4,5	6	8,00	57	0,10
2341544	422801-000050	2341579	422802-000050	5,0	6	6,00	54	0,10
2341612	422804-000050	2341642	422806-000050	5,0	6	10,00	57	0,10
2341546	422801-000060	2341581	422802-000060	6,0	6	7,00	54	0,10
2341614	422804-000060	2341644	422806-000060	6,0	6	10,00	57	0,10
2341548	422801-000070	2341583	422802-000070	7,0	8	8,00	58	0,20
2341616	422804-000070	2341646	422806-000070	7,0	8	13,00	63	0,20
2341550	422801-000080	2341587	422802-000080	8,0	8	9,00	58	0,20
2341618	422804-000080	2341648	422806-000080	8,0	8	16,00	63	0,20
2341553	422801-000090	2341589	422802-000090	9,0	10	10,00	66	0,20
2341620	422804-000090	2341650	422806-000090	9,0	10	16,00	72	0,20
2341555	422801-000100	2341591	422802-000100	10,0	10	11,00	66	0,30
2341622	422804-000100	2341653	422806-000100	10,0	10	19,00	72	0,30
2341557	422801-000120	2341593	422802-000120	12,0	12	12,00	73	0,30
2341624	422804-000120	2341657	422806-000120	12,0	12	22,00	83	0,30
2341559	422801-000140	2341595	422802-000140	14,0	14	14,00	75	0,30
2341626	422804-000140	2341659	422806-000140	14,0	14	22,00	83	0,30
2341561	422801-000160	2341597	422802-000160	16,0	16	16,00	82	0,40
2341628	422804-000160	2341661	422806-000160	16,0	16	26,00	92	0,40
2341562	422801-000180	2341599	422802-000180	18,0	18	18,00	84	0,40
2341630	422804-000180	2341663	422806-000180	18,0	18	26,00	92	0,40
2341564	422801-000200	2341601	422802-000200	20,0	20	20,00	92	0,40
2341632	422804-000200	2341665	422806-000200	20,0	20	32,00	104	0,40

Chamfer Data	Corner Chamfer	
D1 h10	BCH	tolerance
2–6,99	0,1	-0,05
7–9,99	0,2	-0,10
10–15,99	0,3	-0,10
16–20,00	0,4	-0,20

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



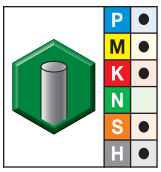




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

Series 4603



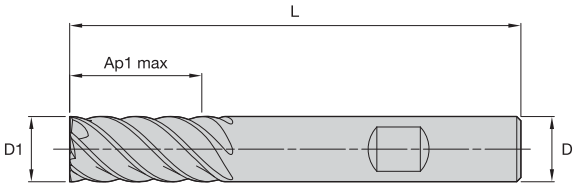
● first choice
○ alternate choice

grade TiAlN-RT TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656750	460303002RT	3,0	6	8,00	57
1656758	460304002RT	4,0	6	11,00	57
1656765	460305002RT	5,0	6	13,00	57
1656773	460306002RT	6,0	6	13,00	57
1656781	460308003RT	8,0	8	19,00	63
1656791	460310004RT	10,0	10	22,00	72
1656799	460312005RT	12,0	12	26,00	83
1656807	460316006RT	16,0	16	32,00	92
1656815	460320007RT	20,0	20	38,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





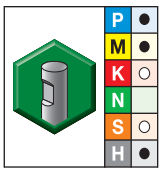


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series D507 D517 • Victory Grades



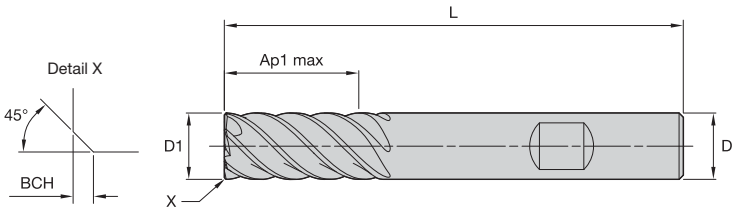
● first choice
○ alternate choice

grade WP15PE AlTiN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
5559100	D50706002W	6,0	6	10,00	54
5559108	D51706002W	6,0	6	13,00	57
5559101	D50708003W	8,0	8	12,00	58
5559109	D51708003W	8,0	8	19,00	63
5559102	D50710004W	10,0	10	14,00	66
5559110	D51710004W	10,0	10	22,00	72
5559103	D50712005W	12,0	12	16,00	73
5559111	D51712005W	12,0	12	26,00	83
5559104	D50714014W	14,0	14	18,00	75
5559112	D51714014W	14,0	14	26,00	83
5559105	D50716006W	16,0	16	22,00	82
5559113	D51716006W	16,0	16	32,00	92
5559106	D50718018W	18,0	18	24,00	84
5559114	D51718018W	18,0	18	32,00	92
5559107	D50720007W	20,0	20	26,00	92
5559115	D51720007W	20,0	20	38,00	104

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



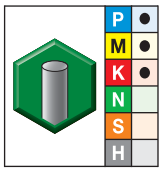


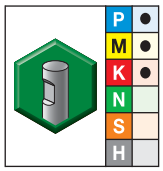


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422822 422826





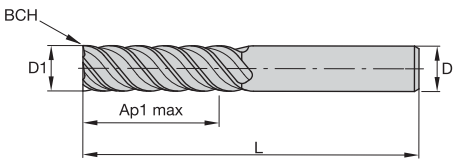
● first choice
○ alternate choice

grade K30F-DCHP AlTiN		grade K30F-DCHP AlTiN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2342270	422822-000060	2342341	422826-000060	6,0	6	13,00	57	0,10	6
2342272	422822-000080	2342343	422826-000080	8,0	8	19,00	63	0,20	6
2342274	422822-000100	2342345	422826-000100	10,0	10	22,00	72	0,30	6
2342276	422822-000120	2342347	422826-000120	12,0	12	26,00	83	0,30	6
2342280	422822-000160	2342351	422826-000160	16,0	16	32,00	92	0,40	6
2342282	422822-000180	2342353	422826-000180	18,0	18	32,00	92	0,40	8
2342284	422822-000200	2342355	422826-000200	20,0	20	38,00	104	0,40	8
2342286	422822-000250	2342357	422826-000250	25,0	25	45,00	121	0,40	8

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



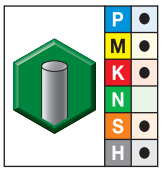




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 422827



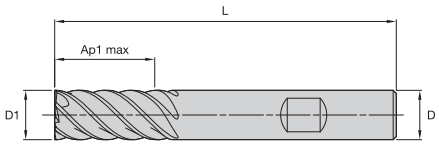
● first choice
○ alternate choice

grade K30F-DCHP AlTiN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2342360	422827-000060	6,0	6	18,00	62	0,10	6
2342362	422827-000080	8,0	8	24,00	68	0,20	6
2342364	422827-000100	10,0	10	30,00	80	0,30	6
2342366	422827-000120	12,0	12	36,00	93	0,30	6
2342368	422827-000160	16,0	16	48,00	108	0,30	6
2342370	422827-000200	20,0	20	60,00	126	0,40	8
2342372	422827-000250	25,0	25	75,00	150	0,40	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





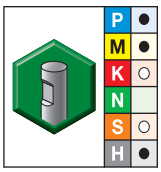


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/-0,006
> 3–6	-0,020/-0,038	> 3–6	0/-0,008
> 6–10	-0,025/-0,047	> 6–10	0/-0,009
> 10–18	-0,032/-0,059	> 10–18	0/-0,011
> 18–30	-0,040/-0,073	> 18–30	0/-0,013

WIDIA VICTORY

Series D518 • Vision Plus • Victory Grades



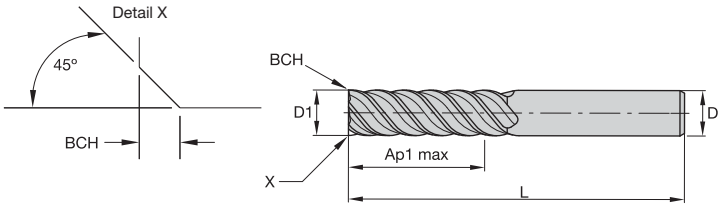
● first choice
○ alternate choice

grade WP15PE AlTiN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
5559116	D51804002W	4,0	6	11,00	57	4
5559117	D51805002W	5,0	6	13,00	57	4
5559118	D51806002W	6,0	6	13,00	57	6
5559119	D51807003W	7,0	8	16,00	63	6
5559120	D51808003W	8,0	8	19,00	63	6
5559121	D51809004W	9,0	10	19,00	72	6
5559122	D51810004W	10,0	10	22,00	72	6
5559123	D51812005W	12,0	12	26,00	83	6
5559124	D51814014W	14,0	14	26,00	83	6
5559125	D51816006W	16,0	16	32,00	92	8
5559126	D51818018W	18,0	18	32,00	92	8
5559127	D51820007W	20,0	20	38,00	104	8
5559128	D51825008W	25,0	25	45,00	121	8

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



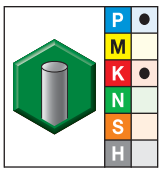




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 026621 • Cermet End Mill

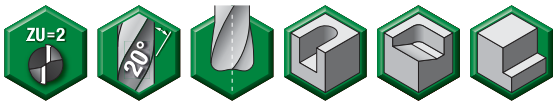


● first choice
○ alternate choice

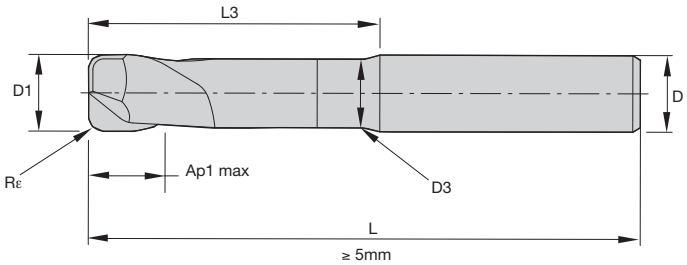
grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2333138	026621-000080	8,0	8	19,00	63	0,20	4
2333140	026621-000120	12,0	12	26,00	83	0,30	6
2333143	026621-000160	16,0	16	32,00	92	0,40	8
2333145	026621-000200	20,0	20	38,00	104	0,40	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



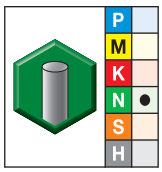




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 024112



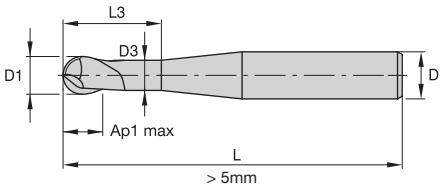
● first choice
○ alternate choice

grade K10F-DIA DIAMOND								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2333112	024112-006005	6,0	6	5,80	6,00	42,00	80	0,50
2333113	024112-008010	8,0	8	7,80	8,00	50,00	90	1,00
2333114	024112-010020	10,0	10	9,70	10,00	56,00	100	2,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



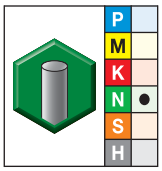




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 024111

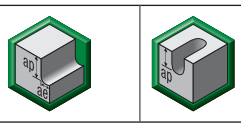


● first choice
○ alternate choice

grade K10F-DIA DIAMOND							
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
2333099	024111-000020	2,0	6	1,90	2,00	17,50	70
2333100	024111-000030	3,0	6	2,90	3,00	18,50	70
2333101	024111-000040	4,0	6	3,80	4,00	19,50	80
2333102	024111-000050	5,0	6	4,80	5,00	39,00	80
2333103	024111-000060	6,0	6	5,80	6,00	42,00	80
2333104	024111-000080	8,0	8	7,80	8,00	52,00	90
2333105	024111-000100	10,0	10	9,70	10,00	58,00	100
2333106	024111-000120	12,0	12	11,70	12,00	63,00	110

■ Series 4001 JJ • Victory Grades

WIDIA VICTORY





Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.													
		A		B	Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,25 x D	0,25 x D	0,5 x D	150	–	200	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
	1	1,25 x D	0,25 x D	0,5 x D	150	–	200	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
	2	1,25 x D	0,25 x D	0,5 x D	140	–	190	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
	3	1,25 x D	0,25 x D	0,5 x D	120	–	160	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
	4	1,25 x D	0,25 x D	0,3 x D	90	–	150	fz	0,009	0,014	0,019	0,024	0,030	0,040	0,049	0,056	0,063	0,069	0,075	0,079	0,088
M	1	1,25 x D	0,25 x D	0,5 x D	90	–	115	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
	2	1,25 x D	0,25 x D	0,5 x D	60	–	80	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,044	0,051	0,057	0,063	0,068	0,073	0,082
K	1	1,25 x D	0,25 x D	0,5 x D	120	–	150	fz	0,012	0,019	0,026	0,032	0,039	0,054	0,065	0,075	0,083	0,091	0,097	0,103	0,111
	2	1,25 x D	0,25 x D	0,5 x D	110	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,063	0,071	0,078	0,085	0,091	0,102
N	1	1,25 x D	0,25 x D	0,5 x D	500	–	2000	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225
	2	1,25 x D	0,25 x D	0,5 x D	500	–	1500	fz	0,016	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162	0,203
	3	1,25 x D	0,25 x D	0,5 x D	250	–	1000	fz	0,016	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162	0,203
	4	1,25 x D	0,25 x D	0,5 x D	100	–	750	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D503



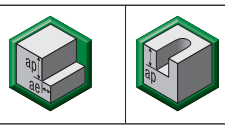




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	0,75 x D	0,4 x D	0,5 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	0,75 x D	0,4 x D	0,5 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	0,75 x D	0,4 x D	0,5 x D	56	–	76	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	0,75 x D	0,4 x D	0,5 x D	48	–	64	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	0,75 x D	0,4 x D	0,3 x D	–	–	–	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	100	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	0,75 x D	0,4 x D	0,3 x D	–	–	–	50	–	75	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	0,75 x D	0,4 x D	0,5 x D	36	–	46	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	60	–	70	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	0,75 x D	0,4 x D	0,5 x D	48	–	60	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	110	–	130	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	50	–	90	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	0,75 x D	0,4 x D	0,3 x D	–	–	–	25	–	40	fz	0,006	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	0,75 x D	0,4 x D	0,3 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	0,75 x D	0,4 x D	0,5 x D	–	–	–	50	–	60	fz	0,007	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	80	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D513




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,25 x D	0,2 x D	0,25 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1,25 x D	0,2 x D	0,25 x D	60	–	80	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,2 x D	0,25 x D	56	–	76	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1,25 x D	0,2 x D	0,25 x D	48	–	64	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1,25 x D	0,2 x D	0,25 x D	–	–	–	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	100	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	75	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,25 x D	0,2 x D	0,25 x D	36	–	46	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	70	fz	0,008	0,012	0,016	0,020	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,25 x D	0,2 x D	0,25 x D	48	–	60	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	110	–	130	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	90	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,25 x D	0,2 x D	0,25 x D	–	–	–	25	–	40	fz	0,006	0,009	0,013	0,016	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1,25 x D	0,2 x D	0,25 x D	–	–	–	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,25 x D	0,2 x D	0,25 x D	–	–	–	50	–	60	fz	0,007	0,011	0,016	0,021	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,25 x D	0,2 X D	0,25 x D	–	–	–	80	–	140	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series DC03





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	0,75 x D	0,4 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	0,75 x D	0,4 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	0,75 x D	0,4 x D	0,5 x D	140	–	190	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	3	0,75 x D	0,4 x D	0,5 x D	120	–	160	fz	0,016	0,021	0,021	0,021	0,021	0,033	0,045	0,054	0,062	0,077	0,088
	4	0,75 x D	0,4 x D	0,3 x D	90	–	150	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	5	0,75 x D	0,4 x D	0,5 x D	60	–	100	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	6	0,75 x D	0,4 x D	0,3 x D	50	–	75	fz	0,012	0,016	0,016	0,016	0,016	0,025	0,034	0,040	0,047	0,057	0,065
M	1	0,75 x D	0,4 x D	0,5 x D	90	–	115	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	0,75 x D	0,4 x D	0,5 x D	60	–	80	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	3	0,75 x D	0,4 x D	0,5 x D	60	–	70	fz	0,012	0,016	0,016	0,016	0,016	0,025	0,034	0,040	0,047	0,057	0,065
K	1	0,75 x D	0,4 x D	0,5 x D	120	–	150	fz	0,021	0,028	0,028	0,028	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	0,75 x D	0,4 x D	0,5 x D	110	–	140	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	3	0,75 x D	0,4 x D	0,5 x D	110	–	130	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
S	1	0,75 x D	0,4 x D	0,3 x D	50	–	90	fz	0,018	0,023	0,023	0,023	0,023	0,036	0,050	0,061	0,070	0,087	0,101
	2	0,75 x D	0,4 x D	0,3 x D	25	–	40	fz	0,010	0,013	0,013	0,013	0,013	0,019	0,026	0,032	0,037	0,046	0,054
	3	0,75 x D	0,4 x D	0,3 x D	60	–	80	fz	0,014	0,019	0,019	0,019	0,019	0,029	0,040	0,048	0,056	0,070	0,081
	4	0,75 x D	0,4 x D	0,5 x D	50	–	60	fz	0,012	0,016	0,016	0,016	0,016	0,026	0,037	0,045	0,052	0,064	0,074
H	1	0,75 x D	0,4 x D	0,3 x D	80	–	140	fz	0,016	0,021	0,021	0,021	0,021	0,033	0,045	0,054	0,062	0,077	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4503 JJ • Victory Grades

WIDIA VICTORY



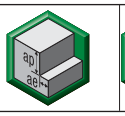




Material Group		Side Milling (A) and Slotting (B)			WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.																
		A		B	Cutting Speed — vc m/min				D1 — Diameter															
		ap	ae	ap	min		max	mm	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
P	0	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
	1	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
	2	1,5 x D	0,3 x D	0,5 x D	140	–	190	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
	3	1,5 x D	0,3 x D	0,5 x D	120	–	160	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,005	0,008	0,010	0,013	0,016	0,019	0,021	0,024	0,027	0,033	0,045	0,054	0,062	0,077	0,083	0,088
	5	1,5 x D	0,3 x D	0,5 x D	60	–	100	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,004	0,006	0,008	0,010	0,012	0,014	0,016	0,018	0,020	0,025	0,034	0,040	0,047	0,057	0,061	0,065
M	1	1,5 x D	0,3 x D	0,5 x D	90	–	115	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
	2	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	3	1,5 x D	0,3 x D	0,5 x D	60	–	70	fz	0,004	0,006	0,008	0,010	0,012	0,014	0,016	0,018	0,020	0,025	0,034	0,040	0,047	0,057	0,061	0,065
K	1	1,5 x D	0,3 x D	0,5 x D	120	–	150	fz	0,007	0,010	0,014	0,017	0,021	0,025	0,028	0,032	0,036	0,044	0,060	0,072	0,083	0,101	0,108	0,114
	2	1,5 x D	0,3 x D	0,5 x D	110	–	140	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
	3	1,5 x D	0,3 x D	0,5 x D	110	–	130	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,006	0,008	0,011	0,014	0,017	0,020	0,023	0,027	0,030	0,036	0,050	0,061	0,070	0,087	0,095	0,101
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,003	0,005	0,006	0,008	0,009	0,011	0,013	0,014	0,016	0,019	0,026	0,032	0,037	0,046	0,050	0,054
	3	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,005	0,007	0,009	0,012	0,014	0,017	0,019	0,022	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	4	1,5 x D	0,3 x D	0,5 x D	50	–	60	fz	0,003	0,005	0,007	0,009	0,011	0,014	0,016	0,018	0,021	0,026	0,037	0,045	0,052	0,064	0,069	0,074
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,005	0,008	0,010	0,013	0,016	0,019	0,021	0,024	0,027	0,033	0,045	0,054	0,062	0,077	0,083	0,088

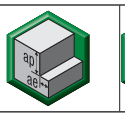
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 022801 022804 322801 322804 422801 022806 022802 322806 322802 422802





Material Group		Side Milling (A) and Slotting (B)			K30F uncoated			K30F-TICN TiCN			K30F-DCF TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	7,0	8,0	9,0	10,0	12,0	16,0	18,0	20,0
P	0	0,75 x D	0,4 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
	1	0,75 x D	0,4 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
	2	0,75 x D	0,4 x D	0,5 x D	56	–	76	112	–	152	140	–	190	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
	3	0,75 x D	0,4 x D	0,5 x D	48	–	64	96	–	128	120	–	160	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
	4	0,75 x D	0,4 x D	0,3 x D	–	–	–	72	–	120	90	–	150	fz	0,008	0,013	0,017	0,022	0,026	0,031	0,036	0,040	0,043	0,050	0,061	0,066	0,070
	5	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	80	60	–	100	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
	6	0,75 x D	0,4 x D	0,3 x D	–	–	–	40	–	60	50	–	75	fz	0,006	0,010	0,013	0,016	0,020	0,023	0,027	0,030	0,032	0,037	0,046	0,049	0,052
M	1	0,75 x D	0,4 x D	0,5 x D	36	–	46	72	–	92	90	–	115	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	48	–	56	60	–	70	fz	0,006	0,010	0,013	0,016	0,020	0,023	0,027	0,030	0,032	0,037	0,046	0,049	0,052
K	1	0,75 x D	0,4 x D	0,5 x D	48	–	60	96	–	120	120	–	150	fz	0,011	0,017	0,023	0,029	0,035	0,041	0,048	0,053	0,058	0,066	0,081	0,086	0,091
	2	0,75 x D	0,4 x D	0,5 x D	–	–	–	88	–	112	110	–	140	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
	3	0,75 x D	0,4 x D	0,5 x D	–	–	–	88	–	104	110	–	130	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
S	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	40	–	72	50	–	90	fz	0,009	0,014	0,019	0,024	0,029	0,034	0,040	0,044	0,048	0,056	0,070	0,076	0,081
	2	0,75 x D	0,4 x D	0,3 x D	–	–	–	20	–	32	25	–	40	fz	0,005	0,008	0,010	0,013	0,016	0,018	0,021	0,023	0,026	0,030	0,037	0,040	0,043
	3	0,75 x D	0,4 x D	0,3 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,028	0,032	0,035	0,039	0,045	0,056	0,060	0,065
	4	0,75 x D	0,4 x D	0,5 x D	–	–	–	40	–	48	50	–	60	fz	0,006	0,009	0,013	0,016	0,021	0,025	0,029	0,033	0,036	0,041	0,051	0,056	0,059
H	1	0,75 x D	0,4 x D	0,3 x D	–	–	–	64	–	112	80	–	140	fz	0,008	0,013	0,017	0,022	0,026	0,031	0,036	0,040	0,043	0,050	0,061	0,066	0,070





Material Group		Side Milling (A) and Slotting (B)			K30F uncoated			K30F-TICN TiCN			K30F-DCF TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter												
		ap	ae	ap	min		max	min		max	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0		
P	0	1,5 x D	0,3 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091		
	1	1,5 x D	0,3 x D	0,5 x D	60	–	80	120	–	160	150	–	200	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091		
	2	1,5 x D	0,3 x D	0,5 x D	56	–	76	112	–	152	140	–	190	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091		
	3	1,5 x D	0,3 x D	0,5 x D	48	–	64	96	–	128	120	–	160	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081		
	4	1,5 x D	0,3 x D	0,3 x D	–	–	–	72	–	120	90	–	150	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070		
	5	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	80	60	–	100	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065		
	6	1,5 x D	0,3 x D	0,3 x D	–	–	–	40	–	60	50	–	75	fz	0,006	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052		
M	1	1,5 x D	0,3 x D	0,5 x D	36	–	46	72	–	92	90	–	115	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081		
	2	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065		
	3	1,5 x D	0,3 x D	0,5 x D	–	–	–	48	–	56	60	–	70	fz	0,006	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052		
K	1	1,5 x D	0,3 x D	0,5 x D	48	–	60	96	–	120	120	–	150	fz	0,011	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091		
	2	1,5 x D	0,3 x D	0,5 x D	–	–	–	88	–	112	110	–	140	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081		
	3	1,5 x D	0,3 x D	0,5 x D	–	–	–	88	–	104	110	–	130	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065		
S	1	1,5 x D	0,3 x D	0,3 x D	–	–	–	40	–	72	50	–	90	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081		
	2	1,5 x D	0,3 x D	0,3 x D	–	–	–	20	–	32	25	–	40	fz	0,005	0,008	0,010	0,013	0,016	0,021	0,026	0,030	0,037	0,040	0,043		
	3	1,5 x D	0,3 x D	0,3 x D	–	–	–	48	–	64	60	–	80	fz	0,008	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065		
	4	1,5 x D	0,3 x D	0,5 x D	–	–	–	40	–	48	50	–	60	fz	0,006	0,009	0,013	0,016	0,021	0,029	0,036	0,041	0,051	0,056	0,059		
H	1	1,5 x D	0,3 x D	0,3 x D	–	–	–	80	–	140	80	–	140	fz	0,008	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070		

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4603





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
P	0	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
	1	1,5 x D	0,3 x D	0,5 x D	150	–	200	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
	2	1,5 x D	0,3 x D	0,5 x D	140	–	190	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
	3	1,5 x D	0,3 x D	0,5 x D	120	–	160	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	4	1,5 x D	0,3 x D	0,3 x D	90	–	150	fz	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070
	5	1,5 x D	0,3 x D	0,5 x D	60	–	100	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
	6	1,5 x D	0,3 x D	0,3 x D	50	–	75	fz	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
M	1	1,5 x D	0,3 x D	0,5 x D	90	–	115	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	2	1,5 x D	0,3 x D	0,5 x D	60	–	80	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
	3	1,5 x D	0,3 x D	0,5 x D	60	–	70	fz	0,010	0,013	0,016	0,020	0,027	0,032	0,037	0,046	0,049	0,052
K	1	1,5 x D	0,3 x D	0,5 x D	120	–	150	fz	0,017	0,023	0,029	0,035	0,048	0,058	0,066	0,081	0,086	0,091
	2	1,5 x D	0,3 x D	0,5 x D	110	–	140	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	3	1,5 x D	0,3 x D	0,5 x D	110	–	130	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
S	1	1,5 x D	0,3 x D	0,3 x D	50	–	90	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,070	0,076	0,081
	2	1,5 x D	0,3 x D	0,3 x D	25	–	40	fz	0,008	0,010	0,013	0,016	0,021	0,026	0,030	0,037	0,040	0,043
	3	1,5 x D	0,3 x D	0,3 x D	60	–	80	fz	0,011	0,015	0,019	0,024	0,032	0,039	0,045	0,056	0,060	0,065
	4	1,5 x D	0,3 x D	0,5 x D	50	–	60	fz	0,009	0,013	0,016	0,021	0,029	0,036	0,041	0,051	0,056	0,059
H	1	1,5 x D	0,3 x D	0,3 x D	80	–	140	fz	0,013	0,017	0,022	0,026	0,036	0,043	0,050	0,061	0,066	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D507 • Victory Grades





Material Group		Side Milling (A)		WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	1,0 x D	0,2 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	1,0 x D	0,2 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,0 x D	0,2 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	1,0 x D	0,1 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	1,0 x D	0,1 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	1,0 x D	0,1 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	1,0 x D	0,1 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	1,0 x D	0,1 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,0 x D	0,1 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	1,0 x D	0,1 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	1,0 x D	0,1 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	1,0 x D	0,1 x D	110	–	140	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	1,0 x D	0,1 x D	110	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	1,0 x D	0,1 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	1,0 x D	0,1 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	1,0 x D	0,15 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	1,0 x D	0,15 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	1,0 x D	0,1 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

■ Series D517 • Victory Grades

WIDIA VICTORY





Material Group		Side Milling (A)		WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	4,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,05 x D	140	–	190	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,05 x D	120	–	160	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,05 x D	90	–	150	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	Ap1 max	0,05 x D	60	–	100	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	Ap1 max	0,05 x D	50	–	75	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	Ap1 max	0,05 x D	90	–	115	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	Ap1 max	0,05 x D	60	–	70	fz	0,016	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	Ap1 max	0,05 x D	120	–	150	fz	0,028	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,05 x D	110	–	140	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	Ap1 max	0,05 x D	110	–	130	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
S	1	Ap1 max	0,04 x D	50	–	90	fz	0,023	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,04 x D	25	–	40	fz	0,013	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054
	3	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	4	Ap1 max	0,05 x D	50	–	60	fz	0,016	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074
H	1	Ap1 max	0,04 x D	80	–	140	fz	0,021	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 422822 422826



Material Group		Side Milling (A) and Slotting (B)		K30F-DCF AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min	–	max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	1,5 x D	0,05 x D	165	–	165	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	1,5 x D	0,05 x D	165	–	165	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,05 x D	154	–	154	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	1,5 x D	0,05 x D	132	–	132	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	1,5 x D	0,05 x D	99	–	99	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	1,5 x D	0,05 x D	66	–	66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	1,5 x D	0,04 x D	55	–	55	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	1,5 x D	0,05 x D	99	–	99	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,05 x D	66	–	66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	1,5 x D	0,05 x D	66	–	66	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	1,5 x D	0,05 x D	132	–	132	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	1,5 x D	0,05 x D	121	–	121	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	1,5 x D	0,05 x D	121	–	121	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
N	1	1,5 x D	0,05 x D	275	–	275	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180	0,225
S	1	1,5 x D	0,04 x D	55		55	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	1,5 x D	0,04 x D	27.5		27.5	fz	0,019	0,026	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	1,5 x D	0,05 x D	66		66	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	1,5 x D	0,05 x D	55		55	fz	0,026	0,037	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	1,5 x D	0,04 x D	88	–	88	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088	0,098

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 422827 • Vision Plus

WIDIA VICTORY



Material Group		Side Milling (A)		K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A).						
		A		Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	3 x D	0,05 x D	150	–	200	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	3 x D	0,05 x D	140	–	190	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	3	3 x D	0,05 x D	120	–	160	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	4	3 x D	0,05 x D	90	–	150	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098
	5	3 x D	0,05 x D	60	–	100	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	6	3 x D	0,05 x D	50	–	75	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
M	1	3 x D	0,05 x D	80	–	100	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	3 x D	0,05 x D	60	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	3	3 x D	0,05 x D	60	–	80	fz	0,025	0,034	0,040	0,047	0,057	0,065	0,071
K	1	3 x D	0,05 x D	120	–	160	fz	0,044	0,060	0,072	0,083	0,101	0,114	0,124
	2	3 x D	0,05 x D	110	–	140	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	3	3 x D	0,05 x D	100	–	130	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
S	1	3 x D	0,05 x D	90	–	115	fz	0,036	0,050	0,061	0,070	0,087	0,101	0,114
	2	3 x D	0,05 x D	20	–	40	fz	0,019	0,026	0,032	0,037	0,046	0,054	0,061
	3	3 x D	0,05 x D	50	–	80	fz	0,029	0,040	0,048	0,056	0,070	0,081	0,091
	4	3 x D	0,05 x D	45	–	65	fz	0,026	0,037	0,045	0,052	0,064	0,074	0,084
H	1	3 x D	0,05 x D	100	–	140	fz	0,033	0,045	0,054	0,062	0,077	0,088	0,098

NOTE: Lower value of cutting speed is used for high-stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D518 • Vision Plus • Victory Grades





Material Group		Side Milling (A)		WP15PE			Recommended feed per tooth (fz = mm/th) for side milling (A).												
		A		Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	min		max	mm	4,0	5,0	6,0	7,0	8,0	9,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	0	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	1	Ap1 max	0,05 x D	150	–	200	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	Ap1 max	0,05 x D	140	–	190	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	3	Ap1 max	0,05 x D	120	–	160	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	4	Ap1 max	0,05 x D	90	–	150	fz	0,021	0,027	0,033	0,039	0,045	0,050	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	5	Ap1 max	0,05 x D	60	–	100	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	6	Ap1 max	0,04 x D	50	–	75	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071
M	1	Ap1 max	0,05 x D	90	–	115	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	3	Ap1 max	0,05 x D	60	–	70	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071
K	1	Ap1 max	0,05 x D	120	–	150	fz	0,028	0,036	0,044	0,052	0,060	0,066	0,072	0,083	0,092	0,101	0,108	0,114	0,124
	2	Ap1 max	0,05 x D	110	–	140	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	3	Ap1 max	0,05 x D	110	–	130	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
S	1	Ap1 max	0,04 x D	50	–	90	fz	0,023	0,030	0,036	0,043	0,050	0,055	0,061	0,070	0,079	0,087	0,095	0,101	0,114
	2	Ap1 max	0,04 x D	25	–	40	fz	0,013	0,016	0,019	0,023	0,026	0,029	0,032	0,037	0,042	0,046	0,050	0,054	0,061
	3	Ap1 max	0,05 x D	60	–	80	fz	0,019	0,024	0,029	0,035	0,040	0,044	0,048	0,056	0,063	0,070	0,076	0,081	0,091
	4	Ap1 max	0,05 x D	50	–	60	fz	0,016	0,021	0,026	0,031	0,037	0,041	0,045	0,052	0,058	0,064	0,069	0,074	0,084
H	1	Ap1 max	0,04 x D	80	–	140	fz	0,021	0,027	0,033	0,039	0,045	0,050	0,054	0,062	0,070	0,077	0,083	0,088	0,098
	2	Ap1 max	0,05 x D	70	–	120	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040	0,047	0,052	0,057	0,061	0,065	0,071

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 026621 • Cermet End Mill





Material Group		Side Milling (A)		Cermet			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,05 x D	225	–	300	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,05 x D	225	–	300	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,05 x D	210	–	285	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,05 x D	180	–	240	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,05 x D	135	–	225	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	5	Ap1 max	0,05 x D	90	–	150	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	6	Ap1 max	0,04 x D	75	–	112,5	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
M	1	Ap1 max	0,05 x D	135	–	172,5	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,05 x D	90	–	120	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
	3	Ap1 max	0,05 x D	90	–	105	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065
K	1	Ap1 max	0,05 x D	180	–	225	fz	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,05 x D	165	–	210	fz	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	3	Ap1 max	0,05 x D	165	–	195	fz	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
N	1	Ap1 max	0,05 x D	750	–	3000	fz	0,060	0,080	0,100	0,120	0,140	0,160	0,180	0,200
	2	Ap1 max	0,05 x D	750	–	2250	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
	3	Ap1 max	0,05 x D	750	–	2250	fz	0,042	0,056	0,070	0,084	0,098	0,112	0,126	0,140
	4	Ap1 max	0,05 x D	600	–	1125	fz	0,048	0,064	0,080	0,096	0,112	0,128	0,144	0,160
	5	Ap1 max	0,05 x D	375	–	1500	fz	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
	6	Ap1 max	0,05 x D	150	–	1125	fz	0,060	0,080	0,100	0,120	0,140	0,160	0,180	0,200
	7	Ap1 max	0,05 x D	150	–	1125	fz	0,042	0,056	0,070	0,084	0,098	0,112	0,126	0,140
H	1	Ap1 max	0,04 x D	120	–	210	fz	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
	2	Ap1 max	0,05 x D	105	–	180	fz	0,025	0,034	0,040	0,047	0,052	0,057	0,061	0,065

NOTE: No slotting for tools with 8 flutes; for 6 flutes ap 0,15 x D.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 024112

Material Group												
		Side Milling (A) and Slotting (B)			K10F-DIA DIA			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	ap	min		max	mm	4,0	6,0	8,0	10,0
N	6	0,7 x D	0,5 x D	0,5 x D	100	–	750	fz	0,040	0,060	0,080	0,100

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 024111

Material Group															
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	6	0,7 x D	0,5 x D	0,5 x D	100	–	750	fz	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120

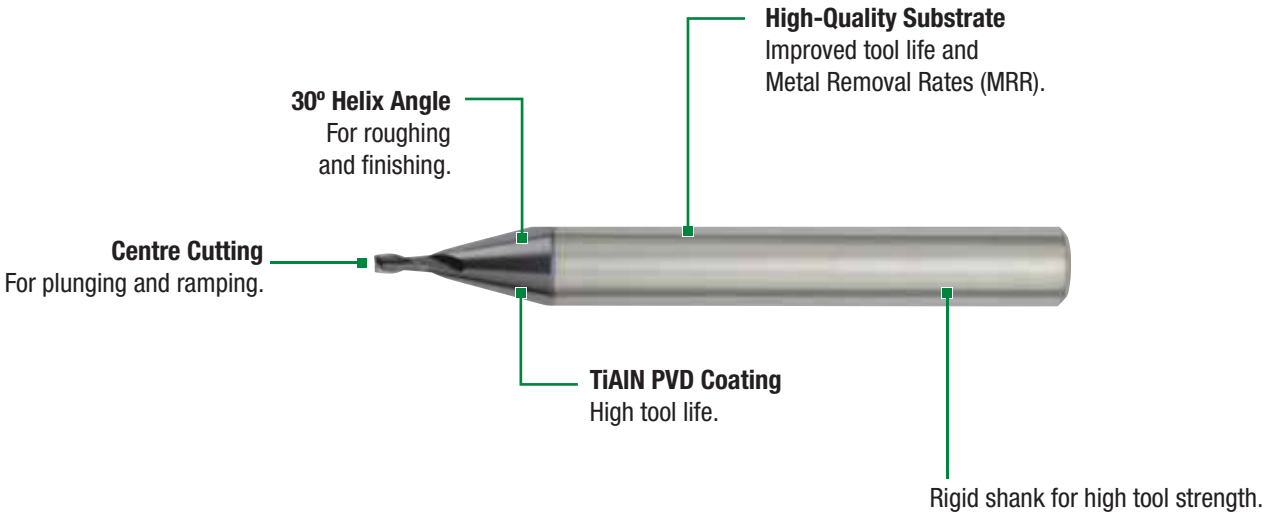
NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.



Micro Solid Carbide End Mills

Micro solid carbide end mills offer plunging, slotting, profiling, and 3D milling for a wide range of materials and applications. They are designed to provide efficient machining in a wide range of steel, cast iron, copper and copper alloys, and aluminium materials. Micro square and ball nose tools, designed for the most demanding end users, offer exceptional tool life and precision at high speeds and feeds.

- 2-flute ball nose and 2–3 flute cutters with sharp corner.
- Micro tools for a wide range of materials.
- Roughing and finishing in one tool.
- Diameter range from 0.4–3mm.



Micro Solid Carbide End Mills

- Increases your manufacturing flexibility and cost efficiency.
- Suitable for roughing and finishing.
- Rigid shank gives extra toughness and strength.

423007 023007 Series

- Diameter range 0,4–3,0mm.
- Steels, stainless steels, cast iron, and non-ferrous.
- Centre cut ball nose.
- Available coated and uncoated.



4633 Series

- Wide range of diameters from 0,4–3mm.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut.
- Available coated and uncoated.
- Rigid shank gives extra toughness and strength.



4632 Series

- Wide range of diameters from 0,4–2mm.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut.
- Available coated and uncoated.



4651 Series

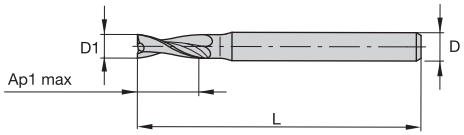
- Ball nose tool in range of diameter from 1–2mm with 3mm shank.
- Medium steel, aluminium, copper, and cast iron.
- Centre cut ball nose.
- Available coated and uncoated.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



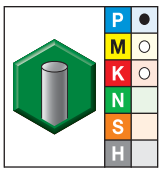


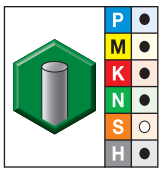


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/-0,040	≤ 3	0/-0,006
> 3–6	0/-0,048	> 3–6	0/-0,008
> 6–10	0/-0,058	> 6–10	0/-0,009
> 10–18	0/-0,070	> 10–18	0/-0,011
> 18–30	0/-0,084	> 18–30	0/-0,013

Series 023007 423007





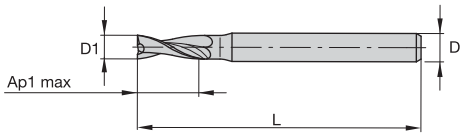
● first choice
○ alternate choice

grade K30F uncoated		grade K30F-DCHP AlTiN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2333055	023007-000004	2343368	423007-000004	0,4	3	0,80	38
2333056	023007-000005	2343370	423007-000005	0,5	3	1,00	38
2333057	023007-000006	2343372	423007-000006	0,6	3	1,20	38
2333058	023007-000008	2343374	423007-000008	0,8	3	1,60	38
2333060	023007-000010	2343376	423007-000010	1,0	3	2,00	38
2333061	023007-000012	2343378	423007-000012	1,2	3	2,40	38
2333064	023007-000015	2343380	423007-000015	1,5	3	3,00	38
2333067	023007-000018	2343382	423007-000018	1,8	3	3,60	38
2333069	023007-000020	2343384	423007-000020	2,0	3	6,00	38
2333070	023007-000025	2343386	423007-000025	2,5	3	7,00	38
2333071	023007-000030	2343388	423007-000030	3,0	3	7,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



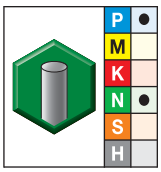


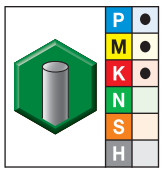


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4632





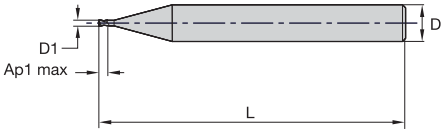
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN-RT TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656841	463200400..	1602266	463200400RT	0,4	3	1,50	38
1656844	463200500..	1602268	463200500RT	0,5	3	1,50	38
1656849	463200600..	1602270	463200600RT	0,6	3	1,50	38
1656853	463200800..	1602273	463200800RT	0,8	3	1,50	38
1656858	463201000..	1602274	463201000RT	1,0	3	2,00	38
1656863	463201500..	1602275	463201500RT	1,5	3	2,00	38
1656867	463202000..		–	2,0	3	8,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



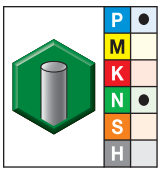


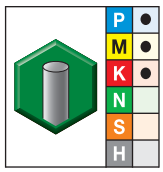


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4633





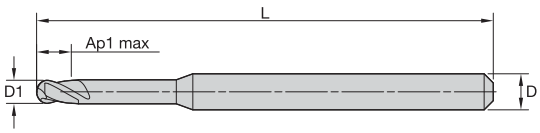
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN-RT TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656873	463300400..	1656875	463300400RT	0,4	3	1,50	38
1656878	463300500..	1656880	463300500RT	0,5	3	1,50	38
1656883	463300600..	1656885	463300600RT	0,6	3	1,50	38
1656888	463300800..	1656890	463300800RT	0,8	3	1,50	38
1656893	463301000..	1656895	463301000RT	1,0	3	2,00	38
1656898	463301200..	1656900	463301200RT	1,2	3	2,00	38
1656901	463301500..	1656903	463301500RT	1,5	3	2,00	38
1656906	463301800..	1656908	463301800RT	1,8	3	2,00	38
1656909	463302000..	1656910	463302000RT	2,0	3	8,00	38
	–	1656913	463302500RT	2,5	3	9,00	38
	–	1656916	463303000RT	3,0	3	12,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



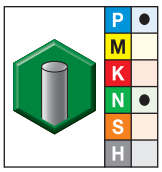


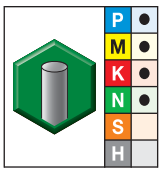


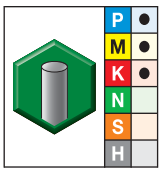
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4651







● first choice
○ alternate choice

grade UNCOATED		grade TiCN-CT TiCN		grade TiAlN-RT TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656950	465101000..	1656951	465101000CT	1611066	465101000RT	1,0	3	2,00	38
1656952	465101200..	1656953	465101200CT	1656954	465101200RT	1,2	3	2,00	38
1656955	465101500..	1656956	465101500CT	1656957	465101500RT	1,5	3	2,00	38
	–	1656959	465101800CT	1656960	465101800RT	1,8	3	2,00	38
1656971	465102000..	1656972	465102000CT	1602538	465102000RT	2,0	3	2,00	38

Series 023007 423007







Material Group		Side Milling (A) and Slotting (B)			K30F uncoated			K30F - DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,2	1,5	1,8	2,0	2,5	3,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
	2	1 x D	0,1 x D	0,25 x D	70	–	95	140	–	190	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
	3	1 x D	0,1 x D	0,25 x D	60	–	80	120	–	160	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,002	0,003	0,003	0,005	0,006	0,007	0,009	0,010	0,012	0,014	0,017
	5	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	100	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
M	1	1 x D	0,1 x D	0,25 x D	45	–	57,5	90	–	115	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
K	1	1 x D	0,1 x D	0,25 x D	60	–	75	120	–	150	fz	0,003	0,004	0,004	0,006	0,007	0,009	0,011	0,014	0,015	0,019	0,023
	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,004	0,006	0,007	0,009	0,011	0,013	0,017	0,020	0,022	0,028	0,033
	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,004	0,005	0,006	0,008	0,010	0,012	0,015	0,018	0,020	0,025	0,030
	5	1 x D	0,1 x D	0,25 x D	125	–	500	250	–	1000	fz	0,004	0,005	0,006	0,008	0,010	0,012	0,015	0,018	0,020	0,025	0,030
S	1	1 x D	0,1 x D	0,25 x D	–	–	–	50	–	90	fz	0,002	0,003	0,004	0,005	0,006	0,007	0,009	0,011	0,012	0,016	0,019
	2	1 x D	0,1 x D	0,25 x D	–	–	–	25	–	40	fz	0,001	0,002	0,002	0,003	0,003	0,004	0,005	0,006	0,007	0,009	0,010
	3	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,006	0,008	0,009	0,010	0,013	0,016
	4	1 x D	0,1 x D	0,25 x D	–	–	–	50	–	60	fz	0,001	0,002	0,002	0,003	0,004	0,005	0,006	0,007	0,008	0,010	0,013
H	1	1 x D	0,1 x D	0,25 x D	–	–	–	80	–	140	fz	0,002	0,003	0,003	0,005	0,006	0,007	0,009	0,010	0,012	0,014	0,017

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 4632

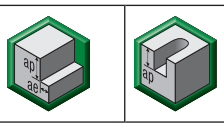




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,5	2,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
	2	1 x D	0,1 x D	0,25 x D	–	–	–	140	–	190	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
	3	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	160	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,002	0,003	0,003	0,005	0,006	0,009	0,012
M	1	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	115	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,002	0,003	0,003	0,004	0,005	0,008	0,010
K	1	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	150	fz	0,003	0,004	0,004	0,006	0,007	0,011	0,015
	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,002	0,003	0,004	0,005	0,006	0,009	0,012
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,004	0,006	0,007	0,009	0,011	0,017	0,022
	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,004	0,005	0,006	0,008	0,010	0,015	0,020
	5	1 x D	0,1 x D	0,25 x D	125	–	400	250	–	1000	fz	0,004	0,005	0,006	0,008	0,010	0,015	0,020

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 4633





Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	min		max	mm	0,4	0,5	0,6	0,8	1,0	1,2	1,5	1,8	2,0	2,5	3,0
P	0	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	1	1 x D	0,1 x D	0,25 x D	75	–	100	150	–	200	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	2	1 x D	0,1 x D	0,25 x D	–	–	–	140	–	190	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	3	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	160	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
	4	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	150	fz	0,023	0,028	0,034	0,045	0,057	0,069	0,086	0,104	0,115	0,145	0,175
M	1	1 x D	0,1 x D	0,25 x D	–	–	–	90	–	115	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
	2	1 x D	0,1 x D	0,25 x D	–	–	–	60	–	80	fz	0,020	0,025	0,031	0,041	0,051	0,062	0,077	0,093	0,103	0,130	0,157
K	1	1 x D	0,1 x D	0,25 x D	–	–	–	120	–	150	fz	0,030	0,037	0,045	0,060	0,075	0,090	0,113	0,136	0,152	0,191	0,231
	2	1 x D	0,1 x D	0,25 x D	–	–	–	110	–	140	fz	0,024	0,030	0,036	0,049	0,061	0,074	0,092	0,111	0,124	0,157	0,190
N	1	1 x D	0,1 x D	0,25 x D	250	–	1000	500	–	2000	fz	0,044	0,055	0,066	0,088	0,110	0,132	0,165	0,198	0,220	0,275	0,330
	2	1 x D	0,1 x D	0,25 x D	250	–	750	500	–	1500	fz	0,040	0,050	0,059	0,079	0,099	0,119	0,149	0,178	0,198	0,248	0,297
	5	1 x D	0,1 x D	0,25 x D	125	–	400	250	–	1000	fz	0,040	0,050	0,059	0,079	0,099	0,119	0,149	0,178	0,198	0,248	0,297

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 4651





Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			TiCN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	ap	min		max	min		max	min		max	mm	1,0	1,2	1,5	1,8	2,0
P	0	0,5 x D	0,5 x D	0,5 x D	75	–	100	150	–	200	120	–	160	fz	0,007	0,009	0,011	0,014	0,015
	1	0,5 x D	0,5 x D	0,5 x D	75	–	100	150	–	200	120	–	160	fz	0,007	0,009	0,011	0,014	0,015
	2	0,5 x D	0,5 x D	0,5 x D	–	–	–	140	–	190	112	–	152	fz	0,007	0,009	0,011	0,014	0,015
	3	0,3 x D	0,3 x D	0,3 x D	–	–	–	120	–	160	96	–	128	fz	0,006	0,007	0,009	0,011	0,012
	4	0,3 x D	0,3 x D	0,3 x D	–	–	–	90	–	150	72	–	120	fz	0,006	0,007	0,009	0,010	0,012
M	1	0,3 x D	0,3 x D	0,3 x D	–	–	–	90	–	115	72	–	92	fz	0,006	0,007	0,009	0,011	0,012
	2	0,3 x D	0,3 x D	0,3 x D	–	–	–	60	–	80	48	–	64	fz	0,005	0,006	0,008	0,009	0,010
K	1	0,5 x D	0,5 x D	0,5 x D	–	–	–	120	–	150	96	–	120	fz	0,007	0,009	0,011	0,014	0,015
	2	0,5 x D	0,5 x D	0,5 x D	–	–	–	110	–	140	88	–	112	fz	0,006	0,007	0,009	0,011	0,012
N	1	0,5 x D	0,5 x D	0,5 x D	250	–	1000	500	–	2000	400	–	1600	fz	0,011	0,013	0,017	0,020	0,022
	2	0,5 x D	0,5 x D	0,5 x D	250	–	750	500	–	1500	400	–	1200	fz	0,010	0,012	0,015	0,018	0,020
	5	0,5 x D	0,5 x D	0,5 x D	125	–	400	250	–	1000	200	–	800	fz	0,010	0,012	0,015	0,018	0,020

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

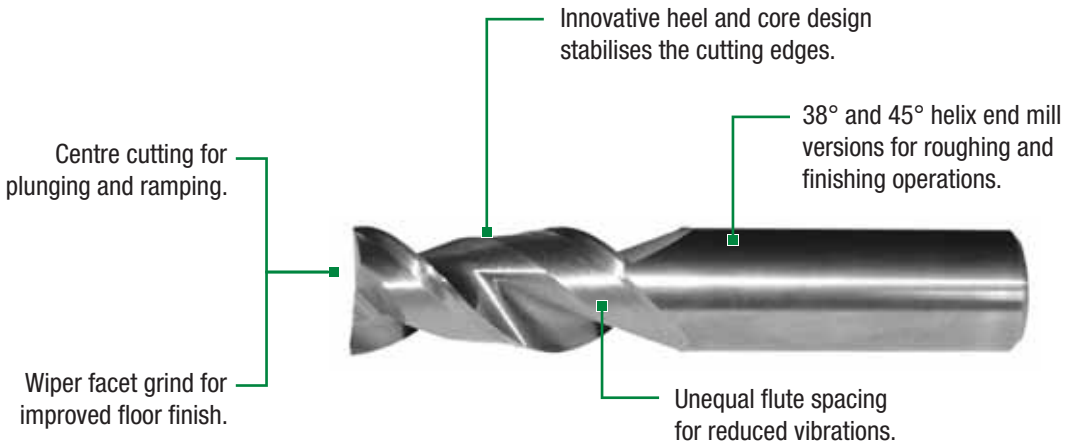
High-Performance Solid Carbide End Mills •
AluSurf™

AluSurf Aluminium



AluSurf provides extraordinary Metal Removal Rates (MRR) by combining roughing and finishing operations for any aluminium plunging, slotting, and profiling application. Its proprietary flute geometry is designed for rigidity and improved chip evacuation generating exceptional wall-to-floor perpendicularity, even in thin wall applications. To ensure a superior floor surface finish the AluSurf front geometry is equipped with a wiper facet grind.

- One tool for roughing and finishing operations.
- Slotting depths up to 1 x D and peripheral milling up to 1.5 x D axially at 0.5 x D radially.
- Unequal flute spacing for chatter-free performance, (3-flute series only).
- Multiple corner radii and extended neck configurations available as standard.



AluSurf™ Series

- Increase your output due to less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing necessary.
- Less passes due to 1 x D slotting capability.
- Perfect for MQL (Minimum Quantity Lubrication) methods.

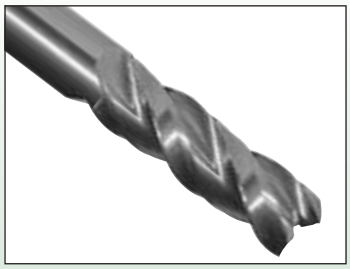
5102 Series

- 2-flute, 45° helix.
- Radii and sharp corner configuration.



5103 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Radii and sharp corner configuration.



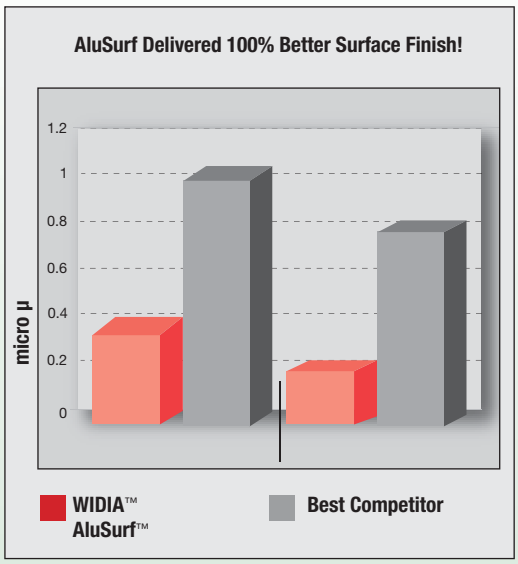
51N3 Series

- 3-flute, 38° helix.
- Unequal flute spacing.
- Extended neck for long-reach applications.
- Radii and sharp corner configuration.



Operation	Slotting
Customer:	Aluminium Block
Material:	6061 Aluminium
Workpiece:	AluSurf solid carbide end mill.
Results:	100% better surface finish on walls and floor.

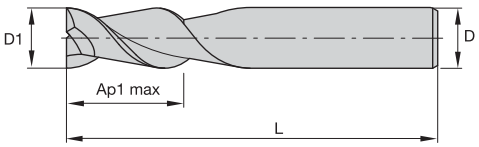
	COMPETITOR	WIDIA™
tool:	uncoated tools	uncoated tools
end mill:	16mm 3-flute	16mm 3-flute
material:	aluminium	aluminium
depth of cut (ap):	8mm	8mm
width of cut (ae):	8mm	8mm
speed (Vc):	610 m/min	610 m/min
RPM (N):	12,000 RPM	12,000 RPM
feed rate (Vf):	3,600 mm/min	3,600 mm/min
chip load per tooth (Fz):	0,1 mm/th	0,1 mm/th
metal removal rate:	230 cm^3/min	230 cm^3/min



- Centre cutting.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



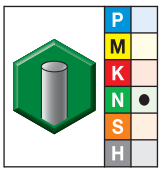




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 5102 • AluSurf



● first choice
○ alternate choice

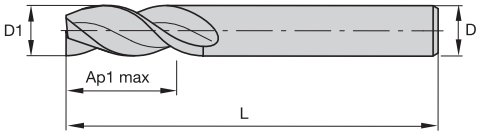
grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L
3484680	**510201500..**	1,5	3	6,00	38
3484681	**510202000..**	2,0	3	8,00	38
3484682	**510202500..**	2,5	3	9,00	38
3484683	**510203000..**	3,0	3	12,00	38
3107860	**510204001..**	4,0	4	12,00	50
3484684	**510205001..**	5,0	5	14,00	50
3484685	**510205002..**	5,0	6	14,00	50
3107859	**510206002..**	6,0	6	16,00	50
3484686	**510208003..**	8,0	8	20,00	63
3484687	**510210004..**	10,0	10	22,00	76
3484688	**510212005..**	12,0	12	25,00	76
3484689	**510214014..**	14,0	14	32,00	83
3484690	**510216006..**	16,0	16	32,00	89
3484691	**510218018..**	18,0	18	38,00	100
3484692	**510220007..**	20,0	20	38,00	104

- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



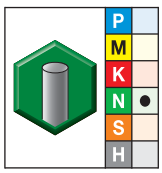




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 5103 • AluSurf



● first choice
○ alternate choice

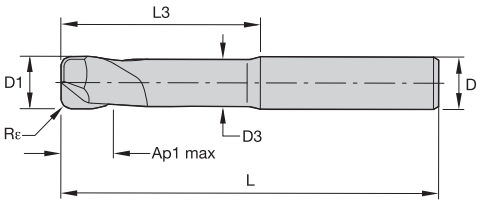
grade UNCOATED

order #	catalogue #	D1	D	length of cut Ap1 max	length L
3484693	510303000..	3,0	3	12,00	38
3484694	510304001..	4,0	4	12,00	50
3484695	510305001..	5,0	5	14,00	50
3484696	510306002..	6,0	6	16,00	50
3484697	510308003..	8,0	8	20,00	63
3484698	510310004..	10,0	10	22,00	76
3484699	510312005..	12,0	12	25,00	76
3484700	510314014..	14,0	14	32,00	83
3350935	510316006..	16,0	16	32,00	89
3484701	510318018..	18,0	18	38,00	100
3484702	510320007..	20,0	20	38,00	104

- Centre cutting.
- Unequal flute spacing.
- Wiper facet design for improved floor finishes.
- Standard items listed. Additional styles and coatings made-to-order.



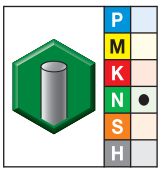




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 51N3 • AluSurf



grade UNCOATED

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
3484705	51N306022..	6,0	6	5,40	9,00	18,00	63	0,20
3484703	51N306002..	6,0	6	5,40	9,00	18,00	63	0,50
3484704	51N306012..	6,0	6	5,40	9,00	18,00	63	1,00
3484708	51N308023..	8,0	8	7,20	12,00	24,00	76	0,20
3484706	51N308003..	8,0	8	7,20	12,00	24,00	76	0,50
3484707	51N308013..	8,0	8	7,20	12,00	24,00	76	1,00
3484711	51N310024..	10,0	10	9,00	15,00	30,00	89	0,20
3484709	51N310004..	10,0	10	9,00	15,00	30,00	89	0,50
3484710	51N310014..	10,0	10	9,00	15,00	30,00	89	1,50
3484714	51N312025..	12,0	12	10,80	18,00	36,00	100	0,20
3484712	51N312005..	12,0	12	10,80	18,00	36,00	100	0,50
3484713	51N312015..	12,0	12	10,80	18,00	36,00	100	1,50
3484718	51N316036..	16,0	16	14,40	24,00	48,00	110	0,20
3484715	51N316006..	16,0	16	14,40	24,00	48,00	110	0,50
3484716	51N316016..	16,0	16	14,40	24,00	48,00	110	1,00
3484717	51N316026..	16,0	16	14,40	24,00	48,00	110	2,00
3484722	51N320037..	20,0	20	18,80	30,00	60,00	125	0,20
3484719	51N320007..	20,0	20	18,80	30,00	60,00	125	0,50
3484720	51N320017..	20,0	20	18,80	30,00	60,00	125	1,50
3484721	51N320027..	20,0	20	18,80	30,00	60,00	125	4,00

Series 5102 • AluSurf



Material Group		For Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed – vc m/min				D1 – Diameter								
		ap	ae	ap	min		max	mm	1,5	2,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,018	0,036	0,054	0,072	0,090	0,108	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,012	0,016	0,032	0,049	0,065	0,081	0,097	0,130	0,162

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 5103 • AluSurf



Material Group		For Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed – vc m/min				D1 – Diameter						
		ap	ae	ap	min		max	mm	3,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,027	0,054	0,072	0,090	0,108	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,024	0,049	0,065	0,081	0,097	0,130	0,162

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 51N3 • AluSurf



Material Group		For Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed – vc m/min				D1 – Diameter					
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,060	0,080	0,100	0,120	0,160	0,200
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,054	0,072	0,090	0,108	0,144	0,180

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

HP Aluminium End Mills Series



WIDIA™ solid carbide end mills provide maximum Metal Removal Rates (MRR) and superior surface quality while reducing machining time in aluminium. The centre cutting design allows for plunging, slotting, and profiling applications in any type of aluminium workpiece materials. The proprietary flute geometry is designed to deliver exceptional chip evacuation while generating floor-to-wall straightness, especially thin wall applications. With many styles to choose from, you can be sure WIDIA will have a solution for your non-ferrous applications.

- One tool for roughing and finishing operations.
- Capable of slotting depths up to 1 x D and side milling up to 1.5 x D axially at 0.5 x D radially (please follow application data for specific tool).
- Multiple corner radii and extended neck configurations available as standard.

HP Aluminium End Mills Series

- Increase your output due to less tool changes and increased Metal Removal Rates (MRR).
- No specific tools for roughing and finishing necessary.
- Less passes due to 1 x D slotting capability.
- Perfect for MQL (Minimum Quantity Lubrication) applications.

524149/022849 Series

- 1-flute, 30° helix.
- DLC coated option for abrasive aluminium and carbon.
- Uncoated for aluminium.
- Sharp corner configuration.



D502 Series

- 2-flute, 30° helix.
- TiAlN coated.
- Sharp corner configuration.



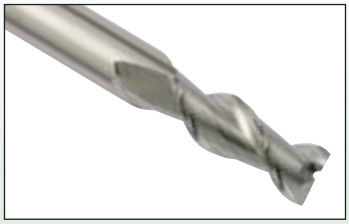
022814/422814/022817/422817 Series

- 2-flute, 45° helix.
- TiAlN coated option.
- Sharp corner configuration.



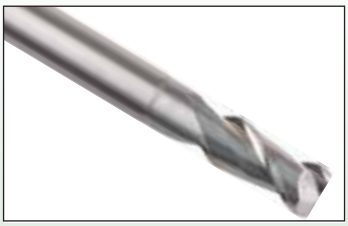
4102 Series

- 2-flute, 45° helix.
- Sharp corner configuration.



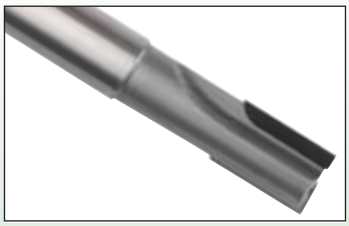
022852/524152 Series

- 2-flute, 45° helix.
- Unequal-flute spacing.
- DLC coated option for abrasive aluminium and carbon.
- Extended neck for long-reach applications.



024101 Series

- 2-flute, 0° helix.
- PCD tipped for aluminium, copper and carbon/graphite compositions.
- Sharp corner configuration.



4103 Series

- 3-flute, 37° helix.
- TiCN coated option.
- Sharp corner configuration.



4909 Series

- 3-flute, 40° helix.
- Coarse cord style roughing profile.
- Protective chamfer configuration.



4979 Series

- 3-flute, 40° helix.
- TiCN coated option.
- Chamfer pitch roughing profile.
- Protective chamfer configuration.



49N9 Series

- 3-flute, 40° helix.
- Coarse cord style roughing profile.
- Protective chamfer configuration.
- Extended neck for long-reach applications.



49G9 Series

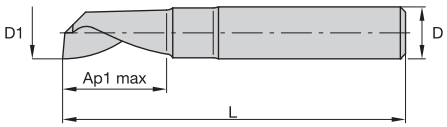
- 3-flute, 40° helix.
- TiCN coated option.
- Coarse cord style roughing profile.
- Protective chamfer configuration.
- Internal coolant for improved chip evacuation and higher tool life.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



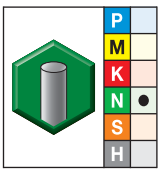




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 524149



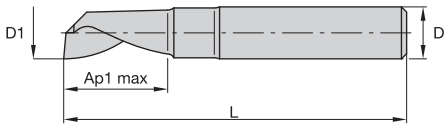
● first choice
○ alternate choice

grade K10F-DCL DLC					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
2651100	524149-000030	3,0	6	12,00	50
2651314	524149-000040	4,0	6	15,00	60
2651317	524149-000050	5,0	6	17,00	60
2651318	524149-000060	6,0	6	20,00	60
2651319	524149-000080	8,0	10	25,00	75
2651320	524149-000100	10,0	8	25,00	75
2651321	524149-000120	12,0	12	25,00	75

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



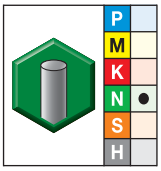




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 022849



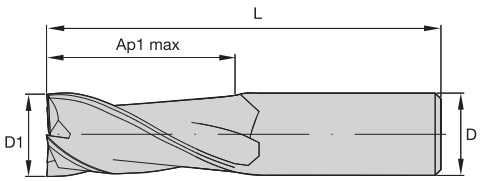
● first choice
○ alternate choice

grade K10F uncoated					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
2281545	022849-000020	2,0	2	10,00	40
2281546	022849-000030	3,0	3	10,00	40
2281547	022849-000040	4,0	4	14,00	50
2281548	022849-000050	5,0	5	16,00	60
2281549	022849-000060	6,0	6	20,00	60
2281550	022849-000080	8,0	8	25,00	75
2281551	022849-000100	10,0	10	25,00	75
2281552	022849-000120	12,0	12	25,00	75

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



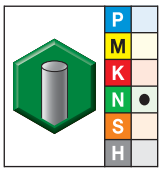


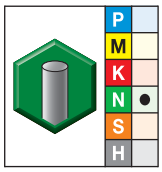


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D502





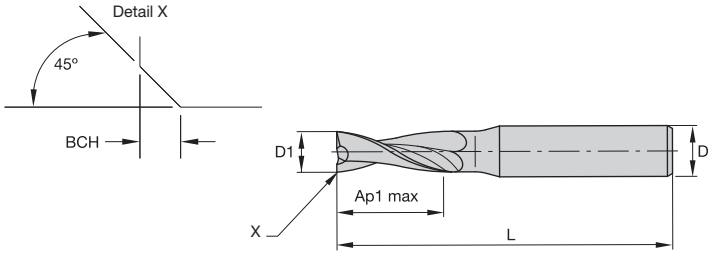
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN-RT TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1661526	D50203002..	1602233	D50203002RT	3,0	6	4,00	50
1661530	D50204002..	1602235	D50204002RT	4,0	6	5,00	54
1661534	D50205002..	1602236	D50205002RT	5,0	6	6,00	54
1661538	D50206002..	1661540	D50206002RT	6,0	6	7,00	54
1661543	D50208003..	1602239	D50208003RT	8,0	8	9,00	58
1661547	D50210004..	1602240	D50210004RT	10,0	10	11,00	66
1661551	D50212005..	1602251	D50212005RT	12,0	12	12,00	73
1661555	D50214014..		–	14,0	14	14,00	75
1661560	D50216006..	1602252	D50216006RT	16,0	16	16,00	82
1661569	D50220007..		–	20,0	20	20,00	92

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



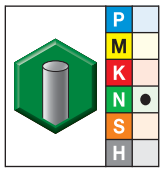


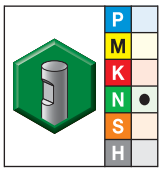


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 022814 022817





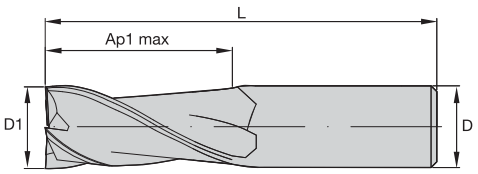
● first choice
○ alternate choice

grade K10F uncoated		grade K10F uncoated						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2332369	022814-000040	2332410	022817-000040	4,0	6	8,00	57	0,10
2332370	022814-000050	2332411	022817-000050	5,0	6	10,00	57	0,10
2332371	022814-000060	2332412	022817-000060	6,0	6	10,00	57	0,10
2332372	022814-000080	2332413	022817-000080	8,0	8	16,00	63	0,10
2332373	022814-000100	2332414	022817-000100	10,0	10	19,00	72	0,10
2332374	022814-000120	2332415	022817-000120	12,0	12	22,00	83	0,20
2332375	022814-000140	2332416	022817-000140	14,0	14	22,00	83	0,20
2332376	022814-000160	2332417	022817-000160	16,0	16	26,00	92	0,20
2332377	022814-000180	2332418	022817-000180	18,0	18	26,00	92	0,20
2332378	022814-000200	2332419	022817-000200	20,0	20	32,00	104	0,20

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



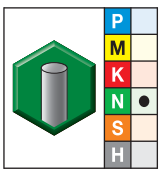




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 4102



grade UNCOATED

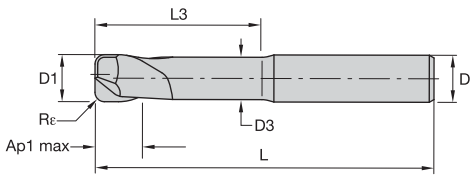
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656432	410201000..	1,0	3	4,00	38
1656436	410201500..	1,5	3	6,00	38
1656440	410202000..	2,0	3	8,00	38
1656444	410202500..	2,5	3	9,00	38
1656448	410203000..	3,0	3	12,00	38
1656454	410204001..	4,0	4	12,00	50
1656458	410205001..	5,0	5	14,00	50
1656459	410205002..	5,0	6	14,00	50
1656464	410206002..	6,0	6	16,00	50
1656468	410208003..	8,0	8	20,00	63
1656473	410210004..	10,0	10	22,00	76
1656478	410212005..	12,0	12	25,00	76
1656484	410214014..	14,0	14	32,00	83
1656488	410216006..	16,0	16	32,00	89
1656492	410218018..	18,0	18	38,00	100
1656496	410220007..	20,0	20	38,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



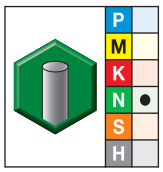


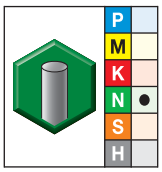


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 022852 524152





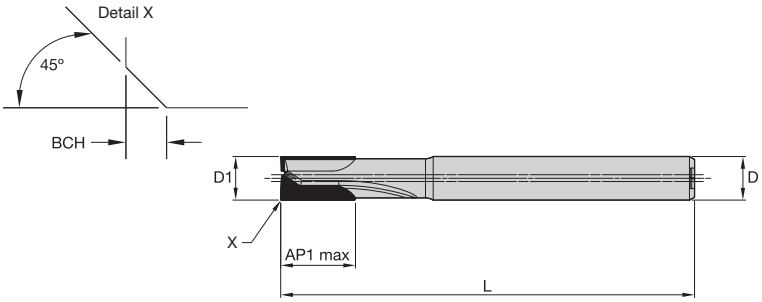
● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCL DLC								
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2635004	022852-003005	2635131	524152-003005	3,0	6	2,80	7,00	16,00	57	0,50
2635006	022852-004005	2635153	524152-004005	4,0	6	3,80	8,00	16,00	57	0,50
2635010	022852-004010	2635155	524152-004010	4,0	6	3,80	8,00	16,00	57	1,00
2635063	022852-005005	2635156	524152-005005	5,0	6	4,70	10,00	16,00	57	0,50
2635065	022852-005010	2635157	524152-005010	5,0	6	4,70	10,00	16,00	57	1,00
2635068	022852-006005	2635158	524152-006005	6,0	6	5,70	10,00	19,00	57	0,50
2635072	022852-006010	2635161	524152-006010	6,0	6	5,70	10,00	19,00	57	1,00
2635094	022852-006020	2635162	524152-006020	6,0	6	5,70	10,00	19,00	57	2,00
2635097	022852-008005	2635173	524152-008005	8,0	8	7,70	16,00	25,00	63	0,50
2635100	022852-008010	2635175	524152-008010	8,0	8	7,70	16,00	25,00	63	1,00
2635101	022852-008020	2635176	524152-008020	8,0	8	7,70	16,00	25,00	63	2,00
2635103	022852-010005	2635180	524152-010005	10,0	10	9,70	19,00	30,00	72	0,50
2635104	022852-010010	2635181	524152-010010	10,0	10	9,70	19,00	30,00	72	1,00
2635107	022852-010020	2635193	524152-010020	10,0	10	9,70	19,00	30,00	72	2,00
2635109	022852-012005	2635344	524152-012005	12,0	12	11,70	22,00	36,00	83	0,50
2635110	022852-012010		–	12,0	12	11,70	22,00	36,00	83	1,00
2635124	022852-012020	2635348	524152-012020	12,0	12	11,70	22,00	36,00	83	2,00
2635127	022852-016005	2635349	524152-016005	16,0	16	15,70	26,00	42,00	92	0,50
2635128	022852-016010	2635350	524152-016010	16,0	16	15,70	26,00	42,00	92	1,00
2635129	022852-016020	2635351	524152-016020	16,0	16	15,70	26,00	42,00	92	2,00
2635130	022852-016030	2635383	524152-016030	16,0	16	15,70	26,00	42,00	92	3,00

- Centre cutting.
- PCD tipped.
- Through coolant.
- Standard items listed. Additional styles and coatings made-to-order.



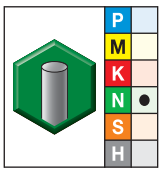




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
All	+0,03/-0,03	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 024101



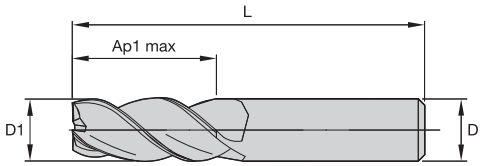
● first choice
○ alternate choice

grade UNCOATED Diamond						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
2333086	024101-000060	6,0	6	10,00	57	0,08
2333087	024101-000080	8,0	8	15,00	63	0,10
2333088	024101-000100	10,0	10	15,00	72	0,12

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



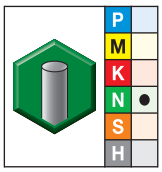


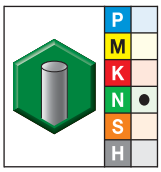


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	0/0,006	≤ 3	0/0,006
> 3–6	0/0,008	> 3–6	0/0,008
> 6–10	0/0,009	> 6–10	0/0,009
> 10–18	0/0,011	> 10–18	0/0,011
> 18–30	0/0,013	> 18–30	0/0,013

Series 4103





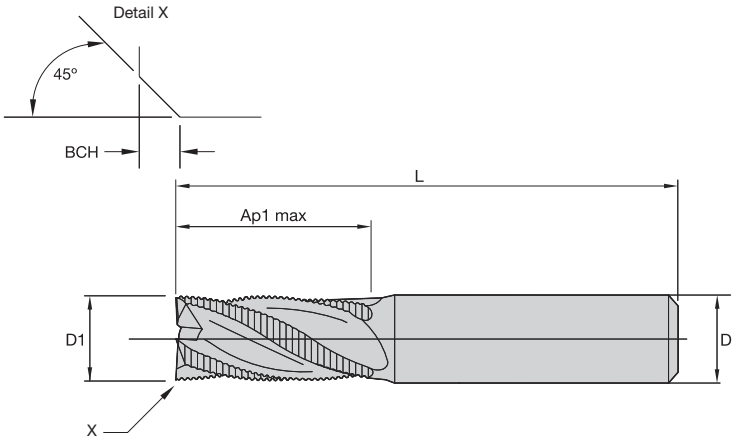
● first choice
○ alternate choice

grade UNCOATED		grade TiCN-CT TiCN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
1656500	410303000..	1902322	410303000CT	3,0	3	12,00	38
1656501	410304001..	1656502	410304001CT	4,0	4	12,00	50
1656503	410304002..	–		4,0	6	12,00	50
1656504	410305001..	1902576	410305001CT	5,0	5	14,00	50
1656505	410305002..	1905949	410305002CT	5,0	6	14,00	50
1656506	410306002..	1656507	410306002CT	6,0	6	16,00	50
1656508	410308003..	1656509	410308003CT	8,0	8	20,00	63
1656510	410310004..	1902578	410310004CT	10,0	10	22,00	76
1656511	410312005..	1902579	410312005CT	12,0	12	25,00	76
1656512	410314014..	1902593	410314014CT	14,0	14	32,00	83
1656513	410316006..	1902594	410316006CT	16,0	16	32,00	89
1656514	410318018..	1902595	410318018CT	18,0	18	38,00	100
1656515	410320007..	1902596	410320007CT	20,0	20	38,00	104

- Centre cutting.
- Coarse pitch.
- Standard items listed. Additional styles and coatings made-to-order.



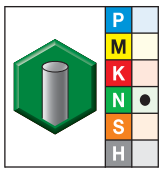


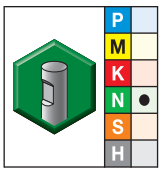


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 4909





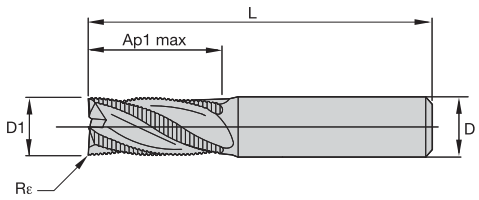
● first choice
○ alternate choice

grade UNCOATED		grade UNCOATED-WW						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
1657125	490906002..	1657126	490906002WW	6,0	6	13,00	57	0,06
1657127	490908003..	1657128	490908003WW	8,0	8	16,00	63	0,06
1657129	490910004..	1657131	490910004WW	10,0	10	22,00	72	0,06
1657132	490912005..	1657134	490912005WW	12,0	12	26,00	83	1,00
1657136	490914014..	1657137	490914014WW	14,0	14	26,00	83	1,00
1657138	490916006..	1657140	490916006WW	16,0	16	32,00	92	1,00
1657142	490918018..	1657143	490918018WW	18,0	18	32,00	92	1,00
1657144	490920007..	1657145	490920007WW	20,0	20	38,00	104	1,00
1657146	490925008..	1657148	490925008WW	25,0	25	45,00	121	1,00

- Centre cutting.
- Chamfered pitch.
- Standard items listed. Additional styles and coatings made-to-order.



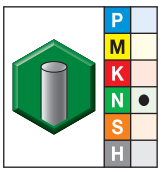


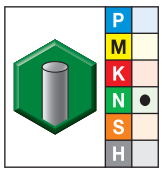


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 4979





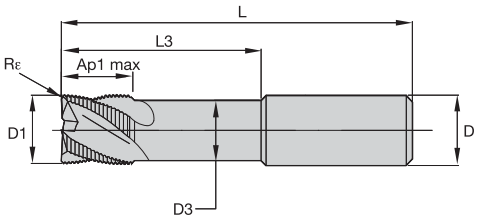
● first choice
○ alternate choice

grade UNCOATED		grade TiCN-CT TiCN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1858322	497906002..	1858423	497906002CT	6,0	6	13,00	57	0,25
1858424	497908003..	1858425	497908003CT	8,0	8	16,00	63	0,25
1858426	497910004..	1858427	497910004CT	10,0	10	22,00	72	0,50
1858428	497912005..	1858430	497912005CT	12,0	12	26,00	83	0,50
1858434	497916006..	1858437	497916006CT	16,0	16	32,00	92	1,00
1858441	497920007..	1858463	497920007CT	20,0	20	38,00	104	1,00
1858465	497925008..	1858466	497925008CT	25,0	25	45,00	121	1,50

- Centre cutting.
- Chamfered pitch.
- Standard items listed. Additional styles and coatings made-to-order.



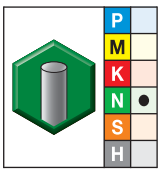




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 49N9



● first choice
○ alternate choice

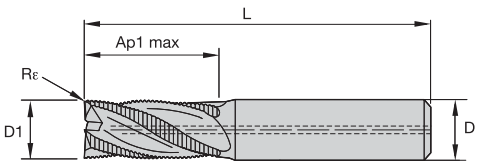
grade UNCOATED

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2510324	49N906002..	6,0	6	5,00	8,00	18,00	57	0,25
2510325	49N908003..	8,0	8	7,00	10,00	24,00	63	0,25
2510326	49N910004..	10,0	10	9,00	12,00	30,00	72	0,50
2510327	49N912005..	12,0	12	11,00	15,00	36,00	83	0,50
2510328	49N916006..	16,0	16	14,80	20,00	48,00	92	1,00
2510329	49N920007..	20,0	20	18,70	24,00	60,00	104	1,00

- Centre cutting.
- Chamfered pitch.
- Through coolant.
- Standard items listed. Additional styles and coatings made-to-order.



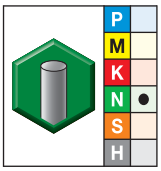


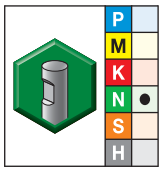


End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 49G9





● first choice
○ alternate choice

grade TiCN-CT TiCN		grade TiCN-CW TiCN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
1859874	49G908003CT	1902489	49G908003CW	8,0	8	16,00	63	0,25
1859875	49G910004CT	1902490	49G910004CW	10,0	10	22,00	72	0,50
1859876	49G912005CT	1902491	49G912005CW	12,0	12	26,00	83	0,50
1859877	49G916006CT	1902492	49G916006CW	16,0	16	32,00	92	1,00
1859878	49G920007CT	1902493	49G920007CW	20,0	20	38,00	104	1,00
1859879	49G925008CT	1902494	49G925008CW	25,0	25	45,00	121	1,50

Series 524149





Material Group		Side Milling (A) and Slotting (B)			K10F-DCL DLC			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	fz	0,021	0,028	0,035	0,042	0,056	0,070	0,084
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,019	0,025	0,032	0,038	0,050	0,063	0,076
	3	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,017	0,022	0,028	0,034	0,045	0,056	0,067
	4	1,2 x D	0,5 x D	1 x D	250	–	750	fz	0,015	0,020	0,025	0,029	0,039	0,049	0,059
	6	1,2 x D	0,5 x D	1 x D	100	–	500	fz	0,021	0,028	0,035	0,042	0,056	0,070	0,084

NOTE: For better surface finish, reduce feed per tooth.

Application Data • Series 022849

Series 022849





Material Group		Side Milling (A) and Slotting (B)			K10F uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,021	0,028	0,035	0,042	0,056	0,070	0,084
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	fz	0,011	0,017	0,022	0,028	0,034	0,045	0,056	0,067

NOTE: For better surface finish, reduce feed per tooth.

Application Data • Series D502

Series D502

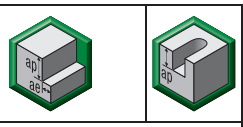




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	500	–	2000	fz	0,027	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,162
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,019	0,025	0,032	0,038	0,050	0,063	0,076	0,088	0,101	0,126
	4	1,5 x D	0,5 x D	1 x D	400	–	750	400	–	750	fz	0,022	0,029	0,036	0,043	0,058	0,072	0,086	0,101	0,115	0,144
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	250	–	1000	fz	0,024	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,162

NOTE: For cutting aluminium with high silicon, TiAlN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 022814 022817

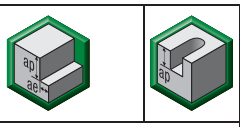




Material Group		Side Milling (A) and Slotting (B) A ap	ae	B ap	K10F uncoated Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. mm	D1 — Diameter 4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,036	0,045	0,054	0,072	0,090	0,108	0,126	0,144	0,162	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,025	0,032	0,038	0,050	0,063	0,076	0,088	0,101	0,113	0,126
	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,029	0,036	0,043	0,058	0,072	0,086	0,101	0,115	0,130	0,144
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,032	0,041	0,049	0,065	0,081	0,097	0,113	0,130	0,146	0,162

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 4102





Material Group		Side Milling (A) and Slotting (B) A ap	ae	B ap	uncoated Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. mm	D1 — Diameter 1,5	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,014	0,018	0,027	0,036	0,054	0,072	0,090	0,108	0,144	0,162	0,180
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,012	0,016	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,146	0,162
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,009	0,013	0,019	0,025	0,038	0,050	0,063	0,076	0,101	0,113	0,126
	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,011	0,014	0,022	0,029	0,043	0,058	0,072	0,086	0,115	0,130	0,144
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,012	0,016	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,146	0,162

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 022852 524152



Material Group		Side Milling (A) and Slotting (B)			K10F uncoated			K10F–DCL DLC			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	14,0	16,0
N	1	1,2 x D	0,5 x D	1 x D	500	–	2000	500	–	2000	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,098	0,112
	2	1,2 x D	0,5 x D	1 x D	500	–	1500	500	–	1500	fz	0,019	0,025	0,038	0,050	0,063	0,076	0,088	0,101
	3	1,2 x D	0,5 x D	1 x D	–	–	–	500	–	1500	fz	0,017	0,022	0,034	0,045	0,056	0,067	0,078	0,090
	4	1,2 x D	0,5 x D	1 x D	–	–	–	400	–	750	fz	0,015	0,020	0,029	0,039	0,049	0,059	0,069	0,078
	6	1,2 x D	0,5 x D	1 x D	–	–	–	750	–	1200	fz	0,021	0,028	0,042	0,056	0,070	0,084	0,098	0,112

NOTE: For cutting aluminium with high silicon, DLC coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0.5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 024101



Material Group		Side Milling (A) and Slotting (B)			PCD PCD–PT			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		A		B	Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	
N	2	1 x D	0,5 x D	0,7 x D	400	–	2500	fz	0,055	0,075	0,095	0,100	
	3	1 x D	0,5 x D	0,7 x D	300	–	1500	fz	0,055	0,075	0,095	0,100	
	4	1 x D	0,5 x D	0,7 x D	500	–	3000	fz	0,055	0,075	0,095	0,100	
	5	1 x D	0,5 x D	0,7 x D	200	–	1000	fz	0,055	0,075	0,095	0,100	
	6	1 x D	0,5 x D	0,7 x D	400	–	800	fz	0,055	0,075	0,095	0,100	

Series 4103

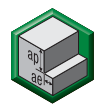




Material Group		Side Milling (A) and Slotting (B)			uncoated			TiCN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	1	1 x D	0,5 x D	0,7 x D	500	–	2000	500	–	2000	fz	0,027	0,036	0,054	0,072	0,090	0,108	0,144	0,180
	2	1 x D	0,5 x D	0,7 x D	500	–	1500	500	–	1500	fz	0,024	0,032	0,049	0,065	0,081	0,097	0,130	0,162

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0.5.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 4909





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	max	6,0	8,0	10,0	12,0	16,0	20,0	25,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,066	0,088	0,110	0,132	0,176	0,220	0,275
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,059	0,079	0,099	0,119	0,158	0,198	0,248

NOTE: For cutting aluminium with high silicon TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 4979





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1,5 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1,5 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1,5 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1,5 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 49N9





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

NOTE: For cutting aluminium with high silicon, TiCN coating is recommended.
Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 49G9

Material Group														
		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,072	0,096	0,120	0,144	0,192	0,216	0,240
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216
	3	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,050	0,067	0,084	0,101	0,134	0,151	0,168
	4	1 x D	0,5 x D	1 x D	400	–	750	fz	0,058	0,077	0,096	0,115	0,154	0,173	0,192
	5	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,065	0,086	0,108	0,130	0,173	0,194	0,216

NOTE: Multiply ap for milling machine spindle with ceramic bearings by 0,5.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

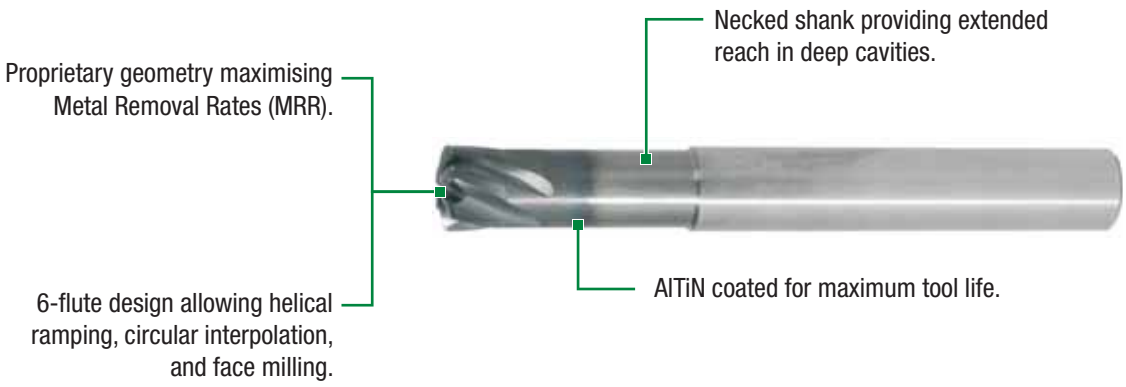
X-Feed™ End Mills for High-Feed Milling



X-Feed

X-Feed significantly reduces manufacturing time machining heat-treated steels up to 67 HRC hardness, having 50% more effective cutting edges than regular solid carbide tooling. X-Feed combines roughing and semi-finishing into one operation by taking shallow depths-of-cut at extremely high feed rates, maximising Metal Removal Rates (MRR). X-Feed, which has a 3 x D neck and extended reach design, is perfectly suited for pocketing using 3D machining techniques such as ramping and helical interpolation. During face milling, the proprietary front-end geometry of X-Feed is entirely in contact with the workpiece, providing up to 55% engagement compared to the regular 5–10% provided by ball nose-type tooling.

- Proprietary 6-flute design for high productivity.
- One tool for roughing and semi-finishing operations.
- Covering hardened materials ranging from 37–67 HRC with two dedicated geometries.
- Custom solutions tailored for machining titanium and other high-temperature alloys available.



X-Feed™ Series

- Significantly reduces manufacturing time in machining hardened steels.
- Providing the benefits of indexable style high-feed milling starting from as small as 6mm.
- Increases your capability to perform 3D machining, helical ramping, circular interpolation, face milling, and pocketing.
- One tool for roughing and semi-finishing.

70N6 Series

- 6-flute.
- Extended neck for long-reach applications.
- Applicable for hardened steels from 40–52 HRC.



70N7 Series

- 6-flute.
- Extended neck for long-reach applications.
- Applicable for hardened steels from 50–67 HRC.



Operation Pocket Milling

Customer: Die and Mould Manufacturer

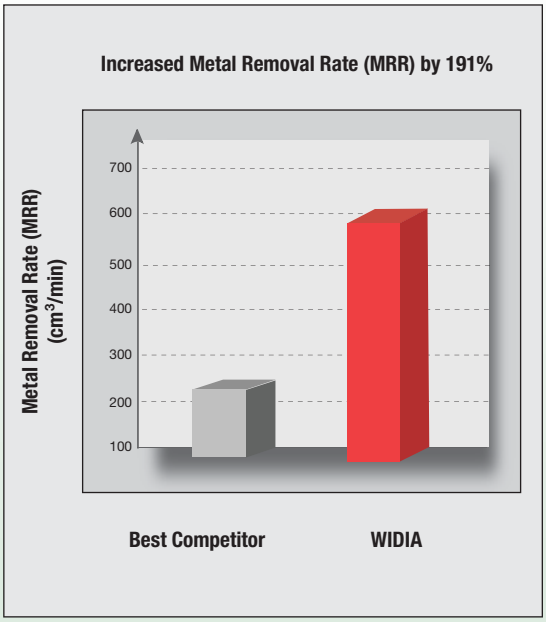
Material: AISI 4340 hardened steel (52 HRc)

Workpiece: Mould

Results:
- 3x better Metal Removal Rate (MRR) than competitive tool!
- Machined at more than 3x faster feed!

	COMPETITOR	WIDIA™
tool:	6-flute H/P for die & mould	70N612005MT
material:	medium-hardened steel (52 HRc)	medium-hardened steel (52 HRc)
surface speed:	120 m/min	160 m/min
feed per tooth:	0,34mm	0,34mm
depth of cut:	0,8mm	0,6mm
table feed:	4,331 mm/min	15,287 mm/min
metal removal rate:	22,8 cm^3	60,5 cm^3

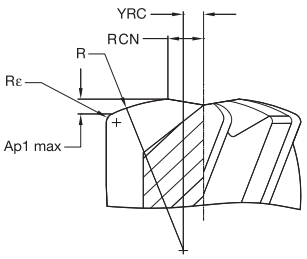
Individual results may vary.

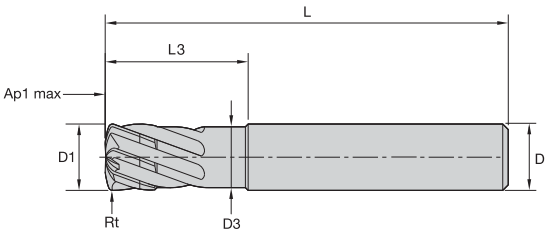


- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





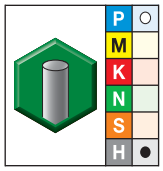




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N6 71N6 • 37–52 HRC • Vision Plus X-Feed



grade AlTiN-MT1
AlTiN

● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	Rt
3745400	71N606002MT	6,0	6	5,50	0,32	9,00	57	0,38	0,62
3341346	70N606002MT	6,0	6	5,50	0,32	18,00	63	0,38	0,62
3745401	71N608003MT	8,0	8	7,50	0,42	12,00	63	0,50	0,83
3341348	70N608003MT	8,0	8	7,50	0,42	24,00	76	0,50	0,83
3745402	71N610004MT	10,0	10	9,00	0,53	15,00	72	0,63	1,04
3101466	70N610004MT	10,0	10	9,00	0,53	30,00	89	0,63	1,04
3745413	71N612005MT	12,0	12	11,00	0,63	18,00	83	0,75	1,24
3101467	70N612005MT	12,0	12	11,00	0,63	36,00	100	0,75	1,24
3484748	70N616006MT	16,0	16	15,00	0,84	48,00	110	1,00	1,66
3484749	70N620007MT	20,0	20	19,00	1,05	60,00	125	1,25	2,07

NOTE: YRC = distance from centre line to the crown of the R radius.
RCN = distance from centre line to the start of the cutting edge. This dimension can also help determine the minimum circle size when helical ramping.
R = the head radius size.
Rε = the shoulder radius or radius at the corner of the cutter.

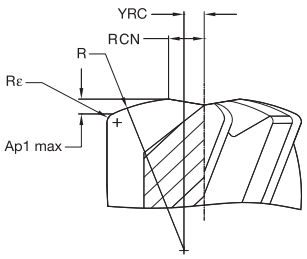
Programming Data

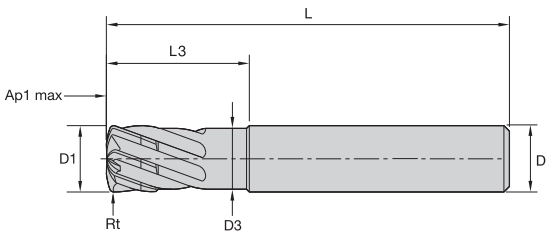
Tool List 70N6															
Geometrical Parameters									Ramping Guide for Circular and Linear Interpolation						
									Circular Interpolation		Linear Interpolation				
									Allowed Range of Hole Diameter		Calculated Length (mm) per Ramp Angle				
diameter	Ap1 max	Rfm	Rt	Rc	Xfm	Yfm	YD	Number			Ramp Angle (degree)				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	flutes	Smallest	Largest	1	2	3	4	5
6	0,32	6	0,62	0,375	0,32	0,75	1,32	6	8,64	12	18,12	9,06	6,03	4,52	3,61
8	0,42	8	0,83	0,500	0,42	1,00	1,76	6	11,52	16	24,16	12,08	8,05	6,03	4,82
10	0,53	10	1,04	0,625	0,53	1,25	2,20	6	14,4	20	30,20	15,09	10,06	7,54	6,02
12	0,63	12	1,24	0,750	0,63	1,50	2,64	6	17,28	24	36,24	18,11	12,07	9,05	7,23
16	0,84	16	1,66	1,000	0,84	2,00	3,52	6	23,04	32	48,31	24,15	16,09	12,06	9,64
20	1,05	20	2,07	1,250	1,05	2,50	4,40	6	28,8	40	60,39	30,19	20,11	15,08	12,05
Recommended Feed											100%	70%	50%	30%	10%

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.





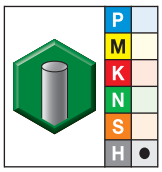




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N7 • >52 HRC • Vision Plus X-Feed



● first choice
○ alternate choice

order #	catalogue #	grade AlTiN-MT1 AlTiN D1	D	D3	length of cut Ap1 max	L3	length L	Rε	Rt
3484756	**70N706002MT**	6,0	6	5,50	0,20	18,00	63	0,38	0,58
3484757	**70N708003MT**	8,0	8	7,50	0,27	24,00	76	0,50	0,77
3484758	**70N710004MT**	10,0	10	9,00	0,33	30,00	89	0,63	0,96
3403492	**70N712005MT**	12,0	12	11,00	0,40	36,00	100	0,75	1,15
3477329	**70N716006MT**	16,0	16	15,00	0,54	48,00	110	1,00	1,54
3484759	**70N720007MT**	20,0	20	19,00	0,67	60,00	125	1,25	1,92

NOTE: YRC = distance from centre line to the crown of the R radius.
RCN = distance from centre line to the start of the cutting edge. This dimension can also help determine the minimum circle size when helical ramping.
R = the head radius size.
Rε = the shoulder radius or radius at the corner of the cutter.

Programming Data

Tool List 70N7															
Geometrical Parameters									Ramping Guide for Circular and Linear Interpolation						
									Circular Interpolation		Linear Interpolation				
									Allowed Range of Hole Diameter		Calculated Length (mm) per Ramp Angle				
diameter	Ap1 max	Rfm	Rt	Rc	Xfm	Yfm	YD	Number			Ramp Angle (degree)				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	flutes	Smallest	Largest	1	2	3	4	5
6	0,20	9	0,58	0,375	0,20	0,75	1,26	6	8,52	12	11,51	5,75	3,83	2,87	2,30
8	0,27	12	0,77	0,500	0,27	1,00	1,68	6	11,36	16	15,34	7,67	5,11	3,83	3,06
10	0,33	15	0,96	0,625	0,33	1,25	2,10	6	14,2	20	19,18	9,58	6,39	4,79	3,83
12	0,40	18	1,15	0,750	0,40	1,50	2,52	6	17,04	24	23,01	11,50	7,66	5,74	4,59
16	0,54	24	1,54	1,000	0,54	2,00	3,36	6	22,72	32	30,68	15,34	10,22	7,66	6,12
20	0,67	30	1,92	1,250	0,67	2,50	4,20	6	28,4	40	38,35	19,17	12,77	9,57	7,65
Recommended Feed											100%	70%	50%	30%	10%

Series 70N6 71N6 • Vision Plus X-Feed

Material Group													
		Profile Milling		AlTiN			Recommended Feed Per Tooth (fz = mm/th) for 3D milling/profiling (A)						
		A		Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
P	4	0,05 x D	0,55 x D	160	–	180	fz	0,300	0,500	0,500	0,500	0,600	0,700
H	1	0,05 x D	0,55 x D	140	–	160	fz	0,300	0,500	0,500	0,500	0,600	0,700
	2	0,05 x D	0,55 x D	100	–	120	fz	0,200	0,300	0,300	0,400	0,500	0,600

NOTE: Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters on diameters >12mm.

Series 70N7 • Vision Plus X-Feed

Material Group												
		Profile Milling		AlTiN			Recommended Feed Per Tooth (fz = mm/th) for 3D milling/profiling (A)					
		A		Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0
H	2	0,03 x D	0,55 x D	100	–	120	fz	0,200	0,300	0,300	0,400	0,500	0,600
	3	0,03 x D	0,55 x D	80	–	100	fz	0,200	0,300	0,300	0,400	0,500	0,600
	4	0,03 x D	0,55 x D	50	–	70	fz	0,150	0,200	0,250	0,300	0,400	0,500

NOTE: Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

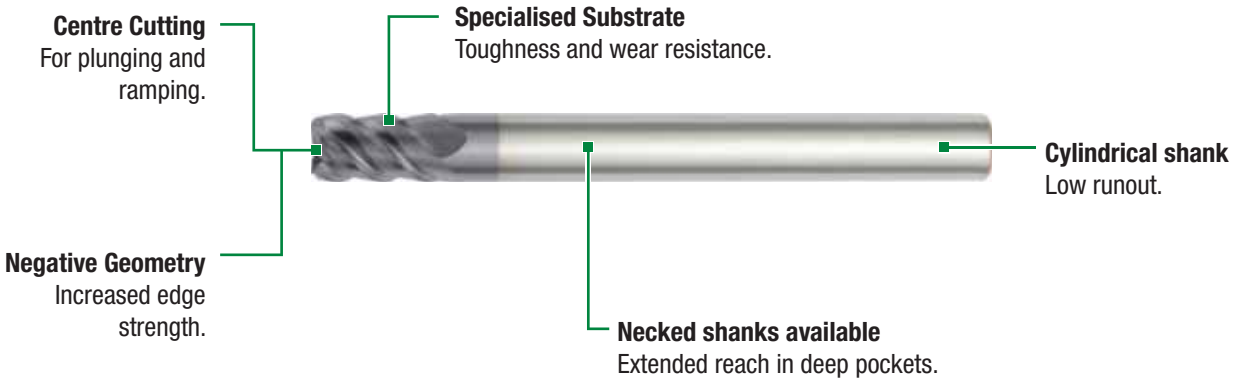
High-Performance Solid Carbide End Mills •
Vision Plus™

Vision Plus



Engineered to machine hardened steels up to 67 HRC at extreme speeds and feeds, Vision Plus solid carbide end mills are designed with a special substrate and geometries to extend tool life and lower manufacturing costs. Vision Plus end mills offer a complete portfolio for the die and mould industry or any application that requires machining of hardened workpiece materials. Vision Plus end mills will make your next application in hardened materials more productive and efficient.

- Capable of machining hardened steels up to 67 HRC.
- Complete line of Vision Plus micro end mills.
- Unique design allows higher feeds and speeds, increasing Metal Removal Rates (MRR).
- Wide range of diameters from 0,3–25mm.
- AlTiN Coating for maximum wear resistance.

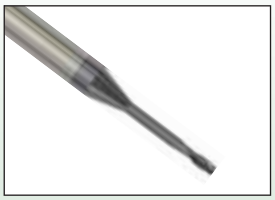


Vision Plus™ Series

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

7N02 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Extended neck for long-reach applications.
- JIS.
- Sharp corner.
- 0,3–3,1mm diameter range.



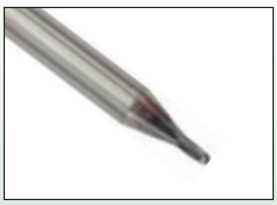
423034 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- 0,5–3mm diameter range.



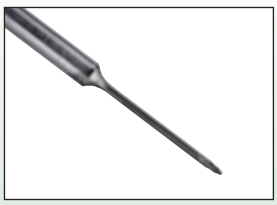
7N01 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- JIS.
- 0,3–6mm diameter range.



7N21 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 0,5–3mm diameter range.



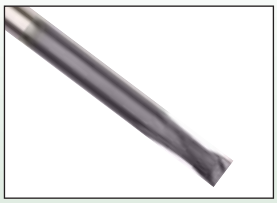
75N2 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Extended neck for long-reach applications.
- 3–12mm diameter range.



422875 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Extended neck for long-reach applications.
- Torus corner.
- 2–12mm diameter range.



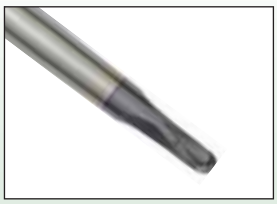
7151 Series

- Centre cutting.
- 2-flute.
- 15° helix.
- Ball nose.
- 1–20mm diameter range.



7061 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–12mm diameter range.



(continued)

Vision Plus™ Series *(continued)*

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

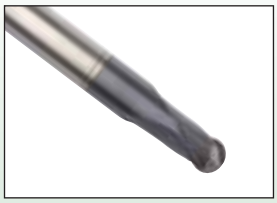
70N1 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–12mm diameter range.



422869 Series

- Centre cutting.
- 2-flute.
- 30° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 1–16mm diameter range.



422870 Series

- Centre cutting.
- 2-flute.
- 20° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 2–12mm diameter range.



422873 Series

- Centre cutting.
- 2-flute.
- 0° helix.
- Extended neck for long-reach applications.
- 3–10mm diameter range.



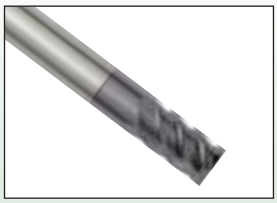
7505 Series

- Centre cutting.
- 4-,5-, and 6-flutes.
- 50° helix.
- Sharp corner.
- 3–25mm diameter range.



7585 Series

- Centre cutting.
- 4- and 5-flutes.
- 50° helix.
- Radii corner.
- 3–25mm diameter range.



75N5 Series

- Centre cutting.
- 4- and 5-flutes.
- 50° helix.
- Sharp corner and radii.
- Extended neck for long-reach applications.
- 3–25mm diameter range.



75N8

- Centre cutting.
- 6-flute.
- 50° helix.
- JIS.
- Radii corner.
- Extended neck for long-reach applications.
- 3–25mm diameter range.



(continued)

Vision Plus™ Series *(continued)*

- Machine hardened materials up to 67 HRC.
- Long overall length for deep-reach applications.
- Reinforced core for better rigidity.
- High helix for better surface finishes.

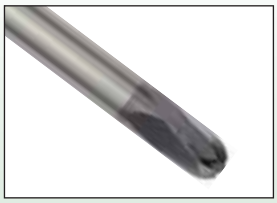
422876 422878 Series

- Centre cutting.
- 4-flute.
- 20° helix.
- Torus style.
- Extended neck for long-reach applications.
- 4–12mm diameter range.



7150 Series

- Centre cutting.
- 4-flute.
- 15° helix.
- Ball nose.
- 2–20mm diameter range.



7050 7060 Series

- Centre cutting.
- 4-flute.
- 15° helix.
- Ball nose.
- Extended neck for long-reach applications.
- 2–20mm diameter range.



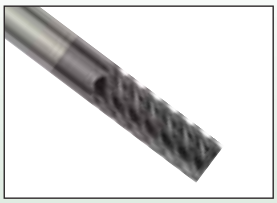
422871 Series

- Centre cutting.
- 4-flute.
- 30° helix.
- Taper ball nose for extended reach.
- 3–10mm diameter range.



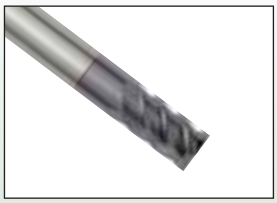
D618 Series

- Centre cutting.
- 4- and 6-flutes.
- 50° helix.
- Sharp corner.
- 3–20mm diameter range.



422837 422831 Series

- Non-centre cutting.
- 6- and 8-flutes.
- 45° helix.
- Radii corner.
- 6–25mm diameter range.



7670 Series

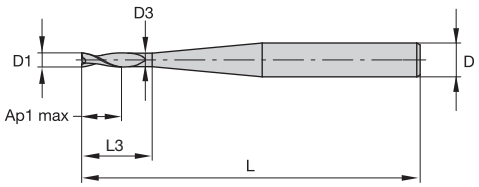
- Centre cutting.
- 3-, 4- and 6-flutes.
- 45° helix.
- Radii corner.
- Rougher profile.
- 4–mm diameter range.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



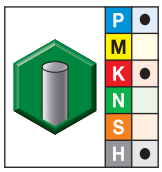


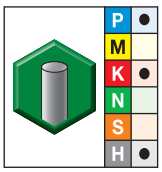


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N02 7N12 7N22 • Vision Plus Micro



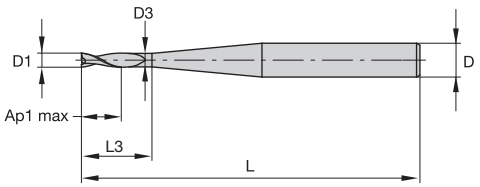


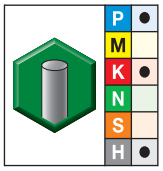
● first choice
○ alternate choice

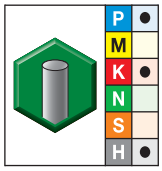
grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321518	7N0200302MJ	2256390	7N0200302RJ	0,3	6	0,84	0,40	0,40	50
3321529	7N2200400MJ	2256438	7N2200400RJ	0,4	3	0,34	0,60	2,00	38
3321530	7N2200410MJ	2256439	7N2200410RJ	0,4	3	0,34	0,60	4,00	38
	–	2256391	7N0200402RJ	0,4	6	0,84	0,60	0,60	50
3089244	7N0200402MJ		–	0,4	6	–	0,60	0,60	50
3321531	7N2200500MJ	2256440	7N2200500RJ	0,5	3	0,44	0,70	2,00	38
3321532	7N2200510MJ	2256441	7N2200510RJ	0,5	3	0,44	0,70	4,00	38
3321533	7N2200520MJ	2256442	7N2200520RJ	0,5	3	0,44	0,70	6,00	38
3321519	7N0200502MJ	2256392	7N0200502RJ	0,5	6	0,44	0,70	1,50	50
3089248	7N1200502MJ	2256403	7N1200502RJ	0,5	6	0,44	0,70	2,50	60
3321534	7N2200600MJ	2256443	7N2200600RJ	0,6	3	0,54	0,90	2,00	38
3321535	7N2200610MJ	2256444	7N2200610RJ	0,6	3	0,54	0,90	4,00	38
3321536	7N2200620MJ	2256445	7N2200620RJ	0,6	3	0,54	0,90	6,00	38
3321520	7N0200602MJ	2256393	7N0200602RJ	0,6	6	0,54	0,90	1,80	50
3089249	7N1200602MJ	2256404	7N1200602RJ	0,6	6	0,54	0,90	3,00	60
3321537	7N2200701MJ	2256446	7N2200701RJ	0,7	4	0,64	1,00	2,00	50
3321538	7N2200711MJ	2256447	7N2200711RJ	0,7	4	0,64	1,00	4,00	50
3321539	7N2200721MJ	2256448	7N2200721RJ	0,7	4	0,64	1,00	6,00	50
3321540	7N2200801MJ	2256449	7N2200801RJ	0,8	4	0,74	1,20	4,00	50
3321541	7N2200811MJ	2256450	7N2200811RJ	0,8	4	0,74	1,20	6,00	50
3321542	7N2200821MJ	2256451	7N2200821RJ	0,8	4	0,74	1,20	8,00	50
3321521	7N0200802MJ	2256394	7N0200802RJ	0,8	6	0,74	1,20	2,40	50
3089250	7N1200802MJ	2256405	7N1200802RJ	0,8	6	0,74	1,20	4,00	60
3321543	7N2200901MJ	2256452	7N2200901RJ	0,9	4	0,84	1,35	6,00	50

(continued)

(Series 7N02 7N12 7N22 • Vision Plus Micro — continued)





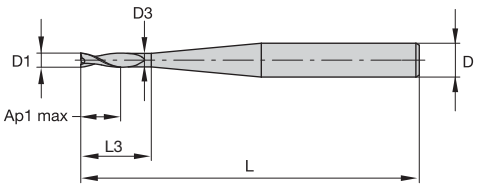


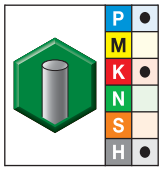
● first choice
○ alternate choice

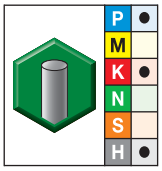
grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN					length of cut		length
order #	catalogue #	order #	catalogue #	D1	D	D3	Ap1 max	L3	L
3321544	7N2200911MJ	2256453	7N2200911RJ	0,9	4	0,84	1,35	8,00	50
3321545	7N2200921MJ	2256454	7N2200921RJ	0,9	4	0,84	1,35	10,00	50
3321546	7N2201001MJ	2256455	7N2201001RJ	1,0	4	0,94	1,50	6,00	50
3321547	7N2201011MJ	2256456	7N2201011RJ	1,0	4	0,94	1,50	8,00	50
3321548	7N2201021MJ	2256457	7N2201021RJ	1,0	4	0,94	1,50	10,00	50
3321549	7N2201031MJ	2256458	7N2201031RJ	1,0	4	0,94	1,50	12,00	50
3089245	7N0201002MJ	2256395	7N0201002RJ	1,0	6	0,94	1,50	2,50	50
3089251	7N1201002MJ	2256406	7N1201002RJ	1,0	6	0,94	1,50	5,00	60
3321550	7N2201201MJ	2256459	7N2201201RJ	1,2	4	1,14	1,50	6,00	50
3321551	7N2201211MJ	2256460	7N2201211RJ	1,2	4	1,14	1,80	8,00	50
3321552	7N2201221MJ	2256461	7N2201221RJ	1,2	4	1,14	1,80	10,00	50
3321553	7N2201231MJ	2256462	7N2201231RJ	1,2	4	1,14	1,80	12,00	50
3321522	7N0201202MJ	2256396	7N0201202RJ	1,2	6	1,14	1,80	3,00	50
3089252	7N1201202MJ	2256407	7N1201202RJ	1,2	6	1,14	1,80	6,00	60
3321554	7N2201401MJ	2256463	7N2201401RJ	1,4	4	1,34	2,10	6,00	50
3321555	7N2201411MJ	2256464	7N2201411RJ	1,4	4	1,34	2,10	8,00	50
3321556	7N2201421MJ		–	1,4	4	1,34	2,10	10,00	50
3321557	7N2201431MJ	2256466	7N2201431RJ	1,4	4	1,34	2,10	12,00	50
3321558	7N2201441MJ	2256467	7N2201441RJ	1,4	4	1,34	2,10	16,00	50
	–	2256465	7N2201421RJ	1,4	4	1,35	2,10	10,00	50
3089246	7N0201402MJ	2256397	7N0201402RJ	1,4	6	1,34	2,10	3,50	50
3321527	7N1201402MJ	2256408	7N1201402RJ	1,4	6	1,34	2,10	7,00	60
	–	3454427	7N2201561RJ	1,5	4	1,44	2,30	5,70	50
3321559	7N2201501MJ	2256468	7N2201501RJ	1,5	4	1,44	2,30	6,00	50
3321560	7N2201511MJ	2256469	7N2201511RJ	1,5	4	1,44	2,30	10,00	50
3321561	7N2201521MJ	2256470	7N2201521RJ	1,5	4	1,44	2,30	12,00	50
3321562	7N2201531MJ	2256471	7N2201531RJ	1,5	4	1,44	2,30	16,00	50
3321563	7N2201541MJ	2256472	7N2201541RJ	1,5	4	1,44	2,30	18,00	63
3321564	7N2201551MJ	2256473	7N2201551RJ	1,5	4	1,44	2,30	20,00	63
3321523	7N0201502MJ	2256398	7N0201502RJ	1,5	6	1,44	2,30	3,80	50
3089253	7N1201502MJ	2256409	7N1201502RJ	1,5	6	1,44	2,30	7,50	60
3321566	7N2201611MJ	2256475	7N2201611RJ	1,6	4	1,54	2,40	10,00	50
3321567	7N2201621MJ	2256476	7N2201621RJ	1,6	4	1,54	2,40	12,00	50
3321568	7N2201631MJ	2256477	7N2201631RJ	1,6	4	1,54	2,40	16,00	50
3321569	7N2201641MJ	2256478	7N2201641RJ	1,6	4	1,54	2,40	20,00	63
	–	3454428	7N2201571RJ	1,6	4	1,54	2,80	11,70	50

(continued)

(Series 7N02 • Series 7N02 7N12 7N22 • Vision Plus Micro — continued)





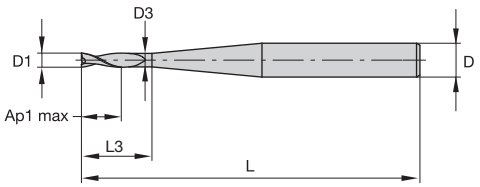


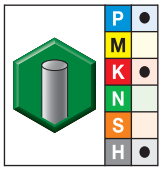
● first choice
○ alternate choice

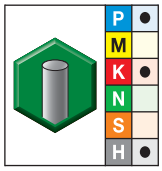
grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN					length of cut		length
order #	catalogue #	order #	catalogue #	D1	D	D3	Ap1 max	L3	L
3321565	7N2201601MJ	2256474	7N2201601RJ	1,6	4	1,57	2,40	6,00	50
3321524	7N0201602MJ	2256399	7N0201602RJ	1,6	6	1,54	2,40	4,00	50
3321528	7N1201602MJ	2256410	7N1201602RJ	1,6	6	1,54	2,40	8,00	60
3321570	7N2201701MJ	2256479	7N2201701RJ	1,7	4	1,64	2,60	6,00	50
3321571	7N2201711MJ	2256480	7N2201711RJ	1,7	4	1,64	2,60	10,00	50
3321572	7N2201721MJ	2256481	7N2201721RJ	1,7	4	1,64	2,60	12,00	50
3321573	7N2201731MJ	2256482	7N2201731RJ	1,7	4	1,64	2,60	16,00	50
3321574	7N2201741MJ	2256483	7N2201741RJ	1,7	4	1,64	2,60	20,00	63
3321575	7N2201801MJ	2256484	7N2201801RJ	1,8	4	1,74	2,70	6,00	50
3321576	7N2201811MJ	2256485	7N2201811RJ	1,8	4	1,74	2,70	10,00	50
3321577	7N2201821MJ	2256486	7N2201821RJ	1,8	4	1,74	2,70	12,00	50
3321578	7N2201831MJ	2256487	7N2201831RJ	1,8	4	1,74	2,70	16,00	50
3321579	7N2201841MJ	2256488	7N2201841RJ	1,8	4	1,74	2,70	20,00	63
3321525	7N0201802MJ	2256400	7N0201802RJ	1,8	6	1,74	2,70	4,50	50
3089254	7N1201802MJ	2256411	7N1201802RJ	1,8	6	1,74	2,70	9,00	60
3321580	7N2201901MJ	2256489	7N2201901RJ	1,9	4	1,84	2,80	6,00	50
3321581	7N2201911MJ	2256490	7N2201911RJ	1,9	4	1,84	2,80	10,00	50
3321582	7N2201921MJ	2256491	7N2201921RJ	1,9	4	1,84	2,80	12,00	50
3321583	7N2201931MJ	2256492	7N2201931RJ	1,9	4	1,84	2,80	16,00	50
3321584	7N2201941MJ	2256493	7N2201941RJ	1,9	4	1,84	2,80	20,00	63
3321585	7N2202001MJ	2256494	7N2202001RJ	2,0	4	1,96	3,00	6,00	50
3321586	7N2202011MJ	2256495	7N2202011RJ	2,0	4	1,96	3,00	10,00	50
3321587	7N2202021MJ	2256496	7N2202021RJ	2,0	4	1,96	3,00	16,00	50
3321588	7N2202031MJ	2256497	7N2202031RJ	2,0	4	1,96	3,00	20,00	63
3321589	7N2202041MJ	2256498	7N2202041RJ	2,0	4	1,96	3,00	20,00	75
3089247	7N0202002MJ	2256401	7N0202002RJ	2,0	6	1,96	3,00	5,00	50
3089255	7N1202002MJ	2256412	7N1202002RJ	2,0	6	1,96	3,00	10,00	60
	–	3454429	7N2202051RJ	2,1	4	2,00	3,00	8,00	50
	–	3454430	7N2202061RJ	2,1	4	2,00	3,00	12,00	50
	–	3454431	7N2202071RJ	2,1	4	2,00	3,00	14,00	50
	–	3454432	7N2202091RJ	2,1	4	2,00	3,00	25,00	63
3321590	7N2202501MJ	2256499	7N2202501RJ	2,5	4	2,40	3,70	8,00	50

(continued)

(Series 7N02 7N12 7N22 • Vision Plus Micro — continued)







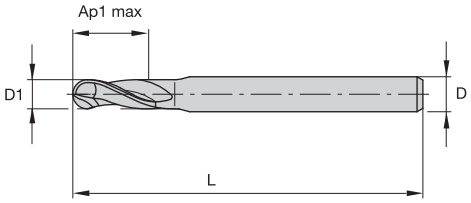
● first choice
○ alternate choice

grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321591	7N2202511MJ	2256500	7N2202511RJ	2,5	4	2,40	3,70	10,00	50
3321592	7N2202521MJ	2256501	7N2202521RJ	2,5	4	2,44	3,70	16,00	63
3321593	7N2202531MJ	2256502	7N2202531RJ	2,5	4	2,44	3,70	20,00	63
3321594	7N2202541MJ	2256503	7N2202541RJ	2,5	4	2,44	3,70	30,00	80
3321526	7N0202502MJ	2256402	7N0202502RJ	2,5	6	2,44	3,70	5,00	50
3089256	7N1202502MJ	2256413	7N1202502RJ	2,5	6	2,44	3,70	12,50	60
3321595	7N2203002MJ	2256504	7N2203002RJ	3,0	6	2,94	4,50	8,00	50
3321596	7N2203012MJ	2256505	7N2203012RJ	3,0	6	2,94	4,50	10,00	50
3321597	7N2203022MJ	2256506	7N2203022RJ	3,0	6	2,94	4,50	16,00	63
3321598	7N2203032MJ	2256507	7N2203032RJ	3,0	6	2,94	4,50	20,00	63
3321599	7N2203042MJ	2256508	7N2203042RJ	3,0	6	2,94	4,50	20,00	80
	–	3454433	7N2203052RJ	3,1	6	3,00	4,50	12,00	50
	–	3454434	7N2203062RJ	3,1	6	3,00	4,50	25,00	76

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



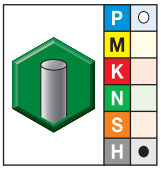




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 423034 • Vision Plus Micro



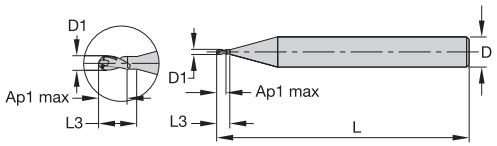
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
2343490	423034-000005	0,5	3	1,50	38
2343492	423034-000006	0,6	3	1,60	38
2343494	423034-000008	0,8	3	1,80	38
2343496	423034-000010	1,0	3	2,00	38
2343498	423034-000012	1,2	3	2,20	38
2343500	423034-000015	1,5	3	2,50	38
2343502	423034-000020	2,0	3	3,00	38
2343504	423034-000025	2,5	3	4,00	38
2343506	423034-000030	3,0	3	5,00	38

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



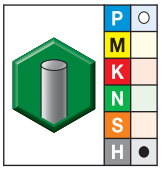


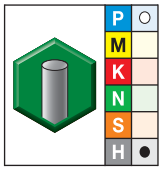


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N01 • Vision Plus Micro





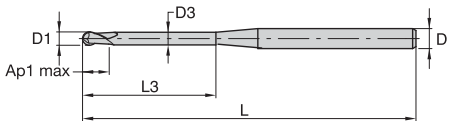
● first choice
○ alternate choice

grade AlTiN-MJ1 AlTiN		grade TiAlN-RJ1 TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
3321510	7N0100302MJ	2256358	7N0100302RJ	0,3	6	–	0,30	0,30	50
3321511	7N0100402MJ	2256359	7N0100402RJ	0,4	6	–	0,40	0,40	50
3089237	7N0100502MJ	2256360	7N0100502RJ	0,5	6	0,45	0,50	1,50	50
3089238	7N0100602MJ	2256361	7N0100602RJ	0,6	6	0,55	0,60	1,80	50
3321512	7N0100802MJ	2256362	7N0100802RJ	0,8	6	0,75	0,80	2,40	50
3321513	7N0101002MJ	2256363	7N0101002RJ	1,0	6	0,95	2,50	2,50	50
3089239	7N0101202MJ	2256364	7N0101202RJ	1,2	6	1,15	1,20	3,00	50
3089240	7N0101402MJ	2256365	7N0101402RJ	1,4	6	1,35	1,40	3,50	50
3321514	7N0101502MJ	2256366	7N0101502RJ	1,5	6	1,45	1,50	3,80	50
3089241	7N0101602MJ	2256367	7N0101602RJ	1,6	6	1,55	1,60	4,00	50
3089242	7N0101802MJ	2256368	7N0101802RJ	1,8	6	1,75	1,80	4,50	50
3321515	7N0102002MJ	2256369	7N0102002RJ	2,0	6	1,95	2,00	5,00	50
3321516	7N0102502MJ	2256370	7N0102502RJ	2,5	6	2,40	2,50	5,00	50
3321517	7N0103002MJ	2256371	7N0103002RJ	3,0	6	2,85	3,00	6,00	50
3089243	7N0104002MJ	2256372	7N0104002RJ	4,0	6	3,85	4,00	6,00	50
3091240	7N0106002MJ	2256373	7N0106002RJ	6,0	6	5,85	6,00	9,00	50

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



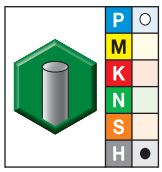




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7N21 • Vision Plus Micro



● first choice
○ alternate choice

order #	catalogue #	grade TiAlN-RT1 TiAlN D1	D	D3	length of cut Ap1 max	L3	length L
3665122	7N2100501RT	0,5	4	0,44	1,00	5,00	63
3665140	7N2100601RT	0,6	4	0,54	1,00	6,00	63
3665141	7N2100801RT	0,8	4	0,74	1,30	8,00	63
3665142	7N2101001RT	1,0	4	0,94	1,60	10,00	63
3665163	7N2101201RT	1,2	4	1,14	1,90	12,00	63
3665164	7N2101501RT	1,5	4	1,44	2,40	16,00	63
3665166	7N2102001RT	2,0	4	1,94	3,20	20,00	63
3665167	7N2102501RT	2,5	4	2,44	3,80	25,00	63
3665168	7N2103001RT	3,0	4	2,90	4,50	30,00	63

Series 7N02 7N12 7N22 • Vision Plus Micro

Material Group																		
		Side Milling (A) and Slotting (B)			AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	0,3	0,4	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	0	1,25 x D	0,25 x D	0,75 x D	150	–	200	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	1	1,25 x D	0,25 x D	0,75 x D	150	–	200	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	2	1,25 x D	0,25 x D	0,75 x D	140	–	190	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	3	1,25 x D	0,25 x D	0,75 x D	120	–	160	fz	0,002	0,002	0,003	0,003	0,004	0,006	0,008	0,011	0,014	0,017
	4	1,25 x D	0,25 x D	0,5 x D	90	–	150	fz	0,002	0,002	0,003	0,003	0,004	0,005	0,008	0,010	0,013	0,016
	5	1,25 x D	0,25 x D	0,5 x D	60	–	100	fz	0,001	0,002	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
K	1	1,25 x D	0,25 x D	0,75 x D	120	–	150	fz	0,002	0,003	0,003	0,004	0,005	0,007	0,010	0,014	0,017	0,021
	2	1,25 x D	0,25 x D	0,5 x D	110	–	140	fz	0,002	0,002	0,003	0,003	0,004	0,006	0,008	0,011	0,014	0,017
H	1	1,25 x D	0,25 x D	0,5 x D	80	–	140	fz	0,002	0,002	0,003	0,003	0,004	0,005	0,008	0,010	0,013	0,016
	2	1,25 x D	0,25 x D	0,3 x D	70	–	120	fz	0,001	0,002	0,002	0,002	0,003	0,004	0,006	0,008	0,010	0,012
	3	1,25 x D	0,25 x D	0,25 x D	60	–	90	fz	0,001	0,001	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For tools with reach > 3 x D, reduce fz by 20%.
For tools with reach > 5 x D, reduce fz by 30%.

Series 423034 • Vision Plus Micro





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on average degrees of the mould. See page O205.

Series 7N01 • Vision Plus Micro

Material Group															
		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028

Material Group															
		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019

Material Group															
		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing**							
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on average degrees of the mould. See page O205.

Series 7N21 • Vision Plus Micro





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,04 x D	0,04 x D	432	–	576	fz	0,012	0,015	0,020	0,025	0,038	0,051	0,064	0,078
	4	0,04 x D	0,04 x D	324	–	540	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
H	1	0,03 x D	0,03 x D	288	–	504	fz	0,012	0,014	0,019	0,023	0,035	0,047	0,059	0,072
	2	0,03 x D	0,03 x D	252	–	432	fz	0,009	0,011	0,014	0,018	0,027	0,036	0,045	0,054
	3	0,02 x D	0,02 x D	216	–	324	fz	0,007	0,008	0,011	0,014	0,021	0,028	0,035	0,043
	4	0,02 x D	0,02 x D	180	–	252	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Semi-Finishing**							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,1 x D	0,05 x D	300	-	400	fz	0,008	0,010	0,013	0,017	0,025	0,034	0,043	0,052
	4	0,1 x D	0,05 x D	225	-	375	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
H	1	0,07 x D	0,1 x D	200	-	350	fz	0,008	0,009	0,012	0,016	0,023	0,031	0,040	0,048
	2	0,05 x D	0,04 x D	175	-	300	fz	0,006	0,007	0,009	0,012	0,018	0,024	0,030	0,036
	3	0,03 x D	0,03 x D	150	-	225	fz	0,005	0,006	0,007	0,009	0,014	0,019	0,024	0,028
	4	0,03 x D	0,03 x D	125	-	175	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,016	0,019

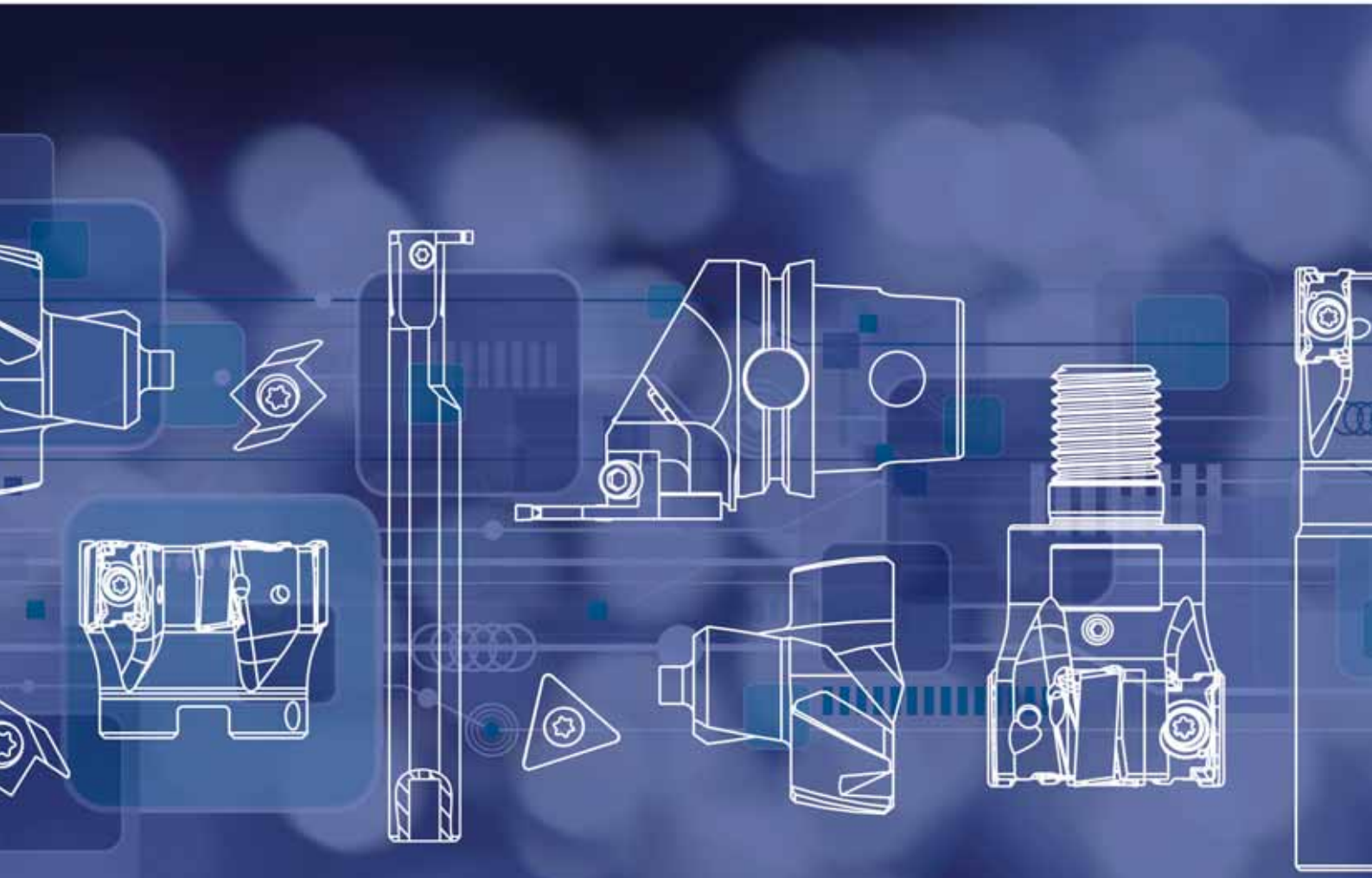




Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — **Roughing**							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	0,5	0,6	0,8	1,0	1,5	2,0	2,5	3,0
P	3	0,2 x D	0,1 x D	216	-	288	fz	0,004	0,005	0,007	0,008	0,013	0,017	0,021	0,026
	4	0,2 x D	0,1 x D	162	-	270	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
H	1	0,15 x D	0,1 x D	144	-	252	fz	0,004	0,005	0,006	0,008	0,012	0,016	0,020	0,024
	2	0,1 x D	0,075 x D	126	-	216	fz	0,003	0,004	0,005	0,006	0,009	0,012	0,015	0,018
	3	0,05 x D	0,05 x D	108	-	162	fz	0,002	0,003	0,004	0,005	0,007	0,009	0,012	0,014
	4	0,05 x D	0,05 x D	90	-	126	fz	0,002	0,002	0,002	0,003	0,005	0,006	0,008	0,009

NOTE: Please use reference table for correction of vc based on averages degree of the mould. See page O205.

WIDIA™



NOVO KNOWS ART TO PART TO PROFIT

Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

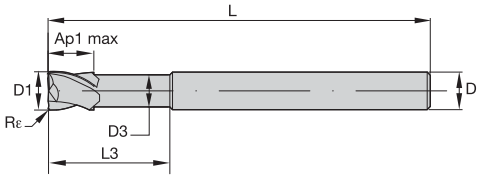
NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

01	THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS widia.com/novo	NOVO™

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



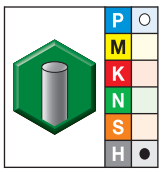




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 75N2 • Vision Plus



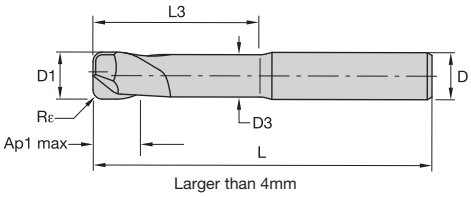
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2544530	75N203022RT	3,0	6	2,80	3,00	9,00	75	0,30
2544735	75N203042RT	3,0	6	2,80	3,00	9,00	75	0,50
2544736	75N203062RT	3,0	6	2,80	3,00	9,00	75	1,00
2544737	75N204022RT	4,0	6	3,70	4,00	12,00	75	0,30
2544738	75N204042RT	4,0	6	3,70	4,00	12,00	75	0,50
2544739	75N204062RT	4,0	6	3,70	4,00	12,00	75	1,00
2544740	75N205022RT	5,0	6	4,60	5,00	15,00	75	0,30
2544741	75N205042RT	5,0	6	4,60	5,00	15,00	75	1,00
2544742	75N206032RT	6,0	6	5,50	6,00	18,00	75	0,30
2545163	75N206042RT	6,0	6	5,50	6,00	18,00	75	0,50
2545164	75N206052RT	6,0	6	5,50	6,00	18,00	75	0,75
2545166	75N206062RT	6,0	6	5,50	6,00	18,00	75	1,00
2545167	75N206072RT	6,0	6	5,50	6,00	18,00	75	1,50
2545168	75N208023RT	8,0	8	7,40	8,00	24,00	100	0,50
2545169	75N208043RT	8,0	8	7,40	8,00	24,00	100	1,00
2545170	75N208063RT	8,0	8	7,40	8,00	24,00	100	1,50
2545171	75N210024RT	10,0	10	9,20	10,00	30,00	100	0,50
2545172	75N210034RT	10,0	10	9,20	10,00	30,00	100	0,75
2545183	75N210044RT	10,0	10	9,20	10,00	30,00	100	1,00
2545184	75N210064RT	10,0	10	9,20	10,00	30,00	100	2,00
2545185	75N212025RT	12,0	12	11,00	12,00	36,00	125	0,50
2545186	75N212035RT	12,0	12	11,00	12,00	36,00	125	0,75
2545187	75N212045RT	12,0	12	11,00	12,00	36,00	125	1,00
2545188	75N212055RT	12,0	12	11,00	12,00	36,00	125	1,50
2545189	75N212065RT	12,0	12	11,00	12,00	36,00	125	2,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



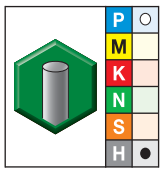




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422875 • Vision Plus



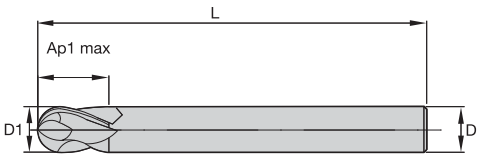
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2343319	422875-002003	2,0	6	1,90	2,00	17,50	70	0,30
2343303	422875-002005	2,0	6	1,90	2,00	17,50	70	0,50
2343305	422875-003005	3,0	6	2,90	3,00	18,50	70	0,50
2343321	422875-003010	3,0	6	2,90	3,00	18,50	70	1,00
2343307	422875-004005	4,0	6	3,80	4,00	19,50	80	0,50
2343323	422875-004010	4,0	6	3,80	4,00	19,50	80	1,00
2343309	422875-005005	5,0	6	4,80	5,00	42,00	80	0,50
2343325	422875-005010	5,0	6	4,80	5,00	42,00	80	1,00
2343327	422875-006005	6,0	6	5,80	6,00	42,00	80	0,50
2343311	422875-006010	6,0	6	5,80	6,00	42,00	80	1,00
2629541	422875-008005	8,0	8	7,80	8,00	51,00	90	0,50
2343329	422875-008010	8,0	8	7,80	8,00	51,00	90	1,00
2629555	422875-008015	8,0	8	7,80	8,00	51,00	90	1,50
2343313	422875-008020	8,0	8	7,80	8,00	51,00	90	2,00
2629559	422875-010005	10,0	10	9,70	10,00	57,00	100	0,50
2629560	422875-010010	10,0	10	9,70	10,00	57,00	100	1,00
3048961	422875-010015	10,0	10	9,70	10,00	57,00	100	1,50
2343331	422875-010020	10,0	10	9,70	10,00	57,00	100	2,00
2343315	422875-010030	10,0	10	9,70	10,00	57,00	100	3,00
2629561	422875-012005	12,0	12	11,70	12,00	62,00	110	0,50
2629573	422875-012010	12,0	12	11,70	12,00	62,00	110	1,00
2343333	422875-012030	12,0	12	11,70	12,00	62,00	110	3,00
2343317	422875-012040	12,0	12	11,70	12,00	62,00	110	4,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



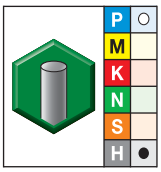




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7151 • Vision Plus



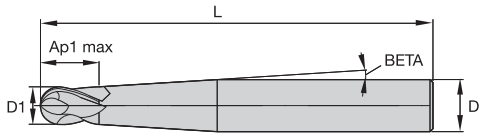
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
1860036	715101000RT	1,0	3	3,00	38
1860090	715102000RT	2,0	3	3,00	38
1860103	715102500RT	2,5	3	3,00	38
1860106	715103000RT	3,0	3	3,00	38
1860109	715104001RT	4,0	4	4,00	50
1860111	715105001RT	5,0	5	5,00	50
1860112	715106002RT	6,0	6	6,00	50
1860133	715108003RT	8,0	8	8,00	63
1860134	715110004RT	10,0	10	10,00	76
1860135	715112005RT	12,0	12	12,00	76
1860136	715116006RT	16,0	16	16,00	89
1860137	715120007RT	20,0	20	20,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



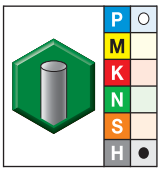




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7061 • Vision Plus



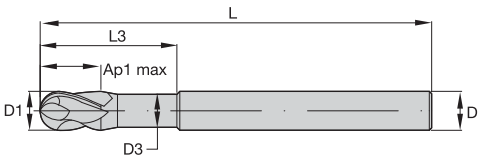
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2495994	706101001RT	1,0	4	1,00	63	3.50
2495995	706102001RT	2,0	4	2,00	63	3.50
2495996	706102501RT	2,5	4	2,50	63	3.00
2495997	706103002RT	3,0	6	3,00	75	1.50
2495998	706104002RT	4,0	6	4,00	75	1.50
2495999	706105002RT	5,0	6	5,00	75	1.50
2496000	706106004RT	6,0	10	6,00	100	1.50
2496001	706108004RT	8,0	10	8,00	100	1.50
2496002	706110005RT	10,0	12	10,00	125	1.50
2496023	706112006RT	12,0	16	12,00	125	1.50

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



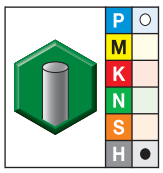




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 70N1 • Vision Plus



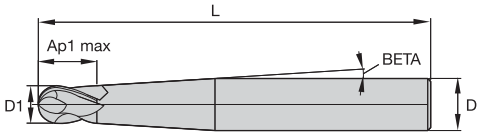
● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
		grade TiAlN-RT1 TiAlN					
2545190	70N101001RT	1,0	4	0,80	1,00	3,00	63
2545191	70N101501RT	1,5	4	1,30	1,50	4,50	63
2545192	70N102002RT	2,0	6	1,80	2,00	6,00	76
2545213	70N103002RT	3,0	6	2,80	3,00	9,00	76
2545214	70N104002RT	4,0	6	3,70	4,00	12,00	76
2545215	70N105002RT	5,0	6	4,60	5,00	15,00	76
2545216	70N106002RT	6,0	6	5,50	6,00	18,00	76
2545217	70N108003RT	8,0	8	7,50	8,00	24,00	100
2545218	70N110004RT	10,0	10	9,50	10,00	30,00	100
2545219	70N112005RT	12,0	12	11,50	12,00	36,00	125

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



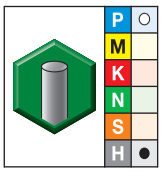




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422869 422868 • Vision Plus



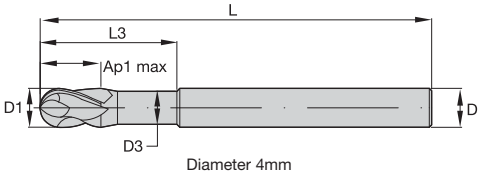
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2343179	422869-000010	1,0	4	1,00	40	7.50
2343183	422869-000020	2,0	6	2,00	45	7.50
2343186	422869-000030	3,0	6	3,00	45	7.50
2343188	422869-000040	4,0	6	4,00	45	7.50
2343190	422869-000050	5,0	6	5,00	50	7.50
2343169	422868-000060	6,0	6	6,00	80	–
2343192	422869-000060	6,0	6	6,00	50	–
2343171	422868-000080	8,0	8	8,00	90	–
2343194	422869-000080	8,0	8	8,00	60	–
2343173	422868-000100	10,0	10	10,00	100	–
2343196	422869-000100	10,0	10	10,00	70	–
2343198	422869-000120	12,0	12	12,00	75	–
2343200	422869-000160	16,0	16	16,00	80	–

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



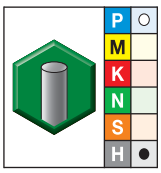




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422870 • Vision Plus



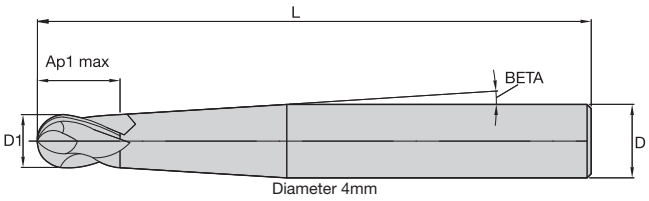
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN							
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L
2343202	422870-000020	2,0	6	1,90	2,00	17,50	70
2343204	422870-000030	3,0	6	2,90	3,00	18,50	70
2343206	422870-000040	4,0	6	3,80	4,00	19,50	80
2343208	422870-000050	5,0	6	4,80	5,00	39,00	80
2343210	422870-000060	6,0	6	5,80	6,00	42,00	80
2343212	422870-000080	8,0	8	7,80	8,00	52,00	90
2343214	422870-000100	10,0	10	9,70	10,00	58,00	100
2343216	422870-000120	12,0	12	11,70	12,00	63,00	110

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



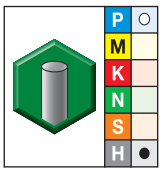




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 422873 • Vision Plus



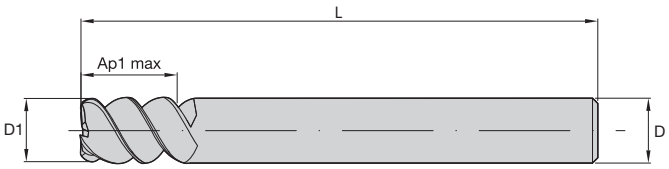
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
		grade K10UF-DCHP AlTiN				
2343265	422873-050100	5,0	8	6,00	100	1.75
2343269	422873-060100	6,0	10	8,00	100	2.52
2343275	422873-100100	10,0	12	15,00	100	1.83
2343277	422873-100150	10,0	12	15,00	150	0.80

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



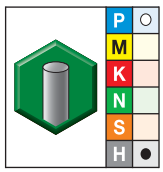




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7505 7515 7525 7545 • Vision Plus



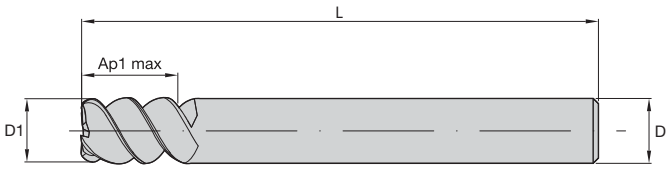
grade TiAlN-LT1
TiAlN

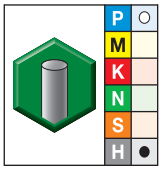
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
2499570	754503002LT	3,0	6	4,50	50	4
2499567	750503002LT	3,0	6	4,50	57	4
2499571	754504002LT	4,0	6	6,00	50	4
2499568	750504002LT	4,0	6	6,00	57	4
2499572	754505002LT	5,0	6	7,50	50	4
2499569	750505002LT	5,0	6	7,50	76	4
1848805	754506002LT	6,0	6	9,00	50	4
1724468	751506002LT	6,0	6	15,00	76	4
1724487	752506002LT	6,0	6	21,00	76	4
1860603	754508003LT	8,0	8	12,00	63	4
1724463	750508003LT	8,0	8	12,00	100	4
1724469	751508003LT	8,0	8	20,00	100	4
1724489	752508003LT	8,0	8	28,00	100	4
1860604	754510004LT	10,0	10	15,00	76	4
1724464	750510004LT	10,0	10	15,00	100	4
1724481	751510004LT	10,0	10	25,00	100	5
1724490	752510004LT	10,0	10	35,00	100	5
1860605	754512005LT	12,0	12	18,00	76	4
1724465	750512005LT	12,0	12	18,00	125	4
1724482	751512005LT	12,0	12	30,00	125	6

(continued)

(Series 7505 7515 7525 7545 • Vision Plus — continued)





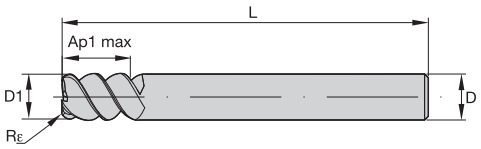
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
1724531	752512005LT	12,0	12	42,00	125	6
1860606	754516006LT	16,0	16	24,00	89	4
1724466	750516006LT	16,0	16	24,00	125	4
1724483	751516006LT	16,0	16	40,00	125	6
1724533	752516006LT	16,0	16	56,00	125	6
1860607	754520007LT	20,0	20	30,00	104	4
1724467	750520007LT	20,0	20	30,00	150	4
1724484	751520007LT	20,0	20	50,00	150	6
1724536	752520007LT	20,0	20	70,00	150	6
1860608	754525008LT	25,0	25	38,00	121	5
1731683	750525008LT	25,0	25	38,00	150	5
1747878	751525008LT	25,0	25	63,00	150	6
1747931	752525008LT	25,0	25	88,00	150	6

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



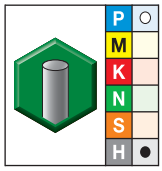




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7585 7595 • Vision Plus

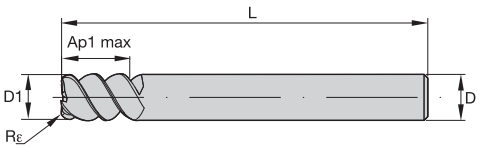


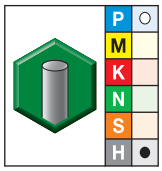
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2540317	759503002LT	3,0	6	4,50	50	0,25	4
2540318	759503012LT	3,0	6	4,50	50	0,50	4
2540319	759504002LT	4,0	6	6,00	50	0,25	4
2540320	759504012LT	4,0	6	6,00	50	0,50	4
2540321	759505002LT	5,0	6	7,50	50	0,25	4
2540322	759505012LT	5,0	6	7,50	50	0,50	4
1862105	759506002LT	6,0	6	9,00	50	0,25	4
1862106	759506012LT	6,0	6	9,00	50	0,50	4
2541273	759506022LT	6,0	6	9,00	50	0,75	4
2541274	759506032LT	6,0	6	9,00	50	1,00	4
1860609	758506002LT	6,0	6	9,00	76	0,25	4
1860610	758506012LT	6,0	6	9,00	76	0,50	4
1862107	759508003LT	8,0	8	12,00	63	0,50	4
2541275	759508023LT	8,0	8	12,00	63	0,75	4
1862108	759508013LT	8,0	8	12,00	63	1,00	4
2541276	759508033LT	8,0	8	12,00	63	1,50	4
1860611	758508003LT	8,0	8	12,00	100	0,50	4
1860612	758508013LT	8,0	8	12,00	100	1,00	4
1862109	759510004LT	10,0	10	15,00	76	0,50	4
1862110	759510014LT	10,0	10	15,00	76	1,00	4

(continued)

(Series 7585 7595 • Vision Plus — continued)





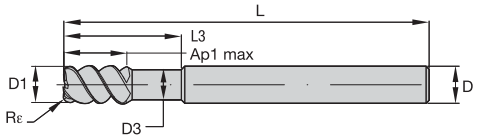
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2541277	759510024LT	10,0	10	15,00	76	1,50	4
2541278	759510034LT	10,0	10	15,00	76	2,00	4
1860623	758510004LT	10,0	10	15,00	100	0,50	4
1860624	758510014LT	10,0	10	15,00	100	1,00	4
1862111	759512005LT	12,0	12	18,00	76	0,50	4
2541279	759512025LT	12,0	12	18,00	76	1,00	4
1862112	759512015LT	12,0	12	18,00	76	1,50	4
2541280	759512035LT	12,0	12	18,00	76	2,00	4
1860625	758512005LT	12,0	12	18,00	125	0,50	4
1860626	758512015LT	12,0	12	18,00	125	1,50	4
1862113	759516006LT	16,0	16	24,00	89	0,50	4
1862114	759516016LT	16,0	16	24,00	89	1,50	4
2541282	759516036LT	16,0	16	24,00	89	2,00	4
1860627	758516006LT	16,0	16	24,00	125	0,50	4
1860628	758516016LT	16,0	16	24,00	125	1,50	4
1862115	759520007LT	20,0	20	30,00	104	0,50	4
2541293	759520027LT	20,0	20	30,00	104	1,00	4
1862116	759520017LT	20,0	20	30,00	104	2,00	4
1860629	758520007LT	20,0	20	30,00	150	0,50	4
1860630	758520017LT	20,0	20	30,00	150	2,00	4
1862117	759525008LT	25,0	25	38,00	121	0,50	5
1862118	759525018LT	25,0	25	38,00	121	3,00	5
1860631	758525008LT	25,0	25	38,00	150	0,50	5
1860632	758525018LT	25,0	25	38,00	150	3,00	5

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



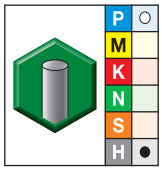




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 75N5 • Vision Plus



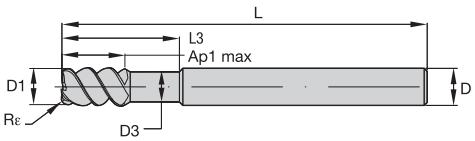
grade TiAlN-LT1 TiAlN

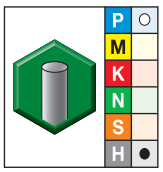
● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU
2544367	75N503022LT	3,0	6	2,7	4,50	9,00	57	0,25	4
2544368	75N503042LT	3,0	6	2,7	4,50	9,00	57	0,50	4
2544369	75N504022LT	4,0	6	3,7	6,00	12,00	57	0,25	4
2544370	75N504042LT	4,0	6	3,7	6,00	12,00	57	0,50	4
2544371	75N505022LT	5,0	6	4,6	7,50	15,00	76	0,25	4
2544372	75N505042LT	5,0	6	4,6	7,50	15,00	76	0,50	4
1862119	75N506002LT	6,0	6	5,4	9,00	18,00	76	–	4
2544443	75N506022LT	6,0	6	5,4	9,00	18,00	76	0,25	4
2544444	75N506042LT	6,0	6	5,4	9,00	18,00	76	0,50	4
2544445	75N506062LT	6,0	6	5,4	9,00	18,00	76	0,75	4
2544446	75N506082LT	6,0	6	5,4	9,00	18,00	76	1,00	4
1862120	75N508003LT	8,0	8	7,4	12,00	24,00	100	–	4
2544447	75N508023LT	8,0	8	7,4	12,00	24,00	100	0,50	4
2544448	75N508033LT	8,0	8	7,4	12,00	24,00	100	1,00	4
2544449	75N508043LT	8,0	8	7,4	12,00	24,00	100	1,50	4
2544450	75N508053LT	8,0	8	7,4	12,00	24,00	100	2,00	4
1862121	75N510004LT	10,0	10	9,4	15,00	30,00	100	–	4
2544452	75N510024LT	10,0	10	9,2	15,00	30,00	100	0,50	4
2544483	75N510034LT	10,0	10	9,2	15,00	30,00	100	1,00	4
2544484	75N510044LT	10,0	10	9,2	15,00	30,00	100	1,50	4

(continued)

(Series 75N5 • Vision Plus — continued)





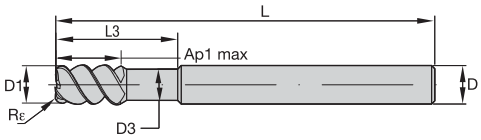
● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN									
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU
2544485	75N510054LT	10,0	10	9,2	15,00	30,00	100	2,00	4
1862122	75N512005LT	12,0	12	11,4	18,00	36,00	125	–	4
2544486	75N512025LT	12,0	12	11,0	18,00	36,00	125	0,50	4
2544487	75N512035LT	12,0	12	11,0	18,00	36,00	125	1,00	4
2544488	75N512045LT	12,0	12	11,0	18,00	36,00	125	1,50	4
2544489	75N512055LT	12,0	12	11,0	18,00	36,00	125	2,00	4
1862123	75N516006LT	16,0	16	15,4	24,00	48,00	125	–	4
2544490	75N516026LT	16,0	16	15,0	24,00	48,00	125	0,50	4
2544491	75N516046LT	16,0	16	15,0	24,00	48,00	125	1,50	4
1862124	75N520007LT	20,0	20	19,4	30,00	60,00	150	–	4
2544492	75N520027LT	20,0	20	19,0	30,00	60,00	150	0,50	4
2544523	75N520047LT	20,0	20	19,0	30,00	60,00	150	2,00	4
1862125	75N525008LT	25,0	25	24,4	38,00	75,00	150	–	5
2544524	75N525028LT	25,0	25	24,0	38,00	75,00	150	0,50	5
2544525	75N525048LT	25,0	25	24,0	38,00	75,00	150	3,00	5

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



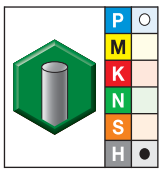




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 75N8 • Vision Plus



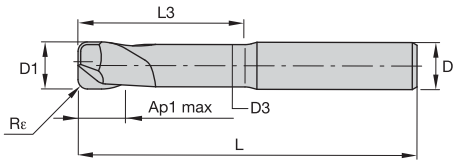
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2544526	75N806002RT	6,0	6	5,50	6,00	18,00	76	0,50
2544527	75N808003RT	8,0	8	7,40	8,00	24,00	100	0,50
2544528	75N810004RT	10,0	10	9,20	10,00	30,00	100	1,00
2544529	75N812005RT	12,0	12	11,00	12,00	36,00	125	1,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



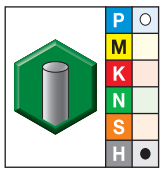




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422876 422878 • Vision Plus



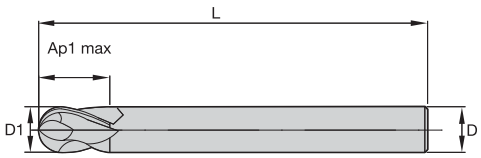
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN								
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε
2628898	422876-004005	4,0	6	3,80	4,00	10,00	45	0,50
2629013	422876-004010	4,0	6	3,80	4,00	10,00	45	1,00
2629015	422876-005005	5,0	6	4,80	5,00	12,00	50	0,50
2629016	422876-005010	5,0	6	4,80	5,00	12,00	50	1,00
2629018	422876-006005	6,0	6	5,80	6,00	12,00	50	0,50
2629021	422876-006010	6,0	6	5,80	6,00	12,00	50	1,00
2630276	422878-006005	6,0	6	5,80	6,00	42,00	80	0,50
2629056	422876-008005	8,0	8	7,80	8,00	20,00	60	0,50
2629060	422876-008010	8,0	8	7,80	8,00	20,00	60	1,00
2629061	422876-008020	8,0	8	7,80	8,00	20,00	60	2,00
2630285	422878-008010	8,0	8	7,80	8,00	51,00	90	1,00
2630288	422878-008015	8,0	8	7,80	8,00	51,00	90	1,50
2630290	422878-008020	8,0	8	7,80	8,00	51,00	90	2,00
2629062	422876-010005	10,0	10	9,80	10,00	26,00	70	0,50
2629077	422876-010010	10,0	10	9,80	10,00	26,00	70	1,00
2629086	422876-010020	10,0	10	9,80	10,00	26,00	70	2,00
2630291	422878-010005	10,0	10	9,70	10,00	57,00	100	0,50
2630292	422878-010010	10,0	10	9,70	10,00	57,00	100	1,00
2630345	422878-010020	10,0	10	9,70	10,00	57,00	100	2,00
2629089	422876-012005	12,0	12	11,80	12,00	26,00	75	0,50
2629094	422876-012010	12,0	12	11,80	12,00	26,00	75	1,00
2629095	422876-012020	12,0	12	11,80	12,00	26,00	75	2,00
2629097	422876-012030	12,0	12	11,80	12,00	26,00	75	3,00
2630347	422878-012010	12,0	12	11,70	12,00	62,00	110	1,00
2630386	422878-012030	12,0	12	11,70	12,00	62,00	110	3,00

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



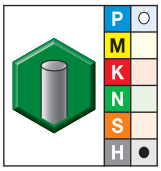




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7150 • Vision Plus



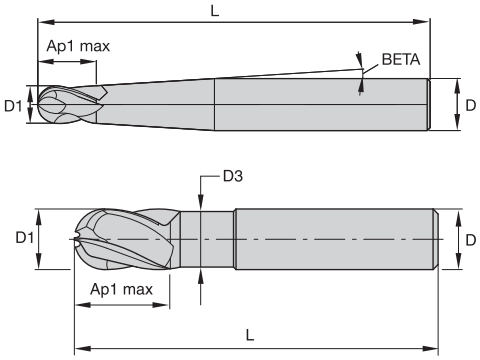
● first choice
○ alternate choice

grade TiAlN-RT1 TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
1859880	715002000RT	2,0	3	2,00	38
1859881	715002500RT	2,5	3	3,00	38
1859882	715003000RT	3,0	3	3,00	38
1859904	715004001RT	4,0	4	4,00	50
1859906	715005001RT	5,0	5	5,00	50
1859907	715006002RT	6,0	6	6,00	50
1859908	715008003RT	8,0	8	8,00	63
1859909	715010004RT	10,0	10	10,00	76
1859910	715012005RT	12,0	12	12,00	76
1859911	715016006RT	16,0	16	16,00	89
1859912	715020007RT	20,0	20	20,00	104

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



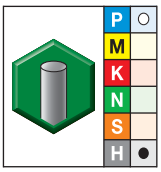




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 7050 7060 • Vision Plus



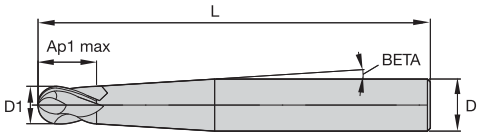
● first choice
○ alternate choice

order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BETA
		grade TiAlN-RT1 TiAlN						
1724321	705002001RT	2,0	4	–	2,00	2,00	63	2.5
2495913	706002001RT	2,0	4	–	2,00	2,00	63	3.5
1724322	705002501RT	2,5	4	–	2,50	2,50	63	2.5
2495914	706002501RT	2,5	4	–	2,50	2,50	63	3.0
1724323	705003002RT	3,0	6	–	3,00	3,00	75	2.5
2495915	706003002RT	3,0	6	–	3,00	3,00	75	1.5
1724324	705004002RT	4,0	6	–	4,00	4,00	75	2.5
2495916	706004002RT	4,0	6	–	4,00	4,00	75	1.5
1724325	705005002RT	5,0	6	–	5,00	5,00	75	2.5
2495917	706005002RT	5,0	6	–	5,00	5,00	75	1.5
1724326	705006004RT	6,0	10	–	6,00	6,00	100	2.5
2495918	706006004RT	6,0	10	–	6,00	6,00	100	1.5
1724327	705008004RT	8,0	10	–	8,00	8,00	100	2.5
2495919	706008004RT	8,0	10	–	8,00	8,00	100	1.5
1724328	705010005RT	10,0	12	–	10,00	10,00	125	2.5
2495920	706010005RT	10,0	12	–	10,00	10,00	125	1.5
1724329	705012006RT	12,0	16	–	12,00	12,00	125	2.5
2495921	706012006RT	12,0	16	–	12,00	12,00	125	1.5
1724330	705016006RT	16,0	16	15,00	16,00	48,00	125	–
1724361	705020007RT	20,0	20	19,00	20,00	60,00	150	–

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



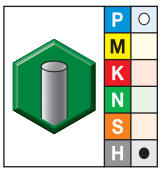




End Mill Tolerances

D1	tolerance h8 + / -	D	tolerance h6 + / -
≤ 3	0/0,014	≤ 3	0/0,006
> 3–6	0/0,018	> 3–6	0/0,008
> 6–10	0/0,022	> 6–10	0/0,009
> 10–18	0/0,027	> 10–18	0/0,011
> 18–30	0/0,033	> 18–30	0/0,013

Series 422871 • Vision Plus



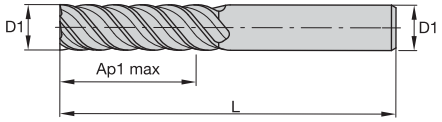
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BETA
2343218	422871-030075	3,0	6	4,00	75	2.85
2343220	422871-030100	3,0	6	4,00	100	1.65
2343222	422871-040075	4,0	6	5,00	75	2.67
2343224	422871-040100	4,0	6	5,00	100	1.18
2343227	422871-050075	5,0	6	6,00	75	1.33
2343229	422871-050100	5,0	8	6,00	100	1.75
2343230	422871-060075	6,0	8	8,00	75	2.38
2343233	422871-060100	6,0	10	8,00	100	2.52
2343235	422871-080100	8,0	10	12,00	100	1.52
2343237	422871-080150	8,0	12	12,00	150	1.40
2343239	422871-100100	10,0	12	15,00	100	1.83
2343241	422871-100150	10,0	12	15,00	150	0.80

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



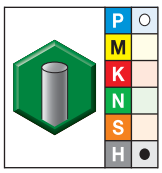




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D618 • Vision Plus



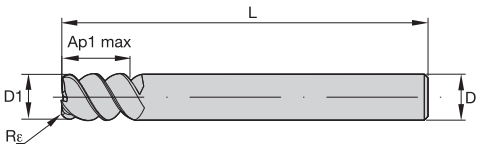
● first choice
○ alternate choice

order #	catalogue #	D1	D	length of cut Ap1 max	length L	ZU
		grade TiAlN-RJ TiAlN				
2256338	D61803002RJ	3,0	4	8,00	50	4
2257304	D61804002RJ	4,0	6	12,00	57	4
2256340	D61805002RJ	5,0	6	13,00	57	4
2256341	D61806002RJ	6,0	6	15,00	60	6
2256342	D61807003RJ	7,0	8	20,00	75	6
2256353	D61808003RJ	8,0	8	20,00	75	6
2256354	D61810004RJ	10,0	10	25,00	80	6
2256355	D61812005RJ	12,0	12	30,00	100	6
2256356	D61816006RJ	16,0	16	40,00	110	6
2256357	D61820007RJ	20,0	20	45,00	120	6

- Non-centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



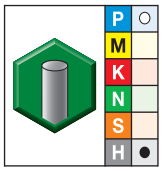




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,040	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 422837 422831 • Vision Plus



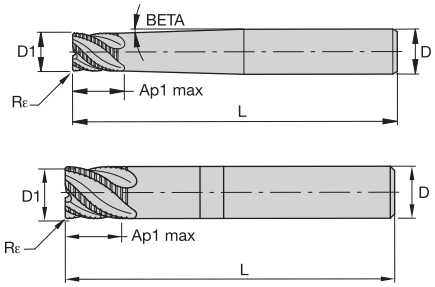
● first choice
○ alternate choice

grade K10UF-DCHP AlTiN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε	ZU
2342495	422837-006005	6,0	6	13,00	57	0,50	6
2342388	422831-006005	6,0	6	18,00	62	0,50	6
2342497	422837-008005	8,0	8	19,00	63	0,50	6
2342390	422831-008005	8,0	8	24,00	68	0,50	6
2342499	422837-010005	10,0	10	22,00	72	0,50	6
2342392	422831-010005	10,0	10	30,00	80	0,50	6
2656458	422837-012005	12,0	12	26,00	83	0,50	6
2342501	422837-012010	12,0	12	26,00	83	1,00	6
2657057	422831-012005	12,0	12	36,00	93	0,50	6
2342394	422831-012010	12,0	12	36,00	93	1,00	6
2656459	422837-016005	16,0	16	32,00	92	0,50	6
2342502	422837-016010	16,0	16	32,00	92	1,00	6
2342396	422831-016010	16,0	16	48,00	108	1,00	6
2657058	422831-016005	16,0	16	48,00	108	0,50	6
2656460	422837-020005	20,0	20	38,00	104	0,50	8
2342505	422837-020010	20,0	20	38,00	104	1,00	8
2342398	422831-020010	20,0	20	60,00	126	1,00	8
2656461	422837-025005	25,0	25	45,00	121	0,50	8
2342400	422831-025015	25,0	25	75,00	150	1,50	8

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



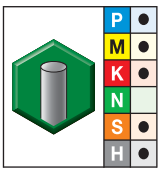




End Mill Tolerances

D1	tolerance d11	D	tolerance h6 + / -
≤ 3	-0,020/-0,080	≤ 3	0/0,006
> 3–6	-0,030/-0,105	> 3–6	0/0,008
> 6–10	-0,040/-0,130	> 6–10	0/0,009
> 10–18	-0,050/-0,160	> 10–18	0/0,011
> 18–30	-0,065/-0,195	> 18–30	0/0,013

Series 7670 • Vision Plus



● first choice
○ alternate choice

grade TiAlN-LT1 TiAlN										
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	Rε	ZU	BETA
1724582	767004002LT	4,0	6	–	4,00	4,00	75	0,75	3	2.5
1724556	767005002LT	5,0	6	–	5,00	5,00	75	0,75	3	2.5
1724558	767006004LT	6,0	10	–	6,00	6,00	100	0,75	4	2.5
1724559	767008004LT	8,0	10	–	8,00	8,00	100	0,75	4	2.5
1724560	767010005LT	10,0	12	–	10,00	10,00	125	0,75	4	2.5
1724590	767012006LT	12,0	16	–	12,00	12,00	125	1,00	4	2.5
1724621	767016006LT	16,0	16	15,00	16,00	48,00	125	1,00	6	–
1724622	767020007LT	20,0	20	19,00	20,00	60,00	150	1,25	6	–
1806404	767025008LT	25,0	25	24,00	25,00	75,00	150	1,25	6	–

Series 75N2 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,75 x D	0,1 x D	0,4 x D	160	–	180	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,1 x D	0,4 x D	140	–	160	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
H	1	0,75 x D	0,1 x D	0,4 x D	120	–	140	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
	2	0,75 x D	0,05 x D	0,3 x D	100	–	130	fz	0,016	0,020	0,025	0,029	0,034	0,037	0,040
	3	0,75 x D	0,03 x D	0,2 x D	70	–	100	fz	0,013	0,016	0,019	0,023	0,026	0,029	0,032
	4	0,75 x D	0,01 x D	0,1 x D	50	–	70	fz	0,008	0,011	0,013	0,015	0,018	0,019	0,021

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 422875 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,5 x D	0,4 x D	0,3 x D	108	–	144	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,5 x D	0,4 x D	0,3 x D	81	–	135	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
H	1	0,5 x D	0,4 x D	0,3 x D	72	–	126	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062
	2	0,5 x D	0,3 x D	0,2 x D	63	–	108	fz	0,012	0,016	0,020	0,025	0,034	0,040	0,047
	3	0,5 x D	0,15 x D	0,15 x D	54	–	81	fz	0,009	0,013	0,016	0,019	0,026	0,032	0,037
	4	0,5 x D	0,1 x D	0,1 x D	45	–	63	fz	0,006	0,008	0,011	0,013	0,018	0,021	0,025

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For ap/ae 0.05 x D, increase fz by 40%.
For better surface finish, reduce feed per tooth.

Series 7151 • Vision Plus

Material Group																	
		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,05 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 7061 • Vision Plus

Material Group																	
		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing										
		A		Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,05 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 70N1 • Vision Plus





Material Group		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 422869 422868 • Vision Plus





Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 422870 • Vision Plus

Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 422873 • Vision Plus

Material Group		Profile Milling		AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series 7505 7545 7515 7525 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0,104	0,111	0,125
	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,009	0,012	0,014	0,019	0,023	0,027	0,031	0,034	0,037	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 7515 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	2 x D	0,3 x D	0,75 x D	160	–	180	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111	0,125
	4	2 x D	0,25 x D	0,5 x D	140	–	160	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	2 x D	0,25 x D	0,5 x D	120	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
	2	2 x D	0,2 x D	0,4 x D	80	–	130	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071	0,078
	3	2 x D	0,1 x D	0,2 x D	70	–	100	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059	0,067
	4	2 x D	0,05 x D	0,05 x D	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 7525 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	3 x D	0,2 x D	0,5 x D	160	–	180	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111	0,125
	4	3 x D	0,2 x D	0,3 x D	140	–	160	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	3 x D	0,2 x D	0,3 x D	120	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097	0,107
	2	3 x D	0,15 x D	0,2 x D	80	–	130	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071	0,078
	3	3 x D	0,05 x D	–	70	–	100	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059	0,067
	4	3 x D	0,03 x D	–	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 7585 7595 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,019	0,033	0,040	0,055	0,067	0,077	0,077	0,096	0,096	0,111	0,125
	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,017	0,030	0,036	0,049	0,059	0,069	0,069	0,084	0,084	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,017	0,030	0,036	0,049	0,059	0,069	0,069	0,084	0,084	0,097	0,107
	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,013	0,022	0,027	0,037	0,044	0,051	0,051	0,063	0,063	0,071	0,078
	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,010	0,018	0,021	0,029	0,035	0,041	0,041	0,051	0,051	0,059	0,067
	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,007	0,012	0,014	0,019	0,023	0,027	0,027	0,034	0,034	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 75N5 • Vision Plus







Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.										
		A		B	Cutting Speed — vc m/min				D1 — Diameter									
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0	25,0
P	3	1 x D	0,4 x D	1 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077	0,087	0,096	0.,104	0,111	0,125
	4	1 x D	0,4 x D	0,75 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
H	1	1 x D	0,4 x D	0,75 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069	0,077	0,084	0,091	0,097	0,107
	2	1 x D	0,3 x D	0,5 x D	70	–	120	fz	0,018	0,022	0,027	0,037	0,044	0,051	0,057	0,063	0,067	0,071	0,078
	3	1 x D	0,15 x D	0,3 x D	60	–	90	fz	0,014	0,018	0,021	0,029	0,035	0,041	0,046	0,051	0,055	0,059	0,067
	4	1 x D	0,1 x D	0,15 x D	50	–	70	fz	0,009	0,012	0,014	0,019	0,023	0,027	0,031	0,034	0,037	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 75N8 • Vision Plus







Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
		ap	ap	ap	min		max	mm	6,0	8,0	10,0	12,0
P	3	0,75 x D	0,2 x D	0,2 x D	120	–	160	fz	0,040	0,055	0,067	0,077
	4	0,75 x D	0,2 x D	0,2 x D	90	–	150	fz	0,036	0,049	0,059	0,069
H	1	0,75 x D	0,2 x D	0,2 x D	80	–	140	fz	0,036	0,049	0,059	0,069
	2	0,75 x D	0,2 x D	0,2 x D	70	–	120	fz	0,027	0,037	0,044	0,051
	3	0,75 x D	0,1 x D	0,1 x D	60	–	90	fz	0,021	0,029	0,035	0,041
	4	0,75 x D	0,05 x D	0,05 x D	50	–	70	fz	0,014	0,019	0,023	0,027

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.

Series 422876 422878 • Vision Plus





Material Group		Side Milling (A) and Slotting (B)			K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,5 x D	0,4 x D	0,3 x D	120	–	160	fz	0,026	0,033	0,040	0,055	0,067	0,077
	4	0,5 x D	0,4 x D	0,3 x D	90	–	150	fz	0,024	0,030	0,036	0,049	0,059	0,069
H	1	0,5 x D	0,4 x D	0,3 x D	80	–	140	fz	0,024	0,030	0,036	0,049	0,059	0,069
	2	0,5 x D	0,3 x D	0,2 x D	60	–	80	fz	0,018	0,022	0,027	0,037	0,044	0,051
	3	0,5 x D	0,15 x D	0,15 x D	50	–	70	fz	0,014	0,018	0,021	0,029	0,035	0,041
	4	0,5 x D	0,1 x D	0,1 x D	40	–	60	fz	0,009	0,012	0,014	0,019	0,023	0,027

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For ap/ae 0,05 x D increase fz by 40%.
For better surface finish, reduce feed per tooth.

Series 7150 • Vision Plus




Material Group		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

■ Series 7050 7060 • Vision Plus





Material Group		Profile Milling		TiAlN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	1,0	2,0	2,5	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	3	0,1 x D	0,1 x D	240	–	320	fz	0,017	0,034	0,043	0,052	0,070	0,089	0,109	0,150	0,182	0,211
	4	0,1 x D	0,1 x D	180	–	300	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
H	1	0,1 x D	0,1 x D	160	–	280	fz	0,016	0,031	0,040	0,048	0,064	0,081	0,099	0,134	0,162	0,187
	2	0,1 x D	0,1 x D	140	–	240	fz	0,012	0,024	0,030	0,036	0,048	0,061	0,074	0,101	0,121	0,140
	3	0,1 x D	0,1 x D	120	–	180	fz	0,009	0,019	0,024	0,028	0,038	0,048	0,058	0,079	0,096	0,112
	4	0,1 x D	0,1 x D	100	–	140	fz	0,006	0,012	0,016	0,019	0,025	0,032	0,039	0,053	0,064	0,074

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

■ Series 422871 • Vision Plus





Material Group		Profile Milling		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling (A) — Semi-Finishing						
		A		Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0
P	3	0,1 x D	0,05 x D	272	–	306	fz	0,052	0,070	0,089	0,109	0,150	0,182
	4	0,1 x D	0,05 x D	238	–	272	fz	0,048	0,064	0,081	0,099	0,134	0,162
H	1	0,07 x D	0,1 x D	200	–	280	fz	0,060	0,080	0,102	0,123	0,168	0,203
	2	0,05 x D	0,04 x D	161	–	276	fz	0,052	0,070	0,088	0,107	0,145	0,174
	3	0,03 x D	0,03 x D	174	–	261	fz	0,047	0,063	0,079	0,096	0,130	0,158
	4	0,03 x D	0,03 x D	145	–	203	fz	0,031	0,042	0,053	0,064	0,087	0,105

NOTE: Please use the reference table to optimise your cutting speed based on the average cutting angle of the application. See page O205.

Series D618 • Vision Plus

Material Group																
		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).									
		A		Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0
P	3	2 x D	0,15 x D	120	–	160	fz	0,019	0,026	0,033	0,040	0,055	0,067	0,077	0,096	0,111
	4	2 x D	0,15 x D	90	–	150	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097
H	1	2 x D	0,15 x D	80	–	140	fz	0,017	0,024	0,030	0,036	0,049	0,059	0,069	0,084	0,097
	2	2 x D	0,15 x D	70	–	120	fz	0,013	0,018	0,022	0,027	0,037	0,044	0,051	0,063	0,071
	3	2 x D	0,1 x D	60	–	90	fz	0,010	0,014	0,018	0,021	0,029	0,035	0,041	0,051	0,059
	4	2 x D	0,05 x D	50	–	70	fz	0,007	0,009	0,012	0,014	0,019	0,023	0,027	0,034	0,039

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 422837 422831 • Vision Plus

Material Group														
		Side Milling (A)		K10UF-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	1,5 x D	0,2 x D	120	–	160	fz	0,040	0,055	0,067	0,077	0,096	0,111	0,125
	4	1,5 x D	0,2 x D	90	–	150	fz	0,036	0,049	0,059	0,069	0,084	0,097	0,107
H	1	1,5 x D	0,2 x D	80	–	140	fz	0,036	0,049	0,059	0,069	0,084	0,097	0,107
	2	1,5 x D	0,15 x D	60	–	80	fz	0,027	0,037	0,044	0,051	0,063	0,071	0,078
	3	1,5 x D	0,1 x D	50	–	70	fz	0,021	0,029	0,035	0,041	0,051	0,059	0,067
	4	1,5 x D	0,05 x D	40	–	60	fz	0,014	0,019	0,023	0,027	0,034	0,039	0,044

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For better surface finish, reduce feed per tooth.
For Series 422831, ap max = 2,5 x D by 50% ae.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 7670 • Vision Plus







Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 10%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	4,0	5,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	3	0,8 x D	0,5 x D	0,75 x D	160	–	180	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	4	0,8 x D	0,4 x D	0,5 x D	140	–	160	fz	0,018	0,023	0,028	0,038	0,046	0,056	0,069	0,088	0,098
	5	0,8 x D	0,5 x D	0,75 x D	60	–	100	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	6	0,8 x D	0,4 x D	0,5 x D	50	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
M	1	0,8 x D	0,5 x D	0,75 x D	80	–	100	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	2	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	3	0,8 x D	0,4 x D	0,75 x D	60	–	80	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
K	1	0,8 x D	0,5 x D	0,75 x D	120	–	160	fz	0,024	0,031	0,037	0,051	0,061	0,075	0,091	0,114	0,124
	2	0,8 x D	0,5 x D	0,75 x D	110	–	140	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	3	0,8 x D	0,4 x D	0,75 x D	100	–	130	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
S	1	0,8 x D	0,4 x D	0,75 x D	90	–	115	fz	0,020	0,025	0,031	0,043	0,051	0,063	0,078	0,101	0,114
	2	0,8 x D	0,25 x D	0,3 x D	20	–	40	fz	0,011	0,014	0,017	0,022	0,027	0,033	0,042	0,054	0,061
	3	0,8 x D	0,4 x D	0,75 x D	50	–	80	fz	0,016	0,021	0,025	0,034	0,041	0,051	0,063	0,081	0,091
	4	0,8 x D	0,3 x D	0,5 x D	45	–	65	fz	0,013	0,018	0,022	0,031	0,038	0,046	0,058	0,074	0,084
H	1	0,8 x D	0,5 x D	0,5 x D	120	–	140	fz	0,018	0,023	0,028	0,038	0,046	0,056	0,069	0,088	0,098
	2	0,8 x D	0,2 x D	0,3 x D	80	–	130	fz	0,014	0,017	0,021	0,029	0,034	0,042	0,051	0,065	0,071
	3	0,8 x D	0,15 x D	0,2 x D	70	–	100	fz	0,011	0,014	0,017	0,023	0,027	0,034	0,041	0,052	0,057

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
For rougher tool with 6 flutes, use ap in slotting 60% of table value.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters on diameters >12mm.

Calculation Examples

Table of Factors for Speed Calculation of Ball Nose							
Average Wall Angle	ap/D						
	0.003	0.006	0.010	0.016	0.020	0.025	0.030
0.0°	9.1	6.5	5.0	4.0	3.6	3.2	2.9
3.0°	6.2	4.9	4.0	3.3	3.0	2.8	2.6
5.0°	5.1	4.2	3.5	3.0	2.8	2.5	2.4
8.0°	4.1	3.4	3.0	2.6	2.4	2.3	2.1
10.0°	3.6	3.1	2.7	2.4	2.3	2.1	2.0
15.0°	2.8	2.5	2.2	2.0	1.9	1.8	1.7
20.0°	2.3	2.1	1.9	1.8	1.7	1.6	1.6
30.0°	1.7	1.6	1.5	1.4	1.4	1.3	1.3
40.0°	1.4	1.3	1.3	1.2	1.2	1.2	1.2
50.0°	1.2	1.2	1.1	1.1	1.1	1.1	1.1
55.0°	1.1	1.1	1.1	1.1	1.1	1.0	1.0

*For calculating real cutting speed, use formula: Basic cutting speed * Factor*

Choose the coefficient according to the ap/D and average wall angle.

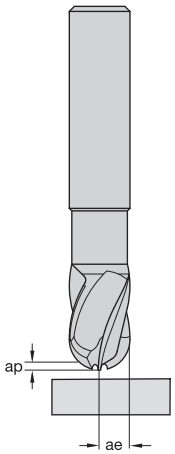
Example 1:
For Tool = 10mm and ap = 0,2mm for average wall angle 0°, ap/D ratio equal 0,2/10 = 0,02. Factor equal 3.6.

Example 2:
For Tool = 8mm and ap = 0,1mm for average wall angle 10°, ap/D ratio equal 0,1/8 = 0,0125. Factor will be between 2.7 and 2.4, choose 2.6.

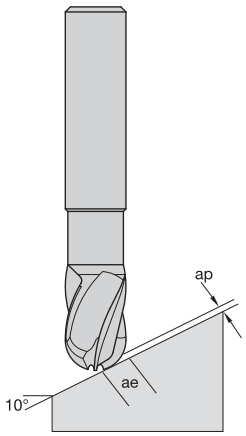
Keep in mind shank diameter and length effect.

If tool length out of the chuck is more than 2 x D, please decrease feed per tooth by 15% each 1 x D.

Material Group	TiAlN or AlTiN Basic Cutting Speed Vc m/min		
	min		max
P3	160	–	180
P4	140	–	160
H1	100	–	140
H2	70	–	120
H3	60	–	90
H4	50	–	70



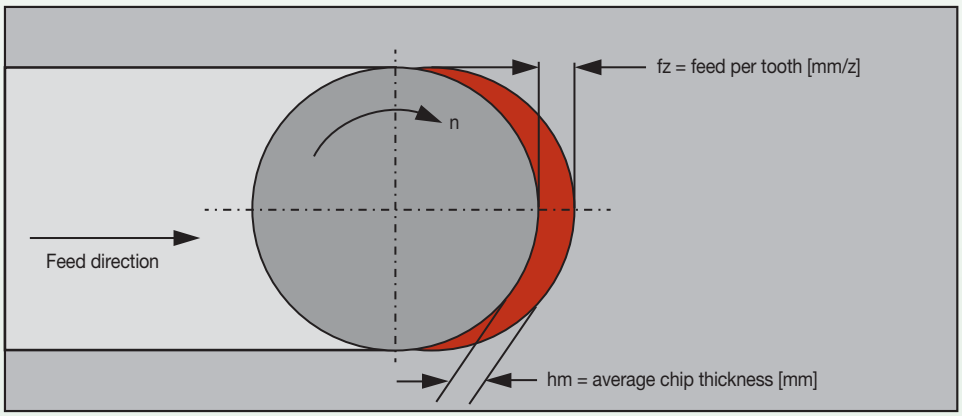
Application example #1 =
face milling a flat surface
D = 10mm
ap = 0,2mm
Average wall angle = 0°
Finishing H2
Starting vc from chart = 100
ap/D = 0.02
Factor from table =
3.6
vc to programme into machine = 100 * 3.6 = 360 m/min
RPM = 360* 1000/3.14/10 = 11460 RPM



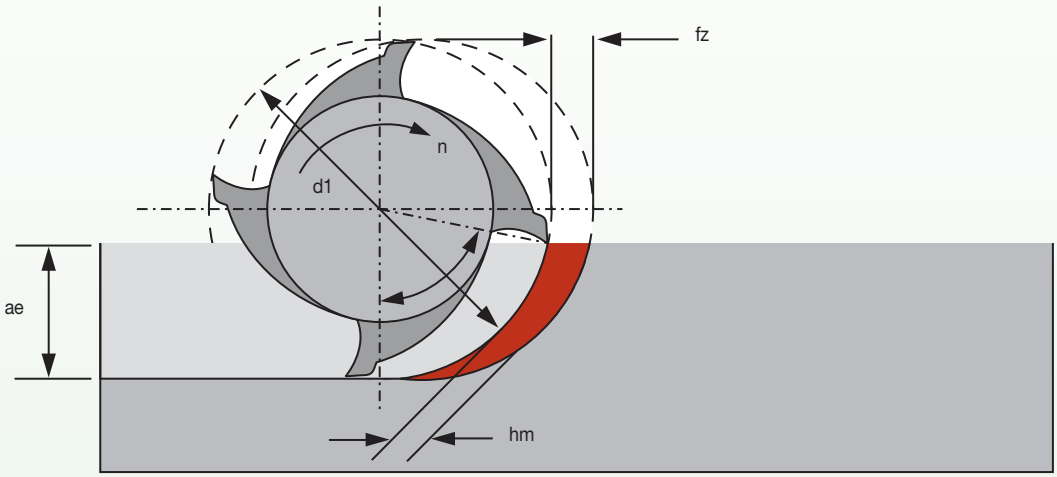
Application example #2 =
face milling a 10° average wall angle
D = 8mm
ap = 0,1mm
Average wall angle = 10°
Finishing H2
Starting vc from chart = 100
ap/D = 0,1/8 = 0,0125
Factor from table =
2.6
vc to programme into machine = 100 * 2.6 = 260 m/min
RPM = 260* 1000/3.14/10 = 7640 RPM

Conventional Slotting

- Full slotting limitations:
  - Usually not more then ap = 1 x D.
  - Conventional and climb milling at the same time.
  - High heat development on the tool and on the workpiece.
  - Difficult chip evacuation.
  - High radial forces.
- This means:
  - No constant chip thickness.
  - Low MRR.
  - Surface quality from the left to right side are different.
  - Limited tool life.
  - High power and torque requirements for the machine.



ae and Chip Thickness



To calculate average chip thickness:

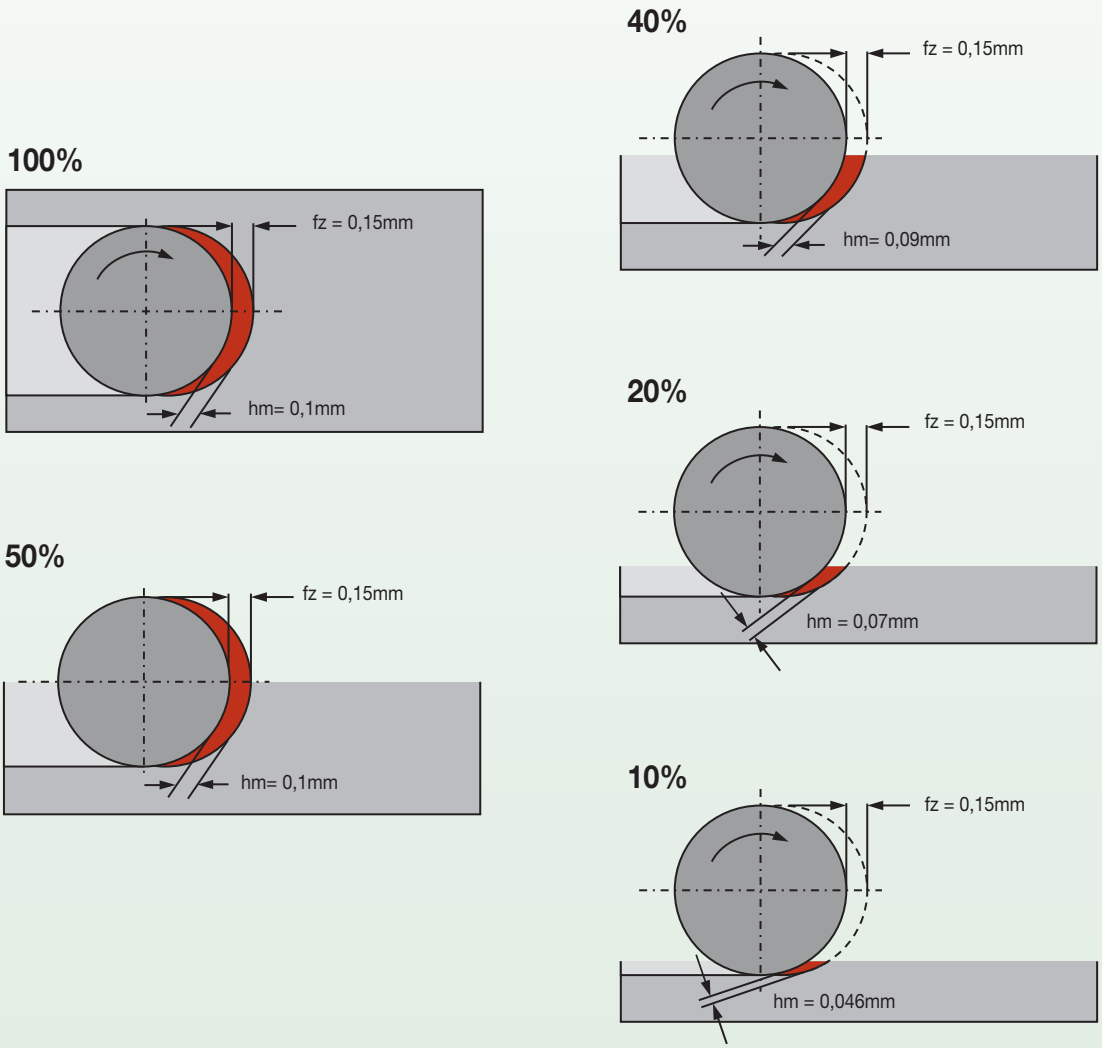
$$hm = fz \bullet \left(\sqrt{\frac{ae}{d1}}\right)$$

Simplified formula for shown application and 90° angles on the tool.
The chip thickness defines the load on the cutting edge.

ae and Chip Thickness

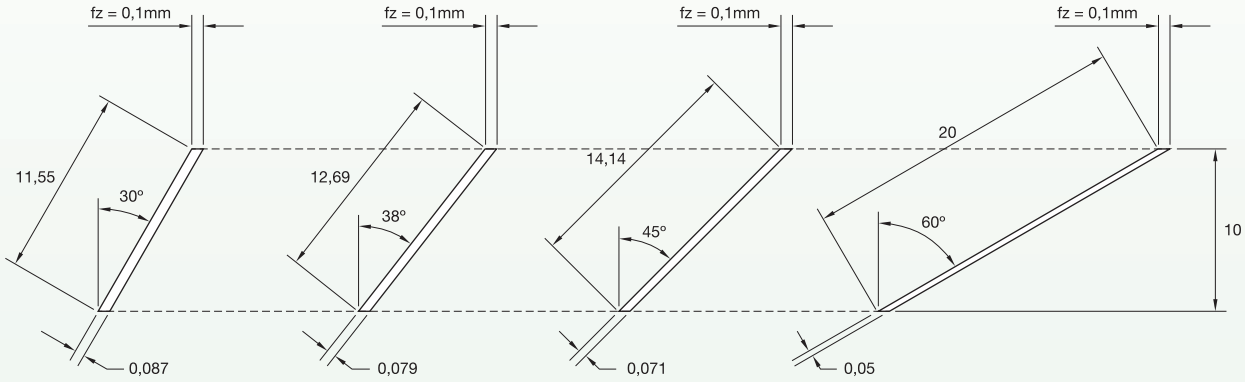
chip thinning effect		
ae	**programmed feed (fz)**	**chip thickness (hm)**
100%	0,15mm	0,1mm
50%	0,15mm	0,1mm
40%	0,15mm	0,09mm
20%	0,15mm	0,07mm
10%	0,15mm	0,046mm

The chip thickness needs to be compensated by feed.



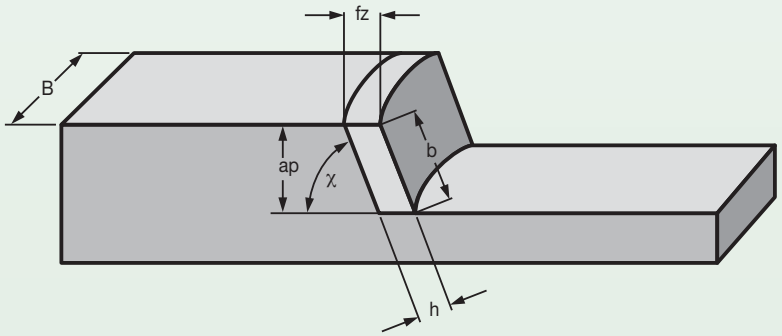
Helix Angle and Chip Thickness

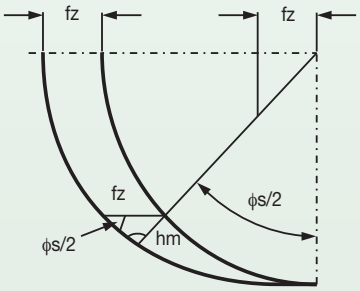
The chip thickness (h) depends on the helix angle of the cutting edge. If the feed fz is constant, the chip thickness gets thinner as helix angle rises. That means with more helix angle, the chip gets thinner — or you can rise feed rate to increase productivity and load to the cutting edge.



Calculation of Chip Thickness

The chip thickness (h) is not constant, but defines the load of the cutting edge. By reducing the load on the cutting edge, machining at higher speeds is possible through the machining parameters. For easier calculation, use an average chip thickness hm. When calculating machining data this way cutting data may be compromised because the workpiece is often a different shape.





$$hm = \frac{360°}{\pi \bullet \phi s} \bullet \frac{ae}{D} \bullet fz \bullet \sin \chi$$

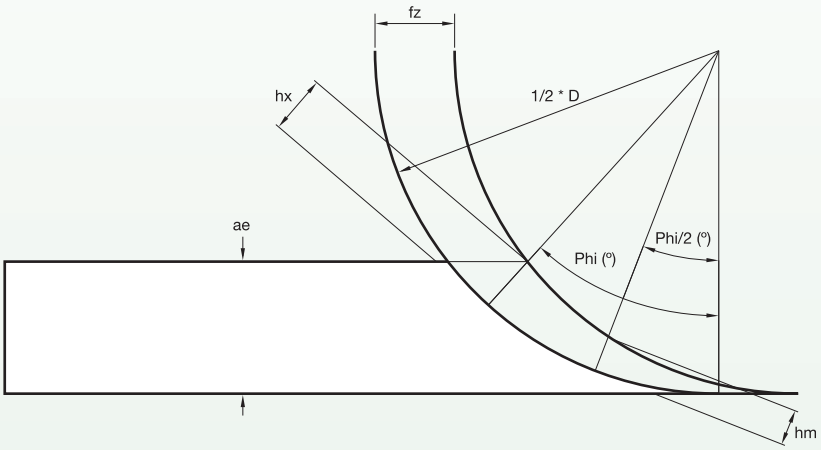
hm [mm]	=	average chip thickness
ϕs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

* Solid End Mills: χ = 90°-λ

NOTE: It makes no difference if the tool is solid or an indexable milling tool.

Differences between hm and hx

In conventional milling, it makes sense to calculate the load to the cutting edge through hm. With reducing the ae to very low values, you can calculate with the maximum chip thickness hx to make sure that the feed per tooth is set up correctly.



Conventional

$hm = 360°/\pi \cdot \phi s \cdot ae/D \cdot fz \cdot \sin x$

hm [mm]	=	average chip thickness
fs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

Smart Machining

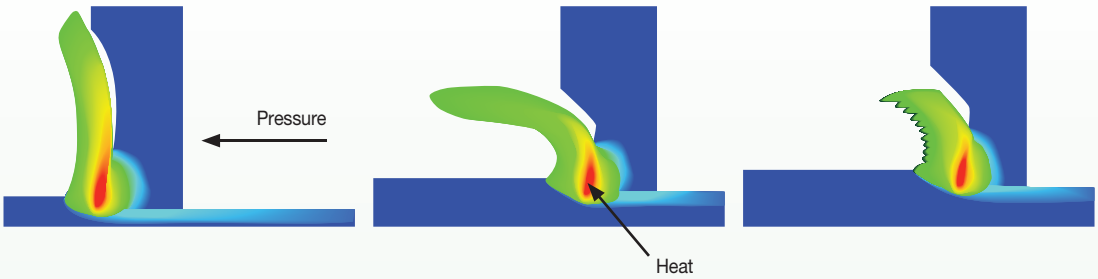
$hx = 360°/\pi \cdot \phi s \cdot 2 \cdot ae/D \cdot fz \cdot \sin x$

hx [mm]	=	maximum chip thickness
fs [°]	=	engagement angle
ae [mm]	=	width of engagement
D1 [mm]	=	outer diameter tool
fz [mm]	=	feed per tooth
χ [°]	=	lead angle
λ [°]	=	helix angle *

* Solid End Mills: $\chi = 90° - \lambda$

Trochoidal Milling can be performed with solid or indexable milling tools.

Cutting Speed

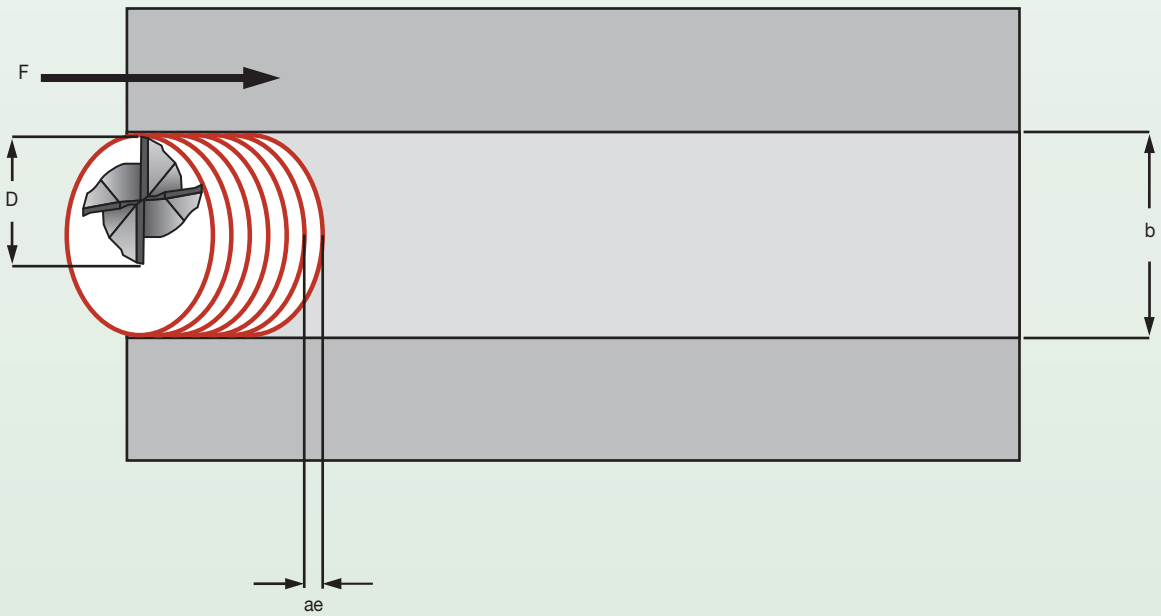


Reduced radial engagement influences the cutting speed, because the heat produced through the cutting process limits the cutting speed.

ae/D	full slot	50% ae	40% ae	30% ae	20% ae	10 % ae	5% ae	4% ae
speed factors	0,9	1	1,1	1,2	1,3	1,4	2,5	3
phi [°]	180	90	78,46	66,42	53,13	36,87	25,84	23,07

Static Trochoidal Milling for a Full Slot

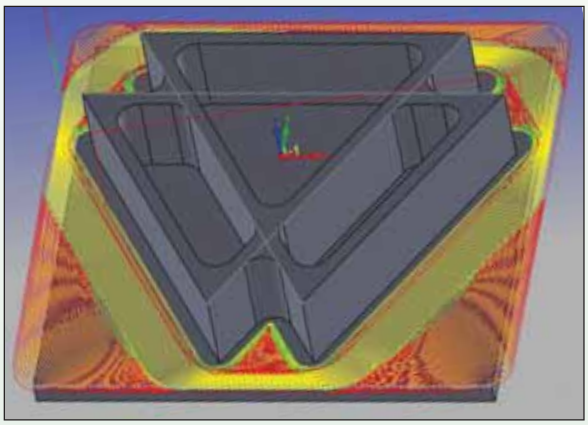
- Use a tool in which D < b.
- Programme circles in the CNC programme (as a cycle).
- After one circle, repeat the same with an offset.
- Optimise by shortening the lane “in the air” to a form like a “D”.

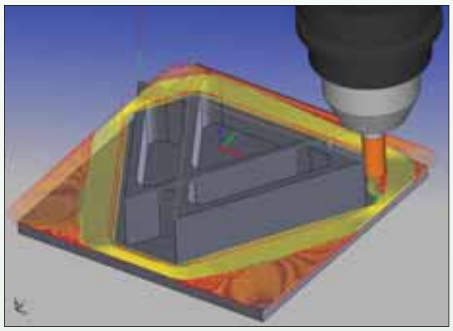


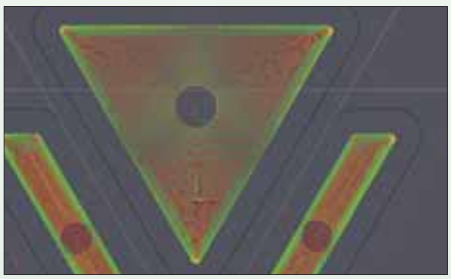
Trochoidal Milling can be performed with solid or indexable milling tools.

Dynamic Trochoidal Milling

- Transfer the basic idea control of chip thickness to dynamic processes.
- Dynamic adaption of feed in relation to ae and wrap angle through an intelligent CAM Software.
- Using helix interpolation, D-lanes, and morphing cycles.







Requirements

Static trochoidal milling
- Dynamic machine.
- CNC Programme.
- Modern tool.
- Cutting data for trochoidal machining.

Dynamic trochoidal milling
- Dynamic CNC machine.
- CAD/CAM optimisation software.
- Modern tool.
- Cutting data for trochoidal machining.

Benefits

- Constant chip thickness.
- Reduced arc/angle engagement (wrap angle).
- Tremendously reduced load on the cutting edge.
- Reduced temperature during the machining process.
- Higher cutting speed and feed per tooth possible.
- Reduced cycle time and increased tool life.
- Better chip evacuation.
- Better usage of the tool length.
- Less torque and power requirements for the machine.
- Less risk of spindle damages through torque fluctuation and reduced torque peaks caused by conventional milling processes.

VariMill III™ ER



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

VariMill III ER provides the highest metal removal rates and superior surface finish in the most demanding workpiece materials in the aerospace industry. WIDIA™ combines its unmatched tooling technology with state-of-the-art surface treatments to deliver the highest quality and productivity you can rely on when it comes down to critical semi-finishing and finishing operations.

- 7-Flute design maximises Metal Removal Rates (MRR) and surface quality.
- Up to 30% radial engagement allowing increased productivity.
- Perfectly suited for high-speed maching techniques such as trochoidal and peel milling.
- Central coolant hole on 2 x D tools for chip evacuation during pocketing.
- Available with **SAFE-λOCK**® as standard for increased tool life and anti-pullout.
- Available with all common aerospace radii.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™

High-Performance Solid Carbide End Mills •
SAFE-λOCK®

In High-Performance Cutting (HPC), slow microcreeping can cause the cutting tool to be pulled out of the chuck, turning high-quality workpieces to scrap.



SAFE-λOCK®

Be on the safe side with SAFE-λOCK® in High-Performance Cutting (HPC).

- Highly accurate clamping due to positive connection.
- No loss of accuracy.
- No pullout or spinning of the tool.
- No damage to the workpiece or machine.
- Groove on tool shank is directed so the tool will be pulled into the chuck (depending on direction of rotation).

Order Information

WIDIA™ high-performance end mills with shank diameters of 12mm and larger are available with **SAFE-λOCK®** technology, as a special tool, upon request. Please contact your local customer service location to receive a quote.

Features
- Form-closed clamping.
- High accuracy clamping.
- Helical grooves.

Functions
- No pullout.
- Excellent runout.
- Adjustable clamping length.

Benefits
- Reduce scrap rate.
- Higher tool life.
- No need to change NC programme after regrinding.









Example for Highest Metal Removal Rates (MRR)

The VariMill II ER proprietary design with unequal flute spacing and unique core geometry for chatter-free machining enables slotting operations in titanium up to 1 x D.





SAFE-λOCK®
The safety belt for high-performance solid carbide end mills provide form-closed clamping with high accuracy and helical grooves for length adjustment.



WIDIA™ and the Machine Tool Industry (MTI)

Partners from Point to Part

Challenges are always better faced with a partner. Getting the most out of a manufacturing process means a 3-point partnership between the end user, the machine tool builder, and the tooling provider. The right partner works with you every step of the way, from the point of the spindle connection to the completed part.

Let WIDIA Machine Tool Industry (MTI) specialists be your partners. We'll work with you from pre-planning, time studies, and machine tool selection through setup, runoff, operator training, and process optimisation. The MTI team focuses simultaneously on engineering, process and application support, and tool selection. We look at the total solution to get you where you want and need to be in your manufacturing.

We have MTI specialists in more than 60 countries around the world, so there's always someone near you: **W-MTI.Solutions@WIDIA.com.**

Components of a Winning Strategy

Our mission is to build lasting relationships with all of the focused builders, end users, and dealers to provide continuous communications and to ensure we have their mind share. WIDIA is the number one choice of machine tool builders, dealers, and end users globally for total tooling solutions. We provide world class quality, service, and on-time delivery to meet and exceed your expectations

- Trust
- Innovation
- Dedicated Support
- Capability
- Engineered Solutions





Global Manufacturers

Our global organisation and network is ensuring a reliable support at the home of the machine tool builder and the final place of installation, and following the machines worldwide.

- Simultaneous engineering support from art to part.
- Seamless transition from the initial investment phase to full production by qualified technical hand-off to local WIDIA staff at the end user stage, guaranteeing satisfying continued service and support.
- Starter kits for machine tool equipment.

Global WIDIA MTI

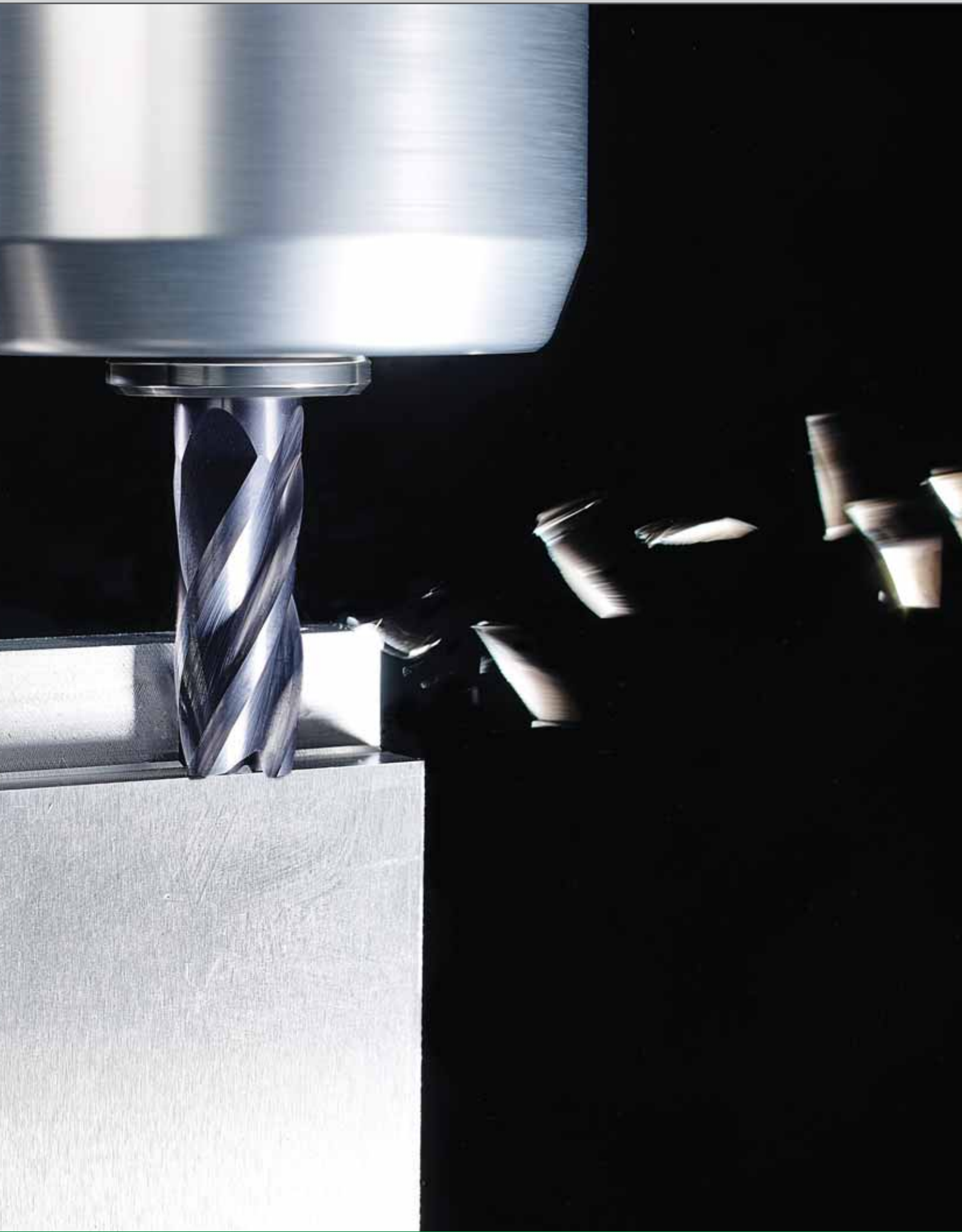
We will provide our customers with a total solution from spindle connection to the part. We include all brands of the WIDIA family of companies to enhance this total solution.

Global Machine Tool Builders

Providing machine tool builders with a long term expertise in the OEM business and an unreached bandwidth of competitive technical solutions, consisting of standard, as well as customised cutting tool technology.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™



Solid End Milling • General Purpose Solid Carbide End Mills

NINA Solid Carbide Roughers and Finishers P2–P11

VariMill General Purpose 2-Flute End Mills P12–P26

VariMill General Purpose 3-Flute End Mills P28

VariMill General Purpose 4-Flute End Mills P30–P44

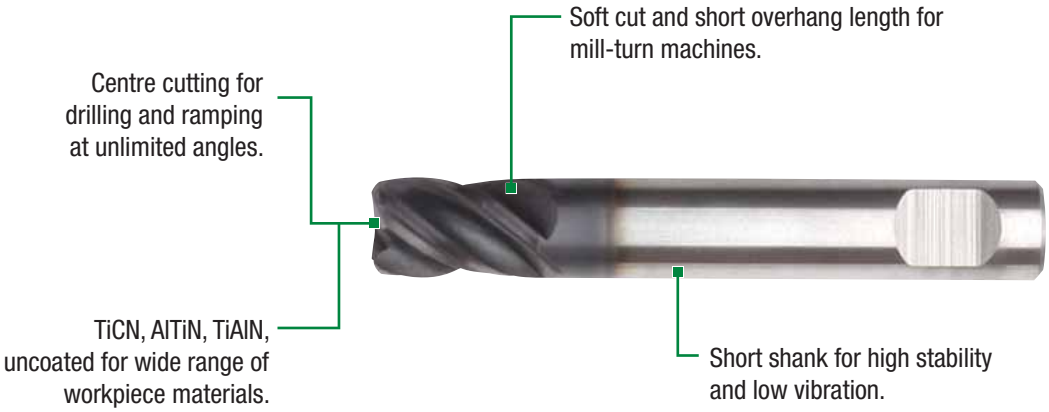


NINA



NINA is an economic choice for high quality and performance when regrinding is not justified. Designed to minimise tool costs for applications when short lengths-of-cut are required. NINA has a short, compact design with minimised vibration and soft cut to support mill-turn machines. A state-of-the-art substrate and wide range of coatings offers high tool life and stable manufacturing on a wide range of workpiece materials. With different front end styles (sharp edge, corner chamfer, radii, ball nose, and chamfering tool), NINA covers a wide range of applications. Roughing and finishing with one tool reduces tool inventory and tool changes providing increased productivity and value.

- One tool for roughing and finishing operations.
- Milling at a value price when re-grinding is not justified.
- Stable, low-vibration solution with soft cut for mill-turn machines.
- Wide range of front ends and coatings.



NINA™ Series

- Economic price, low-cost carbide substrate.
- Excellent results for applications when short lengths-of-cut are required.
- Reduce tool stock and ease tool management.
- Wide range of applications and materials with one tool.
- Rough and finish with one tool.

323002/423002/323001/423001 Series

- 3-flute.
- Sharp edge front end.
- TiCN/AlTiN coating.
- For steel, stainless steel, cast iron, and aluminium.
- Centre cutting.



423004/423003 Series

- 4-flute.
- Chamfer end for improved tool life.
- AlTiN coating.
- For steel, stainless steel, and cast iron.
- Centre cutting.



423048/423047 Series

- 2-flute.
- Radii for improved tool life and wider application range.
- AlTiN coating.
- For steel, stainless steel, and non-ferrous.
- Centre cutting.



423039/423008 Series

- 2-flute.
- Ball nose for 3D profiling.
- AlTiN coating.
- For steel, stainless steel, and non-ferrous.
- Centre cutting.



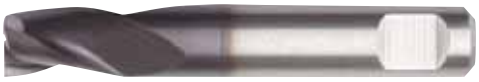
423036/423037 Series

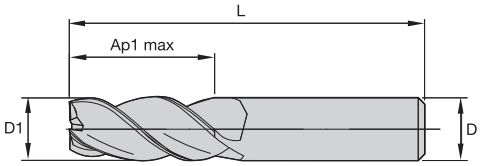
- 4-flute.
- 90° point angle.
- AlTiN/TiAlN coating.
- For widest range of materials.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



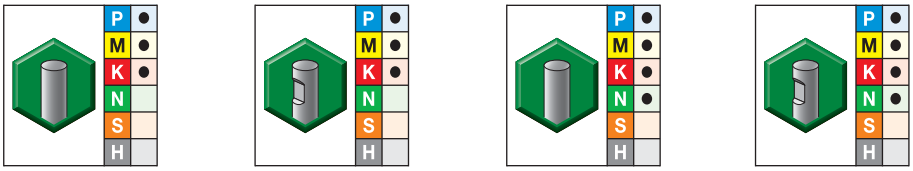




End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423002 323002 423001 323001 • NINA



● first choice
○ alternate choice

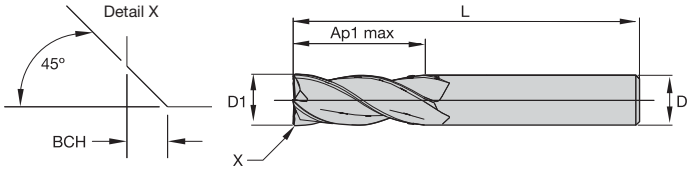
grade K30F-DCF TiAlN		grade K30F-DCF TiAlN		grade K30F-TiCN TiCN		grade K30F-TiCN TiCN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2627990	423002-000020	2343352	423001-000020	2627800	323002-000020	2336740	323001-000020	2,0	6	4,00	38
2628043	423002-000030	2343354	423001-000030	2627801	323002-000030	2336747	323001-000030	3,0	6	5,00	38
2628044	423002-000040	2343356	423001-000040	2627802	323002-000040	2336753	323001-000040	4,0	6	7,00	38
2628045	423002-000050	2343358	423001-000050	2627983	323002-000050	2336759	323001-000050	5,0	6	8,00	38
2628046	423002-000060	2343360	423001-000060	2627984	323002-000060	2336765	323001-000060	6,0	6	8,00	38
2628047	423002-000080	2343362	423001-000080	2627985	323002-000080	2336771	323001-000080	8,0	8	11,00	43
2628048	423002-000100	2343364	423001-000100	2627986	323002-000100	2336777	323001-000100	10,0	10	13,00	50
2628049	423002-000120	2343366	423001-000120	2627987	323002-000120	2336783	323001-000120	12,0	12	15,00	55

NOTE: For application data, please see page P9.

- Centre cutting.
- HPC.
- Standard items listed. Additional styles and coatings made-to-order.



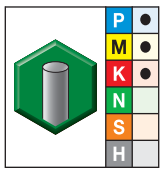


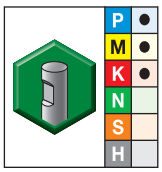


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423004 423003 • NINA





● first choice
○ alternate choice

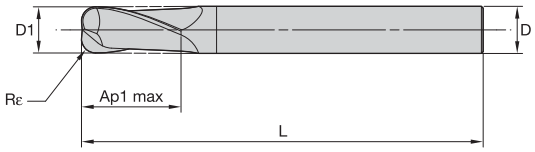
grade K30F-DCHP AlTiN		grade K30F-DCHP AlTiN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
3657761	423004-000040	3657756	423003-000040	4,0	6	7,00	38	0,40
3657762	423004-000060	3657757	423003-000060	6,0	6	8,00	38	0,40
3657763	423004-000080	3657758	423003-000080	8,0	8	11,00	43	0,40
3657764	423004-000100	3657759	423003-000100	10,0	10	13,00	50	0,50
3657765	423004-000120	3657760	423003-000120	12,0	12	15,00	55	0,50

NOTE: For application data, please see page P9.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



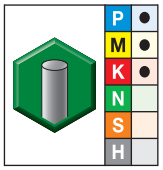


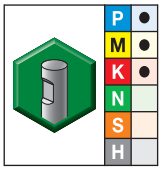


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

■ Series 423048 423047 • NINA





● first choice
○ alternate choice

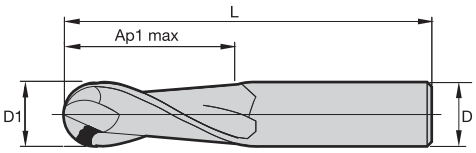
grade K30F-DCHP TiAlN		grade K30F-DCHP TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	Rε
2343564	423048-000020	2343548	423047-000020	2,0	6	4,00	38	0,50
2343566	423048-000030	2343550	423047-000030	3,0	6	5,00	38	0,50
2343568	423048-000040	2343552	423047-000040	4,0	6	7,00	38	0,50
2343570	423048-000050	2343554	423047-000050	5,0	6	8,00	38	0,50
2343572	423048-000060	2343556	423047-000060	6,0	6	8,00	38	1,00
2343574	423048-000080	2343558	423047-000080	8,0	8	11,00	43	2,00
2343576	423048-000100	2343560	423047-000100	10,0	10	13,00	50	3,00
2343579	423048-000120	2343562	423047-000120	12,0	12	15,00	55	3,00

NOTE: For application data, please see page P10.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



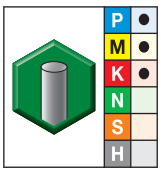


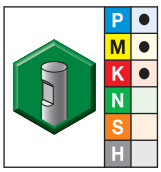


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423039 423038 • NINA





● first choice
○ alternate choice

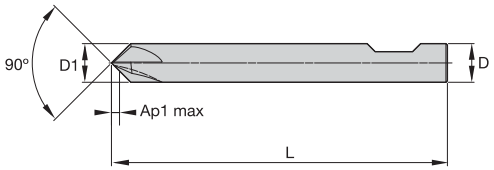
grade K30F-DCHP TiAlN		grade K30F-DCHP TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2343531	423039-000020	2343514	423038-000020	2,0	6	4,00	38
2343533	423039-000030	2343516	423038-000030	3,0	6	5,00	38
2343535	423039-000040	2343519	423038-000040	4,0	6	7,00	38
2343537	423039-000050	2343521	423038-000050	5,0	6	8,00	38
2343539	423039-000060	2343523	423038-000060	6,0	6	8,00	38
2343541	423039-000080	2343525	423038-000080	8,0	8	11,00	43
2343543	423039-000100	2343527	423038-000100	10,0	10	13,00	50
2343545	423039-000120	2343529	423038-000120	12,0	12	15,00	55

NOTE: For application data, please see page P10.

- Non-centre cutting.
- Chamfering.
- Standard items listed. Additional styles and coatings made-to-order.



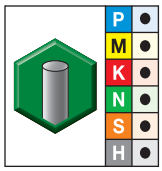


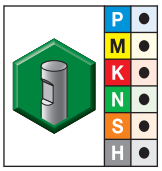


End Mill Tolerances

D1	tolerance h10 + / -	D	tolerance h6 + / -
≤ 3	0/0,04	≤ 3	0/0,006
> 3–6	0/0,048	> 3–6	0/0,008
> 6–10	0/0,058	> 6–10	0/0,009
> 10–18	0/0,070	> 10–18	0/0,011
> 18–30	0/0,084	> 18–30	0/0,013

Series 423036 423037 • NINA





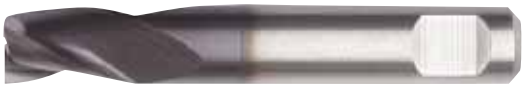
● first choice
○ alternate choice

grade K30F-DCF TiAlN		grade K30F-DCHP AlTiN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2343508	423036-000060		–	6,0	6	1,00	38
	–	2628498	423037-000060	6,0	6	1,00	83
2343510	423036-000080		–	8,0	8	1,50	43
	–	2628499	423037-000080	8,0	8	1,50	104
2343512	423036-000100		–	10,0	10	2,00	50
	–	2628500	423037-000100	10,0	10	2,00	125

NOTE: For application data, please see page P11.

Series 423002 323002 423001 323001 • NINA





Material Group		Side Milling (A) and Slotting (B)			K30F-TICN TiCN			K30F-DCF TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.							
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	ap	min	–	max	min	–	max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	500	–	2000	fz	0,020	0,030	0,040	0,050	0,060	0,080	0,100	0,120
	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	500	–	1500	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108
	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	250	–	1000	fz	0,018	0,027	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 423004 423003 • NINA





Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	1 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	1	1 x D	0,5 x D	1 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	1 x D	0,5 x D	1 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
	3	1 x D	0,5 x D	1 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
	4	1 x D	0,5 x D	1 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	1 x D	0,5 x D	1 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
	2	1 x D	0,5 x D	1 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	1 x D	0,5 x D	1 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	1 x D	0,5 x D	1 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
	3	1 x D	0,5 x D	1 x D	110	–	130	fz	0,019	0,024	0,029	0,040	0,048	0,056
N	1	1 x D	0,5 x D	1 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
	2	1 x D	0,5 x D	1 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
	3	1 x D	0,5 x D	1 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

■ Series 423048 423047 • NINA





Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Application Data • Series 423039 423038 • NINA

■ Series 423039 423038 • NINA





Material Group		Side Milling (A) and Slotting (B)			K30F-DCHP AlTiN			Recommended feed per tooth (fz = mm/th) for 3D milling/profiling						
		A		B	Cutting Speed — vc m/min				D1 — Diameter					
		ap	ae	ap	min	–	max	mm	4,0	5,0	6,0	8,0	10,0	12,0
P	0	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	1	0,75 x D	0,5 x D	0,5 x D	150	–	200	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	140	–	190	fz	0,028	0,036	0,044	0,060	0,072	0,083
	3	0,75 x D	0,5 x D	0,5 x D	120	–	160	fz	0,023	0,030	0,036	0,050	0,061	0,070
	4	0,75 x D	0,5 x D	0,5 x D	90	–	150	fz	0,021	0,027	0,033	0,045	0,054	0,062
M	1	0,75 x D	0,5 x D	0,5 x D	90	–	115	fz	0,023	0,030	0,036	0,050	0,061	0,070
	2	0,75 x D	0,5 x D	0,5 x D	60	–	80	fz	0,019	0,024	0,029	0,040	0,048	0,056
K	1	0,75 x D	0,5 x D	0,5 x D	120	–	150	fz	0,028	0,036	0,044	0,060	0,072	0,083
	2	0,75 x D	0,5 x D	0,5 x D	110	–	140	fz	0,023	0,030	0,036	0,050	0,061	0,070
N	1	0,75 x D	0,5 x D	0,5 x D	500	–	2000	fz	0,040	0,050	0,060	0,080	0,100	0,120
	2	0,75 x D	0,5 x D	0,5 x D	500	–	1500	fz	0,036	0,045	0,054	0,072	0,090	0,108
	5	0,75 x D	0,5 x D	0,5 x D	250	–	1000	fz	0,036	0,045	0,054	0,072	0,090	0,108

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.

Series 423036 423037 • NINA





Material Group		Chamfer Milling		K30F-DCF			K30F-DCHP			Recommended feed per tooth (fz = mm/th) for chamfering (A)			
				TiAlN			AlTiN						
		A		Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter		
		ap	ae	min	–	max	min	–	max	mm	6,0	8,0	10,0
P	0	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
	1	0,35 x D	0,35 x D	150	–	200	150	–	200	fz	0,035	0,048	0,058
	2	0,35 x D	0,35 x D	140	–	190	140	–	190	fz	0,035	0,048	0,058
	3	0,35 x D	0,35 x D	120	–	160	120	–	160	fz	0,029	0,040	0,048
	4	0,35 x D	0,35 x D	90	–	150	90	–	150	fz	0,026	0,036	0,043
	5	0,35 x D	0,35 x D	60	–	100	60	–	100	fz	0,024	0,032	0,039
	6	0,35 x D	0,35 x D	50	–	75	50	–	75	fz	0,020	0,027	0,032
M	1	0,35 x D	0,35 x D	90	–	115	90	–	115	fz	0,029	0,040	0,048
	2	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
	3	0,35 x D	0,35 x D	60	–	70	60	–	70	fz	0,020	0,027	0,032
K	1	0,35 x D	0,35 x D	120	–	150	120	–	150	fz	0,035	0,048	0,058
	2	0,35 x D	0,35 x D	110	–	140	110	–	140	fz	0,029	0,040	0,048
	3	0,35 x D	0,35 x D	110	–	130	110	–	130	fz	0,024	0,032	0,039
N	1	0,35 x D	0,35 x D	500	–	2000	500	–	2000	fz	0,048	0,064	0,080
	2	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,043	0,058	0,072
	3	0,35 x D	0,35 x D	500	–	1500	500	–	1500	fz	0,034	0,045	0,056
	4	0,35 x D	0,35 x D	400	–	750	400	–	750	fz	0,038	0,051	0,064
	5	0,35 x D	0,35 x D	250	–	1000	250	–	1000	fz	0,043	0,058	0,072
	6	0,35 x D	0,35 x D	100	–	750	100	–	750	fz	0,048	0,064	0,080
	7	0,35 x D	0,35 x D	100	–	750	100	–	750	fz	0,034	0,045	0,056
S	1	0,35 x D	0,35 x D	50	–	90	50	–	90	fz	0,029	0,040	0,048
	2	0,35 x D	0,35 x D	25	–	40	25	–	40	fz	0,016	0,021	0,026
	3	0,35 x D	0,35 x D	60	–	80	60	–	80	fz	0,024	0,032	0,039
	4	0,35 x D	0,35 x D	50	–	60	50	–	60	fz	0,021	0,029	0,036
H	1	0,35 x D	0,35 x D	80	–	140	80	–	140	fz	0,026	0,036	0,043

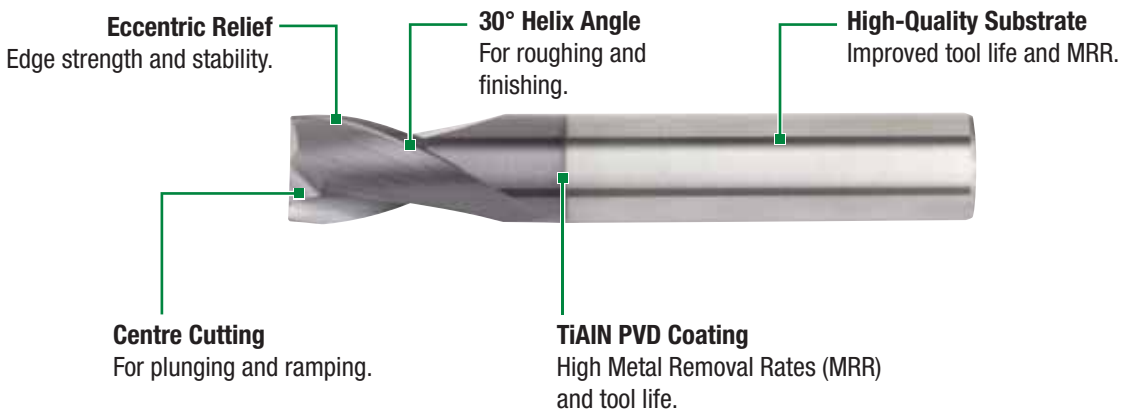


VariMill GP

VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered, sharp edge, and ball nose) are available from stock.

VariMill GP • 2-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front end designs available.
- Two flutes for high flexibility in unstable conditions.

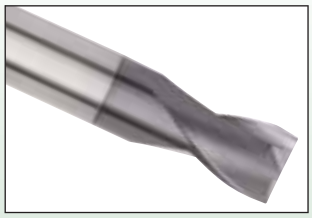


VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Fewer tool changes and high Metal Removal Rates (MRR).
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

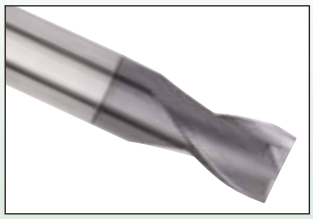
D002/D012 Series

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



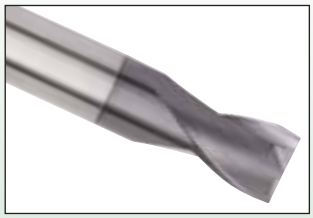
2819 Series

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



4002/4012/4022 Series

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



D001/D011 Series

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



2838 Series

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



4001/4011/4021 Series

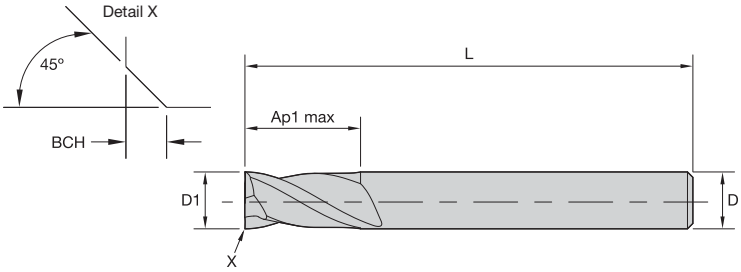
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



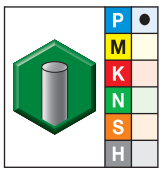


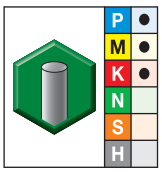


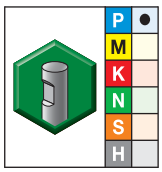
End Mill Tolerances

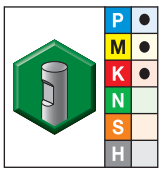
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D002 D012 • VariMill GP







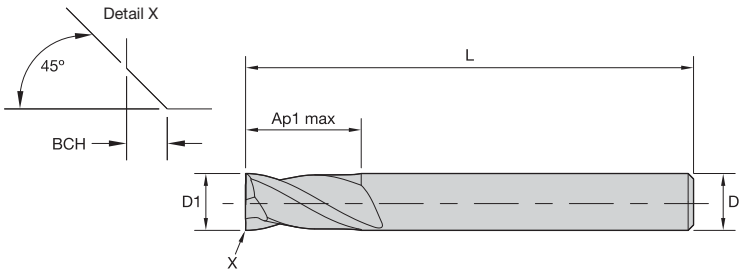


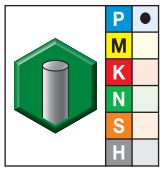
● first choice
○ alternate choice

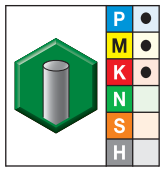
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877567	D0020200T003	5877330	D0020200T003	–		–		2,0	6	3,00	50	–
5877568	D0020250T003	5877501	D0020250T003	–		–		2,5	6	3,00	50	–
5877569	D0120250T007	5877502	D0120250T007	–		–		2,5	6	7,00	57	–
5877571	D0020300T004	5877503	D0020300T004	–		–		3,0	6	4,00	50	–
5877572	D0120300T007	5877504	D0120300T007	–		–		3,0	6	7,00	57	–
5877573	D0020350T004	5877505	D0020350T004	–		–		3,5	6	4,00	50	–
5877574	D0020400T005	5877506	D0020400T005	–		–		4,0	6	5,00	54	0,10
5877575	D0120400T008	5877507	D0120400T008	–		–		4,0	6	8,00	57	0,10
5877576	D0020450T005	5877509	D0020450T005	–		–		4,5	6	5,00	54	0,10
5877577	D0120450T008	5877510	D0120450T008	–		–		4,5	6	8,00	57	0,10
5877578	D0020500T006	5877511	D0020500T006	–		–		5,0	6	6,00	54	0,10
5877579	D0120500T010	5877512	D0120500T010	–		–		5,0	6	10,00	57	0,10
5877581	D0020600T007	5877513	D0020600T007	–		–		6,0	6	7,00	54	0,10
5877582	D0120600T010	5877514	D0120600T010	–		–		6,0	6	10,00	57	0,10
5877583	D0020700T008	5877515	D0020700T008	–		–		7,0	8	8,00	58	0,10
5877584	D0120700T013	5877516	D0120700T013	–		–		7,0	8	13,00	63	0,10
5877585	D0020800T009	5877517	D0020800T009	–		–		8,0	8	9,00	58	0,20
5877586	D0120800T016	5877518	D0120800T016	–		–		8,0	8	16,00	63	0,20
5877588	D0020900T010	5877520	D0020900T010	–		–		9,0	10	10,00	66	0,20
5877589	D0120900T016	5877521	D0120900T016	–		–		9,0	10	16,00	72	0,20

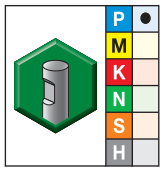
(continued)

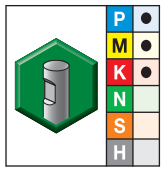
(Series D002 D012 • VariMill GP — continued)











● first choice
○ alternate choice

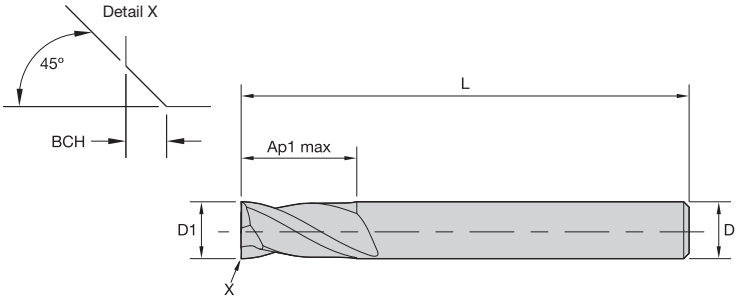
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877590	D0021000T011	5877522	D0021000T011		–		–	10,0	10	11,00	66	0,20
5877591	D0121000T019	5877523	D0121000T019		–		–	10,0	10	19,00	72	0,20
5877592	D0021200T012	5877524	D0021200T012	5877556	D0021200W012	5877535	D0021200W012	12,0	12	12,00	73	0,30
5877593	D0121200T022	5877525	D0121200T022	5877557	D0121200W022	5877537	D0121200W022	12,0	12	22,00	83	0,30
5877594	D0021400T014	5877526	D0021400T014	5877558	D0021400W014	5877538	D0021400W014	14,0	14	14,00	75	0,30
5877595	D0121400T022	5877527	D0121400T022	5877559	D0121400W022	5877539	D0121400W022	14,0	14	22,00	83	0,30
5877596	D0021600T016	5877529	D0021600T016	5877560	D0021600W016	5877540	D0021600W016	16,0	16	16,00	82	0,30
5877597	D0121600T026	5877530	D0121600T026	5877561	D0121600W026	5877551	D0121600W026	16,0	16	26,00	92	0,30
5877598	D0021800T018	5877531	D0021800T018	5877563	D0021800W018	5877552	D0021800W018	18,0	18	18,00	84	0,30
5877599	D0121800T026	5877532	D0121800T026	5877564	D0121800W026	5877553	D0121800W026	18,0	18	26,00	92	0,30
5877601	D0022000T020	5877533	D0022000T020	5877565	D0022000W020	5877554	D0022000W020	20,0	20	20,00	92	0,30
5877602	D0122000T032	5877534	D0122000T032	5877566	D0122000W032	5877555	D0122000W032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page P23.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



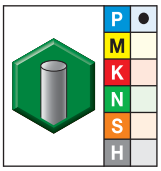


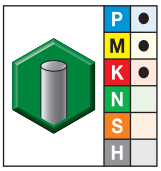


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2819 • VariMill GP



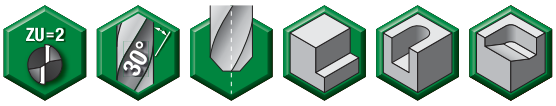


● first choice
○ alternate choice

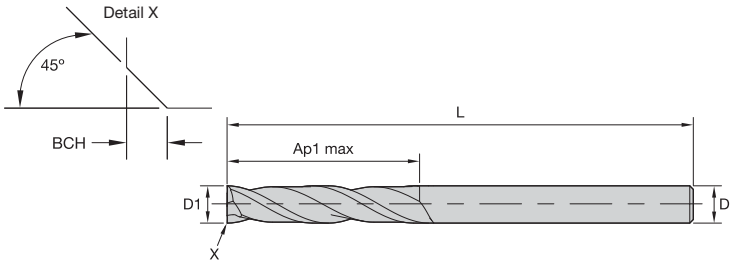
grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5877617	28190300T007	5877603	28190300T007	3,0	3	8,00	50	–
5877618	28190400T008	5877604	28190400T008	4,0	4	8,00	50	0,10
5877619	28190500T010	5877605	28190500T010	5,0	5	10,00	50	0,10
5877620	28190600T010	5877606	28190600T010	6,0	6	10,00	57	0,10
5877621	28190700T013	5877607	28190700T013	7,0	7	13,00	60	0,10
5877622	28190800T016	5877608	28190800T016	8,0	8	16,00	63	0,20
5877623	28190900T016	5877609	28190900T016	9,0	9	16,00	67	0,20
5877624	28191000T019	5877610	28191000T019	10,0	10	19,00	72	0,20
5877625	28191200T022	5877611	28191200T022	12,0	12	22,00	83	0,30
5877626	28191400T022	5877612	28191400T022	14,0	14	22,00	83	0,30
5877627	28191500T026	5877613	28191500T026	15,0	15	26,00	92	0,30
5877628	28191600T026	5877614	28191600T026	16,0	16	26,00	92	0,30
5877629	28191800T026	5877615	28191800T026	18,0	18	26,00	92	0,30
5877630	28192000T032	5877616	28192000T032	20,0	20	32,00	104	0,30

NOTE: For application data, please see page P23.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



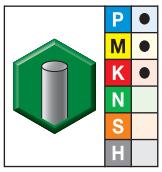




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4002 4012 • VariMill GP

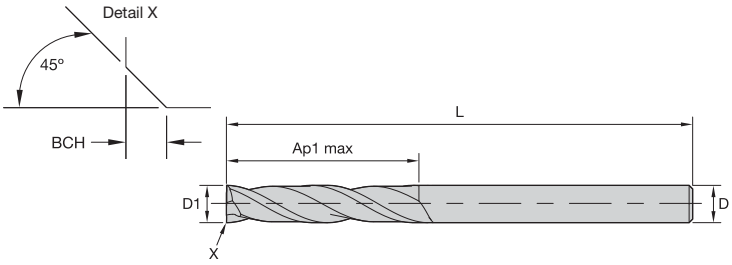


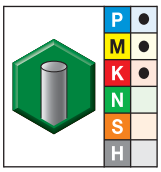
● first choice
○ alternate choice

grade TiAlN TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5873484	40020100T004	1,0	3	4,00	38	–
5873485	40020150T004	1,5	3	4,00	38	–
5873486	40020180T004	1,8	3	4,00	38	–
5873487	40020200T006	2,0	3	6,30	38	–
5873488	40020250T006	2,5	3	6,30	38	–
5873489	40020300T009	3,0	3	9,50	38	–
5873490	40020300T019	3,0	3	19,00	63	–
5873491	40120300T025	3,0	3	25,00	75	–
5873492	40020350T012	3,5	4	12,00	50	–
5873493	40020400T012	4,0	4	12,00	50	0,10
5873494	40020400T019	4,0	4	19,00	63	0,10
5873495	40120400T031	4,0	4	31,00	75	0,10
5873496	40020450T014	4,5	6	14,00	50	0,10
5873497	40020480T014	4,8	6	14,00	50	0,10
5873498	40020500T014	5,0	5	14,00	50	0,10
5873499	40020500T020	5,0	5	20,00	63	0,10
5873500	40120500T031	5,0	5	31,00	100	0,10
5873501	40020550T014	5,5	6	14,00	50	0,10
5873502	40020600T016	6,0	6	16,00	50	0,10
5873503	40020600T028	6,0	6	28,00	76	0,10

(continued)

(Series 4002 4012 • VariMill GP — continued)





● first choice
○ alternate choice

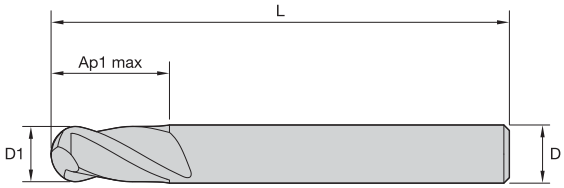
grade TiAlN TiAlN						
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5873504	40120600T038	6,0	6	38,00	100	0,10
5873505	40020700T020	7,0	7	20,00	63	0,10
5873506	40020800T020	8,0	8	20,00	63	0,20
5873507	40020800T028	8,0	8	28,00	76	0,20
5873508	40120800T041	8,0	8	41,00	100	0,20
5873509	40020900T020	9,0	9	20,00	63	0,20
5873510	40021000T022	10,0	10	22,00	72	0,20
5873511	40021000T032	10,0	10	32,00	89	0,20
5873512	40121000T045	10,0	10	45,00	100	0,20
5873513	40021100T025	11,0	11	25,00	76	0,30
5873514	40021200T025	12,0	12	25,00	76	0,30
5873515	40021200T045	12,0	12	45,00	100	0,30
5873516	40121200T075	12,0	12	75,00	150	0,30
5873517	40021400T032	14,0	14	32,00	83	0,30
5873518	40021400T050	14,0	14	50,00	100	0,30
5873519	40121400T075	14,0	14	75,00	150	0,30
5873520	40021600T032	16,0	16	32,00	89	0,30
5873531	40021600T056	16,0	16	56,00	110	0,30
5873532	40121600T075	16,0	16	75,00	150	0,30
5873533	40021800T038	18,0	18	38,00	100	0,30
5873534	40021800T060	18,0	18	60,00	125	0,30
5873535	40121800T075	18,0	18	75,00	150	0,30
5873536	40022000T038	20,0	20	38,00	104	0,30
5873537	40022000T056	20,0	20	56,00	125	0,30
5873538	40122000T075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages P23-P24.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



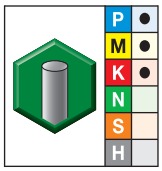




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D001 D011 • VariMill GP



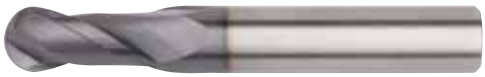
● first choice
○ alternate choice

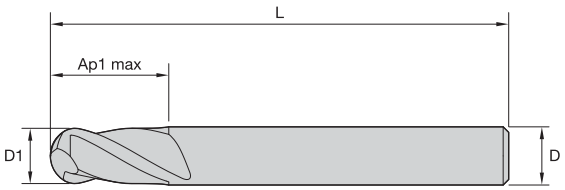
grade TiAlN TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880362	D0110200T006	2,0	6	6,00	57
5880363	D0010300T004	3,0	6	4,00	50
5880364	D0110300T007	3,0	6	7,00	57
5880365	D0010400T005	4,0	6	5,00	54
5880366	D0110400T008	4,0	6	8,00	57
5880367	D0110500T010	5,0	6	10,00	57
5880368	D0110600T010	6,0	6	10,00	57
5880369	D0110700T013	7,0	8	13,00	63
5880370	D0110800T016	8,0	8	16,00	63
5880381	D0111000T019	10,0	10	19,00	72
5880382	D0111200T022	12,0	12	22,00	83
5880383	D0111400T022	14,0	14	22,00	83
5880384	D0111600T026	16,0	16	26,00	92
5880385	D0012000T020	20,0	20	20,00	92
5880386	D0112000T032	20,0	20	32,00	104

NOTE: For application data, please see pages P25.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



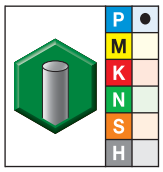


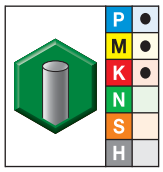


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2838 • VariMill GP





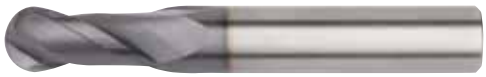
● first choice
○ alternate choice

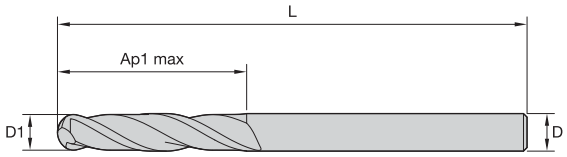
grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
	–	5880451	28380200T007	2,0	2	7,00	50
5880462	28380300T007	5880452	28380300T007	3,0	3	7,00	50
5880463	28380400T008	5880453	28380400T008	4,0	4	8,00	50
5880464	28380500T010	5880454	28380500T010	5,0	5	10,00	50
5880465	28380600T010	5880455	28380600T010	6,0	6	10,00	57
5880466	28380800T016	5880456	28380800T016	8,0	8	16,00	63
5880467	28381000T019	5880457	28381000T019	10,0	10	19,00	72
5880468	28381200T022	5880458	28381200T022	12,0	12	22,00	83
5880469	28381400T022	5880459	28381400T022	14,0	14	22,00	83
5880470	28381600T026	5880460	28381600T026	16,0	16	26,00	92
5880471	28382000T032	5880461	28382000T032	20,0	20	32,00	104

NOTE: For application data, please see page P25.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



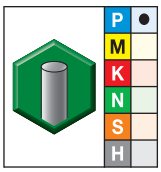


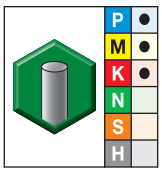


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4001 4011 4021 • VariMill GP



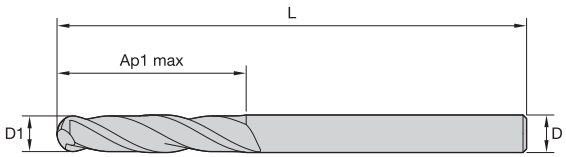


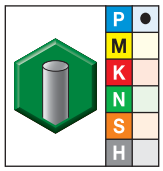
● first choice
○ alternate choice

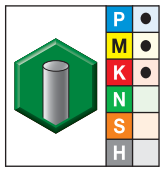
grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880425	40010100T004	5880387	40010100T004	1,0	3	4,00	38
5880426	40010150T005	5880388	40010150T005	1,5	3	5,00	38
5880427	40010200T006	5880389	40010200T006	2,0	3	6,30	38
5880428	40010250T007	5880390	40010250T007	2,5	3	7,00	38
5880429	40010300T009	5880391	40010300T009	3,0	3	9,50	38
	–	5880392	40010350T012	3,5	4	12,00	50
5880430	40010400T012	5880393	40010400T012	4,0	4	12,00	50
5880431	40110400T019	5880395	40110400T019	4,0	4	19,00	63
5880432	40210400T031	5880396	40210400T031	4,0	4	31,00	75
5880433	40010500T014		–	5,0	5	14,00	50
	–	5880397	40210500T014	5,0	6	14,00	50
5880435	40010600T020	5880398	40010600T020	6,0	6	20,00	63
5880436	40110600T028	5880399	40110600T028	6,0	6	28,00	76
5880437	40210600T038	5880400	40210600T038	6,0	6	38,00	100
5880438	40010800T020	5880401	40010800T020	8,0	8	20,00	63
5880439	40110800T028	5880402	40110800T028	8,0	8	28,00	76
5880440	40210800T040	5880403	40210800T040	8,0	8	40,00	100
5880441	40011000T022	5880404	40011000T022	10,0	10	22,00	76
5880442	40111000T032	5880405	40111000T032	10,0	10	32,00	89
5880443	40211000T045	5880406	40211000T045	10,0	10	45,00	100

(continued)

(Series 4001 4011 4021 • VariMill GP — continued)





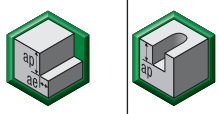


● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5880444	40011200T025	5880407	40011200T025	12,0	12	25,00	75
5880445	40111200T045	5880408	40111200T045	12,0	12	45,00	100
5880446	40211200T075	5880409	40211200T075	12,0	12	75,00	150
5880447	40011400T032	5880410	40011400T032	14,0	14	32,00	89
5880448	40011600T032	5880411	40011600T032	16,0	16	32,00	89
5880449	40012000T038	5880412	40012000T038	20,0	20	38,00	100
5880450	40112000T075	5880413	40112000T075	20,0	20	75,00	150

NOTE: For application data, please see pages P25-P26.

Series D002 D012 2819 4002 • TiAlN • VariMill GP

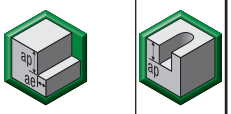




Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed – vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D002 D012 2819 4002 • Uncoated • VariMill GP





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed – vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4012 • TiAlN • VariMill GP





Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).											
		A		Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4012 • Uncoated • VariMill GP

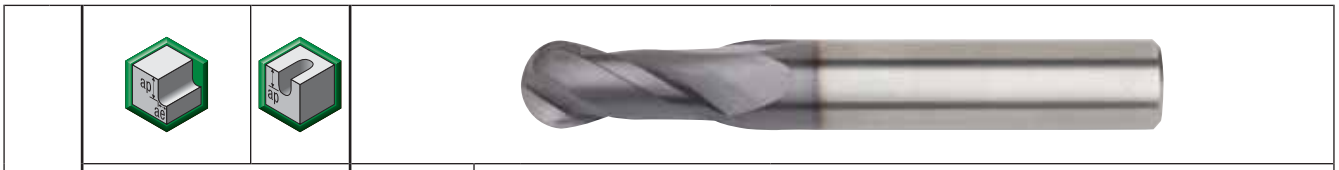




Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D001 D011 2838 4001 • TiAlN • VariMill GP



Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	TiAlN Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. mm	D1 — Diameter 1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D001 D011 2838 4001 • Uncoated • VariMill GP

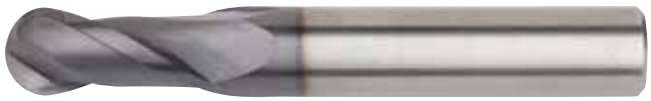


Material Group		Side Milling (A) and Slotting (B) A ap	A ae	B ap	uncoated Cutting Speed — vc m/min min		max	Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%. mm	D1 — Diameter 1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4011 4021 • TiAlN • VariMill GP





Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).											
		A		Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series 4011 4021 • Uncoated • VariMill GP





Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).								
		A		Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	min		max	mm	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Tooling Systems

ERICKSON™



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

ERICKSON™ Toolholders

WIDIA™ proudly offers premium quality ERICKSON toolholder products, so you can be sure that you're buying the best the industry has to offer. The entire portfolio — including steep taper, HSK, straight shank extensions, collets, sleeves, and accompanying products — offers high productivity, increased accuracy, and application flexibility.

Designed for both manual and automatic tool changing, ERICKSON interfaces are ideally suited for most machine tools and feature a compact and rigid construction guaranteed to handle high torque and deliver optimal metal removal rates.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com.**

WIDIA™



Solid Carbide End Mills

WIDIA™ offers a complete line of 3-flute general-purpose solid carbide end mill tools

General purpose offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high Metal Removal Rates (MRR) and excellent surface conditions at economic pricing. For a complete line of comprehensive tools, visit **widia.com**.

NOVO KNOWS ART TO PART TO PROFIT

Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. This results in flawless execution that accelerates every job, and maximises every shift.

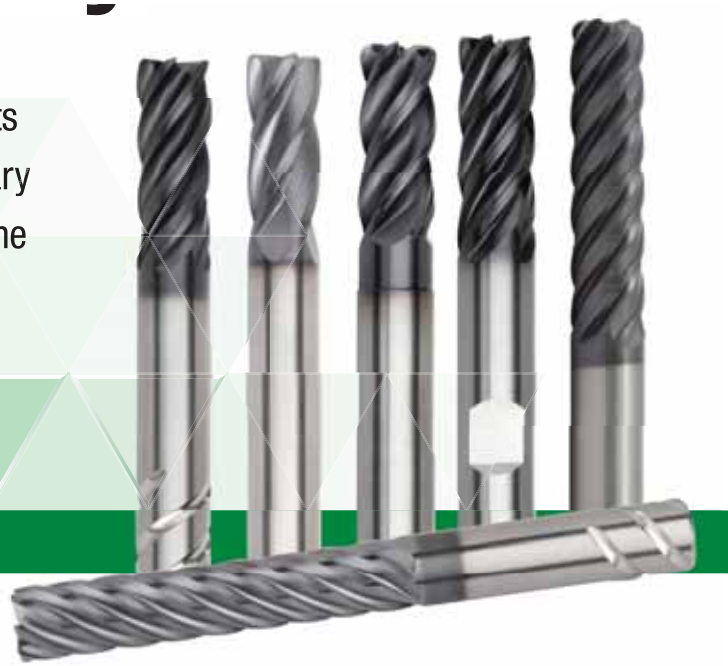
01 THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™

WIDIA™ Means Quality

WIDIA™ solid carbide end mill products have its strong history of providing revolutionary and industry innovative solutions for your most extreme machine solid end milling challenges.



EXTREME **CHALLENGES.** EXTREME **RESULTS.**

As an industry-leading manufacturer of carbide round tools, WIDIA™ offers a complete portfolio of precision-engineered products with solutions for a wide range of workpiece materials at **widia.com**.

The VariMill™ line offers superior performance high-speed machining.

- The versatile 2- and 4-flute general-purpose line, VariMill™ GP, is ideal for a wide range of materials.
- The 4-flute VariMill I™ offers plunging, slotting, and profiling at the highest possible feed rates for a wide range of materials.
- The 5-flute VariMill II™ end mills are the proven leader in the field of high-performance, chatter-free machining.
- The 5-flute VariMill II™ ER end mills are specifically designed for machining high-performance aerospace materials.
- The 7-flute VariMill III™ ER high-performance tool has true finishing capabilities for walls and floors.

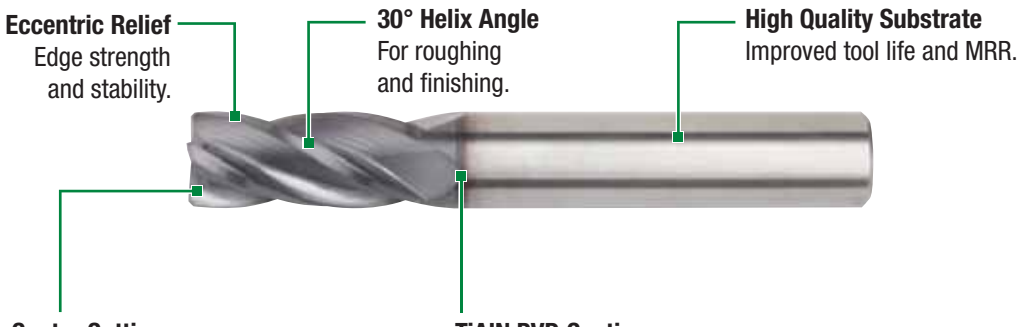


VariMill GP

VariMill GP offers plunging, slotting, and profiling for a wide range of materials and applications. Designed to provide high metal removal rates and excellent surface conditions at a value price. A wide range of diameters, lengths, and corner styles (such as chamfered, sharp edge, and ball nose) are available from stock.

VariMill GP • 4-Flute

- General purpose tools for a wide range of workpiece materials.
- Roughing and finishing with one tool.
- Various lengths-of-cut and overall lengths with different front-end designs available.
- Four flutes for high Metal Removal Rates (MRR) and tool life.



VariMill™ GP

- Increased manufacturing flexibility and reduced tooling cost.
- Less tool changes and high Metal Removal Rates (MRR).
- One tool required for roughing and finishing.
- Eccentric relief for improved edge stability and high tool life.
- Easy and cost-efficient regrinding due to eccentric relief.

D004/D014 Series

- Centre cutting.
- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



2528 Series

- Centre cutting.
- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



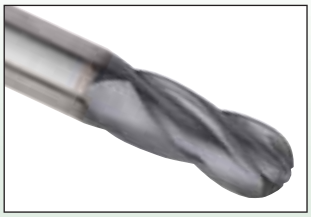
4004/4014/4024 Series

- Centre cutting.
- Wide range of lengths-of-cut — regular, long, and extra long.
- Steel, stainless steel, and cast iron.
- Corner chamfer for increased tool life.



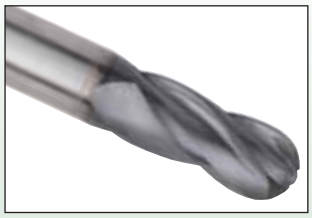
D010 Series

- DIN 6527 standard dimensions — short and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



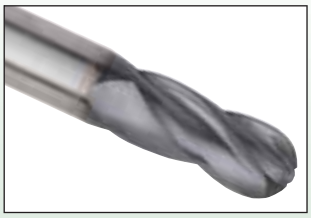
2848 Series

- DIN 6528 standard dimensions.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



4000/4010 Series

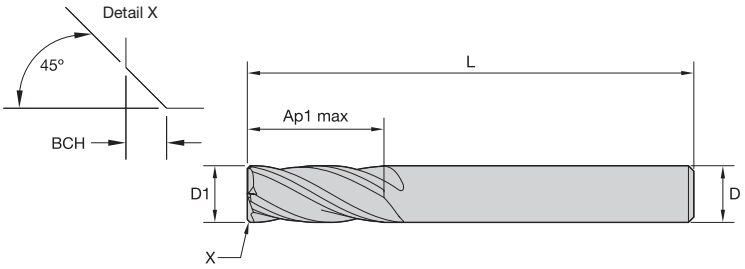
- Wide range of lengths-of-cut — regular and long.
- Steel, stainless steel, and cast iron.
- Centre cut ball nose.



- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



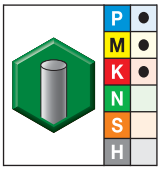


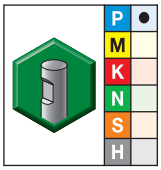


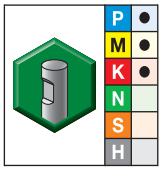
End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D004 D014 • VariMill GP





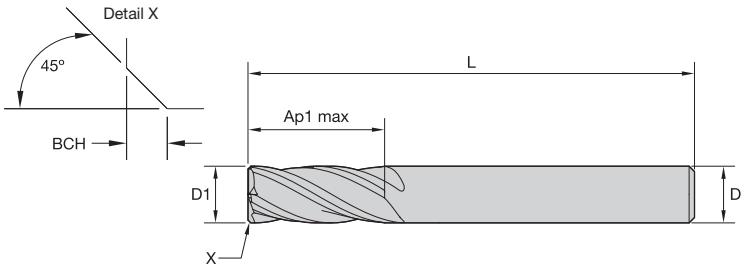


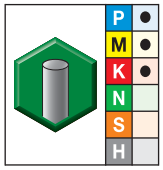
● first choice
○ alternate choice

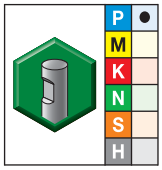
grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825894	D0040200T004		–		–	2,0	6	4,00	50	–
5825895	D0140200T007		–		–	2,0	6	7,00	57	–
5825896	D0140250T008		–		–	2,5	6	8,00	57	–
5825897	D0040300T005		–		–	3,0	6	5,00	50	–
5825898	D0140300T008		–		–	3,0	6	8,00	57	–
5825899	D0140350T010		–		–	3,5	6	10,00	57	–
5825900	D0040400T008		–		–	4,0	6	8,00	54	0,10
5825931	D0140400T011		–		–	4,0	6	11,00	57	0,10
5825932	D0140450T011		–		–	4,5	6	11,00	57	0,10
5825933	D0040500T009		–		–	5,0	6	9,00	54	0,10
5825934	D0140500T013		–		–	5,0	6	13,00	57	0,10
5825935	D0140550T013		–		–	5,5	6	13,00	57	0,10
5825936	D0040600T010		–		–	6,0	6	10,00	54	0,10
5825937	D0140600T013		–		–	6,0	6	13,00	57	0,10
5825938	D0140650T016		–		–	6,5	8	16,00	63	0,10
5825939	D0040700T011		–		–	7,0	8	11,00	58	0,10
5825940	D0140700T016		–		–	7,0	8	16,00	63	0,10
5825941	D0140750T019		–		–	7,5	8	19,00	63	0,10
5825942	D0040800T012		–		–	8,0	8	12,00	58	0,20
5825943	D0140800T019		–		–	8,0	8	19,00	63	0,20

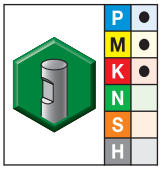
(continued)

(Series D004 D014 • VariMill GP — continued)









● first choice
○ alternate choice

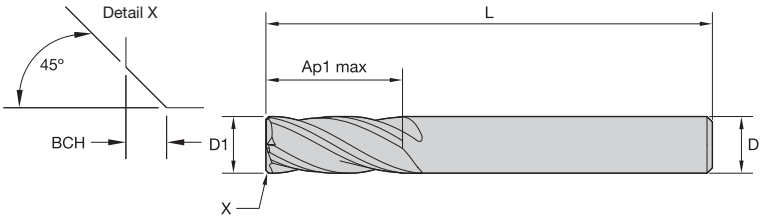
grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825944	D0040900T013		–		–	9,0	10	13,00	66	0,20
5825945	D0140900T019		–		–	9,0	10	19,00	72	0,20
5825946	D0041000T014		–		–	10,0	10	14,00	66	0,20
5825947	D0141000T022		–		–	10,0	10	22,00	72	0,20
5825948	D0041200T016	5825968	D0041200W016	5825958	D0041200W016	12,0	12	16,00	73	0,30
5825949	D0141200T026	5825969	D0141200W026	5825959	D0141200W026	12,0	12	26,00	83	0,30
5825950	D0041400T018	5825970	D0041400W018	5825960	D0041400W018	14,0	14	18,00	75	0,30
5825951	D0141400T026	5825971	D0141400W026	5825961	D0141400W026	14,0	14	26,00	83	0,30
5825952	D0041600T022	5825972	D0041600W022	5825962	D0041600W022	16,0	16	22,00	82	0,30
5825953	D0141600T032	5825973	D0141600W032	5825963	D0141600W032	16,0	16	32,00	92	0,30
5825954	D0041800T024	5825974	D0041800W024	5825964	D0041800W024	18,0	18	24,00	84	0,30
5825955	D0141800T032	5825975	D0141800W032	5825965	D0141800W032	18,0	18	32,00	92	0,30
5825956	D0042000T026	5825976	D0042000W026	5825966	D0042000W026	20,0	20	26,00	92	0,30
5825957	D0142000T038	5825977	D0142000W038	5825967	D0142000W038	20,0	20	38,00	104	0,30

NOTE: For application data, please see pages P40–P41.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



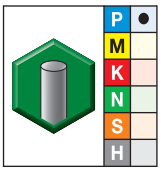


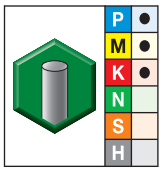


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2528 • VariMill GP





● first choice
○ alternate choice

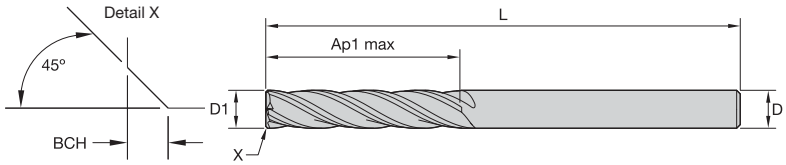
grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5825993	25280400T011	5825978	25280400T011	4,0	4	11,00	50	0,10
5825994	25280500T013	5825979	25280500T013	5,0	5	13,00	50	0,10
5825995	25280600T013	5825980	25280600T013	6,0	6	13,00	57	0,10
5825996	25280800T019	5825981	25280800T019	8,0	8	19,00	63	0,20
5825997	25281000T022	5825982	25281000T022	10,0	10	22,00	72	0,20
5825988	25281200T026	5825983	25281200T026	12,0	12	26,00	83	0,30
5825989	25281400T026	5825984	25281400T026	14,0	14	26,00	83	0,30
5825990	25281600T032	5825985	25281600T032	16,0	16	32,00	92	0,30
5825991	25281800T032	5825986	25281800T032	18,0	18	32,00	92	0,30
5825992	25282000T038	5825987	25282000T038	20,0	20	38,00	104	0,30

NOTE: For application data, please see page P41.

- Centre cutting.
- Chamfered corners.
- Standard items listed. Additional styles and coatings made-to-order.



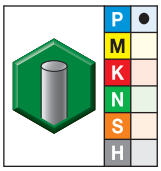


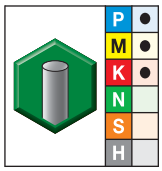


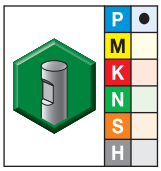
End Mill Tolerances

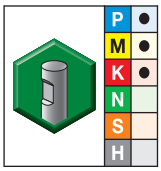
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4004 4014 4024 • VariMill GP







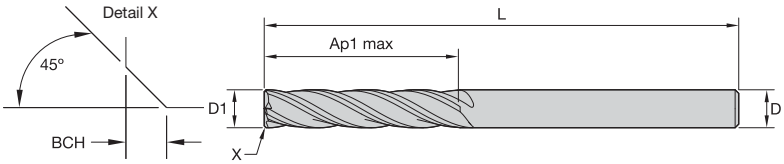


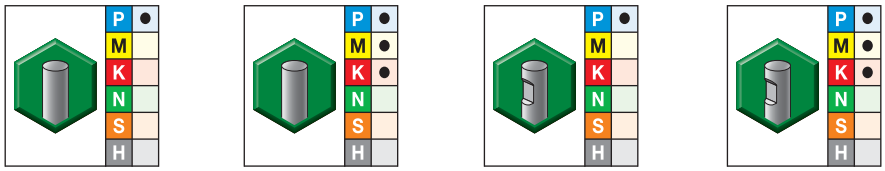
● first choice
○ alternate choice

grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5826085	40040100T004	5826016	40040100T004	–		–		1,0	3	4,00	38	–
5826086	40040150T004	5826017	40040150T004	–		–		1,5	3	4,00	38	–
5826087	40040200T006	5826018	40040200T006	–		–		2,0	3	6,30	38	–
5826088	40040250T006	5826019	40040250T006	–		–		2,5	3	6,30	38	–
5826089	40040300T009	5826020	40040300T009	–		–		3,0	3	9,50	38	–
5826090	40140300T019	5826021	40140300T019	–		–		3,0	3	19,00	63	–
5826101	40240300T025	5826022	40240300T025	–		–		3,0	3	25,00	75	–
5826102	40040350T012	5826023	40040350T012	–		–		3,5	4	12,00	50	–
5826103	40040400T011	5826024	40040400T011	–		–		4,0	4	11,00	50	0,10
	–	5826025	40140400T019	–		–		4,0	4	19,00	63	0,10
	–	5826026	40240400T031	–		–		4,0	4	31,00	75	0,10
5826104	40040450T014	5826027	40040450T014	–		–		4,5	5	14,00	50	0,10
	–	5826028	40040500T013	–		–		5,0	5	13,00	50	0,10
5826105	40040500T020	5826029	40040500T020	–		–		5,0	5	20,00	63	0,10
	–	5826030	40140500T030	–		–		5,0	5	30,00	75	0,10
	–	5826031	40240500T031	–		–		5,0	5	31,00	100	0,10
5826106	40040600T016	5826032	40040600T016	–		–		6,0	6	16,00	50	0,10
5826107	40140600T028	5826033	40140600T028	–		–		6,0	6	28,00	75	0,10
5826108	40240600T038	5826034	40240600T038	–		–		6,0	6	38,00	100	0,10
	–	5826035	40040700T020	–		–		7,0	8	20,00	63	0,10

(continued)

(Series 4004 4014 4024 • VariMill GP — continued)





● first choice
○ alternate choice

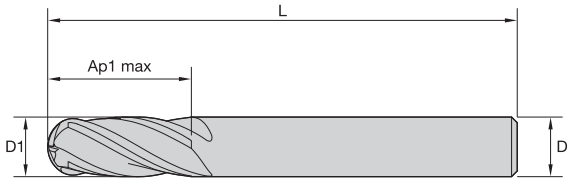
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH
5826109	40040800T020	5826036	40040800T020		–		–	8,0	8	20,00	50	0,20
5826110	40140800T028	5826037	40140800T028		–		–	8,0	8	28,00	75	0,20
5826111	40240800T041	5826038	40240800T041		–		–	8,0	8	41,00	100	0,20
	–	5826039	40040900T020		–		–	9,0	9	20,00	63	0,20
5826113	40041000T022	5826040	40041000T022		–		–	10,0	10	22,00	72	0,20
5826114	40141000T032	5826041	40141000T032		–		–	10,0	10	32,00	89	0,20
5826115	40241000T045	5826042	40241000T045		–		–	10,0	10	45,00	100	0,20
5826116	40041200T025		–	5826141	40041200W025	5826070	40041200W025	12,0	12	25,00	75	0,30
	–	5826043	40041200T025		–		–	12,0	12	25,00	89	0,30
5826117	40141200T045	5826044	40141200T045	5826142	40141200W045	5826071	40141200W045	12,0	12	45,00	100	0,30
5826118	40241200T075	5826045	40241200T075	5826143	40241200W075	5826072	40241200W075	12,0	12	75,00	150	0,30
5826119	40041400T032	5826046	40041400T032	5826144	40041400W032	5826073	40041400W032	14,0	14	32,00	83	0,30
5826120	40141400T050	5826047	40141400T050	5826146	40141400W050	5826074	40141400W050	14,0	14	50,00	100	0,30
5826121	40241400T075	5826049	40241400T075	5826147	40241400W075	5826075	40241400W075	14,0	14	75,00	150	0,30
5826122	40041600T032	5826061	40041600T032	5826148	40041600W032	5826076	40041600W032	16,0	16	32,00	92	0,30
5826123	40141600T056	5826062	40141600T056	5826149	40141600W056	5826077	40141600W056	16,0	16	56,00	110	0,30
5826124	40241600T075	5826063	40241600T075	5826150	40241600W075	5826078	40241600W075	16,0	16	75,00	150	0,30
5826125	40041800T038	5826064	40041800T038	5826151	40041800W038	5826079	40041800W038	18,0	18	38,00	100	0,30
5826126	40141800T060	5826065	40141800T060	5826152	40141800W060	5826080	40141800W060	18,0	18	60,00	125	0,30
5826127	40241800T075	5826066	40241800T075	5826153	40241800W075	5826081	40241800W075	18,0	18	75,00	150	0,30
5826128	40042000T038	5826067	40042000T038	5826154	40042000W038	5826082	40042000W038	20,0	20	38,00	104	0,30
5826129	40142000T056	5826068	40142000T056	5826155	40142000W056	5826083	40142000W056	20,0	20	56,00	125	0,30
5826130	40242000T075	5826069	40242000T075	5826156	40242000W075	5826084	40242000W075	20,0	20	75,00	150	0,30

NOTE: For application data, please see pages P40–P41.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



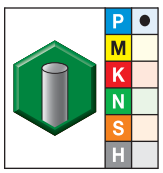


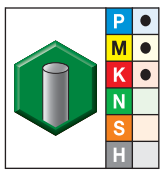


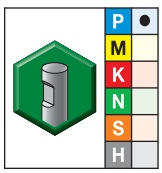
End Mill Tolerances

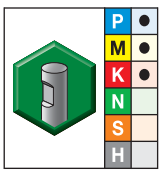
D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series D010 • VariMill GP









● first choice
○ alternate choice

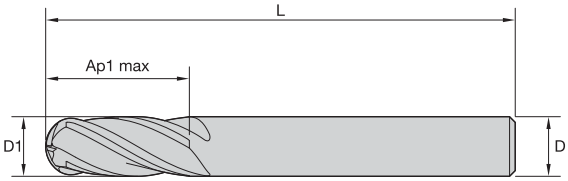
grade UNCOATED		grade TiAlN TiAlN		grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825604	D0100300T008	5825527	D0100300T008	–		–		3,0	6	8,00	57
5825605	D0100400T011	5825528	D0100400T011	–		–		4,0	6	11,00	57
5825606	D0100500T013	5825529	D0100500T013	–		–		5,0	6	13,00	57
5825607	D0100600T013	5825530	D0100600T013	–		–		6,0	6	13,00	57
5825608	D0100800T019	5825531	D0100800T019	–		–		8,0	8	19,00	63
5825609	D0101000T022	5825532	D0101000T022	–		–		10,0	10	22,00	72
5825610	D0101200T026	5825533	D0101200T026	5825589	D0101200W026	5825540	D0101200W026	12,0	12	26,00	83
5825611	D0101400T026	5825534	D0101400T026	5825590	D0101400W026	5825541	D0101400W026	14,0	14	26,00	83
5825612	D0101600T032	5825536	D0101600T032	5825591	D0101600W032	5825542	D0101600W032	16,0	16	32,00	92
5825613	D0101800T032	5825538	D0101800T032	5825592	D0101800W032	5825543	D0101800W032	18,0	18	32,00	92
5825614	D0102000T038	5825539	D0102000T038	5825593	D0102000W038	5825544	D0102000W038	20,0	20	38,00	104

NOTE: For application data, please see page P42.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



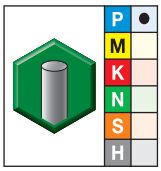


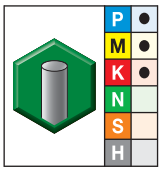


End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 2848 • VariMill GP



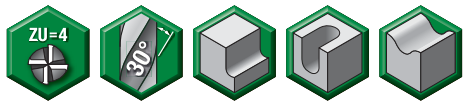


● first choice
○ alternate choice

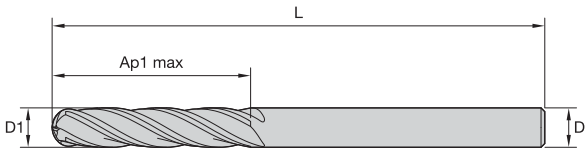
grade UNCOATED		grade TiAlN TiAlN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825594	28480400T011	5825545	28480400T011	4,0	4	11,00	50
5825595	28480500T013	5825546	28480500T013	5,0	5	13,00	50
5825596	28480600T013	5825547	28480600T013	6,0	6	13,00	57
5825597	28480800T019	5825548	28480800T019	8,0	8	19,00	63
5825598	28481000T022	5825549	28481000T022	10,0	10	22,00	72
5825599	28481200T026	5825550	28481200T026	12,0	12	26,00	83
5825600	28481400T026	5825551	28481400T026	14,0	14	26,00	83
5825601	28481600T032	5825552	28481600T032	16,0	16	32,00	92
5825602	28481800T032	5825553	28481800T032	18,0	18	32,00	92
5825603	28482000T038	5825554	28482000T038	20,0	20	38,00	104

NOTE: For application data, please see page P42.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



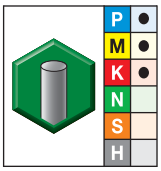




End Mill Tolerances

D1	tolerance e8	D	tolerance h6 + / -
≤ 3	-0,014/-0,028	≤ 3	0/0,006
> 3–6	-0,020/-0,038	> 3–6	0/0,008
> 6–10	-0,025/-0,047	> 6–10	0/0,009
> 10–18	-0,032/-0,059	> 10–18	0/0,011
> 18–30	-0,040/-0,073	> 18–30	0/0,013

Series 4000 4010 • VariMill GP

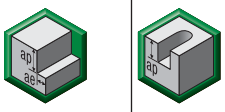


● first choice
○ alternate choice

grade TiAlN TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
5825555	40000200T006	2,0	3	6,30	38
5825556	40000300T020	3,0	3	20,00	75
5825557	40000400T014	4,0	4	14,00	50
5825558	40100400T025	4,0	4	25,00	75
5825559	40000500T016	5,0	5	16,00	50
5825560	40100500T030	5,0	5	30,00	75
5825573	40000600T016	6,0	6	16,00	50
5825574	40100600T019	6,0	6	19,00	63
5825575	40100600T030	6,0	6	30,00	75
5825576	40000800T019	8,0	8	19,00	63
5825577	40100800T040	8,0	8	40,00	100
5825578	40001000T022	10,0	10	22,00	72
5825579	40101000T040	10,0	10	40,00	100
5825580	40001200T025	12,0	12	25,00	75
5825581	40101200T045	12,0	12	45,00	150
5825583	40001400T032	14,0	14	32,00	83
5825584	40101400T050	14,0	14	50,00	100
5825585	40001600T032	16,0	16	32,00	89
5825586	40101600T065	16,0	16	65,00	150
5825587	40001800T038	18,0	18	38,00	100
5825588	40102000T056	20,0	20	56,00	125

NOTE: For application data, please see pages P42–P43.

■ Series D004 4004 • TiAlN • VariMill GP

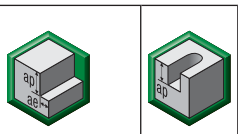




Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.												
		A		B	Cutting Speed — vc m/min				D1 — Diameter											
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,005	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,005	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,007	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,006	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series D004 4004 • Uncoated • VariMill GP





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	0,5 x D	112	–	152	fz	0,007	0,014	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D014 2528 4014 4024 • TiAlN • VariMill GP





Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).											
		A		Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	min		max	mm	2,0	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,010	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,009	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,014	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,011	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions.For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

Series D014 2528 4014 4024 • Uncoated • VariMill GP

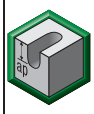




Material Group		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

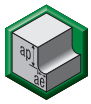
■ Series D010 2848 4000 • TiAlN • VariMill GP


Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.											
		A		B	Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	ap	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	0,5 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	0,5 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	0,5 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	0,5 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	0,5 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	0,5 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	0,5 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

■ Series 4010 • TiAlN • VariMill GP




Material Group		Side Milling (A)		TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A).											
		A		Cutting Speed — vc m/min				D1 — Diameter										
		ap	ae	min		max	mm	3,0	4,0	5,0	6,0	8,0	10,0	12,0	14,0	16,0	18,0	20,0
P	0	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	1	Ap1 max	0,1 x D	150	–	200	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	140	–	190	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	3	Ap1 max	0,1 x D	120	–	160	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	4	Ap1 max	0,1 x D	90	–	150	fz	0,016	0,021	0,027	0,033	0,045	0,054	0,062	0,070	0,077	0,083	0,088
M	1	Ap1 max	0,1 x D	90	–	115	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101
	2	Ap1 max	0,1 x D	60	–	80	fz	0,014	0,019	0,024	0,029	0,040	0,048	0,056	0,063	0,070	0,076	0,081
K	1	Ap1 max	0,1 x D	120	–	150	fz	0,021	0,028	0,036	0,044	0,060	0,072	0,083	0,092	0,101	0,108	0,114
	2	Ap1 max	0,1 x D	110	–	140	fz	0,017	0,023	0,030	0,036	0,050	0,061	0,070	0,079	0,087	0,095	0,101

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

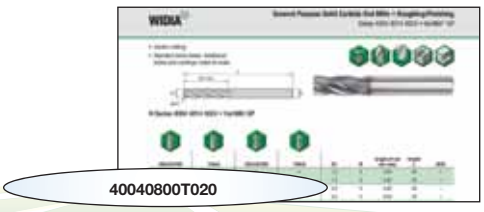
■ Series 4010 • Uncoated • VariMill GP

Material Group														
		Side Milling (A)		uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A).							
		A		Cutting Speed — vc m/min				D1 — Diameter						
		ap	ae	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	0	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	1	Ap1 max	0,1 x D	120	–	160	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114
	2	Ap1 max	0,1 x D	112	–	152	fz	0,021	0,028	0,044	0,060	0,072	0,083	0,101	0,114

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on >12mm diameters.

How Do Catalogue Numbers Work?

Each character in our catalogue number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



4004	0800	T	020
List	Diameter mm	Shank Style	Ap1 max mm
D002 = 2FL Chamfer DIN 6527 — Short **D012** = 2FL Chamfer DIN 6527 — Long **2819** = 2FL Chamfer DIN 6528 **4002** = 2FL Chamfer Factory Standard — Short/Regular **4012** = 2FL Chamfer Factory Standard — Long **4022** = 2FL Chamfer Factory Standard — Extra Long **D001** = 2FL Ball Nose DIN 6527 Short **D011** = 2FL Ball Nose DIN 6527 Long **2838** = 2FL Ball Nose DIN 6528 **4001** = 2FL Ball Nose Factory Standard — Short/Regular **4011** = 2FL Ball Nose Factory Standard — Long **4021** = 2FL Ball Nose Factory Standard — Extra Long **D004** = 4FL Chamfer DIN 6527 — Short **D014** = 4FL Chamfer DIN 6527 — Long **2528** = 4FL Chamfer DIN 6528 **4004** = 4FL Chamfer Factory Standard — Short/Regular **4014** = 4FL Chamfer Factory Standard — Long **4024** = 4FL Chamfer Factory Standard — Extra Long **D000** = 4FL Ball Nose DIN 6527 — Short **D010** = 4FL Ball Nose DIN 6527 — Long		**T** = Plain Shank **W** = Weldon® Shank	

Solid Carbide-Tipped End Mills



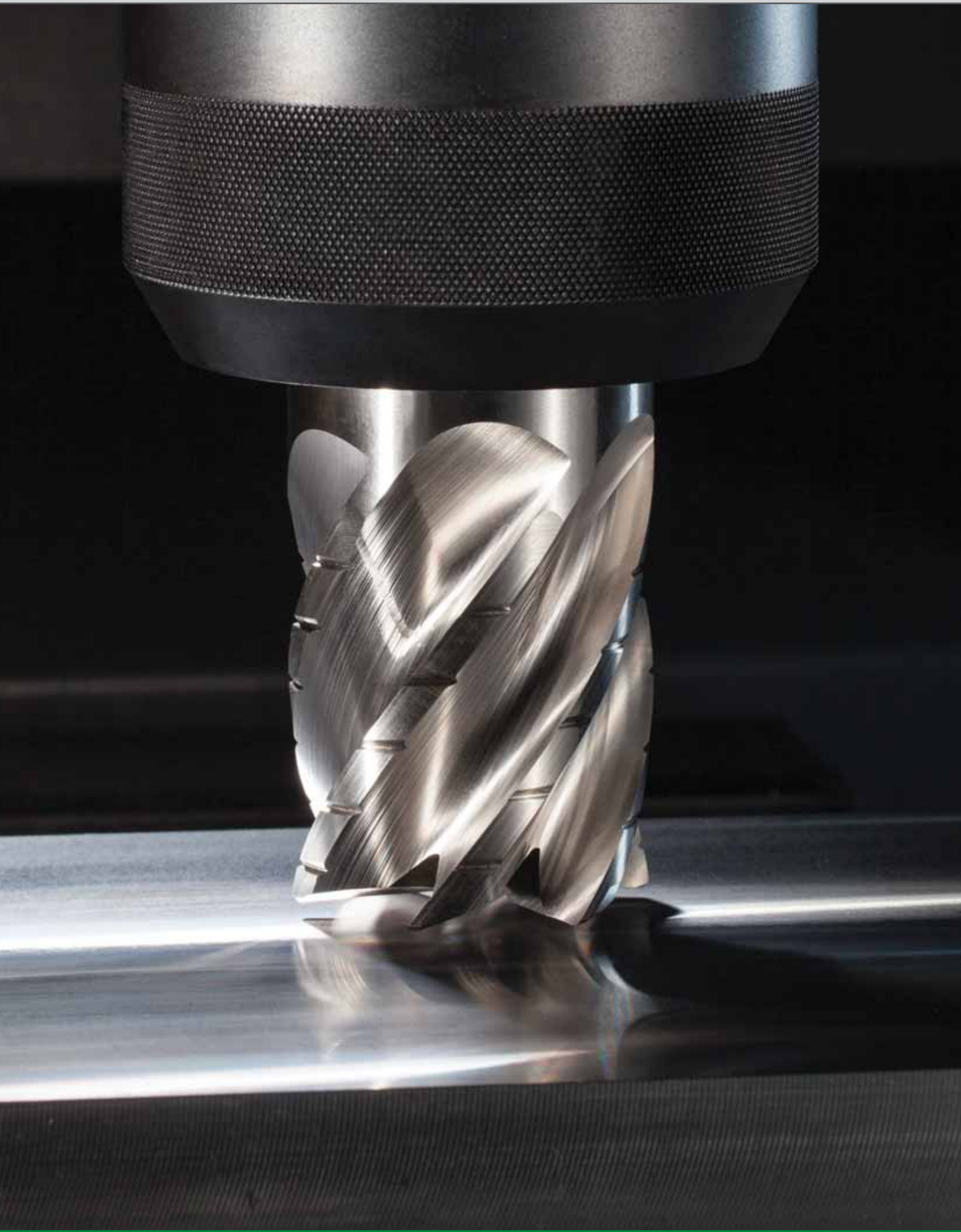
EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

WIDIA™ carbide-tipped end mills can provide unique advantages over solid tools, especially in large diameter sizes. They can be run at the same high cutting speeds as solid carbide but are usually less costly because of their steel body. The tougher body also absorbs shock, which enables it to perform well in conventional machines with less-than-rigid setups. Our in-house brazing capabilities and expertise provide our customers with fl exibility in using carbide-tipped cutting edges on many styles, geometries, and sizes of standard and custom solution tooling.

- Available up to a diameter of 250mm.
- Continuous edge carbide diameter of up to 300mm.
- Centre cutting geometries available.
- Maximum helix angle is 45°.
- Available in multiple spindle connections.
- Outstanding custom solutions capabilities.

To learn more about our innovations, contact your local Authorised Distributor or visit **widia.com**.

WIDIA™



Solid End Milling • High-Performance High-Speed Steel (HSS-E/PM)

High-Performance High-Speed Steel (HSS-E/PM) Q2–Q13

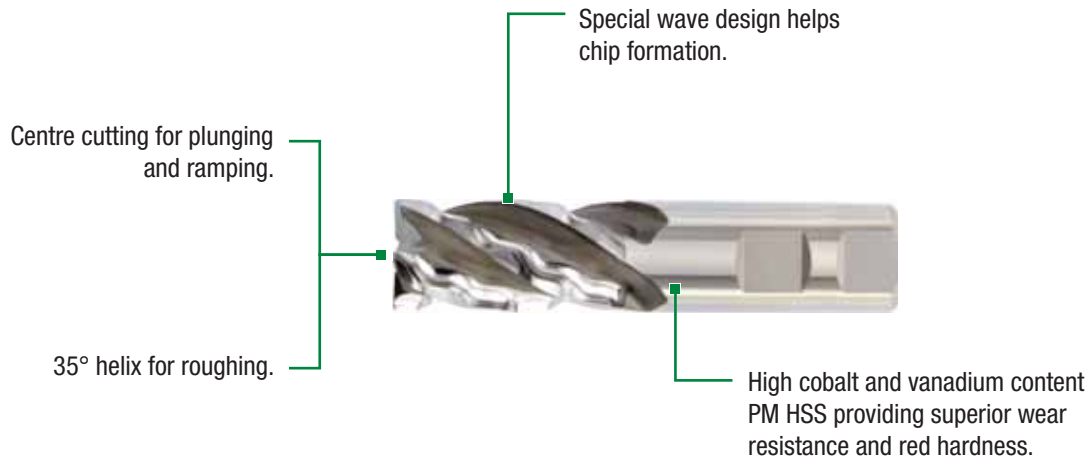


WavCut



WavCut tools for machining titanium are best suited for applications in aerospace and energy, providing high Metal Removal Rates (MRR) and increased tool life. The special wave design of these 5-, 6-, and 8-fluted end mills require less horsepower during roughing and semi-finishing, and provide excellent chip formation. Since chips evacuate easily, WavCut tools do not recut chips thus increasing tool life. Also, the edges change the radial cutting edge position without changing the diameter.

- Centre cutting offering excellent performance in roughing applications, especially in titanium.
- Capable of deep-slotting cuts for high Metal Removal Rates (MRR).
- Special wave design for excellent chip formation and evacuation preventing re-cutting of chips.



WavCut™ Series

- Benefit from reliable and trouble-free machining results using HSS WavCut cutter.
- Drastically reduce the risk of re-cutting chips, especially with vertical machines having multiple spindles.
- Increase stock removal rates over regular roughing tools due to reduced horsepower consumption.

660W Series

- 4-flute 35° helix for slotting.
- 6-flute 35° helix, for slotting, and in certain cases, pocketing and profiling.
- Centre cutting, chamfered corner, uncoated.



Other featured HSS Series

- Sophisticated roughing profiles capable of dealing with common chip formation challenges.
- High cobalt and vanadium content PM HSS providing superior wear resistance and red hardness.

6N06 Series

- 4- and 5-flute, 30° helix.
- Fine pitch style roughing profile.
- Centre cutting and chamfered corner.



6N70 Series

- 3- and 6-flute, 30° helix.
- Fine pitch style roughing profile.
- Centre cutting and chamfered corner.



6NL6 Series

- 4- and 5-flute, 30° helix.
- Extended neck for long-reach applications.
- Fine pitch style roughing profile.



1N0MJJ

- 4-flute.
- 30° helix.
- Square corner.
- JIS standard.
- Centre cutting.



1N77 Series

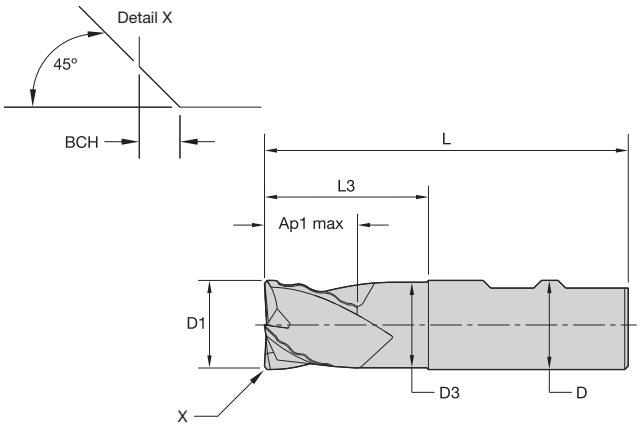
- 4-flute.
- 38° helix.
- Unequal flute spacing.
- Centre cutting.



- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



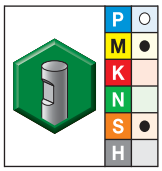




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,05/-0,05	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013
		> 30–50	0/0,016

Series 664W 660W 661W • WavCut I



● first choice
○ alternate choice

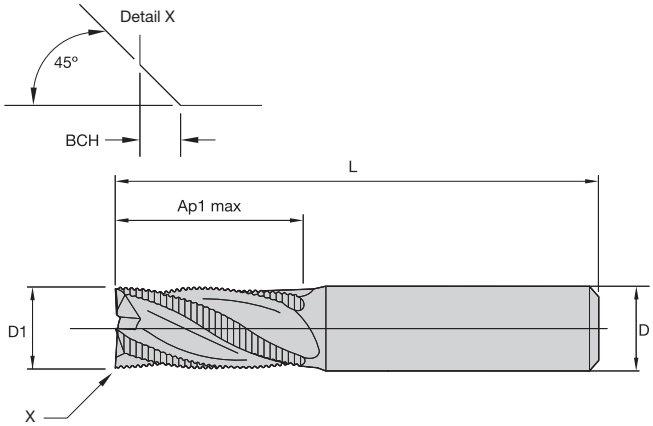
grade UNCOATED-WW									
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
3871691	664W25008WW	25,0	25	23	26,00	46,00	102	1,00	5
3871692	660W25008WW	25,0	25	23	45,00	65,00	121	1,00	5
3871833	661W25008WW	25,0	25	23	90,00	110,00	166	1,00	6
3871834	664W32009WW	32,0	32	30	32,00	52,00	112	1,00	6
3871835	660W32009WW	32,0	32	30	53,00	73,00	133	1,00	6
3871836	661W32009WW	32,0	32	30	100,00	110,00	170	1,00	6
3871837	664W40009WW	40,0	32	–	38,00	58,00	118	1,00	6
3871838	660W40009WW	40,0	32	–	56,00	65,00	125	1,00	6
3871839	661W40009WW	40,0	32	–	100,00	110,00	170	1,00	6
3871840	664W50000WW	50,0	50	47	40,00	60,00	140	1,00	6
3871841	660W50000WW	50,0	50	47	75,00	95,00	175	1,00	6
3871842	661W50000WW	50,0	50	47	110,00	130,00	210	1,00	8

NOTE: For application data, please see page Q10.

- Centre cutting.
- Fine pitch.
- Standard items listed. Additional styles and coatings made-to-order.



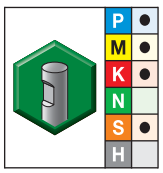




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6N06



● first choice
○ alternate choice

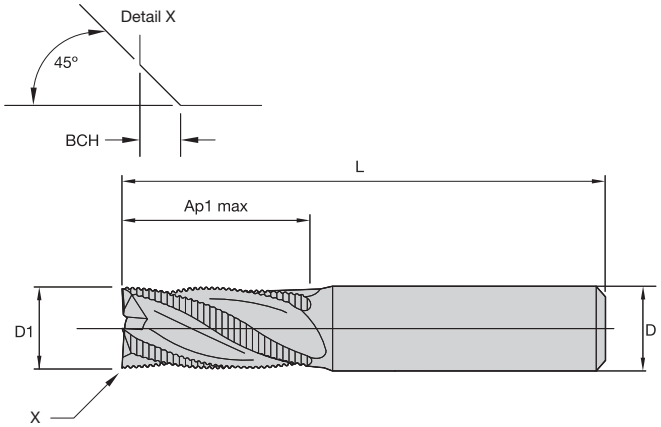
grade TiAlN-LW TiAlN							
order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
1660373	6N0606002LW	6,0	6	13,00	57	0,25	4
1660389	6N0608004LW	8,0	10	19,00	69	0,25	4
1660397	6N0609004LW	9,0	10	19,00	69	0,25	4
1660405	6N0610004LW	10,0	10	22,00	72	0,25	4
1660413	6N0611005LW	11,0	12	22,00	79	0,25	4
1660421	6N0612005LW	12,0	12	26,00	83	0,35	4
1660437	6N0614005LW	14,0	12	26,00	83	0,35	4
1660453	6N0616006LW	16,0	16	32,00	92	0,35	4
1660471	6N0618006LW	18,0	16	32,00	92	0,35	4
1660479	6N0620007LW	20,0	20	38,00	104	0,35	4
1660487	6N0622007LW	22,0	20	38,00	104	0,50	5
1660497	6N0625008LW	25,0	25	45,00	121	0,50	5
1660507	6N0630008LW	30,0	25	45,00	121	0,50	5

NOTE: For application data, please see page Q10.

- Centre cutting.
- Flat shallow pitch.
- Standard items listed. Additional styles and coatings made-to-order.



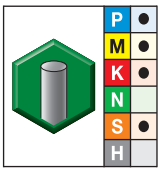


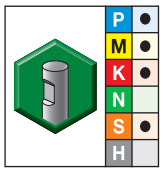


End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6N70





● first choice
○ alternate choice

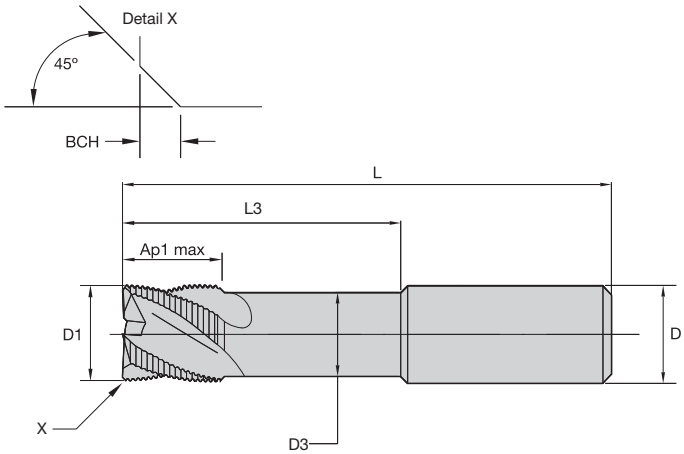
grade TiAlN-LT TiAlN		grade TiAlN-LW TiAlN							
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L	BCH	ZU
2990812	6N7006002LT	1660596	6N7006002LW	6,0	6	13,00	57	0,25	4
2992083	6N7008004LT	1660598	6N7008004LW	8,0	10	19,00	69	0,25	4
1981089	6N7010004LT	1660600	6N7010004LW	10,0	10	22,00	72	0,25	4
1981090	6N7012005LT	1660602	6N7012005LW	12,0	12	26,00	83	0,35	4
3078687	6N7014005LT		–	14,0	12	26,00	83	–	4
	–	1660604	6N7014005LW	14,0	12	26,00	83	0,35	4
1717017	6N7016006LT	1660606	6N7016006LW	16,0	16	32,00	92	0,35	4
3077681	6N7018006LT		–	18,0	16	32,00	92	–	4
	–	1660608	6N7018006LW	18,0	16	32,00	92	0,35	4
1716039	6N7020007LT	1660610	6N7020007LW	20,0	20	38,00	104	0,35	4
2992087	6N7025008LT	1660612	6N7025008LW	25,0	25	45,00	121	0,50	4
3078692	6N7032009LT		–	32,0	20	53,00	133	–	6
	–	1660614	6N7032009LW	32,0	32	53,00	133	0,50	6

NOTE: For application data, please see page Q11.

- Centre cutting.
- Fine pitch.
- Standard items listed. Additional styles and coatings made-to-order.



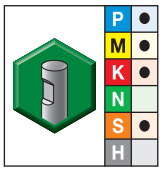




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,12/-0,12	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 6NL6



● first choice
○ alternate choice

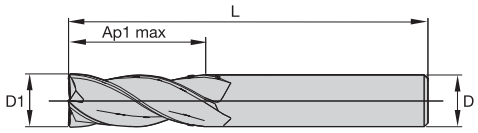
grade TiAlN-LW TiAlN									
order #	catalogue #	D1	D	D3	length of cut Ap1 max	L3	length L	BCH	ZU
1660617	**6NL610004LW**	10,0	10	10	22,00	69,00	110	0,25	4
1660623	**6NL612005LW**	12,0	12	12	26,00	78,00	125	0,35	4
1660629	**6NL616006LW**	16,0	16	15	32,00	87,00	138	0,35	4
1660635	**6NL620007LW**	20,0	20	20	38,00	108,00	160	0,35	4
1660640	**6NL625008LW**	25,0	25	25	45,00	155,00	216	0,50	5

NOTE: For application data, please see page Q11.

- Centre cutting.
- Standard items listed. Additional styles and coatings made-to-order.



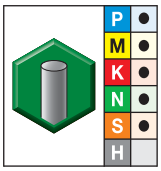




End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,02/-0,0	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

Series 1N0M JJ



● first choice
○ alternate choice

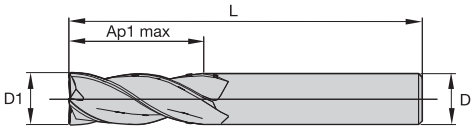
grade TiAlN-LJ TiAlN					
order #	catalogue #	D1	D	length of cut Ap1 max	length L
2605576	1N0M03002LJ	3,0	6	10,00	50
2605577	1N0M04003LJ	4,0	8	12,00	60
2605578	1N0M05003LJ	5,0	8	15,00	60
2605579	1N0M06003LJ	6,0	8	15,00	60
2605580	1N0M08004LJ	8,0	10	20,00	65
2605581	1N0M10004LJ	10,0	10	25,00	75
2605582	1N0M12005LJ	12,0	12	30,00	80
2605583	1N0M14006LJ	14,0	16	35,00	90
2605584	1N0M16006LJ	16,0	16	40,00	95
2605585	1N0M18007LJ	18,0	20	40,00	105
2605586	1N0M20007LJ	20,0	20	45,00	110
2605587	1N0M22007LJ	22,0	20	45,00	125

NOTE: For application data, please see page Q12.

- Centre cutting.
- Unequal flute spacing.
- Standard items listed. Additional styles and coatings made-to-order.



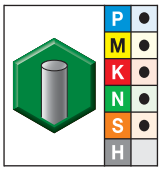


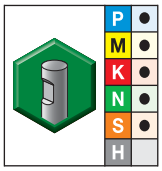


End Mill Tolerances

D1	tolerance	D	tolerance h6 + / -
All	+0,04/-0,0	≤ 3	0/0,006
		> 3–6	0/0,008
		> 6–10	0/0,009
		> 10–18	0/0,011
		> 18–30	0/0,013

■ Series 1N77 • VariMill





● first choice
○ alternate choice

grade TiCN-CT TiCN		grade TiCN-CW TiCN					
order #	catalogue #	order #	catalogue #	D1	D	length of cut Ap1 max	length L
2605715	1N7706002CT	2605716	1N7706002CW	6,0	6	13,00	57
2605717	1N7708004CT	2605718	1N7708004CW	8,0	10	19,00	69
2605719	1N7710004CT	2605720	1N7710004CW	10,0	10	22,00	72
2605721	1N7712005CT	2605722	1N7712005CW	12,0	12	26,00	83
2605823	1N7714005CT	2605824	1N7714005CW	14,0	12	26,00	83
2605825	1N7716006CT	2605826	1N7716006CW	16,0	16	32,00	92
2605827	1N7718006CT	2605828	1N7718006CW	18,0	16	32,00	92
2605829	1N7720007CT	2605830	1N7720007CW	20,0	20	38,00	104
2605831	1N7722007CT	2605832	1N7722007CW	22,0	20	38,00	104
2605843	1N7725008CT	2605844	1N7725008CW	25,0	25	45,00	121
2605845	1N7730008CT	2605846	1N7730008CW	30,0	25	45,00	121

NOTE: For application data, please see page Q13.

Series 664W 660W 661W • WavCut I





Material Group		Side Milling (A) and Slotting (B)			uncoated			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.				
		A		B	Cutting Speed — vc m/min				D1 — Diameter			
		ap	ae	ap	min		max	mm	25,0	32,0	40,0	50,0
P	5	1,5 x D	0,4 x D	1 x D	10	–	14	fz	0,091	0,105	0,124	0,146
M	1	1,5 x D	0,4 x D	1 x D	10	–	14	fz	0,114	0,131	0,155	0,182
	2	1,5 x D	0,4 x D	1 x D	10	–	12	fz	0,091	0,105	0,124	0,146
S	3	1,5 x D	0,4 x D	0,75 x D	6	–	11	fz	0,091	0,105	0,124	0,146
	4	1,5 x D	0,4 x D	0,75 x D	6	–	11	fz	0,084	0,096	0,114	0,134

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Application Data • Series 6N06

Series 6N06





Material Group		Side Milling (A) and Slotting (B)			TiCN			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min			Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0	30,0
P	1	1,5 x D	0,5 x D	1 x D	56	–	64	70	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	2	1,5 x D	0,5 x D	1 x D	48	–	64	60	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	3	1,5 x D	0,5 x D	1 x D	40	–	56	50	–	70	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	5	1,5 x D	0,5 x D	1 x D	20	–	28	25	–	35	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
M	1	1,5 x D	0,5 x D	1 x D	20	–	28	25	–	35	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	2	1,5 x D	0,5 x D	1 x D	20	–	24	25	–	30	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
	3	1,5 x D	0,5 x D	1 x D	12	–	16	15	–	20	fz	0,026	0,035	0,040	0,045	0,055	0,059	0,062	0,068	0,082
K	1	1,5 x D	0,5 x D	1 x D	56	–	64	70	–	80	fz	0,046	0,062	0,072	0,079	0,097	0,104	0,109	0,119	0,143
	2	1,5 x D	0,5 x D	1 x D	40	–	56	50	–	70	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
S	1	1,5 x D	0,5 x D	1 x D	12	–	24	15	–	30	fz	0,038	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,131
	2	1,5 x D	0,5 x D	1 x D	4	–	12	5	–	15	fz	0,021	0,027	0,032	0,036	0,045	0,048	0,052	0,059	0,071
	3	1,5 x D	0,5 x D	1 x D	12	–	22	15	–	28	fz	0,031	0,042	0,048	0,054	0,067	0,073	0,078	0,087	0,105
	4	1,5 x D	0,5 x D	1 x D	12	–	22	15	–	28	fz	0,027	0,038	0,045	0,050	0,062	0,067	0,071	0,080	0,096

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 6N70

Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	16,0	18,0	20,0	25,0	32,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,033	0,044	0,051	0,056	0,068	0,073	0,078	0,085	0,109
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,058	0,078	0,090	0,099	0,121	0,130	0,137	0,149	0,190
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,048	0,065	0,076	0,084	0,105	0,113	0,121	0,137	0,175
	2	1,5 x D	0,5 x D	1 x D	5	–	15	fz	0,026	0,034	0,040	0,045	0,056	0,060	0,065	0,074	0,094
	3	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,039	0,052	0,061	0,067	0,084	0,091	0,097	0,109	0,140
	4	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,034	0,048	0,056	0,062	0,077	0,083	0,089	0,100	0,128

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 6NL6

Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.					
		A		B	Cutting Speed — vc m/min				D1 — Diameter				
		ap	ae	ap	min		max	mm	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,063	0,070	0,085	0,096	0,104
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,063	0,070	0,085	0,096	0,104
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,053	0,059	0,073	0,085	0,096
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,042	0,047	0,059	0,068	0,076
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,053	0,059	0,073	0,085	0,096
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,042	0,047	0,059	0,068	0,076
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,035	0,039	0,048	0,054	0,060
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,063	0,070	0,085	0,096	0,104
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,053	0,059	0,073	0,085	0,096
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,053	0,059	0,073	0,085	0,096
	2	1,5 x D	0,5 x D	1 x D	5	–	15	fz	0,028	0,031	0,039	0,045	0,051
	3	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,042	0,047	0,059	0,068	0,076
	4	1,5 x D	0,5 x D	1 x D	10	–	20	fz	0,039	0,043	0,054	0,062	0,070

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 1N0M JJ







Material Group		Side Milling (A) and Slotting (B)			TiAlN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.									
		A		B	Cutting Speed — vc m/min				D1 — Diameter								
		ap	ae	ap	min		max	mm	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0	25,0
P	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	2	1,5 x D	0,5 x D	1 x D	60	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	3	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	5	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
M	1	1,5 x D	0,5 x D	1 x D	25	–	35	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	2	1,5 x D	0,5 x D	1 x D	25	–	30	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
	3	1,5 x D	0,5 x D	1 x D	15	–	20	fz	0,017	0,022	0,033	0,044	0,051	0,056	0,068	0,078	0,085
K	1	1,5 x D	0,5 x D	1 x D	70	–	80	fz	0,029	0,039	0,058	0,078	0,090	0,099	0,121	0,137	0,149
	2	1,5 x D	0,5 x D	1 x D	50	–	70	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
N	1	1,5 x D	0,5 x D	1 x D	300	–	375	fz	0,042	0,055	0,079	0,104	0,125	0,144	0,192	0,240	0,300
	2	1,5 x D	0,5 x D	1 x D	230	–	300	fz	0,034	0,044	0,063	0,083	0,100	0,115	0,154	0,192	0,240
S	1	1,5 x D	0,5 x D	1 x D	15	–	30	fz	0,024	0,032	0,048	0,065	0,076	0,084	0,105	0,121	0,137
	2	1,5 x D	0,5 x D	0,5 x D	5	–	15	fz	0,013	0,018	0,026	0,034	0,040	0,045	0,056	0,065	0,074
	3	1,5 x D	0,5 x D	1 x D	15	–	28	fz	0,020	0,026	0,039	0,052	0,061	0,067	0,084	0,097	0,109
	4	1,5 x D	0,5 x D	0,5 x D	15	–	28	fz	0,016	0,022	0,034	0,048	0,056	0,062	0,077	0,089	0,100

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.

Series 1N77 • VariMill

Material Group		Side Milling (A) and Slotting (B)			TiCN			Recommended feed per tooth (fz = mm/th) for side milling (A). For slotting (B), reduce fz by 20%.								
		A		B	Cutting Speed — vc m/min				D1 — Diameter							
		ap	ae	ap	min		max	mm	6,0	8,0	10,0	12,0	14,0	16,0	20,0	25,0	30,0
P	1	1,5 x D	0,5 x D	1 x D	56	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	2	1,5 x D	0,5 x D	1 x D	48	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	3	1,5 x D	0,5 x D	1 x D	40	–	56	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	5	1,5 x D	0,5 x D	1 x D	20	–	28	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
M	1	1,5 x D	0,5 x D	1 x D	20	–	28	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	2	1,5 x D	0,5 x D	1 x D	20	–	24	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
	3	1,5 x D	0,5 x D	1 x D	12	–	16	fz	0,033	0,044	0,051	0,056	0,062	0,068	0,078	0,085	0,085
K	1	1,5 x D	0,5 x D	1 x D	56	–	64	fz	0,058	0,078	0,090	0,099	0,111	0,121	0,137	0,149	0,149
	2	1,5 x D	0,5 x D	1 x D	40	–	56	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
N	1	1,5 x D	0,5 x D	1 x D	240	–	300	fz	0,079	0,104	0,125	0,144	0,168	0,192	0,240	0,300	0,300
	2	1,5 x D	0,5 x D	1 x D	184	–	240	fz	0,063	0,083	0,100	0,115	0,134	0,154	0,192	0,240	0,240
S	1	1,5 x D	0,5 x D	1 x D	12	–	24	fz	0,048	0,065	0,076	0,084	0,095	0,105	0,121	0,137	0,137
	2	1,5 x D	0,5 x D	1 x D	4	–	12	fz	0,026	0,034	0,040	0,045	0,050	0,056	0,065	0,074	0,074
	3	1,5 x D	0,5 x D	1 x D	12	–	22	fz	0,039	0,052	0,061	0,067	0,076	0,084	0,097	0,109	0,109
	4	1,5 x D	0,5 x D	0,5 x D	12	–	22	fz	0,034	0,048	0,056	0,062	0,070	0,077	0,089	0,100	0,100

NOTE: Lower value of cutting speed is used for high stock removal applications or for higher hardness (machinability) within group.
Higher value of cutting speed is used for finishing applications or for lower hardness (machinability) within group.
Above parameters are based on ideal conditions. For smaller taper machining centres, please adjust parameters accordingly on diameters >12mm.



Solid End Milling • Burs

Burs..... R2–R18

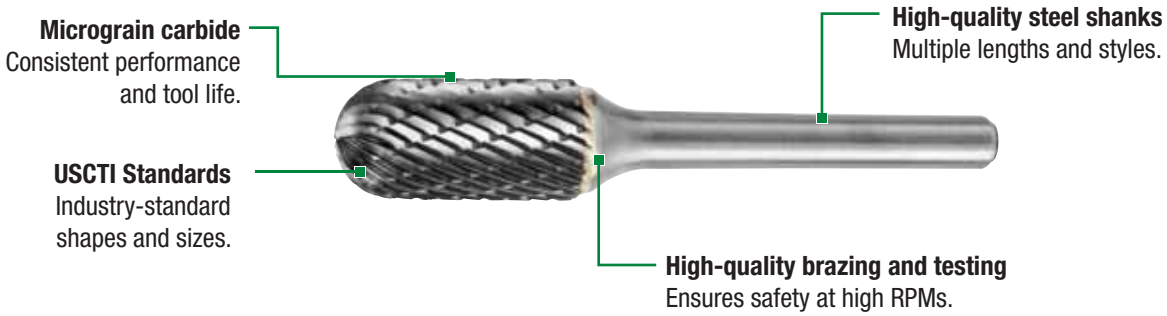




Carbide Burs

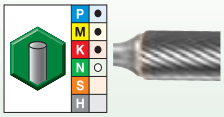
WIDIA™ carbide burs are manufactured in compliance with USCTI standards and are the highest quality in the industry, delivering excellent performance and safety. Our unique manufacturing process ensures exceptional tool life with the reliability to operate safely at high speeds. WIDIA burs offer a comprehensive portfolio of sizes and shapes for all applications and workpiece materials.

- Complete selection of shapes and cut styles for all materials and applications.
- Solid shank and brazed-on steel styles.
- Highest quality materials and construction deliver exceptional tool life.
- Wide array of sizes and shank lengths.
- Available in multiple size and style kits.
- Use of industry-standard USCTI codes for easy identification.



Standard Cut Styles

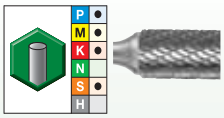
Standard Cut (Right-Hand Spiral)



The WIDIA™ standard (right-hand spiral) cut produces a smooth finish for general-purpose use on steel, cast iron, and other ferrous and non-ferrous materials.

Most WIDIA carbide burs are available in the right-hand spiral design.

Master Cut (Double Cut)



The WIDIA exclusive **master cut,** with its chisel-type cutting edge, is a machine-ground tool built to exacting tolerances of concentricity, size, and shape. This accuracy, when combined with precision grinders, results in smooth-running, fast metal removal, and fine finishes. The right- and left-hand helical flutes combine to produce a chisel-type cutting tooth. This results in faster penetration and stock removal with minimal bounce or chatter.

The master cut design also produces an easy-to-handle granular-type chip in most metals, as opposed to the conventional sliver-type chips.

Throughout its life, the master cut gives faster stock removal and less operator fatigue, and maintains a good finish on the widest possible variety of workpiece materials.

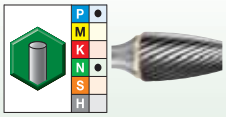
Aluminium Cut



The WIDIA **aluminium cut** burs are outstanding on soft or non-ferrous type materials. Use the aluminium cut design on aluminium, magnesium, brass, lead, and most plastics.

Special Cut Styles

Coarse Cut



Coarse cut burs are favored for applications in softer materials such as brass, lead, annealed low-carbon steels, and some aluminium alloys. The combination of fewer flutes with greater depths provides the chip clearance necessary for these materials.

Available as specials.

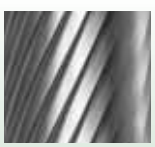
Fine Cut RHS



The **WIDIA fine cut right-hand spiral** is used in applications where stock removal is light and workpiece finish is critical. A greater number of flutes reduces chip load and provides excellent control in deburring small, intricate areas.

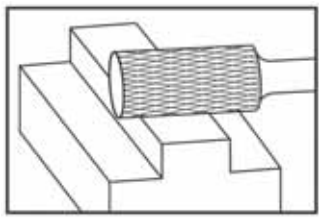
Available as specials.

How to select a Bur

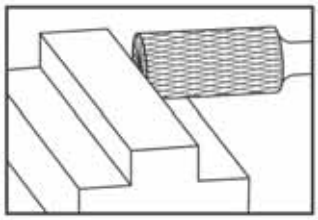
Applications	Material	Cut	
Efficient stock removal — deburring, finishing, and cleaning.	Ferrous metals Non-ferrous metals	Double Master Cut	
Heavy stock removal — deburring, milling, cleaning, and machining.	Non-ferrous metal: aluminium alloys Plastics	Aluminium Cut	
Medium stock removal — deburring, milling, cleaning, and finishing.	Non-ferrous metal: aluminium alloys Plastics Hard rubber	Coarse Cut Special Cut Style	
Medium stock removal — deburring, milling, cleaning, and finishing.	Non-Hardened steel >45 HRC Hardened steel >45 HRC: stainless steel High-temperature resistant metals: nickel, cobalt, titanium Non-ferrous light metals: brass, copper, and zinc Hardened >45 HRC: cast iron	Single Cut	
Light stock removal — fine deburring and fine finishing.	Hardened steel >45 HRC	Fine Cut Special Cut Style	

Bur Shapes

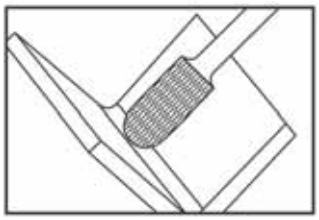
A Shape



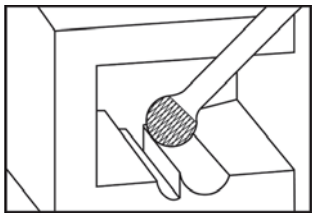
B Shape



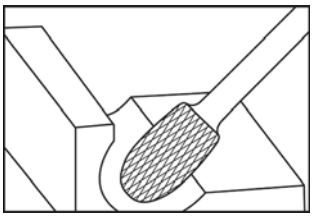
C Shape



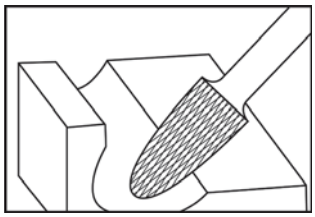
D Shape



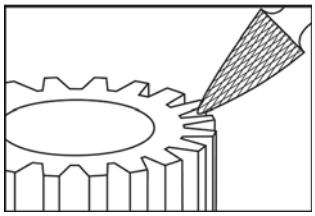
E Shape



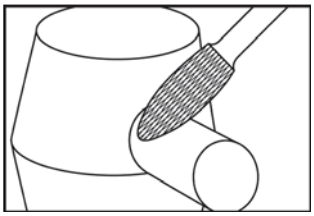
F Shape



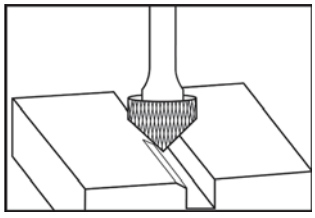
G Shape



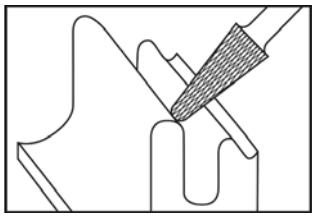
H Shape



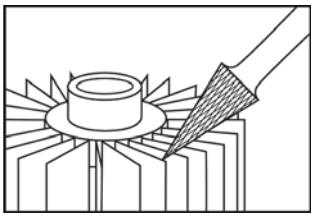
K Shape



L Shape



M Shape



Shank Styles

A Shank
3mm solid carbide shank



B Shank
3mm hardened steel shank



C Shank
6mm hardened steel shank



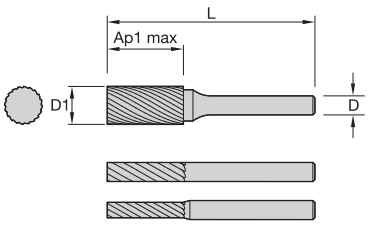
D Shank
3mm solid carbide shank



Bur Cutting Speeds

Bur Diameter	Recommended Cutting Speed (RPM)	Maximum Cutting Speed (RPM)
1,6mm	60,000–90,000	100,000
3,0mm	40,000–70,000	90,000
4,8mm	35,000–60,000	80,000
6,4mm	30,000–50,000	70,000
8,0mm	20,000–40,000	68,000
9,5mm	20,000–40,000	66,000
11,1mm	15,000–40,000	58,000
12,7mm	15,000–40,000	50,000
15,9mm	12,000–25,000	40,000
19,1mm	10,000–20,000	33,000
25,4mm	7,500–20,000	25,000
28,8mm	7,000–13,000	20,000
38,1mm	5,000–10,000	17,000
44,5mm	4,500–9,000	14,000
50,8mm	4,000–8,000	12,500

- Cylindrical shape.
- No end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut


Master Cut


Aluminium Cut

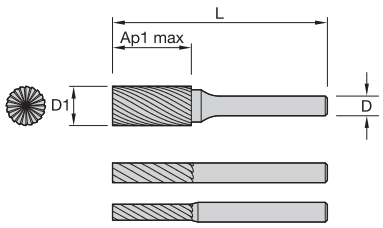
Series SA-M Cylindrical

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SA-41M	3009447	M40222	1598896	M41222	–		1,6	3,0	4,8	38,1	A
SA-42M	3009448	M40223	1293458	M41223	–		2,4	3,0	11,1	38,1	A
SA-43M	2736521	M40224	2270852	M41224	–		3,0	3,0	14,3	31,8	A
SA-11M	–		2991270	M41225	–		3,1	6,0	12,7	50,8	C
SA-52M	–		1977421	M41226	–		4,0	3,0	12,7	38,1	A
SA-53M	2961525	M40227	2949031	M41227	–		4,8	3,0	12,7	38,1	A
SA-14M	2736516	M40228	1293727	M41228	–		4,8	6,0	15,9	50,8	C
SA-1M	2736509	M40229	1977519	M41229	2987350	M40551	6,0	6,0	15,9	50,8	C
SA-51M	2736505	M40230	–		–		6,4	3,0	4,8	36,5	B
SA-51M-2	–		1977415	M41231	–		6,4	3,0	12,7	44,5	B
SA-2M	2991245	M40232	2735696	M41232	–		7,9	6,0	19,1	63,5	C
SA-3M	2736500	M40233	1293733	M41233	2736260	M40552	9,5	6,0	19,1	63,5	C
SA-4M	–		2979468	M41235	–		11,1	6,0	25,4	69,9	C
SA-5M	2990411	M40237	2219983	M41237	2736256	M40553	12,7	6,0	25,4	69,9	C
SA-6M	2736488	M40239	2987343	M41239	2991264	M40555	15,9	6,0	25,4	69,9	C
SA-16M	–		2735681	M41241	–		19,1	6,0	19,1	69,9	C
SA-7M	3009451	M40242	–		–		19,1	6,0	25,4	69,9	C
SA-9M	–		3009494	M41245	–		25,4	6,0	25,4	69,9	C

- Cylindrical shape.
- With end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.


Single Cut

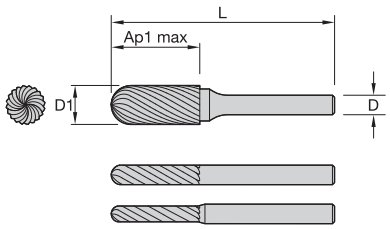

Master Cut



Series SB-M Cylindrical with End Cut

	Single Cut		Master Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SB-41M	–		2894606	M41261	1,6	3,0	6,4	38,1	A
SB-42M	–		2991812	M41262	2,4	3,0	11,1	38,1	A
SB-43M	3009453	M40263	2220466	M41263	3,0	3,0	14,3	38,1	A
SB-52M	–		2991813	M41265	4,0	3,0	12,7	38,1	A
SB-53M	–		3009496	M41266	4,8	3,0	12,7	38,1	A
SB-14M	3009454	M40267	–		4,8	6,0	15,9	50,8	C
SB-1M	2986664	M40268	2987342	M41268	6,0	6,0	15,9	50,8	C
SB-51M	–		2987341	M41269	6,4	3,0	4,8	36,5	B
SB-51M-2	–		2987340	M41270	6,4	3,0	6,4	44,5	B
SB-2M	2981749	M40271	2987339	M41271	7,9	6,0	19,1	63,5	C
SB-3M	2979470	M40272	2987338	M41272	9,5	6,0	19,1	63,5	C
SB-5M	2736421	M40274	2987337	M41274	12,7	6,0	25,4	69,9	C
SB-5M-2	–		3324689	M41275	12,7	8,0	25,4	76,2	C
SB-6M	–		2991272	M41276	15,9	6,0	25,4	69,9	C
SB-6M-2	–		3324690	M41277	15,9	8,0	25,4	76,2	C
SB-9M	2736416	M40282	–		25,4	6,0	25,4	69,9	C

- Cylindrical shape.
- Ball nose end cut.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

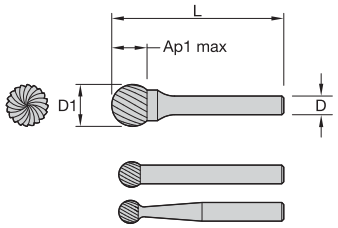

Master Cut

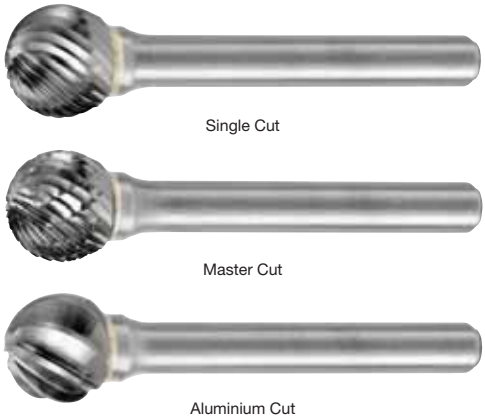

Aluminium Cut

Series SC-M Cylindrical Ball Nose

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SC-41M	**2991248**	**M40303**	**2990415**	**M41303**	–		2,4	3,0	11,1	38,1	A
SC-42M	**2736319**	**M40304**	**1977373**	**M41304**	–		3,0	3,0	14,3	38,1	A
SC-52M	–		**2735503**	**M41306**	–		4,0	3,0	12,7	38,1	A
SC-53M	–		**2894604**	**M41307**	–		4,8	3,0	12,7	38,1	A
SC-14M	–		**2991273**	**M41308**	–		4,8	6,0	15,9	50,8	C
SC-1M	**2730690**	**M40309**	**1977546**	**M41309**	**2730007**	**M40559**	6,0	6,0	15,9	50,8	C
SC-51M	**2991249**	**M40310**	**2894603**	**M41310**	–		6,4	3,0	12,7	44,5	B
SC-2M	–		**2729973**	**M41311**	–		7,9	6,0	19,1	63,5	C
SC-3M	–		**1977548**	**M41312**	**2730002**	**M40560**	9,5	6,0	19,1	63,5	C
SC-4M	–		**2987336**	**M41314**	–		11,1	6,0	25,4	69,9	C
SC-5M	**2736314**	**M40316**	**1977549**	**M41316**	**2987349**	**M40561**	12,7	6,0	25,4	69,9	C
SC-5M-2	–		**3009499**	**M41317**	–		12,7	8,0	25,4	76,2	C
SC-6M	–		**2991274**	**M41318**	–		15,9	6,0	25,4	69,9	C
SC-6M-2	–		**3005591**	**M41319**	–		15,9	8,0	25,4	76,2	C
SC-7M	–		**2991275**	**M41320**	–		19,1	6,0	25,4	69,9	C

- Ball shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.

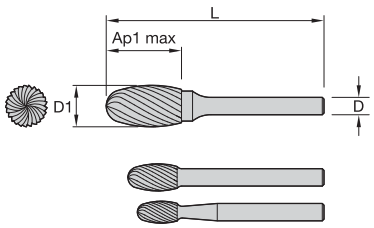




Series SD-M BALL

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SD-40M	1293470	M40342	–		–		1,6	3,0	1,6	38,1	A
SD-41M	2656784	M40343	2729868	M41343	–		2,4	3,0	2,4	38,1	A
SD-42M	2730572	M40344	2729863	M41344	–		3,0	3,0	3,0	38,1	A
SD-53M	–		2973335	M41345	–		4,8	3,0	4,8	38,1	A
SD-14M	3009458	M40346	2987335	M41346	–		4,8	6,0	4,8	50,8	C
SD-1M	2730567	M40347	2729860	M41347	3009484	M40567	6,0	6,0	6,0	50,8	C
SD-51M	–		2729855	M41348	–		6,4	3,0	6,4	38,1	B
SD-2M	2991252	M40349	2987334	M41349	–		7,9	6,0	7,9	51,6	C
SD-3M	–		2991276	M41350	2991265	M40568	9,5	6,0	9,5	52,8	C
SD-4M	–		2990416	M41351	–		11,1	6,0	11,1	54,4	C
SD-5M	2991254	M40352	2729850	M41352	–		12,7	6,0	12,7	56,0	C
SD-5M-2	3324657	M40353	–		–		12,7	8,0	12,7	62,3	C
SD-6M	2991255	M40354	3009500	M41354	–		15,9	6,0	15,9	58,7	C
SD-6M-2	–		–		2991266	M40572	15,9	8,0	15,9	65,1	C
SD-7M	–		2729840	M41356	–		19,1	6,0	19,1	61,9	C

- Egg shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.




Single Cut

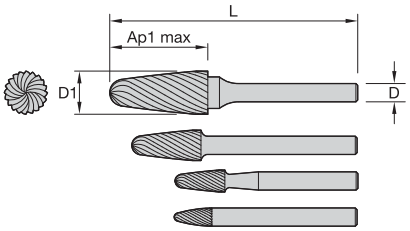

Master Cut

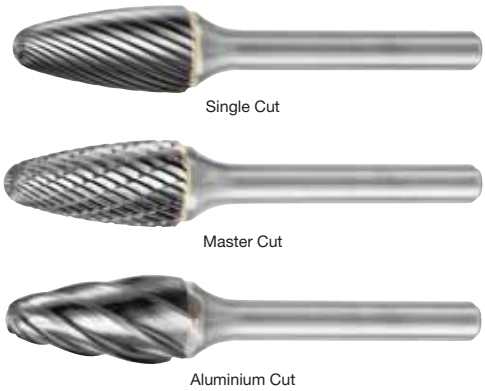

Aluminium Cut

Series SE-M EGG

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SE-41M	**2991803**	**M40368**	**2729793**	**M41368**	–		3,0	3,0	5,6	38,1	A
SE-53M	–		**2991815**	**M41369**	–		4,8	3,0	7,1	38,1	A
SE-1M	–		**2969583**	**M41372**	–		6,0	6,0	9,5	50,8	C
SE-51M	**2991256**	**M40370**	**2987333**	**M41370**	–		6,4	3,0	9,5	41,3	B
SE-3M	–		**2991277**	**M41371**	–		9,5	6,0	15,9	60,3	C
SE-5M	**2730515**	**M40373**	**1977570**	**M41373**	**2987348**	**M40574**	12,7	6,0	22,2	66,7	C
SE-5M-2	–		**3324697**	**M41374**	–		12,7	8,0	25,4	76,2	C
SE-6M	–		**2991278**	**M41375**	–		15,9	6,0	25,4	69,9	C
SE-7M	–		**2991816**	**M41377**	–		19,1	6,0	25,4	69,9	C

- Round nose tree shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.

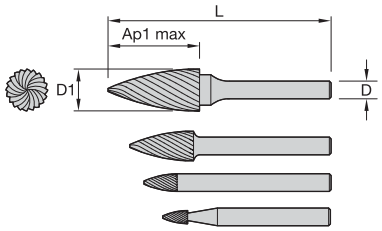




Series SF-M Round Nose Tree

	Single Cut		Master Cut		Aluminium Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SF-41M	–		3009502	M41395	–		3,0	3,0	3,4	38,1	A
SF-42M	2987354	M40396	1977374	M41396	–		3,0	3,0	12,7	38,1	A
SF-53M	–		2729701	M41397	–		4,8	3,0	12,7	38,1	B
SF-1M	2730426	M40398	2987331	M41398	3009487	M40576	6,0	6,0	15,9	50,8	C
SF-51M	2730421	M40399	1977417	M41399	–		6,4	3,0	12,7	44,5	A
SF-3M	2730416	M40400	3526093	M41400	–		9,5	6,0	19,1	63,5	C
SF-4M	–		1977555	M41401	–		11,1	6,0	25,4	69,9	C
SF-13M	–		1293748	M41402	–		12,7	6,0	19,1	63,5	C
SF-5M	2526554	M40403	1977556	M41403	1977630	M40578	12,7	6,0	25,4	69,9	C
SF-5M-2	–		3009503	M41405	–		12,7	8,0	25,4	76,2	C
SF-6M	3009463	M40406	2202572	M41406	–		15,9	6,0	25,4	69,9	C

- Pointed tree shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.



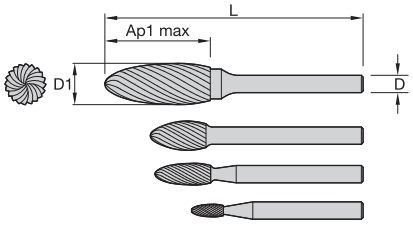

Single Cut


Master Cut

Series SG-M Pointed Tree

	Single Cut		Master Cut						
USCTI Number	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style
SG-41M-2	**2991258**	**M40428**		–	3,0	3,0	6,4	38,1	C
SG-41M-2		–	**1293463**	**M41428**	3,0	3,0	6,4	38,1	A
SG-43M	**2730335**	**M40430**		–	3,0	3,0	9,5	38,1	C
SG-44M	**3009465**	**M40431**		–	3,0	3,0	12,7	38,1	C
SG-44M		–	**1534016**	**M41431**	3,0	3,0	12,7	38,1	A
SG-53M		–	**2894601**	**M41432**	4,8	3,0	12,7	38,1	A
SG-1M		–	**2987329**	**M41433**	6,0	6,0	15,9	50,8	C
SG-51M	**2991261**	**M40434**		–	6,4	3,0	12,7	69,9	C
SG-51M		–	**1293476**	**M41434**	6,4	3,0	12,7	69,9	B
SG-2M		–	**2987327**	**M41435**	7,9	6,0	19,1	63,5	C
SG-3M	**2981799**	**M40436**	**2987326**	**M41436**	9,5	6,0	19,1	63,5	C
SG-5M		–	**2729591**	**M41439**	12,7	6,0	25,4	69,9	C
SG-5M-2		–	**3324707**	**M41442**	12,7	8,0	25,4	76,2	C

- Flame shape.
- Shank styles A and C — see page R5 for shank style definitions.



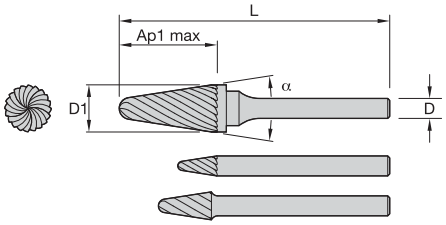

Single Cut

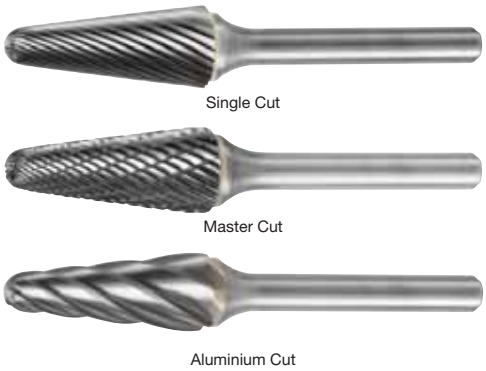

Master Cut

Series SH-M Flame

USCTI Number	Single Cut order #	Single Cut catalogue #	Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L	shank style
SH-41M	**2991807**	**M40452**	**1977378**	**M41452**	3,0	3,0	6,4	38,1	A
SH-53M	–		**1977429**	**M41453**	4,8	3,0	9,5	38,1	A
SH-2M	**3009471**	**M40454**	**2991284**	**M41454**	7,9	6,0	19,1	63,5	C
SH-5M	**2987353**	**M40455**	**2987323**	**M41455**	12,7	6,0	31,8	76,2	C
SH-6M	–		**2987322**	**M41457**	15,9	6,0	36,5	81,0	C

- Included angle shape.
- Shank styles A and C — see page R5 for shank style definitions.

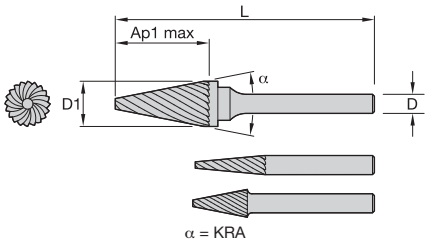




Series SL-M Included Angle

	Single Cut		Master Cut		Aluminium Cut							
USCTI Number	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SL-41M	–		2729483	M41473	–		3,0	3,0	9,5	38,1	A	8
SL-42M	2730232	M40474	1977385	M41474	–		3,0	3,0	12,7	38,1	A	8
SL-53M	2730227	M40475	–		–		4,8	3,0	12,7	38,1	A	14
SL-1M	–		2729472	M41476	–		6,0	6,0	15,9	50,8	C	14
SL-2M	2991809	M40477	1977572	M41477	–		7,9	6,0	22,2	69,9	C	14
SL-3M	3009475	M40478	1977573	M41478	2978948	M40582	9,5	6,0	27,0	74,6	C	14
SL-4M	2730217	M40479	1293770	M41479	2729982	M40584	12,7	6,0	31,8	76,2	C	14
SL-4M-2	–		2729457	M41480	–		12,7	8,0	31,8	82,6	C	14
SL-6M	–		–		2991268	M40585	15,9	6,0	33,3	81,0	C	14

- Pointed cone shape.
- Shank styles A, B, and C — see page R5 for shank style definitions.



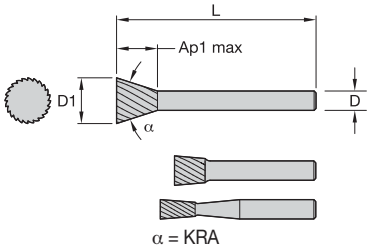

Single Cut

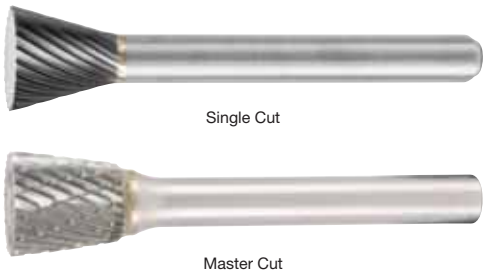

Master Cut

Series SM-M Pointed Cone

	Single Cut		Master Cut							
USCTI Number	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SM-41M	**2730149**	**M40496**	**2990417**	**M41496**	3,0	3,0	9,5	38,1	A	12
SM-42M	**2987352**	**M40497**	**1977382**	**M41497**	3,0	3,0	11,1	38,1	A	14
SM-43M	**2990413**	**M40498**	**1293468**	**M41498**	3,0	3,0	15,9	38,1	A	7
SM-2M	–		**1977564**	**M41501**	6,0	6,0	19,1	50,8	C	14
SM-3M	–		**2990418**	**M41502**	6,0	6,0	25,4	50,8	C	10
SM-51M	**2730139**	**M40503**	**1977419**	**M41503**	6,4	3,0	12,7	47,6	B	22
SM-4M	–		**2872844**	**M41504**	9,5	6,0	15,9	63,5	C	28
SM-5M	–		**1977567**	**M41505**	12,7	6,0	22,2	69,9	C	28

- Inverted taper shape.
- Shank styles A and C — see page R5 for shank style definitions.





Series SN-M Inverted Taper

	Single Cut		Master Cut							
USCTI Number	order #	catalogue #	order #	catalogue #	D1	D	Ap1 max	length L	shank style	KRA
SN-42M	**3009478**	**M40516**	**3139827**	**M41516**	3,0	3,0	4,8	38,1	A	10
SN-1M	–		**2991818**	**M41519**	6,0	6,0	7,9	50,8	C	10
SN-51M	–		**2894600**	**M41518**	6,4	3,0	6,4	38,1	A	10
SN-4M	**3019444**	**M40521**	–		12,7	6,0	12,7	57,2	C	28
SN-7M	–		**3009511**	**M41525**	19,1	6,0	15,9	60,3	C	30

- Fine master-cut style.
- Cylindrical shape.
- Series IGT has no end cut.
- Series IGT-EC has end cut.
- Solid carbide construction.


Master Cut

Series IGT Internal Grinding Tool

Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L
2735469	M42006	1,6	3,2	3,2	38,1
2735464	M42007	2,0	3,2	4,0	38,1
2735459	M42008	2,4	3,2	4,0	38,1
2735454	M42009	2,8	3,2	4,8	38,1
2735449	M42010	3,2	3,2	4,8	38,1
2735411	M42019	3,6	4,8	5,6	50,8
2735406	M42020	4,0	4,8	5,6	50,8
2735401	M42021	4,4	4,8	6,4	50,8
2735396	M42022	4,8	4,8	6,4	50,8
2735443	M42012	5,6	6,4	7,1	50,8
2735439	M42013	6,0	6,4	7,9	50,8
2735432	M42014	6,4	6,4	7,9	50,8
2735427	M42015	7,1	6,4	8,7	63,5
2735423	M42016	7,9	6,4	8,7	63,5
2735417	M42018	9,5	6,4	9,5	63,5

Series IGT-EC Internal Grinding Tool


Master Cut

Series IGT-EC Internal Grinding Tool

Master Cut order #	Master Cut catalogue #	D1	D	Ap1 max	length L
2735391	M42023	1,6	3,2	3,2	38,1
2735386	M42024	2,0	3,2	4,0	38,1
2735381	M42025	2,4	3,2	4,0	38,1
2735376	M42026	2,8	3,2	4,8	38,1
2735371	M42027	3,2	3,2	4,8	38,1
2735326	M42036	3,6	4,8	5,6	50,8
2735320	M42037	4,0	4,8	5,6	50,8
2735316	M42038	4,4	4,8	6,4	50,8
2735310	M42039	4,8	4,8	6,4	50,8
2735366	M42028	5,2	6,4	7,1	50,8
2735361	M42029	5,6	6,4	7,1	50,8
2735357	M42030	6,0	6,4	7,9	50,8
2735352	M42031	6,4	6,4	7,9	50,8
2735346	M42032	7,1	6,4	8,7	63,5
2735341	M42033	7,9	6,4	8,7	63,5
2735336	M42034	8,7	6,4	9,5	63,5
2735331	M42035	9,5	6,4	9,5	63,5

- Shank styles A, B, and C — see page R5 for shank style definitions.
- Assortment of bur styles for multiple applications.
- Most popular metric sizes.



Series Bur Sets

order number	catalogue number	D1	D	quantity	shank style	cut style	includes
2736241	**M40589**	3,0	3	9	A	Master	SA-42M, SA-43M, SC-41M, SC-42M, SD-42M, SE-41M, SF-42M, SG-42M, SM-43M
2987345	**M40590**	3,0	3	9	B	Master	SA-42M, SA-43M, SC-41M, SC-42M, SD-42M, SE-41M, SF-42M, SG-42M, SM-43M
2736231	**M40592**	6,0	3	9	B	Master	SA-51M, SB-51M, SC-51M, SD-51M, SE-51M, SF-51M, SG-51M, SM-51M, SN-51M
3009488	**M40595**	6,0	6	8	C	Master	SA-1M, SC-1M, SD-1M, SE-1M, SF-1M, SG-1M, SL-1M, SM-2M
2736217	**M40596**	9,5	6	8	C	Standard	SA-3M, SC-3M, SD-3M, SE-3M, SF-3M, SG-3M, SL-3M, SM-4M
2736212	**M40597**	9,5	6	8	C	Master	SA-3M, SC-3M, SD-3M, SE-3M, SF-3M, SG-3M, SL-3M, SM-4M
2736206	**M40598**	12,0	6	8	C	Master	SA-5M, SC-5M, SD-5M, SE-5M, SF-5M, SG-5M, SL-4M, SM-5M

Good for You, Better for the Environment!

The WIDIA Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.



For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™



Holemaking

Holemaking Introduction S2–S8

Solid Carbide Drills T1–T149

Modular Drills U1–U45

Indexable Drills V1–V40

Hole Finishing W1–W81



HOLEMAKING PRODUCTS

Holemaking Made Easy and Economical

From sturdy, general-purpose solid carbide drills to high-precision fine boring systems, we offer the most comprehensive line of holemaking products available on the market today. If you need unmatched performance and reliability, look no further than our wide range of solid carbide, modular, and indexable drills, and hole finishing products.

Solid Carbide Drills

- VariDrill™
- TOP DRILL S™ for Steel
- TOP DRILL S™ for Cast Iron
- TOP DRILL S+™
- TOP DRILL S+ 12 x D
- TOP DRILL Deep-Hole Drill
- TOP DRILL G™



Modular Drills

- TOP DRILL M1™
- Spade Blades







Indexable Drills

- Top Cut 4™



Hole Finishing

- Reaming Tools
- ROTAFLEX™ Boring System
- Countersinking Tools



Added Value for Your Performance

Increase of Productivity and Efficiency

- Material and application-specific solutions.
- Maximum metal removal rates and repeatability.
- Standardised design platforms for special tools based on “proven solutions” for individual optimisations and combination tools.

Optimised Purchase

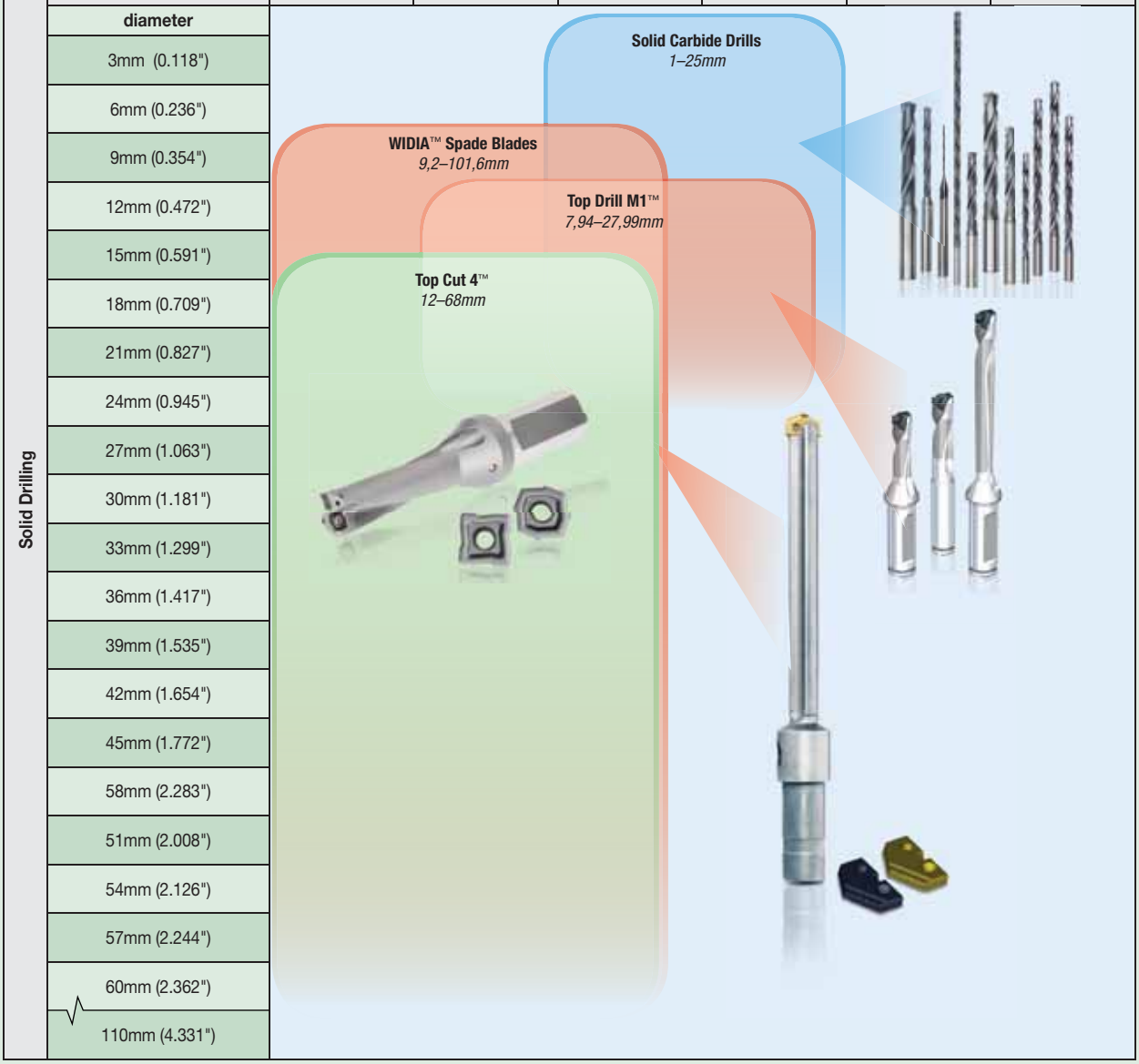
- Broad selection of holemaking tools.
- Integrated into a full range of cutting tools and service offers.
- Onsite service for an efficient development and implementation of machining solutions.

Control of Total Tooling Costs

- High tool utilisation through material and application-specific solutions.
- Process-safe regrinding service.
- Reduction of stocks through efficient modular concepts.
- Multiple platforms per application to achieve the most cost-efficient solution.

Select the Correct Holemaking Product Platform for Your Application

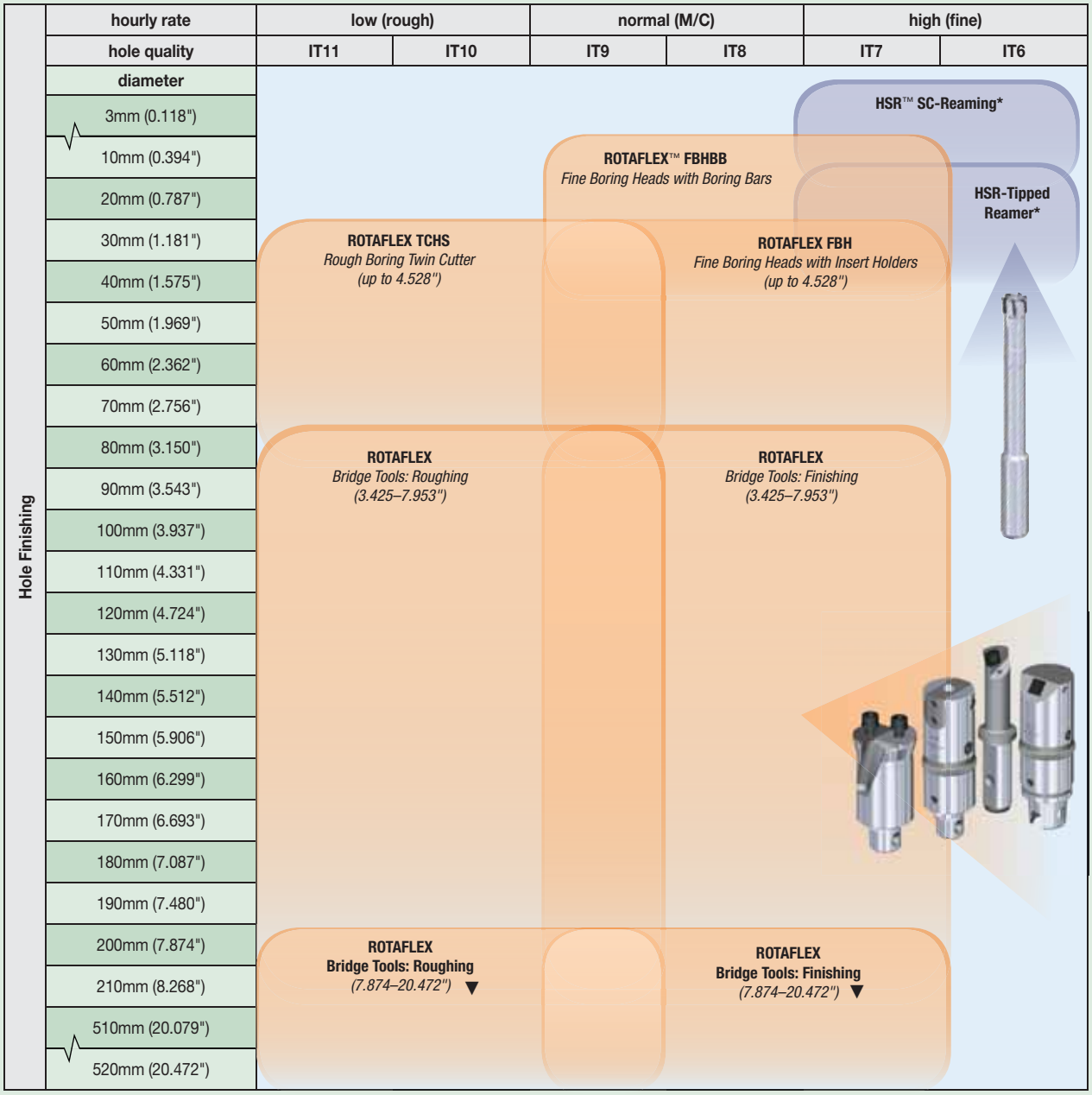
	hourly rate	low (rough)		normal (M/C)		high (fine)	
	hole quality	IT11	IT10	IT9	IT8	IT7	IT6
Solid Drilling	diameter						
	3mm (0.118")						
	6mm (0.236")						
	9mm (0.354")						
	12mm (0.472")						
	15mm (0.591")						
	18mm (0.709")						
	21mm (0.827")						
	24mm (0.945")						
	27mm (1.063")						
	30mm (1.181")						
	33mm (1.299")						
	36mm (1.417")						
	39mm (1.535")						
	42mm (1.654")						
	45mm (1.772")						
	58mm (2.283")						
	51mm (2.008")						
	54mm (2.126")						
	57mm (2.244")						
	60mm (2.362")						
	110mm (4.331")						



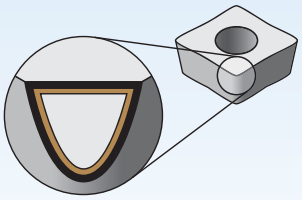
Determine the hole quality and diameter to show the available options and then decide the platform that will best fulfill your requirements.

- Solid Carbide Drills
- Modular Drills
- Indexable Drills
- Precision Hole Finishing
- Reaming

Select the Correct Holemaking Product Platform for Your Application



*IT6 is possible above 10mm (0.394") for both HSR SC-Reaming and HSR-Tipped Reamer in custom solutions.

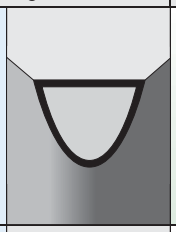
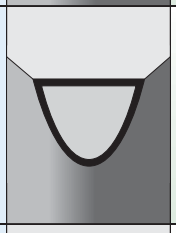
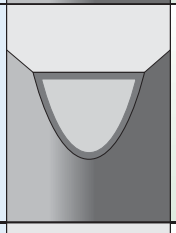
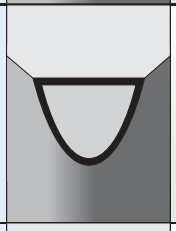
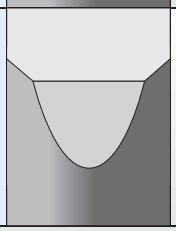


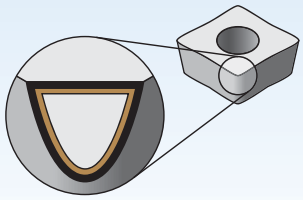
Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
WU25PD		**Composition:** With a multilayered PVD TiN-TiAlN coating and a high-quality submicron carbide substrate, this grade gives a high level of wear resistance at medium to high cutting speeds. **Application:** First choice for high reliability in all materials. This grade should be used at medium to high speeds and feeds. It is a general purpose grade that performs very well for alloyed and high-alloy steel and cast iron, but can also be used with excellent performance in all other material groups.	P			■	■	■	■			
			M			■	■	■	■			
			K			■	■	■	■			
			N		■	■	■					
			S			■	■	■				
			H		■	■	■					
WP20PD		**Composition:** With a multilayered PVD TiN-TiAlN coating, a high-quality submicron carbide substrate and a state-of-the-art surface condition, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** A high productivity grade for high speeds and feeds. First choice for high productivity with excellent reliability in alloyed and high-alloyed steels and cast irons.	P		■	■	■					
			K			■	■	■				
WK15PD		**Composition:** With a newly developed unique multilayered PVD AlCrN coating and a high-quality submicron carbide substrate, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** This grade offers extraordinary wear resistance in drilling of cast iron materials. With its high hot hardness it allows for high speed machining.										
			K	■	■	■	■					
WU20PD		**Composition:** With a multilayered PVD TiN-TiAlN coating, a high-quality submicron carbide substrate and a state-of-the-art surface condition, this grade gives the highest level of wear resistance at high cutting speeds. **Application:** First choice for alloyed and high-alloyed steels and cast irons. A state-of-the-art surface condition enables superior chip evacuation even when MQL is applied.	P		■	■	■					
			K			■	■	■				
WN10HD		**Composition:** This uncoated fine grain carbide with high hardness offers excellent abrasive wear resistance. **Application:** First choice for precision drilling of non-ferrous materials.										
			K	■	■							
			N	■	■							

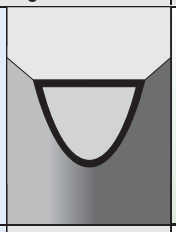
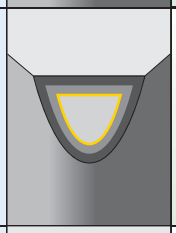
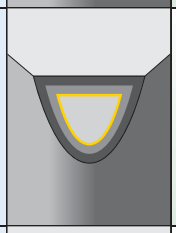
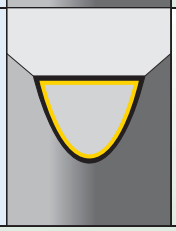


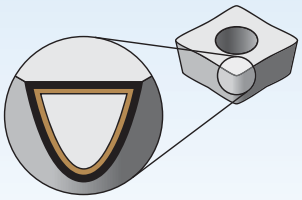
Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
WU25PD		**Composition:** With a multilayered PVD TiN-TiAlN coating and a high-quality submicron carbide substrate, this grade gives a high level of wear resistance at medium to high cutting speeds. **Application:** First choice for high reliability in most materials. This grade should be used at medium to high speeds and feeds. It is a general purpose grade that performs very well for alloyed and high-alloy steel and cast iron, but can also be used with excellent performance in stainless steels. NOTE: Previously named K20FTiAlN.	P			■	■	■	■			
			M			■	■	■	■			
			K			■	■	■	■			
WPK10CH		**Composition:** With an advanced CVD TiCN-Al_2O_3 coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation resistance and edge toughness. **Application:** Offers outstanding abrasion and crater wear resistance for high-speed machining of steels and cast irons. Use for very high cutting speeds with low to medium feed rates.	P	■	■	■	■					
			K	■	■	■	■					
WU25CH		**Composition:** Advanced CVD TiCN-Al2O3 coating together with a newly engineered tough carbide substrate. Ensures adequate deformation resistance and excellent edge strength and offers very good wear resistance over a wide range of machining conditions. **Application:** A high productivity grade with high speeds and feeds. First choice for high productivity with excellent reliability in steels, stainless steels, and cast iron rates.	P				■	■	■	■		
			M			■	■	■	■			
			K			■	■	■	■			
WU40PH		**Composition:** With a multilayered PVD TiN-TiAlN coating and a tough substrate, this grade withstands interruptions and provides high wear resistance for long tool life. **Application:** First choice for high reliability in most materials. This grade should be used at medium speeds and high feeds due to sharper edges and as a grade for high-toughness applications. It covers steel, stainless steel, cast iron, and high-temp alloys under certain conditions.	P						■	■	■	■
			M					■	■	■	■	
			K				■	■	■	■		

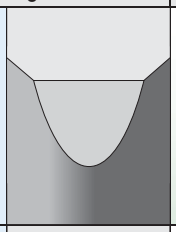
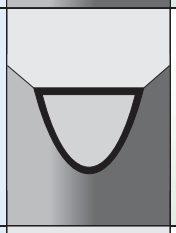
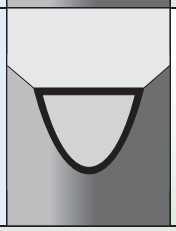


Coatings provide high-speed capability and are engineered for finishing to heavy roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

Grade

Coating	Grade Description		05	10	15	20	25	30	35	40	45
K10F 	**Composition:** This uncoated fine grain carbide with high hardness offers excellent abrasive wear resistance paired with excellent toughness for fine-finishing applications. **Application:** First choice for precision reaming of non-ferrous materials.	P									
		N									
		S									
K10F-DCFD 	**Composition:** With a PVD TiAlN coating and a fine grain carbide substrate, this grade offers excellent wear resistance paired with good toughness for medium speed fine-finishing applications. **Application:** First choice for precision reaming of steels, stainless steel, and cast irons.	P									
		M									
		K									
CERMETDCFD 	**Composition:** With a PVD TiAlN coating and a cermet substrate, this grade offers exceptional wear resistance for high speed fine finishing applications. **Application:** First choice for precision reaming of steels and cast irons.	P									
		K									

NOVO KNOWS CAD/CAM

With the addition of NOVO™ to your team, your CAD/CAM capabilities become much more accurate, streamlined, and productive.

Before NOVO: The programmer would be in their CAD/CAM software, programming a part. Using the outdated method of finding a tool in a catalogue, and then manually inputting the tooling information from the catalogue into the CAD/CAM software.

The concern is that assumptions are made, and only partial tooling information is entered.

With NOVO: The powerful digital intelligence of NOVO not only helps the programmer find the right tool for the metalcutting job, but also automatically integrates all the tooling data into a complete CAD/CAM solution. The integration of all the tooling data increases the viability of the part being programmed, and is delivered quickly — saving you time.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**





Holemaking • High-Performance Solid Carbide Drills

Introduction T2–T4
VariDrill T6–T45
TOP DRILL S T48–T75
TOP DRILL S+ T76–T96
TOP DRILL S+ 12 x D T98–T103
TOP DRILL Deep-Hole Drills T104–T117
TOP DRILL G T118–T139
Technical Information T142–T149



solid carbide drills for external coolant or dry machining		series	grade	standard ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range diameter range min–max	min–max	drilling depth L/D1
	VariDrill™ multiple-material drilling	VDS20	WU25PD	●	●	●	●	●		IT9–IT10	1,0–20,0	.0394–.7874	3 x–5 x
	TOP DRILL S™ for steel application-specific drilling	TDS202	WP20PD	●	○	○				IT9–IT10	3,0–20,0	.1181–.7874	5 x D
	TOP DRILL S for cast iron application-specific drilling	TDS212	WK15PD	○		●				IT9–IT10	3,0–20,0	.1181–.7874	5 x D
	TOP DRILL S+™ multiple-application drilling	TDS301	WU25PD	●	○	●	○	○		IT9–IT10	3,0–20,0	.1181–.7874	3 x D

solid carbide drills with internal coolant channel		series	grade	standard ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range diameter range min–max	min–max	drilling depth L/D1
	VariDrill multiple-material drilling	VDS40	WU25PD	●	●	●	●	●	○	IT9–IT10	1,0–20,0	.0394–.7874	3 x–8 x
	TOP DRILL S for steel application-specific drilling	TDS40	WP20PD	●	○	○				IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S for cast iron application-specific drilling	TDS41	WK15PD	○		●				IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S+ multiple-application drilling	TDS50	WU25PD	●	○	●	○	○		IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL S+ 12 x D deep-hole drilling without piloting	TDS504	WU20PD	●	●	●		○		IT9–IT10	3,0–20,0	.1181–.7874	3 x–8 x
	TOP DRILL Deep superior deep-hole drilling	TDD10	WU20PD	●	○	●				IT9–IT10	3,0–20,0	.1181–.5118	15 x–30 x
	TOP DRILL G™ difficult drilling applications	TDG53	WN10HD				●			IT8–IT9	3,0–20,0	.1181–.7874	5 x–12 x
	TOP DRILL Flat-Bottom for flat-bottom applications	TDF51	WU20PD	●	○	●				IT9–IT10	–	–	–
			WN15HD				●			IT9–IT10	–	–	–

custom solution range			● standard ○ engineered solution capabilities																			
diameter range		drilling depth																				
D1 mm min-max	D1 in min-max																					page(s)
1,0–20,0	.0394–1.00	1.5–8 x	●	●			●			●			○	○			○	●	●	○		T8–T21
3,0–25,0	.1181–1.00	1.5–8 x	●	●			●	●		●			○	○	●	○	○	●	○			T50–T75
3,0–25,0	.1181–1.00	1.5–8 x	●	●			●	●		●			○	○	○	●	●	●	○			T50–T75
3,0–25,0	.1181–1.00	1.5–5 x	●	●			●	●		●			○	○	○	●	○	●	●			T78–T96

engineered solution range			● standard ○ engineered solution capabilities																			
diameter range		drilling depth																				
D1 mm min-max	D1 in min-max																					page(s)
1,0–20,0	.0394–1.00	1.5–8 x			●	●	●			●			○	○			○	●	●	○		T8–T45
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●			●			○	●	●	○	○	●	○			T50–T75
2,4–20,0	.1181–1.00	1.5–8 x			●	●	●	●		●			○	○		●	●	●	○			T50–T75
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●		●			○	○	○	●	○	●	○			T78–T96
2,4–16,0	.1181–.7874	1.5–12 x			●	●	●	●		●			○	○	○	●	○	●	○			T100–T103
3,0–25,0	.0938–.6299	500mm			●	●	●	●		●					○	●	○	●	○			T106–T117
3,0–25,0	.1181–1.00	1.5–12 x			●	●	●	●	●	●	●		○	○	○		○	●	○			T120–T139
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●	●		●	●	○	○	○	●	●	●	○			T46
3,0–25,0	.1181–1.00	1.5–8 x			●	●	●	●	●		●	●	○	○	○	●	●	●	○			T46

Solid Carbide Drills • Recommendation Chart

		Versatile				Application-Specific			
									
		General Purpose	General Purpose	Multipurpose	Multipurpose	High-Performance	High-Performance	Deep-Hole Drilling	
		VariDrill™	VariDrill™	Top Drill S+™	Top Drill S+	Top Drill S/G	Top Drill S/G	WIDIA TDS+ WIDIA TDD	
P	Steel	**3 x D - VDS201A** **3 x D - VDS201F** **5 x D - VDS202A** **5 x D - VDS202F**	**3 x D - VDS401A** **3 x D - VDS401F** **5 x D - VDS402A** **5 x D - VDS402F** **8 x D - VDS403A** **8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A** **5 x D - TDS502A** **8 x D - TDS503A**	**5 x D - TDS202A**	**3 x D - TDS401A** **5 x D - TDS402A** **8 x D - TDS403A**	**12 x D - TDS504A** **15 x D - TDD105Z** **20 x D - TDD106Z** **25 x D - TDD107Z** **30 x D - TDD108Z**	
M	Stainless Steel	**3 x D - VDS201A** **3 x D - VDS201F** **5 x D - VDS202A** **5 x D - VDS202F**	**3 x D - VDS401A** **3 x D - VDS401F** **5 x D - VDS402A** **5 x D - VDS402F** **8 x D - VDS403A** **8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A** **5 x D - TDS502A** **8 x D - TDS503A**	–	WIDIA-Rübig™ Series Type WD	**12 x D - TDS504A** **15 x D - TDD105Z** **20 x D - TDD106Z** **25 x D - TDD107Z** **30 x D - TDD108Z**	
K	Cast Iron	**3 x D - VDS201A** **3 x D - VDS201F** **5 x D - VDS202A** **5 x D - VDS202F**	**3 x D - VDS401A** **3 x D - VDS401F** **5 x D - VDS402A** **5 x D - VDS402F** **8 x D - VDS403A** **8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A** **5 x D - TDS502A** **8 x D - TDS503A**	**5 x D - TDS212A**	**3 x D - TDS411A** **5 x D - TDS412A** **8 x D - TDS413A**	**12 x D - TDS504A** **15 x D - TDD105Z** **20 x D - TDD106Z** **25 x D - TDD107Z** **30 x D - TDD108Z**	
N	Non-Ferrous	3 x D - VDS201A 3 x D - VDS201F 5 x D - VDS202A 5 x D - VDS202F	3 x D - VDS401A 3 x D - VDS401F 5 x D - VDS402A 5 x D - VDS402F 8 x D - VDS403A 8 x D - VDS403F	3 x D - TDS301A	3 x D - TDS501A 5 x D - TDS502A 8 x D - TDS503A		5 x D - TDG531A 8 x D - TDG532A 12 x D - TDG533A	TDD* uncoated, sharp	
S	Heat-Resistant Alloys, Titanium Alloys	**3 x D - VDS201A** **3 x D - VDS201F** **5 x D - VDS202A** **5 x D - VDS202F**	**3 x D - VDS401A** **3 x D - VDS401F** **5 x D - VDS402A** **5 x D - VDS402F** **8 x D - VDS403A** **8 x D - VDS403F**	**3 x D - TDS301A**	**3 x D - TDS501A** **5 x D - TDS502A** **8 x D - TDS503A**	–	WIDIA-Rübig Series Type WD	12 x D - TDS504A 15 x D - TDD105Z 20 x D - TDD106Z 25 x D - TDD107Z 30 x D - TDD108Z	
H	Hard Materials	VDS 3 x D - M155	VDS		TDS+				

standard first choice
alternate choice
simple special

Application-Specific Drilling for Steel and Cast Iron



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Top Drill S™

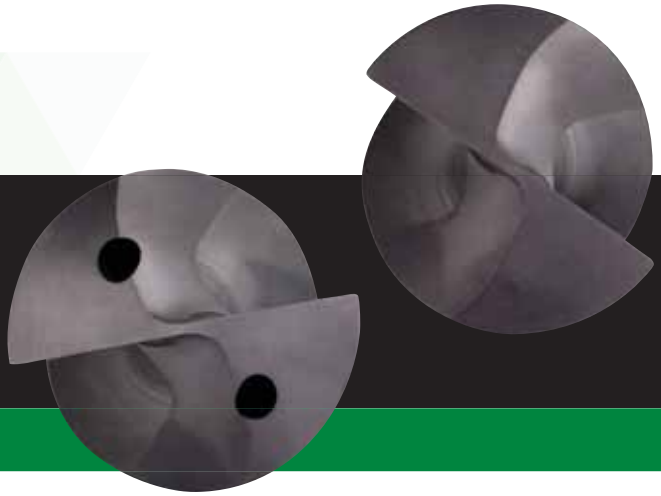
Top Drill S is the WIDIA line of solid carbide drills engineered to provide maximum performance and superior finish to application-specific tasks in steel and cast iron.

- Victory grades WP20PD™ for steel and WK15PD™ for cast iron are specially designed to resist high heat and wear.
- Lower cost-per-hole and greater productivity due to high MRR and long tool life.
- One of the broadest ranges in the market for diameter selection, length series, and coolant options.

To learn more about the benefits of **WIDIA™ Top Drill S**, contact your local distributor.

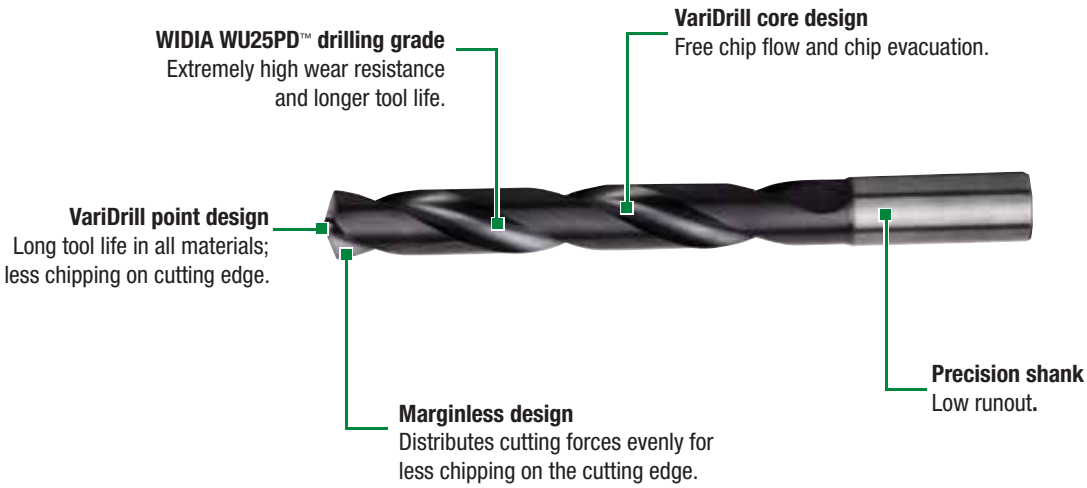
WIDIA™

VariDrill



The VariDrill advanced-point geometry design offers the ultimate solution for multipurpose drilling operations. It offers dependable tool life in all materials due to less chipping on the cutting edge.

- Reduced chipping on cutting edge means longer tool life.
- Geometry design offers strength and versatility.
- Delivers proper surface finish across multiple materials: steel, stainless steel, cast iron, aluminium, and high-temp alloys.



Innovative Technology

VariDrill™ is a technologically advanced holemaking solution. These high-performance solid carbide drills were designed in Germany to provide the transportation, aerospace, general engineering, and energy industries with a tool that performs on multiple materials.

Elegance, Strength, and Versatility

The engineers at WIDIA™ developed an innovative new design to deliver drilling performance. These solid carbide drills have a distinctive geometry and marginless design. The VariDrill point is versatile enough to work through steel, stainless steel, cast iron, aluminium, and a range of high-temp alloys.

Optimum Hole Quality

The unique marginless design reduces chipping on the tool's edge and stabilises cutting forces. This unique tool geometry enables chips to roll smoothly and evacuate easily, resulting in noticeably less friction, heat, jamming, and scratching. By minimising these drilling issues, VariDrill delivers an optimum surface finish with every hole — no matter the material.

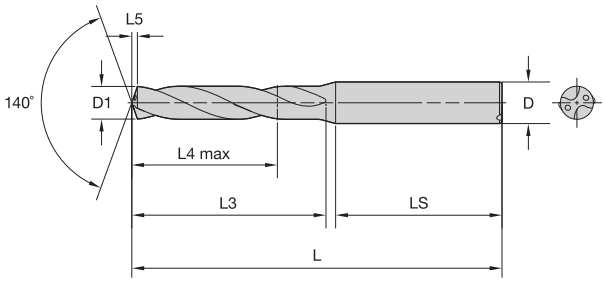
More Options and Longer Tool Life

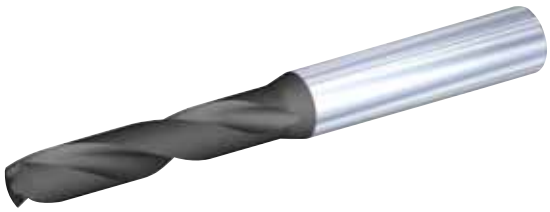
Aside from its uniquely engineered design, VariDrill also offers a broad portfolio of drilling options. With more than 2,200 items, VariDrill offers more choices than any other drill for general engineering operations. And because most drills can be reconditioned, your tools will gain extended life.

VariDrill — Innovatively designed and technologically advanced.
Make VariDrill your go-to drill for hole after hole...after hole.



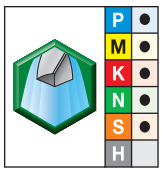


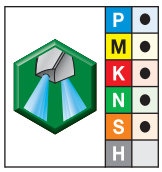




For information on L, L3, and L4 max, see page T143.

VDS201A • VDS401A • 3 x D



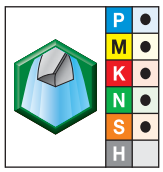


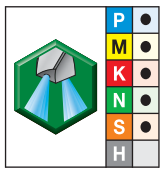
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144195	VDS201A01000		–	1,000	.0394	5	7	0,1	58	28	4
4144196	VDS201A01016		–	1,016	.0400	5	7	0,1	58	28	4
4144197	VDS201A01041		–	1,041	.0410	5	7	0,2	58	28	4
4144198	VDS201A01067		–	1,067	.0420	5	7	0,2	58	28	4
4144199	VDS201A01092		–	1,092	.0430	5	7	0,2	58	28	4
4144200	VDS201A01100		–	1,100	.0433	5	7	0,2	58	28	4
4144201	VDS201A01181		–	1,181	.0465	5	7	0,2	58	28	4
4144202	VDS201A01191		–	1,191	.0469	5	7	0,2	58	28	4
4144523	VDS201A01200		–	1,200	.0472	5	7	0,2	58	28	4
4144524	VDS201A01300		–	1,300	.0512	5	7	0,2	58	28	4
4144525	VDS201A01321		–	1,321	.0520	5	7	0,2	58	28	4
4144526	VDS201A01397		–	1,397	.0550	5	7	0,2	58	28	4
4144527	VDS201A01400		–	1,400	.0551	5	7	0,2	58	28	4
4144528	VDS201A01500	4140270	VDS401A01500	1,500	.0591	6	9	0,2	58	28	4
4144529	VDS201A01600	4140271	VDS401A01600	1,600	.0630	6	9	0,2	58	28	4
4144530	VDS201A01700	4140272	VDS401A01700	1,700	.0669	6	9	0,3	58	28	4
4144531	VDS201A01800	4140423	VDS401A01800	1,800	.0709	6	9	0,3	58	28	4
4144532	VDS201A01900	4140424	VDS401A01900	1,900	.0748	6	9	0,3	58	28	4
4144533	VDS201A01984	4140425	VDS401A01984	1,984	.0781	10	13	0,3	58	28	4
4144534	VDS201A02000	4140426	VDS401A02000	2,000	.0787	10	13	0,3	58	28	4
4144535	VDS201A02100	4140427	VDS401A02100	2,100	.0827	10	13	0,3	58	28	4
4144536	VDS201A02200	4140428	VDS401A02200	2,200	.0866	10	13	0,3	58	28	4
4144537	VDS201A02300	4140429	VDS401A02300	2,300	.0906	10	13	0,4	58	28	4
4144538	VDS201A02383	4140430	VDS401A02383	2,383	.0938	12	17	0,4	58	28	4

(continued)

(VDS201A • VDS401A • 3 x D — continued)



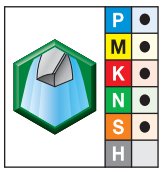


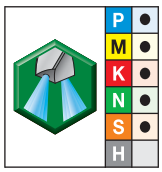
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144539	VDS201A02400	4140431	VDS401A02400	2,400	.0945	12	17	0,4	58	28	4
4144540	VDS201A02439	4140432	VDS401A02439	2,439	.0960	12	17	0,4	58	28	4
4144541	VDS201A02489	4140433	VDS401A02489	2,489	.0980	12	17	0,4	58	28	4
4144542	VDS201A02500	4140434	VDS401A02500	2,500	.0984	12	17	0,4	58	28	4
4144543	VDS201A02578	4140435	VDS401A02578	2,578	.1015	12	17	0,4	58	28	4
4144544	VDS201A02600	4140436	VDS401A02600	2,600	.1024	12	17	0,4	58	28	4
4144545	VDS201A02642	4140437	VDS401A02642	2,642	.1040	12	17	0,4	58	28	4
4144546	VDS201A02700	4140438	VDS401A02700	2,700	.1063	12	17	0,4	58	28	4
4144547	VDS201A02705	4140439	VDS401A02705	2,705	.1065	12	17	0,4	58	28	4
4144548	VDS201A02779	4140440	VDS401A02779	2,779	.1094	12	17	0,4	58	28	4
4144549	VDS201A02800	4140441	VDS401A02800	2,800	.1102	12	17	0,5	58	28	4
4144550	VDS201A02820	4140442	VDS401A02820	2,820	.1110	12	17	0,5	58	28	4
4144551	VDS201A02870	4140443	VDS401A02870	2,870	.1130	12	17	0,5	58	28	4
4144552	VDS201A02900	4140444	VDS401A02900	2,900	.1142	12	17	0,5	58	28	4
4144553	VDS201A02947	4140445	VDS401A02947	2,947	.1160	12	17	0,5	58	28	4
4143907	VDS201A03000	4140299	VDS401A03000	3,000	.1181	14	20	0,5	62	36	6
4143908	VDS201A03048	4140300	VDS401A03048	3,048	.1200	14	20	0,5	62	36	6
4143909	VDS201A03100	4140301	VDS401A03100	3,100	.1220	14	20	0,5	62	36	6
4143910	VDS201A03175	4140302	VDS401A03175	3,175	.1250	14	20	0,5	62	36	6
4143911	VDS201A03200	4140303	VDS401A03200	3,200	.1260	14	20	0,5	62	36	6
4143912	VDS201A03264	4140304	VDS401A03264	3,264	.1285	14	20	0,5	62	36	6
4143913	VDS201A03300	4140305	VDS401A03300	3,300	.1299	14	20	0,5	62	36	6
4143914	VDS201A03400	4140306	VDS401A03400	3,400	.1339	14	20	0,6	62	36	6
4143915	VDS201A03455	4140307	VDS401A03455	3,455	.1360	14	20	0,6	62	36	6
4143916	VDS201A03500	4140308	VDS401A03500	3,500	.1378	14	20	0,6	62	36	6
4143917	VDS201A03571	4140309	VDS401A03571	3,571	.1406	14	20	0,6	62	36	6
4143918	VDS201A03600	4140310	VDS401A03600	3,600	.1417	14	20	0,6	62	36	6
4143919	VDS201A03658	4140311	VDS401A03658	3,658	.1440	14	20	0,6	62	36	6
4143920	VDS201A03700	4140312	VDS401A03700	3,700	.1457	14	20	0,6	62	36	6
4143921	VDS201A03734	4140313	VDS401A03734	3,734	.1470	14	20	0,6	62	36	6
4143922	VDS201A03800	4140314	VDS401A03800	3,800	.1496	17	24	0,6	66	36	6
4143923	VDS201A03900	4140315	VDS401A03900	3,900	.1535	17	24	0,6	66	36	6
4143924	VDS201A03970	4140316	VDS401A03970	3,970	.1563	17	24	0,7	66	36	6
4143925	VDS201A04000	4140317	VDS401A04000	4,000	.1575	17	24	0,7	66	36	6
4143926	VDS201A04039	4140318	VDS401A04039	4,039	.1590	17	24	0,7	66	36	6
4143927	VDS201A04090	4140319	VDS401A04090	4,090	.1610	17	24	0,7	66	36	6
4143928	VDS201A04100	4140320	VDS401A04100	4,100	.1614	17	24	0,7	66	36	6
4143929	VDS201A04200	4140321	VDS401A04200	4,200	.1654	17	24	0,7	66	36	6
4143930	VDS201A04217	4140322	VDS401A04217	4,217	.1660	17	24	0,7	66	36	6
4143931	VDS201A04300	4140323	VDS401A04300	4,300	.1693	17	24	0,7	66	36	6

(continued)

(VDS201A • VDS401A • 3 x D — continued)



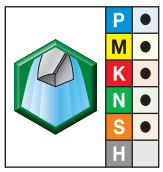


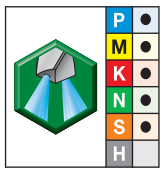
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143932	VDS201A04366	4140324	VDS401A04366	4,366	.1719	17	24	0,7	66	36	6
4143933	VDS201A04400	4140325	VDS401A04400	4,400	.1732	17	24	0,7	66	36	6
4143934	VDS201A04500	4140326	VDS401A04500	4,500	.1772	17	24	0,7	66	36	6
4143935	VDS201A04600	4140328	VDS401A04600	4,600	.1811	17	24	0,8	66	36	6
4143936	VDS201A04623	4140329	VDS401A04623	4,623	.1820	17	24	0,8	66	36	6
4143937	VDS201A04700	4140330	VDS401A04700	4,700	.1850	17	24	0,8	66	36	6
4143938	VDS201A04763	4140331	VDS401A04763	4,763	.1875	20	28	0,8	66	36	6
4143939	VDS201A04800	4140332	VDS401A04800	4,800	.1890	20	28	0,8	66	36	6
4143940	VDS201A04852	4140333	VDS401A04852	4,852	.1910	20	28	0,8	66	36	6
4143941	VDS201A04900	4140334	VDS401A04900	4,900	.1929	20	28	0,8	66	36	6
4143942	VDS201A05000	4140335	VDS401A05000	5,000	.1969	20	28	0,8	66	36	6
4143943	VDS201A05100	4140336	VDS401A05100	5,100	.2008	20	28	0,8	66	36	6
4143944	VDS201A05106	4140337	VDS401A05106	5,106	.2010	20	28	0,8	66	36	6
4143945	VDS201A05159	4140338	VDS401A05159	5,159	.2031	20	28	0,9	66	36	6
4143946	VDS201A05200	4140339	VDS401A05200	5,200	.2047	20	28	0,9	66	36	6
4143947	VDS201A05300	4140340	VDS401A05300	5,300	.2087	20	28	0,9	66	36	6
4143948	VDS201A05400	4140341	VDS401A05400	5,400	.2126	20	28	0,9	66	36	6
4143949	VDS201A05410	4140342	VDS401A05410	5,410	.2130	20	28	0,9	66	36	6
4143950	VDS201A05500	4140343	VDS401A05500	5,500	.2165	20	28	0,9	66	36	6
4143951	VDS201A05558	4140344	VDS401A05558	5,558	.2188	20	28	0,9	66	36	6
4143952	VDS201A05600	4140345	VDS401A05600	5,600	.2205	20	28	0,9	66	36	6
4143953	VDS201A05616	4140346	VDS401A05616	5,616	.2211	20	28	0,9	66	36	6
4143954	VDS201A05700	4140347	VDS401A05700	5,700	.2244	20	28	1,0	66	36	6
4143955	VDS201A05800	4140348	VDS401A05800	5,800	.2283	20	28	1,0	66	36	6
4143956	VDS201A05900	4140349	VDS401A05900	5,900	.2323	20	28	1,0	66	36	6
4143957	VDS201A05954	4140350	VDS401A05954	5,954	.2344	20	28	1,0	66	36	6
4143958	VDS201A06000	4140351	VDS401A06000	6,000	.2362	20	28	1,0	66	36	6
4143959	VDS201A06100	4140352	VDS401A06100	6,100	.2402	24	34	1,0	79	36	8
4143960	VDS201A06200	4140353	VDS401A06200	6,200	.2441	24	34	1,0	79	36	8
4143961	VDS201A06300	4140354	VDS401A06300	6,300	.2480	24	34	1,1	79	36	8
4143962	VDS201A06350	4140355	VDS401A06350	6,350	.2500	24	34	1,1	79	36	8
4143963	VDS201A06400	4140356	VDS401A06400	6,400	.2520	24	34	1,1	79	36	8
4143964	VDS201A06500	4140357	VDS401A06500	6,500	.2559	24	34	1,1	79	36	8
4143965	VDS201A06528	4140358	VDS401A06528	6,528	.2570	24	34	1,1	79	36	8
4143966	VDS201A06600	4140359	VDS401A06600	6,600	.2598	24	34	1,1	79	36	8
4143967	VDS201A06630	4140360	VDS401A06630	6,630	.2610	24	34	1,1	79	36	8
4143968	VDS201A06700	4140361	VDS401A06700	6,700	.2638	24	34	1,1	79	36	8
4143969	VDS201A06746	4140362	VDS401A06746	6,746	.2656	24	34	1,1	79	36	8
4143970	VDS201A06800	4140363	VDS401A06800	6,800	.2677	24	34	1,1	79	36	8
4143971	VDS201A06900	4140364	VDS401A06900	6,900	.2717	24	34	1,2	79	36	8

(continued)

(VDS201A • VDS401A • 3 x D — continued)



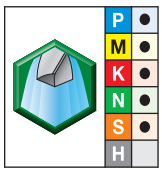


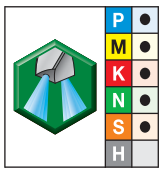
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143972	VDS201A07000	4140365	VDS401A07000	7,000	.2756	24	34	1,2	79	36	8
4143973	VDS201A07100	4140366	VDS401A07100	7,100	.2795	29	41	1,2	79	36	8
4143974	VDS201A07145	4140367	VDS401A07145	7,145	.2813	29	41	1,2	79	36	8
4143975	VDS201A07200	4140368	VDS401A07200	7,200	.2835	29	41	1,2	79	36	8
4143976	VDS201A07300	4140369	VDS401A07300	7,300	.2874	29	41	1,2	79	36	8
4143977	VDS201A07400	4140370	VDS401A07400	7,400	.2913	29	41	1,3	79	36	8
4143978	VDS201A07500	4140371	VDS401A07500	7,500	.2953	29	41	1,3	79	36	8
4143979	VDS201A07541	4140372	VDS401A07541	7,541	.2969	29	41	1,3	79	36	8
4143980	VDS201A07600	4140373	VDS401A07600	7,600	.2992	29	41	1,3	79	36	8
4143981	VDS201A07700	4140374	VDS401A07700	7,700	.3031	29	41	1,3	79	36	8
4143982	VDS201A07800	4140375	VDS401A07800	7,800	.3071	29	41	1,3	79	36	8
4143983	VDS201A07900	4140376	VDS401A07900	7,900	.3110	29	41	1,3	79	36	8
4143984	VDS201A07938	4140377	VDS401A07938	7,938	.3125	29	41	1,3	79	36	8
4143985	VDS201A08000	4140378	VDS401A08000	8,000	.3150	29	41	1,4	79	36	8
4143986	VDS201A08100	4140379	VDS401A08100	8,100	.3189	35	47	1,4	89	40	10
4143987	VDS201A08200	4140380	VDS401A08200	8,200	.3228	35	47	1,4	89	40	10
4143988	VDS201A08300	4140381	VDS401A08300	8,300	.3268	35	47	1,4	89	40	10
4143989	VDS201A08334	4140382	VDS401A08334	8,334	.3281	35	47	1,4	89	40	10
4143990	VDS201A08400	4140383	VDS401A08400	8,400	.3307	35	47	1,4	89	40	10
4143991	VDS201A08433	4140384	VDS401A08433	8,433	.3320	35	47	1,4	89	40	10
4143992	VDS201A08500	4140385	VDS401A08500	8,500	.3346	35	47	1,4	89	40	10
4143993	VDS201A08600	4140386	VDS401A08600	8,600	.3386	35	47	1,5	89	40	10
4143994	VDS201A08700	4140387	VDS401A08700	8,700	.3425	35	47	1,5	89	40	10
4143995	VDS201A08733	4140388	VDS401A08733	8,733	.3438	35	47	1,5	89	40	10
4143996	VDS201A08800	4140389	VDS401A08800	8,800	.3465	35	47	1,5	89	40	10
4143997	VDS201A08900	4140390	VDS401A08900	8,900	.3504	35	47	1,5	89	40	10
4143998	VDS201A09000	4140391	VDS401A09000	9,000	.3543	35	47	1,5	89	40	10
4143999	VDS201A09100	4140392	VDS401A09100	9,100	.3583	35	47	1,5	89	40	10
4144000	VDS201A09129	4140393	VDS401A09129	9,129	.3594	35	47	1,6	89	40	10
4144001	VDS201A09200	4140394	VDS401A09200	9,200	.3622	35	47	1,6	89	40	10
4144002	VDS201A09300	4140395	VDS401A09300	9,300	.3661	35	47	1,6	89	40	10
4144003	VDS201A09347	4140396	VDS401A09347	9,347	.3680	35	47	1,6	89	40	10
4144004	VDS201A09400	4140397	VDS401A09400	9,400	.3701	35	47	1,6	89	40	10
4144005	VDS201A09500	4140398	VDS401A09500	9,500	.3740	35	47	1,6	89	40	10
4144006	VDS201A09525	4140399	VDS401A09525	9,525	.3750	35	47	1,6	89	40	10
4144007	VDS201A09600	4140400	VDS401A09600	9,600	.3780	35	47	1,6	89	40	10
4144008	VDS201A09700	4140401	VDS401A09700	9,700	.3819	35	47	1,7	89	40	10
4144009	VDS201A09800	4140402	VDS401A09800	9,800	.3858	35	47	1,7	89	40	10
4144010	VDS201A09900	4140403	VDS401A09900	9,900	.3898	35	47	1,7	89	40	10
4144011	VDS201A09921	4140404	VDS401A09921	9,921	.3906	35	47	1,7	89	40	10

(continued)

(VDS201A • VDS401A • 3 x D — continued)



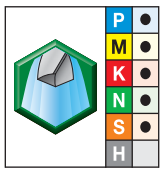


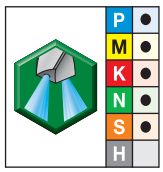
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144172	VDS201A10000	4140001	VDS401A10000	10,000	.3937	35	47	1,7	89	40	10
4144423	VDS201A10100	4140002	VDS401A10100	10,100	.3976	40	55	1,7	102	45	12
4144424	VDS201A10200	4140163	VDS401A10200	10,200	.4016	40	55	1,7	102	45	12
4144425	VDS201A10300	4140164	VDS401A10300	10,300	.4055	40	55	1,8	102	45	12
4144426	VDS201A10320	4140165	VDS401A10320	10,320	.4063	40	55	1,8	102	45	12
4144427	VDS201A10400	4140166	VDS401A10400	10,400	.4094	40	55	1,8	102	45	12
4144428	VDS201A10500	4140167	VDS401A10500	10,500	.4134	40	55	1,8	102	45	12
4144429	VDS201A10600	4140168	VDS401A10600	10,600	.4173	40	55	1,8	102	45	12
4144430	VDS201A10700	4140169	VDS401A10700	10,700	.4213	40	55	1,8	102	45	12
4144431	VDS201A10716	4140170	VDS401A10716	10,716	.4219	40	55	1,8	102	45	12
4144432	VDS201A10800	4140171	VDS401A10800	10,800	.4252	40	55	1,8	102	45	12
4144433	VDS201A10900	4140172	VDS401A10900	10,900	.4291	40	55	1,9	102	45	12
4144434	VDS201A11000	4140173	VDS401A11000	11,000	.4331	40	55	1,9	102	45	12
4144435	VDS201A11100	4140174	VDS401A11100	11,100	.4370	40	55	1,9	102	45	12
4144436	VDS201A11113	4140175	VDS401A11113	11,113	.4375	40	55	1,9	102	45	12
4144437	VDS201A11200	4140176	VDS401A11200	11,200	.4409	40	55	1,9	102	45	12
4144438	VDS201A11300	4140177	VDS401A11300	11,300	.4449	40	55	1,9	102	45	12
4144439	VDS201A11400	4140178	VDS401A11400	11,400	.4488	40	55	2,0	102	45	12
4144440	VDS201A11500	4140179	VDS401A11500	11,500	.4528	40	55	2,0	102	45	12
4144441	VDS201A11509	4140180	VDS401A11509	11,509	.4531	40	55	2,0	102	45	12
4144442	VDS201A11600	4140181	VDS401A11600	11,600	.4567	40	55	2,0	102	45	12
4144443	VDS201A11700	4140182	VDS401A11700	11,700	.4606	40	55	2,0	102	45	12
4144444	VDS201A11800	4140183	VDS401A11800	11,800	.4646	40	55	2,0	102	45	12
4144445	VDS201A11900	4140184	VDS401A11900	11,900	.4685	40	55	2,0	102	45	12
4144446	VDS201A11908	4140185	VDS401A11908	11,908	.4688	40	55	2,0	102	45	12
4144447	VDS201A12000	4140186	VDS401A12000	12,000	.4724	40	55	2,1	102	45	12
4144448	VDS201A12100	4140187	VDS401A12100	12,100	.4764	43	60	2,1	107	45	14
4144449	VDS201A12200	4140188	VDS401A12200	12,200	.4803	43	60	2,1	107	45	14
4144450	VDS201A12300	4140189	VDS401A12300	12,300	.4843	43	60	2,1	107	45	14
4144451	VDS201A12304	4140190	VDS401A12304	12,304	.4844	43	60	2,1	107	45	14
4144452	VDS201A12400	4140191	VDS401A12400	12,400	.4882	43	60	2,1	107	45	14
4144453	VDS201A12500	4140192	VDS401A12500	12,500	.4921	43	60	2,1	107	45	14
4144454	VDS201A12600	4140194	VDS401A12600	12,600	.4961	43	60	2,2	107	45	14
4144455	VDS201A12700	4140195	VDS401A12700	12,700	.5000	43	60	2,2	107	45	14
4144456	VDS201A12800	4140196	VDS401A12800	12,800	.5039	43	60	2,2	107	45	14
4144457	VDS201A12900	4140197	VDS401A12900	12,900	.5079	43	60	2,2	107	45	14
4144458	VDS201A13000	4140198	VDS401A13000	13,000	.5118	43	60	2,2	107	45	14
4144459	VDS201A13096	4140199	VDS401A13096	13,096	.5156	43	60	2,3	107	45	14
4144460	VDS201A13100	4140200	VDS401A13100	13,100	.5157	43	60	2,3	107	45	14
4144461	VDS201A13200	4140201	VDS401A13200	13,200	.5197	43	60	2,3	107	45	14

(continued)

(VDS201A • VDS401A • 3 x D — continued)



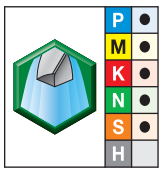


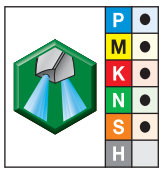
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144462	VDS201A13300	4140202	VDS401A13300	13,300	.5236	43	60	2,3	107	45	14
4144463	VDS201A13400	4140203	VDS401A13400	13,400	.5276	43	60	2,3	107	45	14
4144464	VDS201A13500	4140204	VDS401A13500	13,500	.5315	43	60	2,3	107	45	14
4144465	VDS201A13600	4140205	VDS401A13600	13,600	.5354	43	60	2,3	107	45	14
4144466	VDS201A13700	4140206	VDS401A13700	13,700	.5394	43	60	2,4	107	45	14
4144467	VDS201A13800	4140207	VDS401A13800	13,800	.5433	43	60	2,4	107	45	14
4144468	VDS201A13891	4140208	VDS401A13891	13,891	.5469	43	60	2,4	107	45	14
4144469	VDS201A13900	4140209	VDS401A13900	13,900	.5472	43	60	2,4	107	45	14
4144470	VDS201A14000	4140210	VDS401A14000	14,000	.5512	43	60	2,4	107	45	14
4144471	VDS201A14100	4140211	VDS401A14100	14,100	.5551	45	65	2,4	115	48	16
4144472	VDS201A14200	4140212	VDS401A14200	14,200	.5591	45	65	2,5	115	48	16
4144473	VDS201A14288	4140213	VDS401A14288	14,288	.5625	45	65	2,5	115	48	16
4144474	VDS201A14300	4140214	VDS401A14300	14,300	.5630	45	65	2,5	115	48	16
4144475	VDS201A14400	4140215	VDS401A14400	14,400	.5669	45	65	2,5	115	48	16
4144476	VDS201A14500	4140216	VDS401A14500	14,500	.5709	45	65	2,5	115	48	16
4144477	VDS201A14600	4140217	VDS401A14600	14,600	.5748	45	65	2,5	115	48	16
4144478	VDS201A14684	4140218	VDS401A14684	14,684	.5781	45	65	2,5	115	48	16
4144479	VDS201A14700	4140219	VDS401A14700	14,700	.5787	45	65	2,5	115	48	16
4144480	VDS201A14800	4140220	VDS401A14800	14,800	.5827	45	65	2,6	115	48	16
4144481	VDS201A14900	4140221	VDS401A14900	14,900	.5866	45	65	2,6	115	48	16
4144482	VDS201A15000	4140222	VDS401A15000	15,000	.5906	45	65	2,6	115	48	16
4144483	VDS201A15083	4140223	VDS401A15083	15,083	.5938	45	65	2,6	115	48	16
4144484	VDS201A15100	4140224	VDS401A15100	15,100	.5945	45	65	2,6	115	48	16
4144485	VDS201A15200	4140225	VDS401A15200	15,200	.5984	45	65	2,6	115	48	16
4144486	VDS201A15300	4140226	VDS401A15300	15,300	.6024	45	65	2,6	115	48	16
4144487	VDS201A15400	4140227	VDS401A15400	15,400	.6063	45	65	2,7	115	48	16
4144488	VDS201A15479	4140228	VDS401A15479	15,479	.6094	45	65	2,7	115	48	16
4144489	VDS201A15500	4140229	VDS401A15500	15,500	.6102	45	65	2,7	115	48	16
4144490	VDS201A15600	4140230	VDS401A15600	15,600	.6142	45	65	2,7	115	48	16
4144491	VDS201A15700	4140231	VDS401A15700	15,700	.6181	45	65	2,7	115	48	16
4144492	VDS201A15800	4140232	VDS401A15800	15,800	.6220	45	65	2,7	115	48	16
4144493	VDS201A15875	4140233	VDS401A15875	15,875	.6250	45	65	2,7	115	48	16
4144494	VDS201A15900	4140234	VDS401A15900	15,900	.6260	45	65	2,8	115	48	16
4144495	VDS201A16000	4140235	VDS401A16000	16,000	.6299	45	65	2,8	115	48	16
4144496	VDS201A16100	4140236	VDS401A16100	16,100	.6339	51	73	2,8	123	48	18
4144497	VDS201A16200	4140237	VDS401A16200	16,200	.6378	51	73	2,8	123	48	18
4144498	VDS201A16271	4140238	VDS401A16271	16,271	.6406	51	73	2,8	123	48	18
4144499	VDS201A16300	4140239	VDS401A16300	16,300	.6417	51	73	2,8	123	48	18
4144500	VDS201A16400	4140241	VDS401A16400	16,400	.6457	51	73	2,8	123	48	18
4144501	VDS201A16500	4140242	VDS401A16500	16,500	.6496	51	73	2,9	123	48	18

(continued)

(VDS201A • VDS401A • 3 x D — continued)

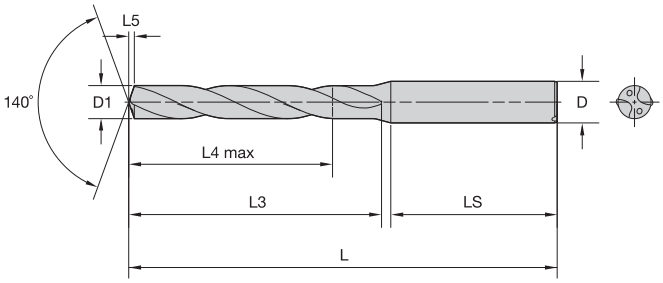


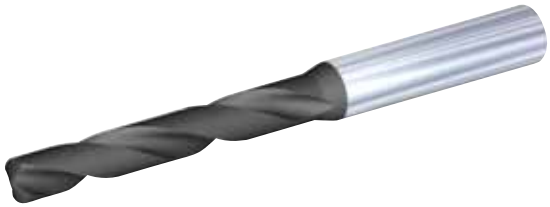


● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144503	VDS201A16600	4140243	VDS401A16600	16,600	.6535	51	73	2,9	123	48	18
4144504	VDS201A16670	4140244	VDS401A16670	16,670	.6563	51	73	2,9	123	48	18
4144505	VDS201A16700	4140245	VDS401A16700	16,700	.6575	51	73	2,9	123	48	18
4144506	VDS201A16800	4140246	VDS401A16800	16,800	.6614	51	73	2,9	123	48	18
4144507	VDS201A16900	4140247	VDS401A16900	16,900	.6654	51	73	2,9	123	48	18
4144508	VDS201A17000	4140248	VDS401A17000	17,000	.6693	51	73	2,9	123	48	18
4144509	VDS201A17100	4140249	VDS401A17100	17,100	.6732	51	73	3,0	123	48	18
4144510	VDS201A17200	4140250	VDS401A17200	17,200	.6772	51	73	3,0	123	48	18
4144511	VDS201A17300	4140251	VDS401A17300	17,300	.6811	51	73	3,0	123	48	18
4144512	VDS201A17400	4140252	VDS401A17400	17,400	.6850	51	73	3,0	123	48	18
4144513	VDS201A17463	4140253	VDS401A17463	17,463	.6875	51	73	3,0	123	48	18
4144514	VDS201A17500	4140254	VDS401A17500	17,500	.6890	51	73	3,0	123	48	18
4144515	VDS201A17600	4140255	VDS401A17600	17,600	.6929	51	73	3,1	123	48	18
4144516	VDS201A17700	4140256	VDS401A17700	17,700	.6969	51	73	3,1	123	48	18
4144517	VDS201A17800	4140257	VDS401A17800	17,800	.7008	51	73	3,1	123	48	18
4144518	VDS201A17859	4140258	VDS401A17859	17,859	.7031	51	73	3,1	123	48	18
4144519	VDS201A17900	4140259	VDS401A17900	17,900	.7047	51	73	3,1	123	48	18
4144590	VDS201A18000	4140449	VDS401A18000	18,000	.7087	51	73	3,1	123	48	18
4144591	VDS201A18100	4140450	VDS401A18100	18,100	.7126	55	79	3,1	131	50	20
4144592	VDS201A18200	4140451	VDS401A18200	18,200	.7165	55	79	3,2	131	50	20
4144593	VDS201A18258	4140452	VDS401A18258	18,258	.7188	55	79	3,2	131	50	20
4144594	VDS201A18300	4140463	VDS401A18300	18,300	.7205	55	79	3,2	131	50	20
4144595	VDS201A18400	4140464	VDS401A18400	18,400	.7244	55	79	3,2	131	50	20
4144596	VDS201A18500	4140465	VDS401A18500	18,500	.7283	55	79	3,2	131	50	20
4144597	VDS201A18600	4140466	VDS401A18600	18,600	.7323	55	79	3,2	131	50	20
4144598	VDS201A18654	4140467	VDS401A18654	18,654	.7344	55	79	3,2	131	50	20
4144599	VDS201A18700	4140468	VDS401A18700	18,700	.7362	55	79	3,2	131	50	20
4144600	VDS201A18800	4140469	VDS401A18800	18,800	.7402	55	79	3,3	131	50	20
4144601	VDS201A18900	4140470	VDS401A18900	18,900	.7441	55	79	3,3	131	50	20
4144602	VDS201A19000	4140471	VDS401A19000	19,000	.7480	55	79	3,3	131	50	20
4144603	VDS201A19050	4140472	VDS401A19050	19,050	.7500	55	79	3,3	131	50	20
4144604	VDS201A19100	4140473	VDS401A19100	19,100	.7520	55	79	3,3	131	50	20
4144605	VDS201A19200	4140474	VDS401A19200	19,200	.7559	55	79	3,3	131	50	20
4144606	VDS201A19300	4140475	VDS401A19300	19,300	.7598	55	79	3,4	131	50	20
4144607	VDS201A19400	4140476	VDS401A19400	19,400	.7638	55	79	3,4	131	50	20
4144608	VDS201A19500	4140477	VDS401A19500	19,500	.7677	55	79	3,4	131	50	20
4144609	VDS201A19600	4140478	VDS401A19600	19,600	.7717	55	79	3,4	131	50	20
4144610	VDS201A19700	4140479	VDS401A19700	19,700	.7756	55	79	3,4	131	50	20
4144611	VDS201A19800	4140480	VDS401A19800	19,800	.7795	55	79	3,4	131	50	20
4144612	VDS201A19900	4140481	VDS401A19900	19,900	.7835	55	79	3,5	131	50	20
4144613	VDS201A20000	4140482	VDS401A20000	20,000	.7874	55	79	3,5	131	50	20

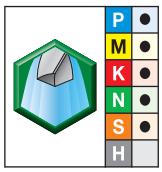


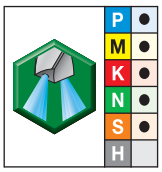




For information on L, L3, and L4 max, see page T143.

VDS202A • VDS402A • 5 x D



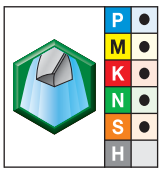


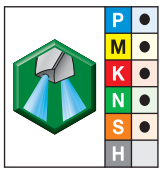
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148000	VDS202A01000		–	1,000	.0394	6	9	0,1	58	28	4
4148001	VDS202A01016		–	1,016	.0400	6	9	0,1	58	28	4
4148002	VDS202A01041		–	1,041	.0410	6	9	0,2	58	28	4
4148003	VDS202A01067		–	1,067	.0420	6	9	0,2	58	28	4
4148004	VDS202A01092		–	1,092	.0430	6	9	0,2	58	28	4
4148005	VDS202A01100		–	1,100	.0433	6	9	0,2	58	28	4
4148006	VDS202A01181		–	1,181	.0465	6	9	0,2	58	28	4
4148007	VDS202A01191		–	1,191	.0469	6	9	0,2	58	28	4
4148008	VDS202A01200		–	1,200	.0472	6	9	0,2	58	28	4
4148009	VDS202A01300		–	1,300	.0512	6	9	0,2	58	28	4
4148010	VDS202A01321		–	1,321	.0520	6	9	0,2	58	28	4
4148011	VDS202A01397		–	1,397	.0550	6	9	0,2	58	28	4
4148012	VDS202A01400		–	1,400	.0551	6	9	0,2	58	28	4
4148013	VDS202A01500	4142871	VDS402A01500	1,500	.0591	9	12	0,2	58	40	4
4148014	VDS202A01600	4142884	VDS402A01600	1,600	.0630	9	12	0,2	58	28	4
4148015	VDS202A01700	4142887	VDS402A01700	1,700	.0669	9	12	0,3	58	28	4
4148016	VDS202A01800	4142890	VDS402A01800	1,800	.0709	9	12	0,3	58	28	4
4148017	VDS202A01900	4142893	VDS402A01900	1,900	.0748	9	12	0,3	58	28	4
4148018	VDS202A01984	4142896	VDS402A01984	1,984	.0781	14	18	0,3	58	28	4
4148019	VDS202A02000	4142899	VDS402A02000	2,000	.0787	14	18	0,3	58	28	4
4148020	VDS202A02100	4142902	VDS402A02100	2,100	.0827	14	18	0,3	58	28	4
4148021	VDS202A02200	4142905	VDS402A02200	2,200	.0866	14	18	0,3	58	28	4
4148022	VDS202A02300	4142908	VDS402A02300	2,300	.0906	14	18	0,4	58	28	4
4148023	VDS202A02383	4142911	VDS402A02383	2,383	.0938	17	22	0,4	58	28	4

(continued)

(VDS202A • VDS402A • 5 x D — continued)



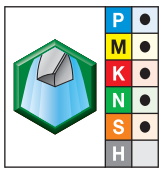


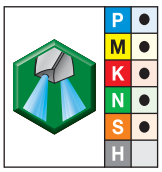
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148024	VDS202A02400	4142924	VDS402A02400	2,400	.0945	17	22	0,4	58	28	4
4148025	VDS202A02439	4142927	VDS402A02439	2,439	.0960	17	22	0,4	58	28	4
4148026	VDS202A02489	4142930	VDS402A02489	2,489	.0980	17	22	0,4	58	28	4
4148027	VDS202A02500	4142933	VDS402A02500	2,500	.0984	17	22	0,4	58	28	4
4148028	VDS202A02578	4142936	VDS402A02578	2,578	.1015	17	22	0,4	58	28	4
4148029	VDS202A02600	4142939	VDS402A02600	2,600	.1024	17	22	0,4	58	28	4
4148030	VDS202A02642	4142942	VDS402A02642	2,642	.1040	17	22	0,4	58	28	4
4148031	VDS202A02700	4142945	VDS402A02700	2,700	.1063	17	22	0,4	58	28	4
4148032	VDS202A02705	4142948	VDS402A02705	2,705	.1065	17	22	0,4	58	28	4
4148033	VDS202A02779	4142951	VDS402A02779	2,779	.1094	17	22	0,4	58	28	4
4148034	VDS202A02800	4142964	VDS402A02800	2,800	.1102	17	22	0,5	58	28	4
4148035	VDS202A02820	4142967	VDS402A02820	2,820	.1110	17	22	0,5	58	28	4
4148036	VDS202A02870	4142970	VDS402A02870	2,870	.1130	17	22	0,5	58	28	4
4148037	VDS202A02900	4142973	VDS402A02900	2,900	.1142	17	22	0,5	58	28	4
4148038	VDS202A02947	4142976	VDS402A02947	2,947	.1160	17	22	0,5	58	28	4
4148142	VDS202A03000	4142844	VDS402A03000	3,000	.1181	23	28	0,5	66	36	6
4148143	VDS202A03048	4142846	VDS402A03048	3,048	.1200	23	28	0,5	66	36	6
4148144	VDS202A03100	4142847	VDS402A03100	3,100	.1220	23	28	0,5	66	36	6
4148145	VDS202A03175	4142849	VDS402A03175	3,175	.1250	23	28	0,5	66	36	6
4148146	VDS202A03200	4142851	VDS402A03200	3,200	.1260	23	28	0,5	66	36	6
4148147	VDS202A03264	4142864	VDS402A03264	3,264	.1285	23	28	0,5	66	36	6
4148148	VDS202A03300	4142865	VDS402A03300	3,300	.1299	23	28	0,5	66	36	6
4148149	VDS202A03400	4142867	VDS402A03400	3,400	.1339	23	28	0,6	66	36	6
4148150	VDS202A03455	4142869	VDS402A03455	3,455	.1360	23	28	0,6	66	36	6
4148151	VDS202A03500	4142872	VDS402A03500	3,500	.1378	23	28	0,6	66	36	6
4148152	VDS202A03571	4142885	VDS402A03571	3,571	.1406	23	28	0,6	66	36	6
4148153	VDS202A03600	4142888	VDS402A03600	3,600	.1417	23	28	0,6	66	36	6
4148154	VDS202A03658	4142891	VDS402A03658	3,658	.1440	23	28	0,6	66	36	6
4148155	VDS202A03700	4142894	VDS402A03700	3,700	.1457	23	28	0,6	66	36	6
4148156	VDS202A03734	4142897	VDS402A03734	3,734	.1470	23	28	0,6	66	36	6
4148157	VDS202A03800	4142900	VDS402A03800	3,800	.1496	29	36	0,6	74	36	6
4148158	VDS202A03900	4142903	VDS402A03900	3,900	.1535	29	36	0,6	74	36	6
4148159	VDS202A03970	4142906	VDS402A03970	3,970	.1563	29	36	0,7	74	36	6
4148160	VDS202A04000	4142909	VDS402A04000	4,000	.1575	29	36	0,7	74	36	6
4148161	VDS202A04039	4142912	VDS402A04039	4,039	.1590	29	36	0,7	74	36	6
4148162	VDS202A04090	4142925	VDS402A04090	4,090	.1610	29	36	0,7	74	36	6
4148163	VDS202A04100	4142928	VDS402A04100	4,100	.1614	29	36	0,7	74	36	6
4148164	VDS202A04200	4142931	VDS402A04200	4,200	.1654	29	36	0,7	74	36	6
4148165	VDS202A04217	4142934	VDS402A04217	4,217	.1660	29	36	0,7	74	36	6
4148166	VDS202A04300	4142937	VDS402A04300	4,300	.1693	29	36	0,7	74	36	6

(continued)

(VDS202A • VDS402A • 5 x D — continued)



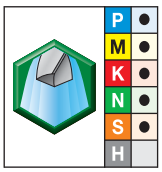


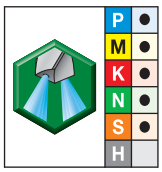
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148167	VDS202A04366	4142940	VDS402A04366	4,366	.1719	29	36	0,7	74	36	6
4148168	VDS202A04400	4142943	VDS402A04400	4,400	.1732	29	36	0,7	74	36	6
4148169	VDS202A04500	4142946	VDS402A04500	4,500	.1772	29	36	0,7	74	36	6
4148170	VDS202A04600	4142949	VDS402A04600	4,600	.1811	29	36	0,8	74	36	6
4148171	VDS202A04623	4142952	VDS402A04623	4,623	.1820	29	36	0,8	74	36	6
4148172	VDS202A04700	4142965	VDS402A04700	4,700	.1850	29	36	0,8	74	36	6
4148173	VDS202A04763	4142968	VDS402A04763	4,763	.1875	35	44	0,8	82	36	6
4148174	VDS202A04800	4142971	VDS402A04800	4,800	.1890	35	44	0,8	82	36	6
4148175	VDS202A04852	4142974	VDS402A04852	4,852	.1910	35	44	0,8	82	36	6
4148176	VDS202A04900	4142977	VDS402A04900	4,900	.1929	35	44	0,8	82	36	6
4148177	VDS202A05000	4142979	VDS402A05000	5,000	.1969	35	44	0,8	82	36	6
4148178	VDS202A05100	4142981	VDS402A05100	5,100	.2008	35	44	0,8	82	36	6
4148179	VDS202A05106	4142994	VDS402A05106	5,106	.2010	35	44	0,8	82	36	6
4148180	VDS202A05159	4142996	VDS402A05159	5,159	.2031	35	44	0,9	82	36	6
4148181	VDS202A05200	4142997	VDS402A05200	5,200	.2047	35	44	0,9	82	36	6
4148182	VDS202A05300	4142999	VDS402A05300	5,300	.2087	35	44	0,9	82	36	6
4148183	VDS202A05400	4143000	VDS402A05400	5,400	.2126	35	44	0,9	82	36	6
4148184	VDS202A05410	4143001	VDS402A05410	5,410	.2130	35	44	0,9	82	36	6
4148185	VDS202A05500	4143002	VDS402A05500	5,500	.2165	35	44	0,9	82	36	6
4148186	VDS202A05558	4143003	VDS402A05558	5,558	.2188	35	44	0,9	82	36	6
4148187	VDS202A05600	4143004	VDS402A05600	5,600	.2205	35	44	0,9	82	36	6
4148188	VDS202A05616	4143005	VDS402A05616	5,616	.2211	35	44	0,9	82	36	6
4148189	VDS202A05700	4143006	VDS402A05700	5,700	.2244	35	44	1,0	82	36	6
4148190	VDS202A05800	4143007	VDS402A05800	5,800	.2283	35	44	1,0	82	36	6
4148191	VDS202A05900	4143008	VDS402A05900	5,900	.2323	35	44	1,0	82	36	6
4148192	VDS202A05954	4143009	VDS402A05954	5,954	.2344	35	44	1,0	82	36	6
4148193	VDS202A06000	4143010	VDS402A06000	6,000	.2362	35	44	1,0	82	36	6
4148194	VDS202A06100	4143011	VDS402A06100	6,100	.2402	43	53	1,0	91	36	8
4148195	VDS202A06200	4143012	VDS402A06200	6,200	.2441	43	53	1,0	91	36	8
4148196	VDS202A06300	4143023	VDS402A06300	6,300	.2480	43	53	1,1	91	36	8
4148197	VDS202A06350	4143024	VDS402A06350	6,350	.2500	43	53	1,1	91	36	8
4148198	VDS202A06400	4143025	VDS402A06400	6,400	.2520	43	53	1,1	91	36	8
4148199	VDS202A06500	4143026	VDS402A06500	6,500	.2559	43	53	1,1	91	36	8
4148200	VDS202A06528	4143027	VDS402A06528	6,528	.2570	43	53	1,1	91	36	8
4148201	VDS202A06600	4143028	VDS402A06600	6,600	.2598	43	53	1,1	91	36	8
4148202	VDS202A06630	4143029	VDS402A06630	6,630	.2610	43	53	1,1	91	36	8
4148203	VDS202A06700	4143030	VDS402A06700	6,700	.2638	43	53	1,1	91	36	8
4148204	VDS202A06746	4143031	VDS402A06746	6,746	.2656	43	53	1,1	91	36	8
4148205	VDS202A06800	4143032	VDS402A06800	6,800	.2677	43	53	1,1	91	36	8
4148206	VDS202A06900	4143043	VDS402A06900	6,900	.2717	43	53	1,2	91	36	8

(continued)

(VDS202A • VDS402A • 5 x D — continued)



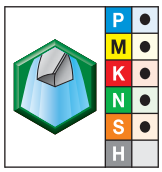


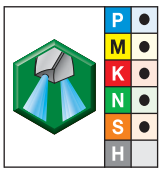
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148207	VDS202A07000	4143044	VDS402A07000	7,000	.2756	43	53	1,2	91	36	8
4148208	VDS202A07100	4143045	VDS402A07100	7,100	.2795	43	53	1,2	91	36	8
4148209	VDS202A07145	4143046	VDS402A07145	7,145	.2813	43	53	1,2	91	36	8
4148210	VDS202A07200	4143047	VDS402A07200	7,200	.2835	43	53	1,2	91	36	8
4148211	VDS202A07300	4143048	VDS402A07300	7,300	.2874	43	53	1,2	91	36	8
4148212	VDS202A07400	4143049	VDS402A07400	7,400	.2913	43	53	1,3	91	36	8
4148213	VDS202A07500	4143050	VDS402A07500	7,500	.2953	43	53	1,3	91	36	8
4148214	VDS202A07541	4143051	VDS402A07541	7,541	.2969	43	53	1,3	91	36	8
4148215	VDS202A07600	4143052	VDS402A07600	7,600	.2992	43	53	1,3	91	36	8
4148216	VDS202A07700	4143063	VDS402A07700	7,700	.3031	43	53	1,3	91	36	8
4148217	VDS202A07800	4143064	VDS402A07800	7,800	.3071	43	53	1,3	91	36	8
4148218	VDS202A07900	4143065	VDS402A07900	7,900	.3110	43	53	1,3	91	36	8
4148219	VDS202A07938	4143066	VDS402A07938	7,938	.3125	43	53	1,3	91	36	8
4148220	VDS202A08000	4143067	VDS402A08000	8,000	.3150	43	53	1,4	91	36	8
4148221	VDS202A08100	4143068	VDS402A08100	8,100	.3189	49	61	1,4	103	40	10
4148222	VDS202A08200	4143069	VDS402A08200	8,200	.3228	49	61	1,4	103	40	10
4148223	VDS202A08300	4143070	VDS402A08300	8,300	.3268	49	61	1,4	103	40	10
4148224	VDS202A08334	4143071	VDS402A08334	8,334	.3281	49	61	1,4	103	40	10
4148225	VDS202A08400	4143072	VDS402A08400	8,400	.3307	49	61	1,4	103	40	10
4148226	VDS202A08433	4143083	VDS402A08433	8,433	.3320	49	61	1,4	103	40	10
4148227	VDS202A08500	4143084	VDS402A08500	8,500	.3346	49	61	1,4	103	40	10
4148228	VDS202A08600	4143085	VDS402A08600	8,600	.3386	49	61	1,5	103	40	10
4148229	VDS202A08700	4143086	VDS402A08700	8,700	.3425	49	61	1,5	103	40	10
4148230	VDS202A08733	4143087	VDS402A08733	8,733	.3438	49	61	1,5	103	40	10
4148231	VDS202A08800	4143088	VDS402A08800	8,800	.3465	49	61	1,5	103	40	10
4148232	VDS202A08900	4143089	VDS402A08900	8,900	.3504	49	61	1,5	103	40	10
4148233	VDS202A09000	4143090	VDS402A09000	9,000	.3543	49	61	1,5	103	40	10
4148234	VDS202A09100	4143091	VDS402A09100	9,100	.3583	49	61	1,5	103	40	10
4148235	VDS202A09129	4143092	VDS402A09129	9,129	.3594	49	61	1,6	103	40	10
4148236	VDS202A09200	4143103	VDS402A09200	9,200	.3622	49	61	1,6	103	40	10
4148237	VDS202A09300	4143104	VDS402A09300	9,300	.3661	49	61	1,6	103	40	10
4148238	VDS202A09347	4143105	VDS402A09347	9,347	.3680	49	61	1,6	103	40	10
4148239	VDS202A09400	4143106	VDS402A09400	9,400	.3701	49	61	1,6	103	40	10
4148240	VDS202A09500	4143107	VDS402A09500	9,500	.3740	49	61	1,6	103	40	10
4148241	VDS202A09525	4143108	VDS402A09525	9,525	.3750	49	61	1,6	103	40	10
4148242	VDS202A09600	4143109	VDS402A09600	9,600	.3780	49	61	1,6	103	40	10
4148243	VDS202A09700	4143110	VDS402A09700	9,700	.3819	49	61	1,7	103	40	10
4148244	VDS202A09800	4143111	VDS402A09800	9,800	.3858	49	61	1,7	103	40	10
4148245	VDS202A09900	4143112	VDS402A09900	9,900	.3898	49	61	1,7	103	40	10
4148246	VDS202A09921	4143113	VDS402A09921	9,921	.3906	49	61	1,7	103	40	10

(continued)

(VDS202A • VDS402A • 5 x D — continued)



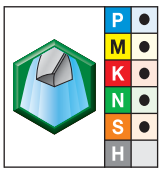


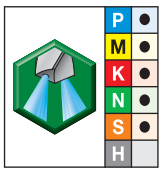
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148258	VDS202A10000	4142823	VDS402A10000	10,000	.3937	49	61	1,7	103	40	10
4148259	VDS202A10100	4142825	VDS402A10100	10,100	.3976	56	71	1,7	118	45	12
4148260	VDS202A10200	4142827	VDS402A10200	10,200	.4016	56	71	1,7	118	45	12
4148261	VDS202A10300	4142829	VDS402A10300	10,300	.4055	56	71	1,8	118	45	12
4148262	VDS202A10320	4142831	VDS402A10320	10,320	.4063	56	71	1,8	118	45	12
4148283	VDS202A10400	4142832	VDS402A10400	10,400	.4094	56	71	1,8	118	45	12
4148284	VDS202A10500	4142834	VDS402A10500	10,500	.4134	56	71	1,8	118	45	12
4148285	VDS202A10600	4142836	VDS402A10600	10,600	.4173	56	71	1,8	118	45	12
4148286	VDS202A10700	4142838	VDS402A10700	10,700	.4213	56	71	1,8	118	45	12
4148287	VDS202A10716	4142840	VDS402A10716	10,716	.4219	56	71	1,8	118	45	12
4148288	VDS202A10800	4142842	VDS402A10800	10,800	.4252	56	71	1,8	118	45	12
4148289	VDS202A10900	4142855	VDS402A10900	10,900	.4291	56	71	1,9	118	45	12
4148290	VDS202A11000	4142857	VDS402A11000	11,000	.4331	56	71	1,9	118	45	12
4148291	VDS202A11100	4142858	VDS402A11100	11,100	.4370	56	71	1,9	118	45	12
4148292	VDS202A11113	4142861	VDS402A11113	11,113	.4375	56	71	1,9	118	45	12
4148293	VDS202A11200	4142862	VDS402A11200	11,200	.4409	56	71	1,9	118	45	12
4148294	VDS202A11300	4142873	VDS402A11300	11,300	.4449	56	71	1,9	118	45	12
4148295	VDS202A11400	4142874	VDS402A11400	11,400	.4488	56	71	2,0	118	45	12
4148296	VDS202A11500	4142875	VDS402A11500	11,500	.4528	56	71	2,0	118	45	12
4148297	VDS202A11509	4142876	VDS402A11509	11,509	.4531	56	71	2,0	118	45	12
4148298	VDS202A11600	4142877	VDS402A11600	11,600	.4567	56	71	2,0	118	45	12
4148299	VDS202A11700	4142878	VDS402A11700	11,700	.4606	56	71	2,0	118	45	12
4148300	VDS202A11800	4142879	VDS402A11800	11,800	.4646	56	71	2,0	118	45	12
4148301	VDS202A11900	4142880	VDS402A11900	11,900	.4685	56	71	2,0	118	45	12
4148302	VDS202A11908	4142881	VDS402A11908	11,908	.4688	56	71	2,0	118	45	12
4148313	VDS202A12000	4142882	VDS402A12000	12,000	.4724	56	71	2,1	118	45	12
4148314	VDS202A12100	4142913	VDS402A12100	12,100	.4764	60	77	2,1	124	45	14
4148315	VDS202A12200	4142914	VDS402A12200	12,200	.4803	60	77	2,1	124	45	14
4148316	VDS202A12300	4142915	VDS402A12300	12,300	.4843	60	77	2,1	124	45	14
4148317	VDS202A12304	4142916	VDS402A12304	12,304	.4844	60	77	2,1	124	45	14
4148318	VDS202A12400	4142917	VDS402A12400	12,400	.4882	60	77	2,1	124	45	14
4148319	VDS202A12500	4142918	VDS402A12500	12,500	.4921	60	77	2,1	124	45	14
4148320	VDS202A12600	4142919	VDS402A12600	12,600	.4961	60	77	2,2	124	45	14
4148321	VDS202A12700	4142920	VDS402A12700	12,700	.5000	60	77	2,2	124	45	14
4148322	VDS202A12800	4142921	VDS402A12800	12,800	.5039	60	77	2,2	124	45	14
4148343	VDS202A12900	4142922	VDS402A12900	12,900	.5079	60	77	2,2	124	45	14
4148344	VDS202A13000	4142953	VDS402A13000	13,000	.5118	60	77	2,2	124	45	14
4148345	VDS202A13096	4142954	VDS402A13096	13,096	.5156	60	77	2,3	124	45	14
4148346	VDS202A13100	4142955	VDS402A13100	13,100	.5157	60	77	2,3	124	45	14
4148347	VDS202A13200	4142956	VDS402A13200	13,200	.5197	60	77	2,3	124	45	14

(continued)

(VDS202A • VDS402A • 5 x D — continued)



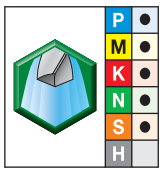


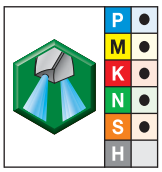
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148348	VDS202A13300	4142957	VDS402A13300	13,300	.5236	60	77	2,3	124	45	14
4148349	VDS202A13400	4142958	VDS402A13400	13,400	.5276	60	77	2,3	124	45	14
4148350	VDS202A13500	4142959	VDS402A13500	13,500	.5315	60	77	2,3	124	45	14
4148351	VDS202A13600	4142960	VDS402A13600	13,600	.5354	60	77	2,3	124	45	14
4148352	VDS202A13700	4142961	VDS402A13700	13,700	.5394	60	77	2,4	124	45	14
4148353	VDS202A13800	4142962	VDS402A13800	13,800	.5433	60	77	2,4	124	45	14
4148354	VDS202A13891	4142983	VDS402A13891	13,891	.5469	60	77	2,4	124	45	14
4148355	VDS202A13900	4142984	VDS402A13900	13,900	.5472	60	77	2,4	124	45	14
4148356	VDS202A14000	4142985	VDS402A14000	14,000	.5512	60	77	2,4	124	45	14
4148357	VDS202A14100	4142986	VDS402A14100	14,100	.5551	63	83	2,4	133	48	16
4148358	VDS202A14200	4142987	VDS402A14200	14,200	.5591	63	83	2,5	133	48	16
4148359	VDS202A14288	4142988	VDS402A14288	14,288	.5625	63	83	2,5	133	48	16
4148360	VDS202A14300	4142989	VDS402A14300	14,300	.5630	63	83	2,5	133	48	16
4148361	VDS202A14400	4142990	VDS402A14400	14,400	.5669	63	83	2,5	133	48	16
4148362	VDS202A14500	4142991	VDS402A14500	14,500	.5709	63	83	2,5	133	48	16
4148363	VDS202A14600	4142992	VDS402A14600	14,600	.5748	63	83	2,5	133	48	16
4148364	VDS202A14684	4143013	VDS402A14684	14,684	.5781	63	83	2,5	133	48	16
4148365	VDS202A14700	4143014	VDS402A14700	14,700	.5787	63	83	2,5	133	48	16
4148366	VDS202A14800	4143015	VDS402A14800	14,800	.5827	63	83	2,6	133	48	16
4148367	VDS202A14900	4143016	VDS402A14900	14,900	.5866	63	83	2,6	133	48	16
4148368	VDS202A15000	4143017	VDS402A15000	15,000	.5906	63	83	2,6	133	48	16
4148369	VDS202A15083	4143018	VDS402A15083	15,083	.5938	63	83	2,6	133	48	16
4148370	VDS202A15100	4143019	VDS402A15100	15,100	.5945	63	83	2,6	133	48	16
4148371	VDS202A15200	4143020	VDS402A15200	15,200	.5984	63	83	2,6	133	48	16
4148372	VDS202A15300	4143021	VDS402A15300	15,300	.6024	63	83	2,6	133	48	16
4148373	VDS202A15400	4143022	VDS402A15400	15,400	.6063	63	83	2,7	133	48	16
4148374	VDS202A15479	4143033	VDS402A15479	15,479	.6094	63	83	2,7	133	48	16
4148375	VDS202A15500	4143034	VDS402A15500	15,500	.6102	63	83	2,7	133	48	16
4148376	VDS202A15600	4143035	VDS402A15600	15,600	.6142	63	83	2,7	133	48	16
4148377	VDS202A15700	4143036	VDS402A15700	15,700	.6181	63	83	2,7	133	48	16
4148378	VDS202A15800	4143037	VDS402A15800	15,800	.6220	63	83	2,7	133	48	16
4148379	VDS202A15875	4143038	VDS402A15875	15,875	.6250	63	83	2,7	133	48	16
4148380	VDS202A15900	4143039	VDS402A15900	15,900	.6260	63	83	2,8	133	48	16
4148381	VDS202A16000	4143040	VDS402A16000	16,000	.6299	63	83	2,8	133	48	16
4148382	VDS202A16100	4143041	VDS402A16100	16,100	.6339	71	93	2,8	143	48	18
4148383	VDS202A16200	4143042	VDS402A16200	16,200	.6378	71	93	2,8	143	48	18
4148384	VDS202A16271	4143053	VDS402A16271	16,271	.6406	71	93	2,8	143	48	18
4148385	VDS202A16300	4143054	VDS402A16300	16,300	.6417	71	93	2,8	143	48	18
4148386	VDS202A16400	4143055	VDS402A16400	16,400	.6457	71	93	2,8	143	48	18
4148387	VDS202A16500	4143056	VDS402A16500	16,500	.6496	71	93	2,9	143	48	18

(continued)

(VDS202A • VDS402A • 5 x D — continued)

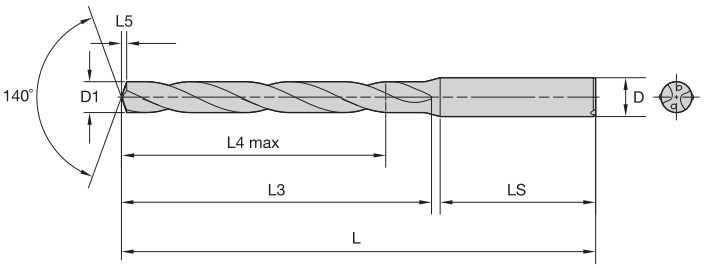




● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148388	VDS202A16600	4143057	VDS402A16600	16,600	.6535	71	93	2,9	143	48	18
4148389	VDS202A16670	4143058	VDS402A16670	16,670	.6563	71	93	2,9	143	48	18
4148390	VDS202A16700	4143059	VDS402A16700	16,700	.6575	71	93	2,9	143	48	18
4148391	VDS202A16800	4143060	VDS402A16800	16,800	.6614	71	93	2,9	143	48	18
4148392	VDS202A16900	4143061	VDS402A16900	16,900	.6654	71	93	2,9	143	48	18
4148393	VDS202A17000	4143062	VDS402A17000	17,000	.6693	71	93	2,9	143	48	18
4148394	VDS202A17100	4143073	VDS402A17100	17,100	.6732	71	93	3,0	143	48	18
4148395	VDS202A17200	4143074	VDS402A17200	17,200	.6772	71	93	3,0	143	48	18
4148396	VDS202A17300	4143075	VDS402A17300	17,300	.6811	71	93	3,0	143	48	18
4148397	VDS202A17400	4143076	VDS402A17400	17,400	.6850	71	93	3,0	143	48	18
4148398	VDS202A17463	4143077	VDS402A17463	17,463	.6875	71	93	3,0	143	48	18
4148399	VDS202A17500	4143078	VDS402A17500	17,500	.6890	71	93	3,0	143	48	18
4148400	VDS202A17600	4143079	VDS402A17600	17,600	.6929	71	93	3,1	143	48	18
4148401	VDS202A17700	4143080	VDS402A17700	17,700	.6969	71	93	3,1	143	48	18
4148402	VDS202A17800	4143081	VDS402A17800	17,800	.7008	71	93	3,1	143	48	18
4148403	VDS202A17859	4143082	VDS402A17859	17,859	.7031	71	93	3,1	143	48	18
4148404	VDS202A17900	4143093	VDS402A17900	17,900	.7047	71	93	3,1	143	48	18
4147921	VDS202A18000	4142803	VDS402A18000	18,000	.7087	71	93	3,1	143	48	18
4147922	VDS202A18100	4142804	VDS402A18100	18,100	.7126	77	101	3,1	153	50	20
4148303	VDS202A18200	4142805	VDS402A18200	18,200	.7165	77	101	3,2	153	50	20
4148304	VDS202A18258	4142806	VDS402A18258	18,258	.7188	77	101	3,2	153	50	20
4148305	VDS202A18300	4142807	VDS402A18300	18,300	.7205	77	101	3,2	153	50	20
4148306	VDS202A18400	4142808	VDS402A18400	18,400	.7244	77	101	3,2	153	50	20
4148307	VDS202A18500	4142809	VDS402A18500	18,500	.7283	77	101	3,2	153	50	20
4148308	VDS202A18600	4142810	VDS402A18600	18,600	.7323	77	101	3,2	153	50	20
4148309	VDS202A18654	4142811	VDS402A18654	18,654	.7344	77	101	3,2	153	50	20
4148310	VDS202A18700	4142812	VDS402A18700	18,700	.7362	77	101	3,2	153	50	20
4148311	VDS202A18800	4142824	VDS402A18800	18,800	.7402	77	101	3,3	153	50	20
4148312	VDS202A18900	4142826	VDS402A18900	18,900	.7441	77	101	3,3	153	50	20
4148323	VDS202A19000	4142828	VDS402A19000	19,000	.7480	77	101	3,3	153	50	20
4148324	VDS202A19050	4142830	VDS402A19050	19,050	.7500	77	101	3,3	153	50	20
4148325	VDS202A19100	4142833	VDS402A19100	19,100	.7520	77	101	3,3	153	50	20
4148326	VDS202A19200	4142835	VDS402A19200	19,200	.7559	77	101	3,3	153	50	20
4148327	VDS202A19300	4142837	VDS402A19300	19,300	.7598	77	101	3,4	153	50	20
4148328	VDS202A19400	4142839	VDS402A19400	19,400	.7638	77	101	3,4	153	50	20
4148329	VDS202A19500	4142841	VDS402A19500	19,500	.7677	77	101	3,4	153	50	20
4148330	VDS202A19600	4142853	VDS402A19600	19,600	.7717	77	101	3,4	153	50	20
4148331	VDS202A19700	4142854	VDS402A19700	19,700	.7756	77	101	3,4	153	50	20
4148332	VDS202A19800	4142856	VDS402A19800	19,800	.7795	77	101	3,4	153	50	20
4148333	VDS202A19900	4142859	VDS402A19900	19,900	.7835	77	101	3,5	153	50	20
4148334	VDS202A20000	4142860	VDS402A20000	20,000	.7874	77	101	3,5	153	50	20







For information on L, L3, and L4 max, see page T143.

VDS403A • 8 x D



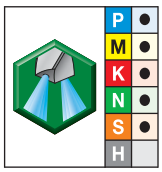
grade WU25PD TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L4 max	L3	L5	L	LS	D
6023126	VDS403A01000	1,000	.0394	10	12	0,1	58	28	4
6023127	VDS403A01016	1,016	.0400	10	12	0,1	58	28	4
6023128	VDS403A01067	1,067	.0420	10	12	0,2	58	28	4
6023129	VDS403A01100	1,100	.0433	10	12	0,2	58	28	4
6023130	VDS403A01181	1,181	.0465	10	12	0,2	58	28	4
6023131	VDS403A01191	1,191	.0469	10	12	0,2	58	28	4
6023132	VDS403A01200	1,200	.0472	10	12	0,2	58	28	4
6023133	VDS403A01300	1,300	.0512	10	12	0,2	58	28	4
6023134	VDS403A01321	1,321	.0520	10	12	0,2	58	28	4
6023135	VDS403A01397	1,397	.0550	10	12	0,2	58	28	4
6023136	VDS403A01400	1,400	.0551	10	12	0,2	58	28	4
4143700	VDS403A01500	1,500	.0591	15	18	0,2	58	28	4
4143701	VDS403A01600	1,600	.0630	15	18	0,2	58	28	4
4143702	VDS403A01700	1,700	.0669	15	18	0,3	58	28	4
4143723	VDS403A01800	1,800	.0709	15	18	0,3	58	28	4
4143724	VDS403A01900	1,900	.0748	15	18	0,3	58	28	4
4143725	VDS403A01984	1,984	.0781	22	26	0,3	66	28	4
4143726	VDS403A02000	2,000	.0787	22	26	0,3	66	28	4
4143727	VDS403A02100	2,100	.0827	22	26	0,3	66	28	4
4143728	VDS403A02200	2,200	.0866	22	26	0,3	66	28	4
4143729	VDS403A02300	2,300	.0906	22	26	0,4	66	28	4
4143730	VDS403A02383	2,383	.0938	25	30	0,4	66	28	4
4143731	VDS403A02400	2,400	.0945	25	30	0,4	66	28	4
4143732	VDS403A02439	2,439	.0960	25	30	0,4	66	28	4
4143733	VDS403A02489	2,489	.0980	25	30	0,4	66	28	4
4143734	VDS403A02500	2,500	.0984	25	30	0,4	66	28	4
4143735	VDS403A02578	2,578	.1015	25	30	0,4	66	28	4
4143736	VDS403A02600	2,600	.1024	25	30	0,4	66	28	4

(continued)

(VDS403A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

D1 diameter

order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143737	VDS403A02642	2,642	.1040	25	30	0,4	66	28	4
4143738	VDS403A02700	2,700	.1063	25	30	0,4	66	28	4
4143739	VDS403A02705	2,705	.1065	25	30	0,4	66	28	4
4143740	VDS403A02779	2,779	.1094	25	30	0,4	66	28	4
4143741	VDS403A02800	2,800	.1102	25	30	0,5	66	28	4
4143742	VDS403A02820	2,820	.1110	25	30	0,5	66	28	4
4143743	VDS403A02870	2,870	.1130	25	30	0,5	66	28	4
4143744	VDS403A02900	2,900	.1142	25	30	0,5	66	28	4
4143745	VDS403A02947	2,947	.1160	25	30	0,5	66	28	4
4143746	VDS403A03000	3,000	.1181	33	40	0,5	78	36	6
4143747	VDS403A03048	3,048	.1200	33	40	0,5	78	36	6
4143748	VDS403A03100	3,100	.1220	33	40	0,5	78	36	6
4143749	VDS403A03175	3,175	.1250	33	40	0,5	78	36	6
4143750	VDS403A03200	3,200	.1260	33	40	0,5	78	36	6
4143751	VDS403A03264	3,264	.1285	33	40	0,5	78	36	6
4143752	VDS403A03300	3,300	.1299	33	40	0,5	78	36	6
4143753	VDS403A03400	3,400	.1339	33	40	0,6	78	36	6
4143754	VDS403A03455	3,455	.1360	33	49	0,6	78	36	6
4143755	VDS403A03500	3,500	.1378	33	49	0,6	78	36	6
4143756	VDS403A03571	3,571	.1406	33	49	0,6	78	36	6
4143757	VDS403A03600	3,600	.1417	33	40	0,6	78	36	6
4143758	VDS403A03658	3,658	.1440	33	49	0,6	78	36	6
4143759	VDS403A03700	3,700	.1457	33	40	0,6	78	36	6
4143760	VDS403A03734	3,734	.1470	33	40	0,6	78	36	6
4143761	VDS403A03800	3,800	.1496	41	49	0,6	87	36	6
4143762	VDS403A03900	3,900	.1535	41	40	0,6	87	36	6
4143763	VDS403A03970	3,970	.1563	41	49	0,7	87	36	6
4143764	VDS403A04000	4,000	.1575	41	40	0,7	87	36	6
4143765	VDS403A04039	4,039	.1590	41	40	0,7	87	36	6
4143766	VDS403A04090	4,090	.1610	41	40	0,7	87	36	6
4143767	VDS403A04100	4,100	.1614	41	49	0,7	87	36	6
4143768	VDS403A04200	4,200	.1654	41	49	0,7	87	36	6
4143769	VDS403A04217	4,217	.1660	41	49	0,7	87	36	6
4143770	VDS403A04300	4,300	.1693	41	49	0,7	87	36	6
4143771	VDS403A04366	4,366	.1719	41	49	0,7	87	36	6
4143772	VDS403A04400	4,400	.1732	41	49	0,7	87	36	6
4143773	VDS403A04500	4,500	.1772	41	49	0,7	87	36	6
4143774	VDS403A04600	4,600	.1811	41	49	0,8	87	36	6
4143775	VDS403A04623	4,623	.1820	41	49	0,8	87	36	6
4143776	VDS403A04700	4,700	.1850	41	56	0,8	87	36	6

(continued)

(VDS403A • 8 x D — continued)

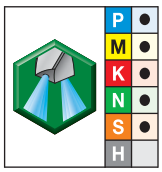


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143777	VDS403A04763	4,763	.1875	48	49	0,8	94	36	6
4143778	VDS403A04800	4,800	.1890	48	56	0,8	94	36	6
4143779	VDS403A04852	4,852	.1910	48	56	0,8	94	36	6
4143780	VDS403A04900	4,900	.1929	48	56	0,8	94	36	6
4143781	VDS403A05000	5,000	.1969	48	56	0,8	94	36	6
4143782	VDS403A05100	5,100	.2008	48	56	0,8	94	36	6
4143783	VDS403A05106	5,106	.2010	48	56	0,8	94	36	6
4143784	VDS403A05159	5,159	.2031	48	56	0,9	94	36	6
4143785	VDS403A05200	5,200	.2047	48	56	0,9	94	36	6
4143786	VDS403A05300	5,300	.2087	48	56	0,9	94	36	6
4143787	VDS403A05400	5,400	.2126	48	56	0,9	94	36	6
4143788	VDS403A05410	5,410	.2130	48	56	0,9	94	36	6
4143789	VDS403A05500	5,500	.2165	48	56	0,9	94	36	6
4143790	VDS403A05558	5,558	.2188	48	56	0,9	94	36	6
4143791	VDS403A05600	5,600	.2205	48	56	0,9	94	36	6
4143792	VDS403A05616	5,616	.2211	48	56	0,9	94	36	6
4143793	VDS403A05700	5,700	.2244	48	56	1,0	94	36	6
4143794	VDS403A05800	5,800	.2283	48	67	1,0	94	36	6
4143795	VDS403A05900	5,900	.2323	48	67	1,0	94	36	6
4143796	VDS403A05954	5,954	.2344	48	56	1,0	94	36	6
4143797	VDS403A06000	6,000	.2362	48	67	1,0	94	36	6
4143798	VDS403A06100	6,100	.2402	57	67	1,0	105	36	8
4143799	VDS403A06200	6,200	.2441	57	67	1,0	105	36	8
4143800	VDS403A06300	6,300	.2480	57	56	1,1	105	36	8
4143801	VDS403A06350	6,350	.2500	57	67	1,1	105	36	8
4143802	VDS403A06400	6,400	.2520	57	67	1,1	105	36	8
4143803	VDS403A06500	6,500	.2559	57	67	1,1	105	36	8
4143804	VDS403A06528	6,528	.2570	57	67	1,1	105	36	8
4143805	VDS403A06600	6,600	.2598	57	67	1,1	105	36	8
4143806	VDS403A06630	6,630	.2610	57	56	1,1	105	36	8
4143807	VDS403A06700	6,700	.2638	57	67	1,1	105	36	8
4143808	VDS403A06746	6,746	.2656	57	56	1,1	105	36	8
4143809	VDS403A06800	6,800	.2677	57	67	1,1	105	36	8
4143810	VDS403A06900	6,900	.2717	57	67	1,2	105	36	8
4143811	VDS403A07000	7,000	.2756	57	72	1,2	105	36	8
4143812	VDS403A07100	7,100	.2795	61	72	1,2	110	36	8
4143813	VDS403A07145	7,145	.2813	61	67	1,2	110	36	8
4143814	VDS403A07200	7,200	.2835	61	72	1,2	110	36	8
4143815	VDS403A07300	7,300	.2874	61	72	1,2	110	36	8
4143816	VDS403A07400	7,400	.2913	61	72	1,3	110	36	8

(continued)

(VDS403A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143817	VDS403A07500	7,500	.2953	61	72	1,3	110	36	8
4143818	VDS403A07541	7,541	.2969	61	72	1,3	110	36	8
4143819	VDS403A07600	7,600	.2992	61	80	1,3	110	36	8
4143820	VDS403A07700	7,700	.3031	61	80	1,3	110	36	8
4143821	VDS403A07800	7,800	.3071	61	80	1,3	110	36	8
4143822	VDS403A07900	7,900	.3110	61	80	1,3	110	36	8
4143823	VDS403A07938	7,938	.3125	61	80	1,3	110	36	8
4143824	VDS403A08000	8,000	.3150	61	80	1,4	110	36	8
4143825	VDS403A08100	8,100	.3189	68	80	1,4	122	40	10
4143826	VDS403A08200	8,200	.3228	68	80	1,4	122	40	10
4143827	VDS403A08300	8,300	.3268	68	80	1,4	122	40	10
4143828	VDS403A08334	8,334	.3281	68	80	1,4	122	40	10
4143829	VDS403A08400	8,400	.3307	68	72	1,4	122	40	10
4143830	VDS403A08433	8,433	.3320	68	80	1,4	122	40	10
4143831	VDS403A08500	8,500	.3346	68	80	1,4	122	40	10
4143832	VDS403A08600	8,600	.3386	68	80	1,5	122	40	10
4143833	VDS403A08700	8,700	.3425	68	72	1,5	122	40	10
4143834	VDS403A08733	8,733	.3438	68	72	1,5	122	40	10
4143835	VDS403A08800	8,800	.3465	68	72	1,5	122	40	10
4143836	VDS403A08900	8,900	.3504	68	72	1,5	122	40	10
4143837	VDS403A09000	9,000	.3543	68	72	1,5	122	40	10
4143838	VDS403A09100	9,100	.3583	68	80	1,5	122	40	10
4143839	VDS403A09129	9,129	.3594	68	80	1,6	122	40	10
4143840	VDS403A09200	9,200	.3622	68	80	1,6	122	40	10
4143841	VDS403A09300	9,300	.3661	68	80	1,6	122	40	10
4143842	VDS403A09347	9,347	.3680	68	80	1,6	122	40	10
4143843	VDS403A09400	9,400	.3701	68	80	1,6	122	40	10
4143844	VDS403A09500	9,500	.3740	68	80	1,6	122	40	10
4143845	VDS403A09525	9,525	.3750	68	80	1,6	122	40	10
4143846	VDS403A09600	9,600	.3780	68	80	1,6	122	40	10
4143847	VDS403A09700	9,700	.3819	68	80	1,7	122	40	10
4143848	VDS403A09800	9,800	.3858	68	80	1,7	122	40	10
4143849	VDS403A09900	9,900	.3898	68	80	1,7	122	40	10
4143850	VDS403A09921	9,921	.3906	68	80	1,7	122	40	10
4143421	VDS403A10000	10,000	.3937	68	80	1,7	122	40	10
4143422	VDS403A10100	10,100	.3976	79	94	1,7	141	45	12
4143473	VDS403A10200	10,200	.4016	79	94	1,7	141	45	12
4143474	VDS403A10300	10,300	.4055	79	94	1,8	141	45	12
4143475	VDS403A10320	10,320	.4063	79	94	1,8	141	45	12
4143476	VDS403A10400	10,400	.4094	79	94	1,8	141	45	12

(continued)

(VDS403A • 8 x D — continued)

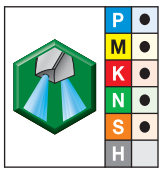


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143477	VDS403A10500	10,500	.4134	79	94	1,8	141	45	12
4143478	VDS403A10600	10,600	.4173	79	94	1,8	141	45	12
4143479	VDS403A10700	10,700	.4213	79	94	1,8	141	45	12
4143480	VDS403A10716	10,716	.4219	79	94	1,8	141	45	12
4143481	VDS403A10800	10,800	.4252	79	94	1,8	141	45	12
4143482	VDS403A10900	10,900	.4291	79	94	1,9	141	45	12
4143483	VDS403A11000	11,000	.4331	79	94	1,9	141	45	12
4143484	VDS403A11100	11,100	.4370	79	94	1,9	141	45	12
4143485	VDS403A11113	11,113	.4375	79	94	1,9	141	45	12
4143486	VDS403A11200	11,200	.4409	79	94	1,9	141	45	12
4143487	VDS403A11300	11,300	.4449	79	94	1,9	141	45	12
4143488	VDS403A11400	11,400	.4488	79	94	2,0	141	45	12
4143489	VDS403A11500	11,500	.4528	79	94	2,0	141	45	12
4143490	VDS403A11509	11,509	.4531	79	94	2,0	141	45	12
4143491	VDS403A11600	11,600	.4567	79	94	2,0	141	45	12
4143492	VDS403A11700	11,700	.4606	79	94	2,0	141	45	12
4143493	VDS403A11800	11,800	.4646	79	94	2,0	141	45	12
4143494	VDS403A11900	11,900	.4685	79	94	2,0	141	45	12
4143495	VDS403A11908	11,908	.4688	79	94	2,0	141	45	12
4143496	VDS403A12000	12,000	.4724	79	94	2,1	141	45	12
4143497	VDS403A12100	12,100	.4764	91	108	2,1	155	45	14
4143498	VDS403A12200	12,200	.4803	91	108	2,1	155	45	14
4143499	VDS403A12300	12,300	.4843	91	108	2,1	155	45	14
4143500	VDS403A12304	12,304	.4844	91	108	2,1	155	45	14
4143501	VDS403A12400	12,400	.4882	91	108	2,1	155	45	14
4143502	VDS403A12500	12,500	.4921	91	108	2,1	155	45	14
4143503	VDS403A12600	12,600	.4961	91	108	2,2	155	45	14
4143504	VDS403A12700	12,700	.5000	91	108	2,2	155	45	14
4143505	VDS403A12800	12,800	.5039	91	108	2,2	155	45	14
4143506	VDS403A12900	12,900	.5079	91	108	2,2	155	45	14
4143507	VDS403A13000	13,000	.5118	91	108	2,2	155	45	14
4143508	VDS403A13096	13,096	.5156	91	108	2,3	155	45	14
4143509	VDS403A13100	13,100	.5157	91	108	2,3	155	45	14
4143510	VDS403A13200	13,200	.5197	91	108	2,3	155	45	14
4143511	VDS403A13300	13,300	.5236	91	108	2,3	155	45	14
4143512	VDS403A13400	13,400	.5276	91	108	2,3	155	45	14
4143513	VDS403A13500	13,500	.5315	91	108	2,3	155	45	14
4143514	VDS403A13600	13,600	.5354	91	108	2,3	155	45	14
4143515	VDS403A13700	13,700	.5394	91	108	2,4	155	45	14
4143516	VDS403A13800	13,800	.5433	91	108	2,4	155	45	14

(continued)

(VDS403A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD
TiAlN

D1 diameter

order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143517	VDS403A13891	13,891	.5469	91	108	2,4	155	45	14
4143518	VDS403A13900	13,900	.5472	91	108	2,4	155	45	14
4143519	VDS403A14000	14,000	.5512	91	108	2,4	155	45	14
4143520	VDS403A14100	14,100	.5551	101	121	2,4	171	48	16
4143521	VDS403A14200	14,200	.5591	101	121	2,5	171	48	16
4143522	VDS403A14288	14,288	.5625	101	121	2,5	171	48	16
4143523	VDS403A14300	14,300	.5630	101	121	2,5	171	48	16
4143524	VDS403A14400	14,400	.5669	101	121	2,5	171	48	16
4143525	VDS403A14500	14,500	.5709	101	121	2,5	171	48	16
4143526	VDS403A14600	14,600	.5748	101	121	2,5	171	48	16
4143527	VDS403A14684	14,684	.5781	101	121	2,5	171	48	16
4143528	VDS403A14700	14,700	.5787	101	121	2,5	171	48	16
4143529	VDS403A14800	14,800	.5827	101	121	2,6	171	48	16
4143530	VDS403A14900	14,900	.5866	101	121	2,6	171	48	16
4143531	VDS403A15000	15,000	.5906	101	121	2,6	171	48	16
4143532	VDS403A15083	15,083	.5938	101	121	2,6	171	48	16
4143533	VDS403A15100	15,100	.5945	101	121	2,6	171	48	16
4143534	VDS403A15200	15,200	.5984	101	121	2,6	171	48	16
4143535	VDS403A15300	15,300	.6024	101	121	2,6	171	48	16
4143536	VDS403A15400	15,400	.6063	101	121	2,7	171	48	16
4143537	VDS403A15479	15,479	.6094	101	121	2,7	171	48	16
4143538	VDS403A15500	15,500	.6102	101	121	2,7	171	48	16
4143539	VDS403A15600	15,600	.6142	101	121	2,7	171	48	16
4143540	VDS403A15700	15,700	.6181	101	121	2,7	171	48	16
4143541	VDS403A15800	15,800	.6220	101	121	2,7	171	48	16
4143542	VDS403A15875	15,875	.6250	101	121	2,7	171	48	16
4143543	VDS403A15900	15,900	.6260	101	121	2,8	171	48	16
4143544	VDS403A16000	16,000	.6299	101	121	2,8	171	48	16
4143545	VDS403A16100	16,100	.6339	113	135	2,8	185	48	18
4143546	VDS403A16200	16,200	.6378	113	135	2,8	185	48	18
4143547	VDS403A16271	16,271	.6406	113	135	2,8	185	48	18
4143548	VDS403A16300	16,300	.6417	113	135	2,8	185	48	18
4143549	VDS403A16400	16,400	.6457	113	135	2,8	185	48	18
4143550	VDS403A16500	16,500	.6496	113	135	2,9	185	48	18
4143551	VDS403A16600	16,600	.6535	113	135	2,9	185	48	18
4143552	VDS403A16670	16,670	.6563	113	135	2,9	185	48	18
4143553	VDS403A16700	16,700	.6575	113	135	2,9	185	48	18
4143554	VDS403A16800	16,800	.6614	113	135	2,9	185	48	18
4143555	VDS403A16900	16,900	.6654	113	135	2,9	185	48	18
4143556	VDS403A17000	17,000	.6693	113	135	2,9	185	48	18

(continued)

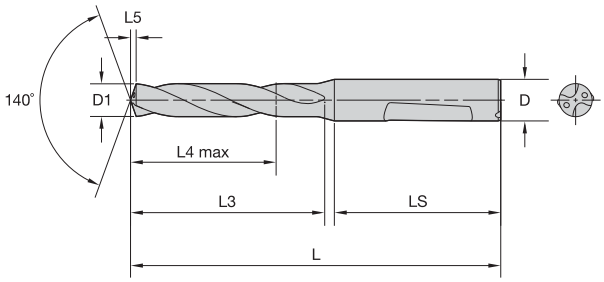
(VDS403A • 8 x D — continued)

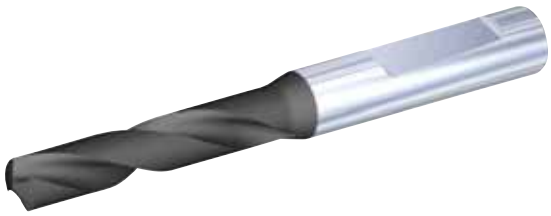


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4143557	VDS403A17100	17,100	.6732	113	135	3,0	185	48	18
4143558	VDS403A17200	17,200	.6772	113	135	3,0	185	48	18
4143559	VDS403A17300	17,300	.6811	113	135	3,0	185	48	18
4143560	VDS403A17400	17,400	.6850	113	135	3,0	185	48	18
4143561	VDS403A17463	17,463	.6875	113	135	3,0	185	48	18
4143562	VDS403A17500	17,500	.6890	113	135	3,0	185	48	18
4143563	VDS403A17600	17,600	.6929	113	135	3,1	185	48	18
4143564	VDS403A17700	17,700	.6969	113	135	3,1	185	48	18
4143565	VDS403A17800	17,800	.7008	113	135	3,1	185	48	18
4143566	VDS403A17859	17,859	.7031	113	135	3,1	185	48	18
4143567	VDS403A17900	17,900	.7047	113	135	3,1	185	48	18
4144209	VDS403A18000	18,000	.7087	113	135	3,1	185	48	18
4144211	VDS403A18100	18,100	.7126	124	148	3,1	200	50	20
4144212	VDS403A18200	18,200	.7165	124	148	3,2	200	50	20
4144244	VDS403A18258	18,258	.7188	124	148	3,2	200	50	20
4144246	VDS403A18300	18,300	.7205	124	148	3,2	200	50	20
4144248	VDS403A18400	18,400	.7244	124	148	3,2	200	50	20
4144250	VDS403A18500	18,500	.7283	124	148	3,2	200	50	20
4144252	VDS403A18600	18,600	.7323	124	148	3,2	200	50	20
4144254	VDS403A18654	18,654	.7344	124	148	3,2	200	50	20
4144256	VDS403A18700	18,700	.7362	124	148	3,2	200	50	20
4144258	VDS403A18800	18,800	.7402	124	148	3,3	200	50	20
4144260	VDS403A18900	18,900	.7441	124	148	3,3	200	50	20
4144262	VDS403A19000	19,000	.7480	124	148	3,3	200	50	20
4144275	VDS403A19050	19,050	.7500	124	148	3,3	200	50	20
4144277	VDS403A19100	19,100	.7520	124	148	3,3	200	50	20
4144279	VDS403A19200	19,200	.7559	124	148	3,3	200	50	20
4144281	VDS403A19300	19,300	.7598	124	148	3,4	200	50	20
4144283	VDS403A19400	19,400	.7638	124	148	3,4	200	50	20
4144285	VDS403A19500	19,500	.7677	124	148	3,4	200	50	20
4144287	VDS403A19600	19,600	.7717	124	148	3,4	200	50	20
4144289	VDS403A19700	19,700	.7756	124	148	3,4	200	50	20
4144291	VDS403A19800	19,800	.7795	124	148	3,4	200	50	20
4144303	VDS403A19900	19,900	.7835	124	148	3,5	200	50	20
4144305	VDS403A20000	20,000	.7874	124	148	3,5	200	50	20

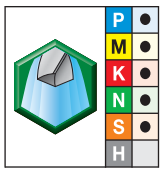


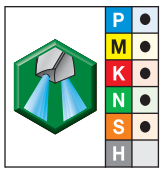




For information on L, L3, and L4 max, see page T143.

VDS201F • VDS401F • 3 x D



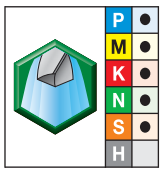


● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147927	VDS201F03000	4140012	VDS401F03000	3,000	.1181	14	20	0,5	62	36	6
4147928	VDS201F03100	4140023	VDS401F03100	3,100	.1220	14	20	0,5	62	36	6
4147929	VDS201F03200	4140024	VDS401F03200	3,200	.1260	14	20	0,5	62	36	6
4147930	VDS201F03300	4140025	VDS401F03300	3,300	.1299	14	20	0,5	62	36	6
4147931	VDS201F03400	4140026	VDS401F03400	3,400	.1339	14	20	0,6	62	36	6
4147932	VDS201F03500	4140027	VDS401F03500	3,500	.1378	14	20	0,6	62	36	6
4147933	VDS201F03600	4140028	VDS401F03600	3,600	.1417	14	20	0,6	62	36	6
4147934	VDS201F03700	4140029	VDS401F03700	3,700	.1457	14	20	0,6	62	36	6
4147935	VDS201F03800	4140030	VDS401F03800	3,800	.1496	17	24	0,6	66	36	6
4147936	VDS201F03900	4140031	VDS401F03900	3,900	.1535	17	24	0,6	66	36	6
4147937	VDS201F04000	4140032	VDS401F04000	4,000	.1575	17	24	0,7	66	36	6
4147938	VDS201F04100	4140033	VDS401F04100	4,100	.1614	17	24	0,7	66	36	6
4147939	VDS201F04200	4140034	VDS401F04200	4,200	.1654	17	24	0,7	66	36	6
4147940	VDS201F04300	4140035	VDS401F04300	4,300	.1693	17	24	0,7	66	36	6
4147941	VDS201F04400	4140036	VDS401F04400	4,400	.1732	17	24	0,7	66	36	6
4147942	VDS201F04500	4140037	VDS401F04500	4,500	.1772	17	24	0,7	66	36	6
4147943	VDS201F04600	4140038	VDS401F04600	4,600	.1811	17	24	0,8	66	36	6
4147944	VDS201F04700	4140039	VDS401F04700	4,700	.1850	17	24	0,8	66	36	6
4147945	VDS201F04800	4140040	VDS401F04800	4,800	.1890	20	28	0,8	66	36	6
4147946	VDS201F04900	4140041	VDS401F04900	4,900	.1929	20	28	0,8	66	36	6
4147947	VDS201F05000	4140042	VDS401F05000	5,000	.1969	20	28	0,8	66	36	6
4147948	VDS201F05100	4140043	VDS401F05100	5,100	.2008	20	28	0,8	66	36	6
4147949	VDS201F05200	4140044	VDS401F05200	5,200	.2047	20	28	0,9	66	36	6
4147950	VDS201F05300	4140045	VDS401F05300	5,300	.2087	20	28	0,9	66	36	6

(continued)

(VDS201F • VDS401F • 3 x D — continued)



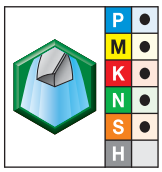


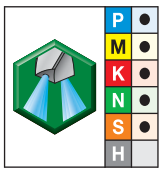
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147951	VDS201F05400	4140046	VDS401F05400	5,400	.2126	20	28	0,9	66	36	6
4147952	VDS201F05500	4140047	VDS401F05500	5,500	.2165	20	28	0,9	66	36	6
4147953	VDS201F05600	4140048	VDS401F05600	5,600	.2205	20	28	0,9	66	36	6
4147954	VDS201F05700	4140049	VDS401F05700	5,700	.2244	20	28	1,0	66	36	6
4147955	VDS201F05800	4140050	VDS401F05800	5,800	.2283	20	28	1,0	66	36	6
4147956	VDS201F05900	4140051	VDS401F05900	5,900	.2323	20	28	1,0	66	36	6
4147957	VDS201F06000	4140052	VDS401F06000	6,000	.2362	20	28	1,0	66	36	6
4147958	VDS201F06100	4140053	VDS401F06100	6,100	.2402	24	34	1,0	79	36	8
4147959	VDS201F06200	4140054	VDS401F06200	6,200	.2441	24	34	1,0	79	36	8
4147960	VDS201F06300	4140055	VDS401F06300	6,300	.2480	24	34	1,1	79	36	8
4147961	VDS201F06400	4140056	VDS401F06400	6,400	.2520	24	34	1,1	79	36	8
4147962	VDS201F06500	4140057	VDS401F06500	6,500	.2559	24	34	1,1	79	36	8
4147963	VDS201F06600	4140058	VDS401F06600	6,600	.2598	24	34	1,1	79	36	8
4147964	VDS201F06700	4140059	VDS401F06700	6,700	.2638	24	34	1,1	79	36	8
4147965	VDS201F06800	4140060	VDS401F06800	6,800	.2677	24	34	1,1	79	36	8
4147966	VDS201F06900	4140061	VDS401F06900	6,900	.2717	24	34	1,2	79	36	8
4147967	VDS201F07000	4140062	VDS401F07000	7,000	.2756	24	34	1,2	79	36	8
4147968	VDS201F07100	4140063	VDS401F07100	7,100	.2795	29	41	1,2	79	36	8
4147969	VDS201F07200	4140064	VDS401F07200	7,200	.2835	29	41	1,2	79	36	8
4147970	VDS201F07300	4140065	VDS401F07300	7,300	.2874	29	41	1,2	79	36	8
4147971	VDS201F07400	4140066	VDS401F07400	7,400	.2913	29	41	1,3	79	36	8
4147972	VDS201F07500	4140067	VDS401F07500	7,500	.2953	29	41	1,3	79	36	8
4147973	VDS201F07600	4140068	VDS401F07600	7,600	.2992	29	41	1,3	79	36	8
4147974	VDS201F07700	4140069	VDS401F07700	7,700	.3031	29	41	1,3	79	36	8
4147975	VDS201F07800	4140070	VDS401F07800	7,800	.3071	29	41	1,3	79	36	8
4147976	VDS201F07900	4140071	VDS401F07900	7,900	.3110	29	41	1,3	79	36	8
4147977	VDS201F08000	4140072	VDS401F08000	8,000	.3150	29	41	1,4	79	36	8
4147978	VDS201F08100	4140073	VDS401F08100	8,100	.3189	35	47	1,4	89	40	10
4147979	VDS201F08200	4140074	VDS401F08200	8,200	.3228	35	47	1,4	89	40	10
4147980	VDS201F08300	4140075	VDS401F08300	8,300	.3268	35	47	1,4	89	40	10
4147981	VDS201F08400	4140076	VDS401F08400	8,400	.3307	35	47	1,4	89	40	10
4147982	VDS201F08500	4140077	VDS401F08500	8,500	.3346	35	47	1,4	89	40	10
4147983	VDS201F08600	4140078	VDS401F08600	8,600	.3386	35	47	1,5	89	40	10
4147984	VDS201F08700	4140079	VDS401F08700	8,700	.3425	35	47	1,5	89	40	10
4147985	VDS201F08800	4140080	VDS401F08800	8,800	.3465	35	47	1,5	89	40	10
4147986	VDS201F08900	4140081	VDS401F08900	8,900	.3504	35	47	1,5	89	40	10
4147987	VDS201F09000	4140082	VDS401F09000	9,000	.3543	35	47	1,5	89	40	10
4147988	VDS201F09100	4140083	VDS401F09100	9,100	.3583	35	47	1,5	89	40	10
4147989	VDS201F09200	4140084	VDS401F09200	9,200	.3622	35	47	1,6	89	40	10
4147990	VDS201F09300	4140085	VDS401F09300	9,300	.3661	35	47	1,6	89	40	10

(continued)

(VDS201F • VDS401F • 3 x D — continued)



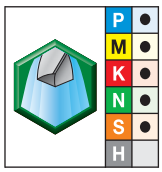


● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4147991	VDS201F09400	4140086	VDS401F09400	9,400	.3701	35	47	1,6	89	40	10
4147992	VDS201F09500	4140087	VDS401F09500	9,500	.3740	35	47	1,6	89	40	10
4147993	VDS201F09600	4140088	VDS401F09600	9,600	.3780	35	47	1,6	89	40	10
4147994	VDS201F09700	4140089	VDS401F09700	9,700	.3819	35	47	1,7	89	40	10
4147995	VDS201F09800	4140090	VDS401F09800	9,800	.3858	35	47	1,7	89	40	10
4147996	VDS201F09900	4140091	VDS401F09900	9,900	.3898	35	47	1,7	89	40	10
4148039	VDS201F10000	4140410	VDS401F10000	10,000	.3937	35	47	1,7	89	40	10
4148040	VDS201F10100	4140411	VDS401F10100	10,100	.3976	40	55	1,7	102	45	12
4148041	VDS201F10200	4140412	VDS401F10200	10,200	.4016	40	55	1,7	102	45	12
4148042	VDS201F10300	4140503	VDS401F10300	10,300	.4055	40	55	1,8	102	45	12
4148043	VDS201F10400	4140504	VDS401F10400	10,400	.4094	40	55	1,8	102	45	12
4148044	VDS201F10500	4140505	VDS401F10500	10,500	.4134	40	55	1,8	102	45	12
4148045	VDS201F10600	4140506	VDS401F10600	10,600	.4173	40	55	1,8	102	45	12
4148046	VDS201F10700	4140507	VDS401F10700	10,700	.4213	40	55	1,8	102	45	12
4148047	VDS201F10800	4140508	VDS401F10800	10,800	.4252	40	55	1,8	102	45	12
4148048	VDS201F10900	4140509	VDS401F10900	10,900	.4291	40	55	1,9	102	45	12
4148049	VDS201F11000	4140510	VDS401F11000	11,000	.4331	40	55	1,9	102	45	12
4148050	VDS201F11100	4140511	VDS401F11100	11,100	.4370	40	55	1,9	102	45	12
4148051	VDS201F11200	4140512	VDS401F11200	11,200	.4409	40	55	1,9	102	45	12
4148052	VDS201F11300	4140513	VDS401F11300	11,300	.4449	40	55	1,9	102	45	12
4148053	VDS201F11400	4140514	VDS401F11400	11,400	.4488	40	55	2,0	102	45	12
4148054	VDS201F11500	4140515	VDS401F11500	11,500	.4528	40	55	2,0	102	45	12
4148055	VDS201F11600	4140516	VDS401F11600	11,600	.4567	40	55	2,0	102	45	12
4148056	VDS201F11700	4140517	VDS401F11700	11,700	.4606	40	55	2,0	102	45	12
4148057	VDS201F11800	4140518	VDS401F11800	11,800	.4646	40	55	2,0	102	45	12
4148058	VDS201F11900	4140519	VDS401F11900	11,900	.4685	40	55	2,0	102	45	12
4148059	VDS201F12000	4140520	VDS401F12000	12,000	.4724	40	55	2,1	102	45	12
4148060	VDS201F12100	4140521	VDS401F12100	12,100	.4764	43	60	2,1	107	45	14
4148061	VDS201F12200	4140522	VDS401F12200	12,200	.4803	43	60	2,1	107	45	14
4148062	VDS201F12300	4140523	VDS401F12300	12,300	.4843	43	60	2,1	107	45	14
4148063	VDS201F12400	4140524	VDS401F12400	12,400	.4882	43	60	2,1	107	45	14
4148064	VDS201F12500	4140525	VDS401F12500	12,500	.4921	43	60	2,1	107	45	14
4148065	VDS201F12600	4140526	VDS401F12600	12,600	.4961	43	60	2,2	107	45	14
4148066	VDS201F12700	4140527	VDS401F12700	12,700	.5000	43	60	2,2	107	45	14
4148067	VDS201F12800	4140528	VDS401F12800	12,800	.5039	43	60	2,2	107	45	14
4148068	VDS201F12900	4140529	VDS401F12900	12,900	.5079	43	60	2,2	107	45	14
4148069	VDS201F13000	4140530	VDS401F13000	13,000	.5118	43	60	2,2	107	45	14
4148070	VDS201F13100	4140531	VDS401F13100	13,100	.5157	43	60	2,3	107	45	14
4148071	VDS201F13200	4140532	VDS401F13200	13,200	.5197	43	60	2,3	107	45	14
4148072	VDS201F13300	4140533	VDS401F13300	13,300	.5236	43	60	2,3	107	45	14

(continued)

(VDS201F • VDS401F • 3 x D — continued)



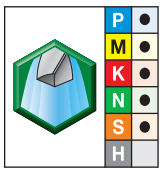


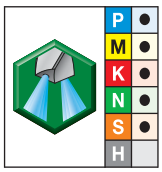
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148073	VDS201F13400	4140534	VDS401F13400	13,400	.5276	43	60	2,3	107	45	14
4148074	VDS201F13500	4140535	VDS401F13500	13,500	.5315	43	60	2,3	107	45	14
4148075	VDS201F13600	4140536	VDS401F13600	13,600	.5354	43	60	2,3	107	45	14
4148076	VDS201F13700	4140537	VDS401F13700	13,700	.5394	43	60	2,4	107	45	14
4148077	VDS201F13800	4140538	VDS401F13800	13,800	.5433	43	60	2,4	107	45	14
4148078	VDS201F13900	4140539	VDS401F13900	13,900	.5472	43	60	2,4	107	45	14
4148079	VDS201F14000	4140540	VDS401F14000	14,000	.5512	43	60	2,4	107	45	14
4148080	VDS201F14100	4140541	VDS401F14100	14,100	.5551	45	65	2,4	115	48	16
4148081	VDS201F14200	4140542	VDS401F14200	14,200	.5591	45	65	2,5	115	48	16
4148082	VDS201F14300	4140543	VDS401F14300	14,300	.5630	45	65	2,5	115	48	16
4148083	VDS201F14400	4140544	VDS401F14400	14,400	.5669	45	65	2,5	115	48	16
4148084	VDS201F14500	4140545	VDS401F14500	14,500	.5709	45	65	2,5	115	48	16
4148085	VDS201F14600	4140546	VDS401F14600	14,600	.5748	45	65	2,5	115	48	16
4148086	VDS201F14700	4140547	VDS401F14700	14,700	.5787	45	65	2,5	115	48	16
4148087	VDS201F14800	4140548	VDS401F14800	14,800	.5827	45	65	2,6	115	48	16
4148088	VDS201F14900	4140549	VDS401F14900	14,900	.5866	45	65	2,6	115	48	16
4148089	VDS201F15000	4140550	VDS401F15000	15,000	.5906	45	65	2,6	115	48	16
4148090	VDS201F15100	4140551	VDS401F15100	15,100	.5945	45	65	2,6	115	48	16
4148091	VDS201F15200	4140552	VDS401F15200	15,200	.5984	45	65	2,6	115	48	16
4148092	VDS201F15300	4140553	VDS401F15300	15,300	.6024	45	65	2,6	115	48	16
4148093	VDS201F15400	4140554	VDS401F15400	15,400	.6063	45	65	2,7	115	48	16
4148094	VDS201F15500	4140555	VDS401F15500	15,500	.6102	45	65	2,7	115	48	16
4148095	VDS201F15600	4140556	VDS401F15600	15,600	.6142	45	65	2,7	115	48	16
4148096	VDS201F15700	4140557	VDS401F15700	15,700	.6181	45	65	2,7	115	48	16
4148097	VDS201F15800	4140558	VDS401F15800	15,800	.6220	45	65	2,7	115	48	16
4148098	VDS201F15900	4140559	VDS401F15900	15,900	.6260	45	65	2,8	115	48	16
4148099	VDS201F16000	4140560	VDS401F16000	16,000	.6299	45	65	2,8	115	48	16
4148100	VDS201F16100	4140561	VDS401F16100	16,100	.6339	51	73	2,8	123	48	18
4148101	VDS201F16200	4140562	VDS401F16200	16,200	.6378	51	73	2,8	123	48	18
4148102	VDS201F16300	4140563	VDS401F16300	16,300	.6417	51	73	2,8	123	48	18
4148103	VDS201F16400	4140564	VDS401F16400	16,400	.6457	51	73	2,8	123	48	18
4148104	VDS201F16500	4140565	VDS401F16500	16,500	.6496	51	73	2,9	123	48	18
4148105	VDS201F16600	4140566	VDS401F16600	16,600	.6535	51	73	2,9	123	48	18
4148106	VDS201F16700	4140567	VDS401F16700	16,700	.6575	51	73	2,9	123	48	18
4148107	VDS201F16800	4140568	VDS401F16800	16,800	.6614	51	73	2,9	123	48	18
4148108	VDS201F16900	4140569	VDS401F16900	16,900	.6654	51	73	2,9	123	48	18
4148109	VDS201F17000	4140570	VDS401F17000	17,000	.6693	51	73	2,9	123	48	18
4148110	VDS201F17100	4140571	VDS401F17100	17,100	.6732	51	73	3,0	123	48	18
4148111	VDS201F17200	4140572	VDS401F17200	17,200	.6772	51	73	3,0	123	48	18
4148112	VDS201F17300	4140573	VDS401F17300	17,300	.6811	51	73	3,0	123	48	18

(continued)

(VDS201F • VDS401F • 3 x D — continued)

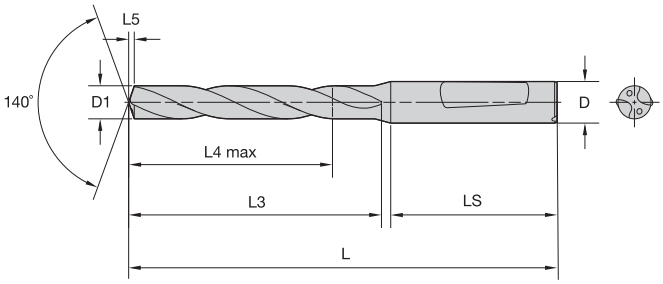




● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148113	VDS201F17400	4140574	VDS401F17400	17,400	.6850	51	73	3,0	123	48	18
4148114	VDS201F17500	4140575	VDS401F17500	17,500	.6890	51	73	3,0	123	48	18
4148115	VDS201F17600	4140576	VDS401F17600	17,600	.6929	51	73	3,1	123	48	18
4148116	VDS201F17700	4140577	VDS401F17700	17,700	.6969	51	73	3,1	123	48	18
4148117	VDS201F17800	4140578	VDS401F17800	17,800	.7008	51	73	3,1	123	48	18
4148118	VDS201F17900	4140579	VDS401F17900	17,900	.7047	51	73	3,1	123	48	18
4148119	VDS201F18000	4140580	VDS401F18000	18,000	.7087	51	73	3,1	123	48	18
4148120	VDS201F18100	4140581	VDS401F18100	18,100	.7126	55	79	3,1	131	50	20
4148121	VDS201F18200	4140582	VDS401F18200	18,200	.7165	55	79	3,2	131	50	20
4148122	VDS201F18300	4140583	VDS401F18300	18,300	.7205	55	79	3,2	131	50	20
4148123	VDS201F18400	4140584	VDS401F18400	18,400	.7244	55	79	3,2	131	50	20
4148124	VDS201F18500	4140585	VDS401F18500	18,500	.7283	55	79	3,2	131	50	20
4148125	VDS201F18600	4140586	VDS401F18600	18,600	.7323	55	79	3,2	131	50	20
4148126	VDS201F18700	4140587	VDS401F18700	18,700	.7362	55	79	3,2	131	50	20
4148127	VDS201F18800	4140588	VDS401F18800	18,800	.7402	55	79	3,3	131	50	20
4148128	VDS201F18900	4140589	VDS401F18900	18,900	.7441	55	79	3,3	131	50	20
4148129	VDS201F19000	4140590	VDS401F19000	19,000	.7480	55	79	3,3	131	50	20
4148130	VDS201F19100	4140591	VDS401F19100	19,100	.7520	55	79	3,3	131	50	20
4148131	VDS201F19200	4140592	VDS401F19200	19,200	.7559	55	79	3,3	131	50	20
4148132	VDS201F19300	4140593	VDS401F19300	19,300	.7598	55	79	3,4	131	50	20
4148133	VDS201F19400	4140594	VDS401F19400	19,400	.7638	55	79	3,4	131	50	20
4148134	VDS201F19500	4140595	VDS401F19500	19,500	.7677	55	79	3,4	131	50	20
4148135	VDS201F19600	4140596	VDS401F19600	19,600	.7717	55	79	3,4	131	50	20
4148136	VDS201F19700	4140597	VDS401F19700	19,700	.7756	55	79	3,4	131	50	20
4148137	VDS201F19800	4140598	VDS401F19800	19,800	.7795	55	79	3,4	131	50	20
4148138	VDS201F19900	4140599	VDS401F19900	19,900	.7835	55	79	3,5	131	50	20
4148139	VDS201F20000	4140600	VDS401F20000	20,000	.7874	55	79	3,5	131	50	20

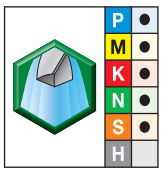


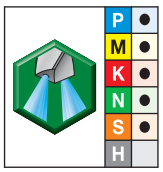




For information on L, L3, and L4 max, see page T143.

■ VDS202F • VDS402F • 5 x D



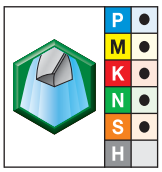


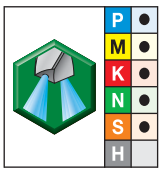
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148335	VDS202F03000	4142783	VDS402F03000	3,000	.1181	23	28	0,5	66	36	6
4148336	VDS202F03100	4142784	VDS402F03100	3,100	.1220	23	28	0,5	66	36	6
4148337	VDS202F03200	4142785	VDS402F03200	3,200	.1260	23	28	0,5	66	36	6
4148338	VDS202F03300	4142786	VDS402F03300	3,300	.1299	23	28	0,5	66	36	6
4148339	VDS202F03400	4142787	VDS402F03400	3,400	.1339	23	28	0,6	66	36	6
4148340	VDS202F03500	4142788	VDS402F03500	3,500	.1378	23	28	0,6	66	36	6
4148341	VDS202F03600	4142789	VDS402F03600	3,600	.1417	23	28	0,6	66	36	6
4148342	VDS202F03700	4142790	VDS402F03700	3,700	.1457	23	28	0,6	66	36	6
4148413	VDS202F03800	4142791	VDS402F03800	3,800	.1496	29	36	0,6	74	36	6
4148414	VDS202F03900	4142792	VDS402F03900	3,900	.1535	29	36	0,6	74	36	6
4148415	VDS202F04000	4142793	VDS402F04000	4,000	.1575	29	36	0,7	74	36	6
4148416	VDS202F04100	4142794	VDS402F04100	4,100	.1614	29	36	0,7	74	36	6
4148417	VDS202F04200	4142795	VDS402F04200	4,200	.1654	29	36	0,7	74	36	6
4148418	VDS202F04300	4142796	VDS402F04300	4,300	.1693	29	36	0,7	74	36	6
4148419	VDS202F04400	4142797	VDS402F04400	4,400	.1732	29	36	0,7	74	36	6
4148420	VDS202F04500	4142798	VDS402F04500	4,500	.1772	29	36	0,7	74	36	6
4148421	VDS202F04600	4142799	VDS402F04600	4,600	.1811	29	36	0,8	74	36	6
4148422	VDS202F04700	4142800	VDS402F04700	4,700	.1850	29	36	0,8	74	36	6
4148423	VDS202F04800	4142801	VDS402F04800	4,800	.1890	35	44	0,8	82	36	6
4148424	VDS202F04900	4142802	VDS402F04900	4,900	.1929	35	44	0,8	82	36	6
4148425	VDS202F05000	4142813	VDS402F05000	5,000	.1969	35	44	0,8	82	36	6
4148426	VDS202F05100	4142814	VDS402F05100	5,100	.2008	35	44	0,8	82	36	6
4148427	VDS202F05200	4142815	VDS402F05200	5,200	.2047	35	44	0,9	82	36	6
4148428	VDS202F05300	4142816	VDS402F05300	5,300	.2087	35	44	0,9	82	36	6

(continued)

(VDS202F • VDS402F • 5 x D — continued)



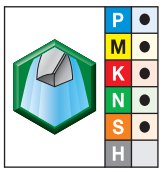


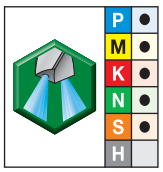
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148429	VDS202F05400	4142817	VDS402F05400	5,400	.2126	35	44	0,9	82	36	6
4148430	VDS202F05500	4142818	VDS402F05500	5,500	.2165	35	44	0,9	82	36	6
4148431	VDS202F05600	4142819	VDS402F05600	5,600	.2205	35	44	0,9	82	36	6
4148432	VDS202F05700	4142820	VDS402F05700	5,700	.2244	35	44	1,0	82	36	6
4148433	VDS202F05800	4142821	VDS402F05800	5,800	.2283	35	44	1,0	82	36	6
4148434	VDS202F05900	4142822	VDS402F05900	5,900	.2323	35	44	1,0	82	36	6
4148435	VDS202F06000	4142843	VDS402F06000	6,000	.2362	35	44	1,0	82	36	6
4148436	VDS202F06100	4142845	VDS402F06100	6,100	.2402	43	53	1,0	91	36	8
4148437	VDS202F06200	4142848	VDS402F06200	6,200	.2441	43	53	1,0	91	36	8
4148438	VDS202F06300	4142850	VDS402F06300	6,300	.2480	43	53	1,1	91	36	8
4148439	VDS202F06400	4142852	VDS402F06400	6,400	.2520	43	53	1,1	91	36	8
4148440	VDS202F06500	4142863	VDS402F06500	6,500	.2559	43	53	1,1	91	36	8
4148441	VDS202F06600	4142866	VDS402F06600	6,600	.2598	43	53	1,1	91	36	8
4148442	VDS202F06700	4142868	VDS402F06700	6,700	.2638	43	53	1,1	91	36	8
4148443	VDS202F06800	4142870	VDS402F06800	6,800	.2677	43	53	1,1	91	36	8
4148444	VDS202F06900	4142883	VDS402F06900	6,900	.2717	43	53	1,2	91	36	8
4148445	VDS202F07000	4142886	VDS402F07000	7,000	.2756	43	53	1,2	91	36	8
4148446	VDS202F07100	4142889	VDS402F07100	7,100	.2795	43	53	1,2	91	36	8
4148447	VDS202F07200	4142892	VDS402F07200	7,200	.2835	43	53	1,2	91	36	8
4148448	VDS202F07300	4142895	VDS402F07300	7,300	.2874	43	53	1,2	91	36	8
4148449	VDS202F07400	4142898	VDS402F07400	7,400	.2913	43	53	1,3	91	36	8
4148450	VDS202F07500	4142901	VDS402F07500	7,500	.2953	43	53	1,3	91	36	8
4148451	VDS202F07600	4142904	VDS402F07600	7,600	.2992	43	53	1,3	91	36	8
4148452	VDS202F07700	4142907	VDS402F07700	7,700	.3031	43	53	1,3	91	36	8
4148453	VDS202F07800	4142910	VDS402F07800	7,800	.3071	43	53	1,3	91	36	8
4148454	VDS202F07900	4142923	VDS402F07900	7,900	.3110	43	53	1,3	91	36	8
4148455	VDS202F08000	4142926	VDS402F08000	8,000	.3150	43	53	1,4	91	36	8
4148456	VDS202F08100	4142929	VDS402F08100	8,100	.3189	49	61	1,4	103	40	10
4148457	VDS202F08200	4142932	VDS402F08200	8,200	.3228	49	61	1,4	103	40	10
4148458	VDS202F08300	4142935	VDS402F08300	8,300	.3268	49	61	1,4	103	40	10
4148459	VDS202F08400	4142938	VDS402F08400	8,400	.3307	49	61	1,4	103	40	10
4148460	VDS202F08500	4142941	VDS402F08500	8,500	.3346	49	61	1,4	103	40	10
4148461	VDS202F08600	4142944	VDS402F08600	8,600	.3386	49	61	1,5	103	40	10
4148462	VDS202F08700	4142947	VDS402F08700	8,700	.3425	49	61	1,5	103	40	10
4148463	VDS202F08800	4142950	VDS402F08800	8,800	.3465	49	61	1,5	103	40	10
4148464	VDS202F08900	4142963	VDS402F08900	8,900	.3504	49	61	1,5	103	40	10
4148465	VDS202F09000	4142966	VDS402F09000	9,000	.3543	49	61	1,5	103	40	10
4148466	VDS202F09100	4142969	VDS402F09100	9,100	.3583	49	61	1,5	103	40	10
4148467	VDS202F09200	4142972	VDS402F09200	9,200	.3622	49	61	1,6	103	40	10
4148468	VDS202F09300	4142975	VDS402F09300	9,300	.3661	49	61	1,6	103	40	10

(continued)

(VDS202F • VDS402F • 5 x D — continued)



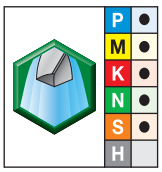


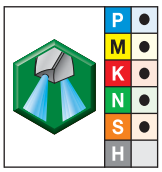
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148469	VDS202F09400	4142978	VDS402F09400	9,400	.3701	49	61	1,6	103	40	10
4148470	VDS202F09500	4142980	VDS402F09500	9,500	.3740	49	61	1,6	103	40	10
4148471	VDS202F09600	4142982	VDS402F09600	9,600	.3780	49	61	1,6	103	40	10
4148472	VDS202F09700	4142993	VDS402F09700	9,700	.3819	49	61	1,7	103	40	10
4148473	VDS202F09800	4142995	VDS402F09800	9,800	.3858	49	61	1,7	103	40	10
4148474	VDS202F09900	4142998	VDS402F09900	9,900	.3898	49	61	1,7	103	40	10
4148405	VDS202F10000	4143569	VDS402F10000	10,000	.3937	49	61	1,7	103	40	10
4148406	VDS202F10100	4143570	VDS402F10100	10,100	.3976	56	71	1,7	118	45	12
4148407	VDS202F10200	4143571	VDS402F10200	10,200	.4016	56	71	1,7	118	45	12
4148408	VDS202F10300	4143572	VDS402F10300	10,300	.4055	56	71	1,8	118	45	12
4148409	VDS202F10400	4143583	VDS402F10400	10,400	.4094	56	71	1,8	118	45	12
4148410	VDS202F10500	4143584	VDS402F10500	10,500	.4134	56	71	1,8	118	45	12
4148411	VDS202F10600	4143585	VDS402F10600	10,600	.4173	56	71	1,8	118	45	12
4148412	VDS202F10700	4143586	VDS402F10700	10,700	.4213	56	71	1,8	118	45	12
4148483	VDS202F10800	4143587	VDS402F10800	10,800	.4252	56	71	1,8	118	45	12
4148484	VDS202F10900	4143588	VDS402F10900	10,900	.4291	56	71	1,9	118	45	12
4148485	VDS202F11000	4143589	VDS402F11000	11,000	.4331	56	71	1,9	118	45	12
4148486	VDS202F11100	4143590	VDS402F11100	11,100	.4370	56	71	1,9	118	45	12
4148487	VDS202F11200	4143591	VDS402F11200	11,200	.4409	56	71	1,9	118	45	12
4148488	VDS202F11300	4143592	VDS402F11300	11,300	.4449	56	71	1,9	118	45	12
4148489	VDS202F11400	4143593	VDS402F11400	11,400	.4488	56	71	2,0	118	45	12
4148490	VDS202F11500	4143594	VDS402F11500	11,500	.4528	56	71	2,0	118	45	12
4148491	VDS202F11600	4143595	VDS402F11600	11,600	.4567	56	71	2,0	118	45	12
4148492	VDS202F11700	4143596	VDS402F11700	11,700	.4606	56	71	2,0	118	45	12
4148493	VDS202F11800	4143597	VDS402F11800	11,800	.4646	56	71	2,0	118	45	12
4148494	VDS202F11900	4143598	VDS402F11900	11,900	.4685	56	71	2,0	118	45	12
4148495	VDS202F12000	4143599	VDS402F12000	12,000	.4724	56	71	2,1	118	45	12
4148496	VDS202F12100	4143600	VDS402F12100	12,100	.4764	60	77	2,1	124	45	14
4148497	VDS202F12200	4143601	VDS402F12200	12,200	.4803	60	77	2,1	124	45	14
4148498	VDS202F12300	4143602	VDS402F12300	12,300	.4843	60	77	2,1	124	45	14
4148499	VDS202F12400	4143603	VDS402F12400	12,400	.4882	60	77	2,1	124	45	14
4148500	VDS202F12500	4143604	VDS402F12500	12,500	.4921	60	77	2,1	124	45	14
4148501	VDS202F12600	4143605	VDS402F12600	12,600	.4961	60	77	2,2	124	45	14
4148502	VDS202F12700	4143606	VDS402F12700	12,700	.5000	60	77	2,2	124	45	14
4148503	VDS202F12800	4143607	VDS402F12800	12,800	.5039	60	77	2,2	124	45	14
4148504	VDS202F12900	4143608	VDS402F12900	12,900	.5079	60	77	2,2	124	45	14
4148505	VDS202F13000	4143609	VDS402F13000	13,000	.5118	60	77	2,2	124	45	14
4148506	VDS202F13100	4143610	VDS402F13100	13,100	.5157	60	77	2,3	124	45	14
4148507	VDS202F13200	4143611	VDS402F13200	13,200	.5197	60	77	2,3	124	45	14
4148508	VDS202F13300	4143612	VDS402F13300	13,300	.5236	60	77	2,3	124	45	14

(continued)

(VDS202F • VDS402F • 5 x D — continued)



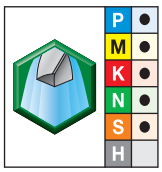


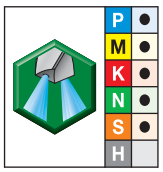
● first choice
○ alternate choice

grade WU25PD TiAlN		grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148509	VDS202F13400	4143613	VDS402F13400	13,400	.5276	60	77	2,3	124	45	14
4148510	VDS202F13500	4143614	VDS402F13500	13,500	.5315	60	77	2,3	124	45	14
4148511	VDS202F13600	4143615	VDS402F13600	13,600	.5354	60	77	2,3	124	45	14
4148512	VDS202F13700	4143616	VDS402F13700	13,700	.5394	60	77	2,4	124	45	14
4148513	VDS202F13800	4143617	VDS402F13800	13,800	.5433	60	77	2,4	124	45	14
4148514	VDS202F13900	4143618	VDS402F13900	13,900	.5472	60	77	2,4	124	45	14
4148515	VDS202F14000	4143619	VDS402F14000	14,000	.5512	60	77	2,4	124	45	14
4148516	VDS202F14100	4143620	VDS402F14100	14,100	.5551	63	83	2,4	133	48	16
4148517	VDS202F14200	4143621	VDS402F14200	14,200	.5591	63	83	2,5	133	48	16
4148518	VDS202F14300	4143622	VDS402F14300	14,300	.5630	63	83	2,5	133	48	16
4148519	VDS202F14400	4143623	VDS402F14400	14,400	.5669	63	83	2,5	133	48	16
4148520	VDS202F14500	4143624	VDS402F14500	14,500	.5709	63	83	2,5	133	48	16
4148521	VDS202F14600	4143625	VDS402F14600	14,600	.5748	63	83	2,5	133	48	16
4148522	VDS202F14700	4143626	VDS402F14700	14,700	.5787	63	83	2,5	133	48	16
4148523	VDS202F14800	4143627	VDS402F14800	14,800	.5827	63	83	2,6	133	48	16
4148524	VDS202F14900	4143628	VDS402F14900	14,900	.5866	63	83	2,6	133	48	16
4148525	VDS202F15000	4143629	VDS402F15000	15,000	.5906	63	83	2,6	133	48	16
4148526	VDS202F15100	4143630	VDS402F15100	15,100	.5945	63	83	2,6	133	48	16
4148527	VDS202F15200	4143631	VDS402F15200	15,200	.5984	63	83	2,6	133	48	16
4148528	VDS202F15300	4143632	VDS402F15300	15,300	.6024	63	83	2,6	133	48	16
4148529	VDS202F15400	4143633	VDS402F15400	15,400	.6063	63	83	2,7	133	48	16
4148530	VDS202F15500	4143634	VDS402F15500	15,500	.6102	63	83	2,7	133	48	16
4148531	VDS202F15600	4143635	VDS402F15600	15,600	.6142	63	83	2,7	133	48	16
4148532	VDS202F15700	4143636	VDS402F15700	15,700	.6181	63	83	2,7	133	48	16
4148533	VDS202F15800	4143637	VDS402F15800	15,800	.6220	63	83	2,7	133	48	16
4148534	VDS202F15900	4143638	VDS402F15900	15,900	.6260	63	83	2,8	133	48	16
4148535	VDS202F16000	4143639	VDS402F16000	16,000	.6299	63	83	2,8	133	48	16
4148536	VDS202F16100	4143640	VDS402F16100	16,100	.6339	71	93	2,8	143	48	18
4148537	VDS202F16200	4143641	VDS402F16200	16,200	.6378	71	93	2,8	143	48	18
4148538	VDS202F16300	4143642	VDS402F16300	16,300	.6417	71	93	2,8	143	48	18
4148539	VDS202F16400	4143643	VDS402F16400	16,400	.6457	71	93	2,8	143	48	18
4148540	VDS202F16500	4143644	VDS402F16500	16,500	.6496	71	93	2,9	143	48	18
4148541	VDS202F16600	4143645	VDS402F16600	16,600	.6535	71	93	2,9	143	48	18
4148542	VDS202F16700	4143646	VDS402F16700	16,700	.6575	71	93	2,9	143	48	18
4148543	VDS202F16800	4143647	VDS402F16800	16,800	.6614	71	93	2,9	143	48	18
4148544	VDS202F16900	4143648	VDS402F16900	16,900	.6654	71	93	2,9	143	48	18
4148545	VDS202F17000	4143649	VDS402F17000	17,000	.6693	71	93	2,9	143	48	18
4148546	VDS202F17100	4143650	VDS402F17100	17,100	.6732	71	93	3,0	143	48	18
4148547	VDS202F17200	4143651	VDS402F17200	17,200	.6772	71	93	3,0	143	48	18
4148548	VDS202F17300	4143652	VDS402F17300	17,300	.6811	71	93	3,0	143	48	18

(continued)

(VDS202F • VDS402F • 5 x D — continued)

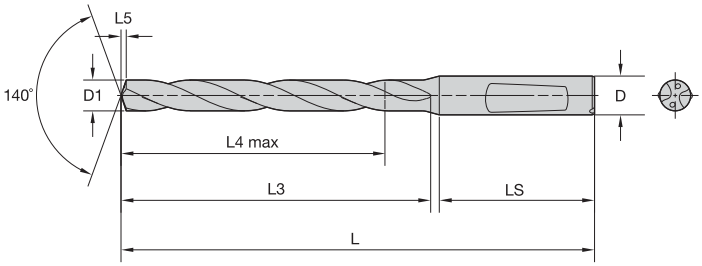




● first choice
○ alternate choice

grade WU25PD TiAIN		grade WU25PD TiAIN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4148549	VDS202F17400	4143653	VDS402F17400	17,400	.6850	71	93	3,0	143	48	18
4148550	VDS202F17500	4143654	VDS402F17500	17,500	.6890	71	93	3,0	143	48	18
4148551	VDS202F17600	4143655	VDS402F17600	17,600	.6929	71	93	3,1	143	48	18
4148552	VDS202F17700	4143656	VDS402F17700	17,700	.6969	71	93	3,1	143	48	18
4148553	VDS202F17800	4143657	VDS402F17800	17,800	.7008	71	93	3,1	143	48	18
4148554	VDS202F17900	4143658	VDS402F17900	17,900	.7047	71	93	3,1	143	48	18
4148555	VDS202F18000	4143659	VDS402F18000	18,000	.7087	71	93	3,1	143	48	18
4148556	VDS202F18100	4143660	VDS402F18100	18,100	.7126	77	101	3,1	153	50	20
4148557	VDS202F18200	4143661	VDS402F18200	18,200	.7165	77	101	3,2	153	50	20
4148558	VDS202F18300	4143662	VDS402F18300	18,300	.7205	77	101	3,2	153	50	20
4148559	VDS202F18400	4143663	VDS402F18400	18,400	.7244	77	101	3,2	153	50	20
4148560	VDS202F18500	4143664	VDS402F18500	18,500	.7283	77	101	3,2	153	50	20
4148561	VDS202F18600	4143665	VDS402F18600	18,600	.7323	77	101	3,2	153	50	20
4148562	VDS202F18700	4143666	VDS402F18700	18,700	.7362	77	101	3,2	153	50	20
4148563	VDS202F18800	4143667	VDS402F18800	18,800	.7402	77	101	3,3	153	50	20
4148564	VDS202F18900	4143668	VDS402F18900	18,900	.7441	77	101	3,3	153	50	20
4148565	VDS202F19000	4143669	VDS402F19000	19,000	.7480	77	101	3,3	153	50	20
4148566	VDS202F19100	4143670	VDS402F19100	19,100	.7520	77	101	3,3	153	50	20
4148567	VDS202F19200	4143671	VDS402F19200	19,200	.7559	77	101	3,3	153	50	20
4148568	VDS202F19300	4143672	VDS402F19300	19,300	.7598	77	101	3,4	153	50	20
4148569	VDS202F19400	4143673	VDS402F19400	19,400	.7638	77	101	3,4	153	50	20
4148570	VDS202F19500	4143674	VDS402F19500	19,500	.7677	77	101	3,4	153	50	20
4148571	VDS202F19600	4143675	VDS402F19600	19,600	.7717	77	101	3,4	153	50	20
4148572	VDS202F19700	4143676	VDS402F19700	19,700	.7756	77	101	3,4	153	50	20
4148573	VDS202F19800	4143677	VDS402F19800	19,800	.7795	77	101	3,4	153	50	20
4148574	VDS202F19900	4143678	VDS402F19900	19,900	.7835	77	101	3,5	153	50	20
4148575	VDS202F20000	4143679	VDS402F20000	20,000	.7874	77	101	3,5	153	50	20







For information on L, L3, and L4 max, see page T143.

VDS403F • 8 x D

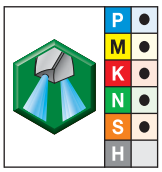


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144208	VDS403F03000	3,000	.1181	33	40	0,5	78	36	6
4144210	VDS403F03100	3,100	.1220	33	40	0,5	78	36	6
4144243	VDS403F03200	3,200	.1260	33	40	0,5	78	36	6
4144245	VDS403F03300	3,300	.1299	33	40	0,5	78	36	6
4144247	VDS403F03400	3,400	.1339	33	40	0,6	78	36	6
4144249	VDS403F03500	3,500	.1378	33	40	0,6	78	36	6
4144251	VDS403F03600	3,600	.1417	33	40	0,6	78	36	6
4144253	VDS403F03700	3,700	.1457	33	40	0,6	78	36	6
4144255	VDS403F03800	3,800	.1496	41	49	0,6	87	36	6
4144257	VDS403F03900	3,900	.1535	41	49	0,6	87	36	6
4144259	VDS403F04000	4,000	.1575	41	49	0,7	87	36	6
4144261	VDS403F04100	4,100	.1614	41	49	0,7	87	36	6
4144273	VDS403F04200	4,200	.1654	41	49	0,7	87	36	6
4144274	VDS403F04300	4,300	.1693	41	49	0,7	87	36	6
4144276	VDS403F04400	4,400	.1732	41	49	0,7	87	36	6
4144278	VDS403F04500	4,500	.1772	41	49	0,7	87	36	6
4144280	VDS403F04600	4,600	.1811	41	49	0,8	87	36	6
4144282	VDS403F04700	4,700	.1850	41	49	0,8	87	36	6
4144284	VDS403F04800	4,800	.1890	48	56	0,8	94	36	6
4144286	VDS403F04900	4,900	.1929	48	56	0,8	94	36	6
4144288	VDS403F05000	5,000	.1969	48	56	0,8	94	36	6
4144290	VDS403F05100	5,100	.2008	48	56	0,8	94	36	6
4144292	VDS403F05200	5,200	.2047	48	56	0,9	94	36	6
4144304	VDS403F05300	5,300	.2087	48	56	0,9	94	36	6

(continued)

(VDS403F • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144306	VDS403F05400	5,400	.2126	48	56	0,9	94	36	6
4144307	VDS403F05500	5,500	.2165	48	56	0,9	94	36	6
4144308	VDS403F05600	5,600	.2205	48	56	0,9	94	36	6
4144309	VDS403F05700	5,700	.2244	48	56	1,0	94	36	6
4144310	VDS403F05800	5,800	.2283	48	56	1,0	94	36	6
4144311	VDS403F05900	5,900	.2323	48	56	1,0	94	36	6
4144312	VDS403F06000	6,000	.2362	48	56	1,0	94	36	6
4144313	VDS403F06100	6,100	.2402	57	67	1,0	105	36	8
4144314	VDS403F06200	6,200	.2441	57	67	1,0	105	36	8
4144315	VDS403F06300	6,300	.2480	57	67	1,1	105	36	8
4144316	VDS403F06400	6,400	.2520	57	67	1,1	105	36	8
4144317	VDS403F06500	6,500	.2559	57	67	1,1	105	36	8
4144318	VDS403F06600	6,600	.2598	57	67	1,1	105	36	8
4144319	VDS403F06700	6,700	.2638	57	67	1,1	105	36	8
4144320	VDS403F06800	6,800	.2677	57	67	1,1	105	36	8
4144321	VDS403F06900	6,900	.2717	57	67	1,2	105	36	8
4144322	VDS403F07000	7,000	.2756	57	67	1,2	105	36	8
4144343	VDS403F07100	7,100	.2795	61	72	1,2	110	36	8
4144344	VDS403F07200	7,200	.2835	61	72	1,2	110	36	8
4144345	VDS403F07300	7,300	.2874	61	72	1,2	110	36	8
4144346	VDS403F07400	7,400	.2913	61	72	1,3	110	36	8
4144347	VDS403F07500	7,500	.2953	61	72	1,3	110	36	8
4144348	VDS403F07600	7,600	.2992	61	72	1,3	110	36	8
4144349	VDS403F07700	7,700	.3031	61	72	1,3	110	36	8
4144350	VDS403F07800	7,800	.3071	61	72	1,3	110	36	8
4144351	VDS403F07900	7,900	.3110	61	72	1,3	110	36	8
4144352	VDS403F08000	8,000	.3150	61	72	1,4	110	36	8
4144363	VDS403F08100	8,100	.3189	68	80	1,4	122	40	10
4144364	VDS403F08200	8,200	.3228	68	80	1,4	122	40	10
4144365	VDS403F08300	8,300	.3268	68	80	1,4	122	40	10
4144366	VDS403F08400	8,400	.3307	68	80	1,4	122	40	10
4144367	VDS403F08500	8,500	.3346	68	80	1,4	122	40	10
4144368	VDS403F08600	8,600	.3386	68	80	1,5	122	40	10
4144369	VDS403F08700	8,700	.3425	68	80	1,5	122	40	10
4144370	VDS403F08800	8,800	.3465	68	80	1,5	122	40	10
4144371	VDS403F08900	8,900	.3504	68	80	1,5	122	40	10
4144372	VDS403F09000	9,000	.3543	68	80	1,5	122	40	10
4144373	VDS403F09100	9,100	.3583	68	80	1,5	122	40	10
4144374	VDS403F09200	9,200	.3622	68	80	1,6	122	40	10
4144375	VDS403F09300	9,300	.3661	68	80	1,6	122	40	10

(continued)

(VDS403F • 8 x D — continued)

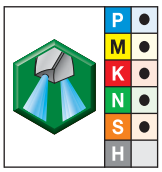


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144376	VDS403F09400	9,400	.3701	68	80	1,6	122	40	10
4144377	VDS403F09500	9,500	.3740	68	80	1,6	122	40	10
4144378	VDS403F09600	9,600	.3780	68	80	1,6	122	40	10
4144379	VDS403F09700	9,700	.3819	68	80	1,7	122	40	10
4144380	VDS403F09800	9,800	.3858	68	80	1,7	122	40	10
4144381	VDS403F09900	9,900	.3898	68	80	1,7	122	40	10
4144207	VDS403F10000	10,000	.3937	68	80	1,7	122	40	10
4143888	VDS403F10100	10,100	.3976	79	94	1,7	141	45	12
4143889	VDS403F10200	10,200	.4016	79	94	1,7	141	45	12
4143890	VDS403F10300	10,300	.4055	79	94	1,8	141	45	12
4143891	VDS403F10400	10,400	.4094	79	94	1,8	141	45	12
4143892	VDS403F10500	10,500	.4134	79	94	1,8	141	45	12
4144223	VDS403F10600	10,600	.4173	79	94	1,8	141	45	12
4144224	VDS403F10700	10,700	.4213	79	94	1,8	141	45	12
4144225	VDS403F10800	10,800	.4252	79	94	1,8	141	45	12
4144226	VDS403F10900	10,900	.4291	79	94	1,9	141	45	12
4144227	VDS403F11000	11,000	.4331	79	94	1,9	141	45	12
4144228	VDS403F11100	11,100	.4370	79	94	1,9	141	45	12
4144229	VDS403F11200	11,200	.4409	79	94	1,9	141	45	12
4144230	VDS403F11300	11,300	.4449	79	94	1,9	141	45	12
4144231	VDS403F11400	11,400	.4488	79	94	2,0	141	45	12
4144232	VDS403F11500	11,500	.4528	79	94	2,0	141	45	12
4144233	VDS403F11600	11,600	.4567	79	94	2,0	141	45	12
4144234	VDS403F11700	11,700	.4606	79	94	2,0	141	45	12
4144235	VDS403F11800	11,800	.4646	79	94	2,0	141	45	12
4144236	VDS403F11900	11,900	.4685	79	94	2,0	141	45	12
4144237	VDS403F12000	12,000	.4724	79	94	2,1	141	45	12
4144238	VDS403F12100	12,100	.4764	91	108	2,1	155	45	14
4144239	VDS403F12200	12,200	.4803	91	108	2,1	155	45	14
4144240	VDS403F12300	12,300	.4843	91	108	2,1	155	45	14
4144241	VDS403F12400	12,400	.4882	91	108	2,1	155	45	14
4144242	VDS403F12500	12,500	.4921	91	108	2,1	155	45	14
4144263	VDS403F12600	12,600	.4961	91	108	2,2	155	45	14
4144264	VDS403F12700	12,700	.5000	91	108	2,2	155	45	14
4144265	VDS403F12800	12,800	.5039	91	108	2,2	155	45	14
4144266	VDS403F12900	12,900	.5079	91	108	2,2	155	45	14
4144267	VDS403F13000	13,000	.5118	91	108	2,2	155	45	14
4144268	VDS403F13100	13,100	.5157	91	108	2,3	155	45	14
4144269	VDS403F13200	13,200	.5197	91	108	2,3	155	45	14
4144270	VDS403F13300	13,300	.5236	91	108	2,3	155	45	14

(continued)

(VDS403F • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144271	VDS403F13400	13,400	.5276	91	108	2,3	155	45	14
4144272	VDS403F13500	13,500	.5315	91	108	2,3	155	45	14
4144293	VDS403F13600	13,600	.5354	91	108	2,3	155	45	14
4144294	VDS403F13700	13,700	.5394	91	108	2,4	155	45	14
4144295	VDS403F13800	13,800	.5433	91	108	2,4	155	45	14
4144296	VDS403F13900	13,900	.5472	91	108	2,4	155	45	14
4144297	VDS403F14000	14,000	.5512	91	108	2,4	155	45	14
4144298	VDS403F14100	14,100	.5551	101	121	2,4	171	48	16
4144299	VDS403F14200	14,200	.5591	101	121	2,5	171	48	16
4144300	VDS403F14300	14,300	.5630	101	121	2,5	171	48	16
4144301	VDS403F14400	14,400	.5669	101	121	2,5	171	48	16
4144302	VDS403F14500	14,500	.5709	101	121	2,5	171	48	16
4144323	VDS403F14600	14,600	.5748	101	121	2,5	171	48	16
4144324	VDS403F14700	14,700	.5787	101	121	2,5	171	48	16
4144325	VDS403F14800	14,800	.5827	101	121	2,6	171	48	16
4144326	VDS403F14900	14,900	.5866	101	121	2,6	171	48	16
4144327	VDS403F15000	15,000	.5906	101	121	2,6	171	48	16
4144328	VDS403F15100	15,100	.5945	101	121	2,6	171	48	16
4144329	VDS403F15200	15,200	.5984	101	121	2,6	171	48	16
4144330	VDS403F15300	15,300	.6024	101	121	2,6	171	48	16
4144331	VDS403F15400	15,400	.6063	101	121	2,7	171	48	16
4144332	VDS403F15500	15,500	.6102	101	121	2,7	171	48	16
4144333	VDS403F15600	15,600	.6142	101	121	2,7	171	48	16
4144334	VDS403F15700	15,700	.6181	101	121	2,7	171	48	16
4144335	VDS403F15800	15,800	.6220	101	121	2,7	171	48	16
4144336	VDS403F15900	15,900	.6260	101	121	2,8	171	48	16
4144337	VDS403F16000	16,000	.6299	101	121	2,8	171	48	16
4144338	VDS403F16100	16,100	.6339	113	135	2,8	185	48	18
4144339	VDS403F16200	16,200	.6378	113	135	2,8	185	48	18
4144340	VDS403F16300	16,300	.6417	113	135	2,8	185	48	18
4144341	VDS403F16400	16,400	.6457	113	135	2,8	185	48	18
4144342	VDS403F16500	16,500	.6496	113	135	2,9	185	48	18
4144353	VDS403F16600	16,600	.6535	113	135	2,9	185	48	18
4144354	VDS403F16700	16,700	.6575	113	135	2,9	185	48	18
4144355	VDS403F16800	16,800	.6614	113	135	2,9	185	48	18
4144356	VDS403F16900	16,900	.6654	113	135	2,9	185	48	18
4144357	VDS403F17000	17,000	.6693	113	135	2,9	185	48	18
4144358	VDS403F17100	17,100	.6732	113	135	3,0	185	48	18
4144359	VDS403F17200	17,200	.6772	113	135	3,0	185	48	18
4144360	VDS403F17300	17,300	.6811	113	135	3,0	185	48	18

(continued)

(VDS403F • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN

D1 diameter

order #	catalogue #	mm	in	L4 max	L3	L5	L	LS	D
4144361	VDS403F17400	17,400	.6850	113	135	3,0	185	48	18
4144362	VDS403F17500	17,500	.6890	113	135	3,0	185	48	18
4144383	VDS403F17600	17,600	.6929	113	135	3,1	185	48	18
4144384	VDS403F17700	17,700	.6969	113	135	3,1	185	48	18
4144385	VDS403F17800	17,800	.7008	113	135	3,1	185	48	18
4144386	VDS403F17900	17,900	.7047	113	135	3,1	185	48	18
4144387	VDS403F18000	18,000	.7087	113	135	3,1	185	48	18
4144388	VDS403F18100	18,100	.7126	124	148	3,1	200	50	20
4144389	VDS403F18200	18,200	.7165	124	148	3,2	200	50	20
4144390	VDS403F18300	18,300	.7205	124	148	3,2	200	50	20
4144391	VDS403F18400	18,400	.7244	124	148	3,2	200	50	20
4144392	VDS403F18500	18,500	.7283	124	148	3,2	200	50	20
4144393	VDS403F18600	18,600	.7323	124	148	3,2	200	50	20
4144394	VDS403F18700	18,700	.7362	124	148	3,2	200	50	20
4144395	VDS403F18800	18,800	.7402	124	148	3,3	200	50	20
4144396	VDS403F18900	18,900	.7441	124	148	3,3	200	50	20
4144397	VDS403F19000	19,000	.7480	124	148	3,3	200	50	20
4144398	VDS403F19100	19,100	.7520	124	148	3,3	200	50	20
4144399	VDS403F19200	19,200	.7559	124	148	3,3	200	50	20
4144400	VDS403F19300	19,300	.7598	124	148	3,4	200	50	20
4144401	VDS403F19400	19,400	.7638	124	148	3,4	200	50	20
4144402	VDS403F19500	19,500	.7677	124	148	3,4	200	50	20
4144403	VDS403F19600	19,600	.7717	124	148	3,4	200	50	20
4144404	VDS403F19700	19,700	.7756	124	148	3,4	200	50	20
4144405	VDS403F19800	19,800	.7795	124	148	3,4	200	50	20
4144406	VDS403F19900	19,900	.7835	124	148	3,5	200	50	20
4144407	VDS403F20000	20,000	.7874	124	148	3,5	200	50	20

■ VariDrill • VDS2_ Series • WU25PD™ • Flood Coolant • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter									
		min	–	max	Tool Diameter (mm)	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	60	–	100	mm/r	0,04–0,09	0,05–0,12	0,07–0,14	0,08–0,16	0,11–0,22	0,13–0,26	0,15–0,31	0,18–0,35	0,22–0,42	0,28–0,54
	2, 3, 4, 6, 7	50	–	90	mm/r	0,05–0,10	0,06–0,13	0,08–0,15	0,09–0,17	0,13–0,23	0,15–0,28	0,19–0,33	0,22–0,38	0,26–0,47	0,34–0,59
	5, 9, 10, 11	50	–	100	mm/r	0,05–0,10	0,06–0,13	0,07–0,15	0,08–0,17	0,12–0,23	0,14–0,28	0,17–0,33	0,19–0,38	0,23–0,47	0,29–0,59
	12, 13	30	–	60	mm/r	0,03–0,05	0,04–0,06	0,05–0,08	0,06–0,10	0,08–0,14	0,10–0,18	0,13–0,22	0,14–0,24	0,18–0,32	0,23–0,41
M	14.1	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14.3	40	–	60	mm/r	0,02–0,06	0,03–0,07	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	70	–	150	mm/r	0,06–0,13	0,07–0,14	0,09–0,18	0,10–0,19	0,13–0,25	0,16–0,30	0,18–0,35	0,20–0,39	0,25–0,48	0,30–0,59
	17, 18, 19	90	–	120	mm/r	0,08–0,11	0,09–0,12	0,10–0,13	0,10–0,15	0,13–0,20	0,16–0,25	0,18–0,29	0,20–0,32	0,25–0,38	0,30–0,48
	20	80	–	120	mm/r	0,04–0,10	0,06–0,12	0,06–0,14	0,07–0,15	0,10–0,20	0,11–0,24	0,14–0,28	0,15–0,32	0,19–0,38	0,24–0,48
N	21	90	–	270	mm/r	0,05–0,12	0,06–0,13	0,08–0,14	0,10–0,16	0,12–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,48
	22, 23, 24	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,44	0,32–0,52
	25	90	–	225	mm/r	0,10–0,13	0,11–0,14	0,12–0,14	0,13–0,16	0,14–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,44
	26, 27, 28	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,40	0,32–0,48
S	31, 32	20	–	30	mm/r	0,01–0,04	0,02–0,05	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
	33, 34, 35	10	–	30	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
	36	20	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
	37	20	–	50	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

Metric tolerance

nominal size range	D1 tolerance	D tolerance h6
1–3	0,000/-0,014 (h8)	0,000/-0,006
>3–6	0,000/-0,012 (h7)	0,000/-0,008
>6–10	0,000/-0,015 (h7)	0,000/-0,009
>10–18	0,000/-0,018 (h7)	0,000/-0,011
>18–20	0,000/-0,021 (h7)	0,000/-0,013

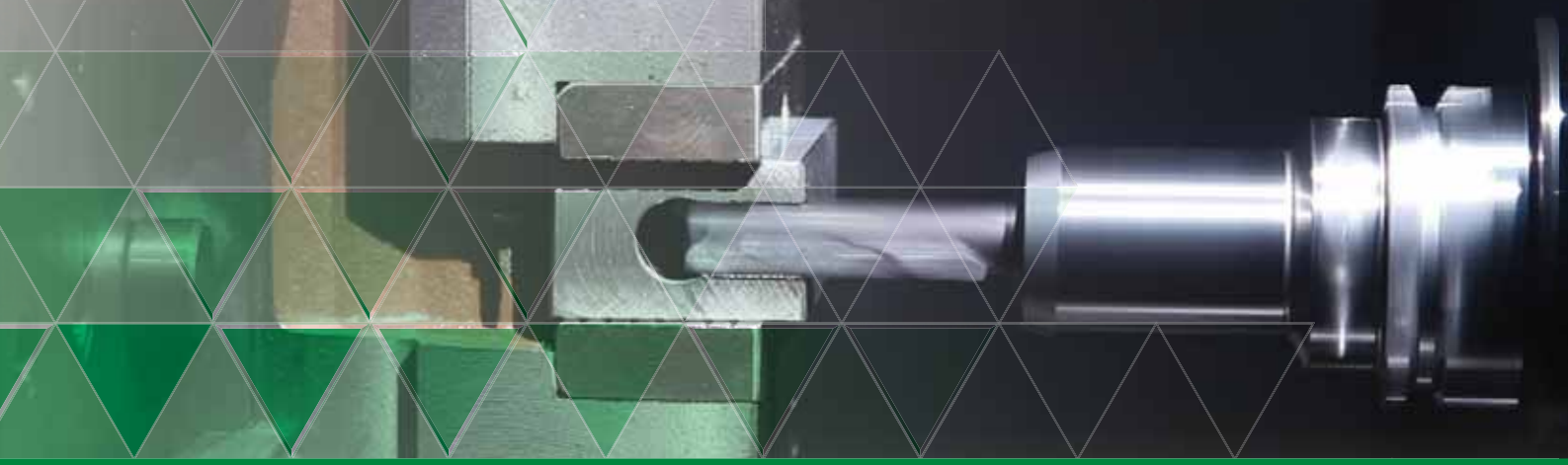
■ VariDrill • VDS4_ Series • WU25PD™ • Through Coolant • Metric



Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter									
		min	–	max	Tool Diameter (mm)	1,0	2,0	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	70	–	140	mm/r	0,04–0,09	0,05–0,12	0,07–0,14	0,08–0,16	0,11–0,22	0,13–0,26	0,15–0,31	0,18–0,35	0,22–0,42	0,28–0,54
	2, 3, 4, 6, 7	60	–	100	mm/r	0,05–0,10	0,06–0,13	0,08–0,15	0,09–0,17	0,13–0,23	0,15–0,28	0,19–0,33	0,22–0,38	0,26–0,47	0,34–0,59
	5, 9, 10, 11	50	–	100	mm/r	0,05–0,10	0,06–0,13	0,07–0,15	0,08–0,17	0,12–0,23	0,14–0,28	0,17–0,33	0,19–0,38	0,23–0,47	0,29–0,59
	12, 13	40	–	70	mm/r	0,03–0,05	0,04–0,06	0,05–0,08	0,06–0,10	0,08–0,14	0,10–0,18	0,13–0,22	0,14–0,24	0,18–0,32	0,23–0,41
M	14.1	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14.3	40	–	60	mm/r	0,02–0,06	0,03–0,07	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,02–0,05	0,03–0,06	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	80	–	160	mm/r	0,07–0,14	0,08–0,15	0,10–0,20	0,11–0,22	0,14–0,28	0,18–0,34	0,21–0,40	0,23–0,44	0,28–0,54	0,34–0,67
	17, 18, 19	90	–	140	mm/r	0,09–0,13	0,10–0,14	0,11–0,14	0,12–0,17	0,14–0,23	0,18–0,28	0,21–0,32	0,23–0,36	0,28–0,43	0,34–0,54
	20	80	–	130	mm/r	0,05–0,12	0,06–0,14	0,07–0,15	0,08–0,17	0,11–0,23	0,13–0,27	0,15–0,32	0,17–0,36	0,22–0,43	0,27–0,54
N	21	90	–	315	mm/r	0,05–0,12	0,06–0,13	0,08–0,14	0,10–0,16	0,12–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,48
	22, 23, 24	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,44	0,32–0,52
	25	90	–	270	mm/r	0,10–0,13	0,11–0,14	0,12–0,14	0,13–0,16	0,14–0,20	0,16–0,24	0,20–0,28	0,24–0,32	0,28–0,40	0,32–0,44
	26, 27, 28	90	–	270	mm/r	0,04–0,08	0,06–0,12	0,08–0,16	0,10–0,20	0,12–0,24	0,16–0,28	0,20–0,32	0,24–0,36	0,28–0,40	0,32–0,48
S	31, 32	20	–	30	mm/r	0,01–0,04	0,02–0,05	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
	33, 34, 35	10	–	30	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
	36	10	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
	37	10	–	40	mm/r	0,01–0,03	0,02–0,03	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

Metric tolerance

nominal size range	D1 tolerance	D tolerance h6
1–3	0,000/-0,014 (h8)	0,000/-0,006
>3–6	0,000/-0,012 (h7)	0,000/-0,008
>6–10	0,000/-0,015 (h7)	0,000/-0,009
>10–18	0,000/-0,018 (h7)	0,000/-0,011
>18–20	0,000/-0,021 (h7)	0,000/-0,013



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

TDF Drills for Flat-Bottom Applications

(Available as Semi-Standards)

Primary Application

Engineered specifically to eliminate the need for a two-part operation when drilling flat-bottom holes or on an inclined surface:

- Drill flat-bottom holes in one step.
- Eliminate the need to use both an end mill and a drill to machine a flat on an inclined surface.
- After full cylindrical engagement, the drills run at normal solid carbide drilling parameters.

Features and Benefits

- Four-Margin Design
  - Increases contact with material at full diameter.
  - Improves hold quality and drill stability in the cut.
  - Enables interrupted cuts and inclined exits.
- Special Point-Thinning
  - Increases centring capability.
  - Improves chip formation and flow.
  - Reduces cutting forces.

Product Portfolio

- The Flat-Bottom Drill product series TDF51* is pre-designed in four lengths and available in two grades, WN15HD for non-ferrous materials, and WU20PD™ for steel, iron, and stainless steel.
  - TDF510* 1,5 x D
  - TDF511* 3 x D
  - TDF512* 5 x D
  - TDF513* 8 x D
- Length variations and step drills available as engineered solutions.

Ordering Process

- Please contact your local Authorised Distributor for a quote.

WIDIA™

For a Wide Range of Materials





EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

VariDrill™

The VariDrill offers the ultimate solution for multipurpose drilling operations. Its advanced-point geometry design enables less chipping on the cutting edge, resulting in longer tool life. It delivers proper surface finish across multiple materials, including steel, stainless steel, cast iron, aluminium, and high-temp alloys.

- WU25PD™ drilling grade for extremely high wear resistance and longer tool life.
- VariDrill core design offers free chip flow and chip evacuation, resulting in optimum hole quality.
- Broad portfolio of items, with more than 2,200 choices.
- Reconditioning options for extended tool life.

To learn more about the benefits of **WIDIA™ VariDrill**, contact your local distributor.

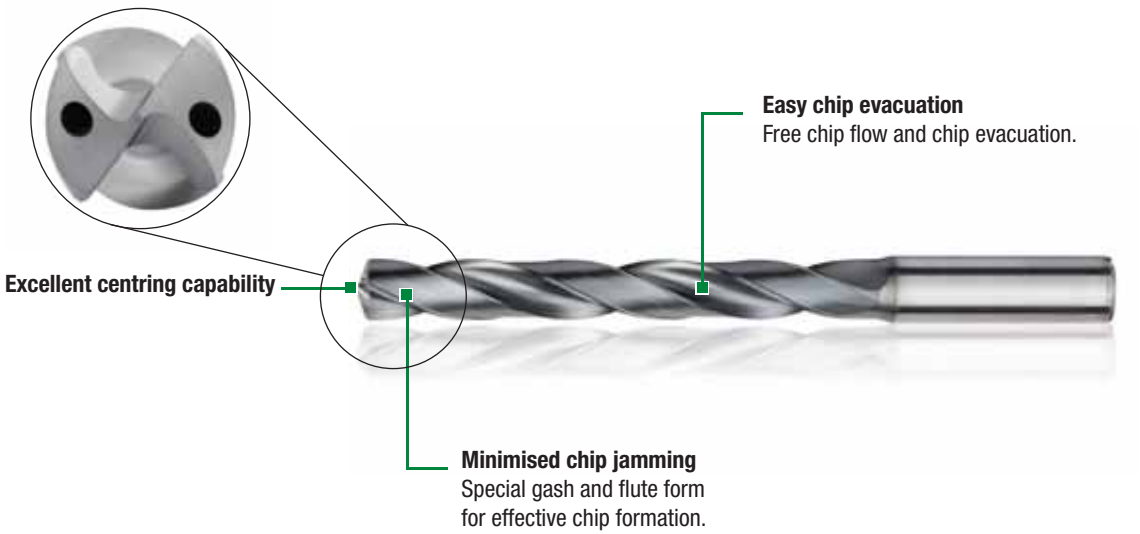
WIDIA™

TOP DRILL S



TOP DRILL S is WIDIA's line of solid carbide drills engineered to provide maximum performance and superior finish for application-specific tasks. Available in two material applications, TDS for steel and cast iron are each specially designed and coated to maximise output and increase tool life — offering less cost-per-hole and greater productivity.

- Designed for maximum productivity and longer tool life for steel and cast iron.
- Easy to choose and apply.
- One of the broadest ranges on the market for diameter selection, length series, and coolant options.
- Highest metal removal rates possible without sacrificing tool life.
- Latest Victory™ grades from WIDIA.



TOP DRILL S™ for Steel

TOP DRILL S for steel is a high-performance solid carbide drill with an application-specific design. Although the point geometry is strong enough to drill stainless steel and cast iron, it is engineered to maximise performance when drilling steel. The WP20PD™ grade, designed to resist high heat and wear, is the latest in WIDIA™ technology. The two-margin design facilitates excellent hole quality and less friction when drilling steel at high speeds.

TOP DRILL S for Cast Iron

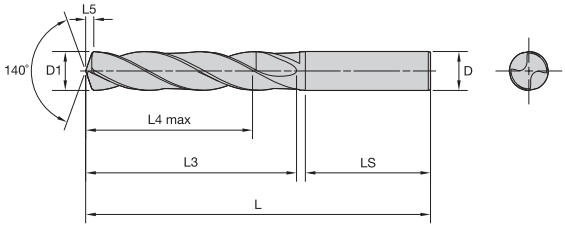
TOP DRILL S for cast iron is designed with application-specific point geometry for maximum performance in cast iron materials. The point features corner chamfers that minimise breakout on exit holes. A four-margin design improves hole straightness, increasing tool life and extending cross-hole and inclined exit capabilities when drilling tough cast iron. The technologically advanced WK15PD™ grade is specially engineered to withstand high wear.

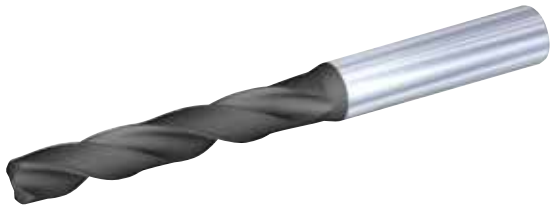
WIDIA Advantage

- Application-specific geometry with the latest WIDIA grade technology.
- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Broad range of standard lengths, diameters, and coolant options in one line, including extensive intermediate metric, inch, fraction, and wire sizes.



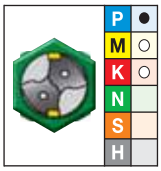




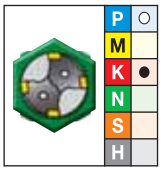


For information on L, L3, and L4 max, see page T143.

■ TDS202A • TDS212A • 5 x D



grade WP20PD
TiAlN



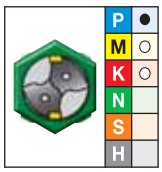
grade WK15PD
AlCrN

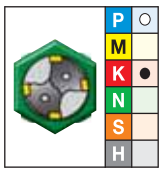
● first choice
○ alternate choice

order #	catalogue #	order #	catalogue #	D1 diameter mm	D1 diameter in	L	L3	L4 max	L5	LS	D
4162258	TDS202A03000	4162417	TDS212A03000	3,000	.1181	66	28	23	0,5	36	6
4162259	TDS202A03048	4162418	TDS212A03048	3,048	.1200	66	28	23	0,5	36	6
4162260	TDS202A03100	4162419	TDS212A03100	3,100	.1220	66	28	23	0,5	36	6
4162261	TDS202A03175	4162420	TDS212A03175	3,175	.1250	66	28	23	0,5	36	6
4162262	TDS202A03200	4162421	TDS212A03200	3,200	.1260	66	28	23	0,5	36	6
4162283	TDS202A03264	4162422	TDS212A03264	3,264	.1285	66	28	23	0,5	36	6
4162284	TDS202A03300	4162543	TDS212A03300	3,300	.1299	66	28	23	0,5	36	6
4162285	TDS202A03400	4162544	TDS212A03400	3,400	.1339	66	28	23	0,6	36	6
4162286	TDS202A03455	4162545	TDS212A03455	3,455	.1360	66	28	23	0,6	36	6
4162287	TDS202A03500	4162546	TDS212A03500	3,500	.1378	66	28	23	0,6	36	6
4162288	TDS202A03571	4162547	TDS212A03571	3,571	.1406	66	28	23	0,6	36	6
4162289	TDS202A03600	4162548	TDS212A03600	3,600	.1417	66	28	23	0,6	36	6
4162290	TDS202A03658	4162549	TDS212A03658	3,658	.1440	66	28	23	0,6	36	6
4162291	TDS202A03700	4162550	TDS212A03700	3,700	.1457	66	28	23	0,6	36	6
4162292	TDS202A03734	4162551	TDS212A03734	3,734	.1470	66	28	23	0,6	36	6
4162293	TDS202A03800	4162552	TDS212A03800	3,800	.1496	74	36	29	0,6	36	6
4162294	TDS202A03900	4162553	TDS212A03900	3,900	.1535	74	36	29	0,6	36	6
4162295	TDS202A03970	4162554	TDS212A03970	3,970	.1563	74	36	29	0,7	36	6
4162296	TDS202A04000	4162555	TDS212A04000	4,000	.1575	74	36	29	0,7	36	6
4162297	TDS202A04039	4162556	TDS212A04039	4,039	.1590	74	36	29	0,7	36	6
4162298	TDS202A04090	4162557	TDS212A04090	4,090	.1610	74	36	29	0,7	36	6
4162299	TDS202A04100	4162558	TDS212A04100	4,100	.1614	74	36	29	0,7	36	6
4162300	TDS202A04200	4162559	TDS212A04200	4,200	.1654	74	36	29	0,7	36	6
4162301	TDS202A04217	4162560	TDS212A04217	4,217	.1660	74	36	29	0,7	36	6

(continued)

(TDS202A • TDS212A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162302	TDS202A04300	4162561	TDS212A04300	4,300	.1693	74	36	29	0,7	36	6
4162303	TDS202A04366	4162562	TDS212A04366	4,366	.1719	74	36	29	0,7	36	6
4162304	TDS202A04400	4162563	TDS212A04400	4,400	.1732	74	36	29	0,7	36	6
4162305	TDS202A04500	4162564	TDS212A04500	4,500	.1772	74	36	29	0,7	36	6
4162306	TDS202A04600	4162565	TDS212A04600	4,600	.1811	74	36	29	0,8	36	6
4162307	TDS202A04623	4162566	TDS212A04623	4,623	.1820	74	36	29	0,8	36	6
4162308	TDS202A04700	4162567	TDS212A04700	4,700	.1850	74	36	29	0,8	36	6
4162309	TDS202A04763	4162568	TDS212A04763	4,763	.1875	82	44	35	0,8	36	6
4162310	TDS202A04800	4162569	TDS212A04800	4,800	.1890	82	44	35	0,8	36	6
4162311	TDS202A04852	4162570	TDS212A04852	4,852	.1910	82	44	35	0,8	36	6
4162312	TDS202A04900	4162571	TDS212A04900	4,900	.1929	82	44	35	0,8	36	6
4162313	TDS202A05000	4162572	TDS212A05000	5,000	.1969	82	44	35	0,8	36	6
4162314	TDS202A05100	4162573	TDS212A05100	5,100	.2008	82	44	35	0,8	36	6
4162315	TDS202A05106	4162574	TDS212A05106	5,106	.2010	82	44	35	0,8	36	6
4162316	TDS202A05159	4162575	TDS212A05159	5,159	.2031	82	44	35	0,9	36	6
4162317	TDS202A05200	4162576	TDS212A05200	5,200	.2047	82	44	35	0,9	36	6
4162318	TDS202A05300	4162577	TDS212A05300	5,300	.2087	82	44	35	0,9	36	6
4162319	TDS202A05400	4162578	TDS212A05400	5,400	.2126	82	44	35	0,9	36	6
4162320	TDS202A05410	4162579	TDS212A05410	5,410	.2130	82	44	35	0,9	36	6
4162321	TDS202A05500	4162580	TDS212A05500	5,500	.2165	82	44	35	0,9	36	6
4162322	TDS202A05558	4162581	TDS212A05558	5,558	.2188	82	44	35	0,9	36	6
4162323	TDS202A05600	4162582	TDS212A05600	5,600	.2205	82	44	35	0,9	36	6
4162324	TDS202A05616	4162583	TDS212A05616	5,616	.2211	82	44	35	0,9	36	6
4162325	TDS202A05700	4162584	TDS212A05700	5,700	.2244	82	44	35	1,0	36	6
4162326	TDS202A05800	4162585	TDS212A05800	5,800	.2283	82	44	35	1,0	36	6
4162327	TDS202A05900	4162586	TDS212A05900	5,900	.2323	82	44	35	1,0	36	6
4162328	TDS202A05954	4162587	TDS212A05954	5,954	.2344	82	44	35	1,0	36	6
4162329	TDS202A06000	4162588	TDS212A06000	6,000	.2362	82	44	35	1,0	36	6
4162330	TDS202A06100	4162589	TDS212A06100	6,100	.2402	91	53	43	1,0	36	8
4162331	TDS202A06200	4162590	TDS212A06200	6,200	.2441	91	53	43	1,0	36	8
4162332	TDS202A06300	4162591	TDS212A06300	6,300	.2480	91	53	43	1,1	36	8
4162333	TDS202A06350	4162592	TDS212A06350	6,350	.2500	91	53	43	1,1	36	8
4162334	TDS202A06400	4162593	TDS212A06400	6,400	.2520	91	53	43	1,1	36	8
4162335	TDS202A06500	4162594	TDS212A06500	6,500	.2559	91	53	43	1,1	36	8
4162336	TDS202A06528	4162595	TDS212A06528	6,528	.2570	91	53	43	1,1	36	8
4162337	TDS202A06600	4162596	TDS212A06600	6,600	.2598	91	53	43	1,1	36	8
4162338	TDS202A06630	4162597	TDS212A06630	6,630	.2610	91	53	43	1,1	36	8
4162339	TDS202A06700	4162598	TDS212A06700	6,700	.2638	91	53	43	1,1	36	8
4162340	TDS202A06746	4162599	TDS212A06746	6,746	.2656	91	53	43	1,1	36	8
4148908	TDS202A06800	4148983	TDS212A06800	6,800	.2677	91	53	43	1,1	36	8

(continued)

(TDS202A • TDS212A • 5 x D — continued)



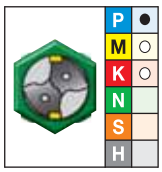


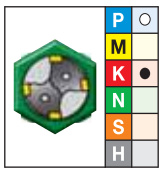
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162341	TDS202A06900	4162600	TDS212A06900	6,900	.2717	91	53	43	1,2	36	8
4162342	TDS202A07000	4162601	TDS212A07000	7,000	.2756	91	53	43	1,2	36	8
4162343	TDS202A07100	4162602	TDS212A07100	7,100	.2795	91	53	43	1,2	36	8
4162344	TDS202A07145	4162603	TDS212A07145	7,145	.2813	91	53	43	1,2	36	8
4162345	TDS202A07200	4162604	TDS212A07200	7,200	.2835	91	53	43	1,2	36	8
4162346	TDS202A07300	4162605	TDS212A07300	7,300	.2874	91	53	43	1,2	36	8
4162347	TDS202A07400	4162606	TDS212A07400	7,400	.2913	91	53	43	1,3	36	8
4162348	TDS202A07500	4162607	TDS212A07500	7,500	.2953	91	53	43	1,3	36	8
4162349	TDS202A07541	4162608	TDS212A07541	7,541	.2969	91	53	43	1,3	36	8
4162350	TDS202A07600	4162609	TDS212A07600	7,600	.2992	91	53	43	1,3	36	8
4162351	TDS202A07700	4162610	TDS212A07700	7,700	.3031	91	53	43	1,3	36	8
4162352	TDS202A07800	4162611	TDS212A07800	7,800	.3071	91	53	43	1,3	36	8
4162353	TDS202A07900	4162612	TDS212A07900	7,900	.3110	91	53	43	1,3	36	8
4162354	TDS202A07938	4162613	TDS212A07938	7,938	.3125	91	53	43	1,3	36	8
4162355	TDS202A08000	4162614	TDS212A08000	8,000	.3150	91	53	43	1,4	36	8
4162356	TDS202A08100	4162615	TDS212A08100	8,100	.3189	103	61	49	1,4	40	10
4162357	TDS202A08200	4162616	TDS212A08200	8,200	.3228	103	61	49	1,4	40	10
4162358	TDS202A08300	4162617	TDS212A08300	8,300	.3268	103	61	49	1,4	40	10
4162359	TDS202A08334	4162618	TDS212A08334	8,334	.3281	103	61	49	1,4	40	10
4162360	TDS202A08400	4162619	TDS212A08400	8,400	.3307	103	61	49	1,4	40	10
4162361	TDS202A08433	4162620	TDS212A08433	8,433	.3320	103	61	49	1,4	40	10
4162362	TDS202A08500	4162621	TDS212A08500	8,500	.3346	103	61	49	1,4	40	10
4162363	TDS202A08600	4162622	TDS212A08600	8,600	.3386	103	61	49	1,5	40	10
4162364	TDS202A08700	4162623	TDS212A08700	8,700	.3425	103	61	49	1,5	40	10
4162365	TDS202A08733	4162624	TDS212A08733	8,733	.3438	103	61	49	1,5	40	10
4162366	TDS202A08800	4162625	TDS212A08800	8,800	.3465	103	61	49	1,5	40	10
4162367	TDS202A08900	4162626	TDS212A08900	8,900	.3504	103	61	49	1,5	40	10
4162368	TDS202A09000	4162627	TDS212A09000	9,000	.3543	103	61	49	1,5	40	10
4162369	TDS202A09100	4162628	TDS212A09100	9,100	.3583	103	61	49	1,5	40	10
4162370	TDS202A09129	4162629	TDS212A09129	9,129	.3594	103	61	49	1,6	40	10
4162371	TDS202A09200	4162630	TDS212A09200	9,200	.3622	103	61	49	1,6	40	10
4162372	TDS202A09300	4162631	TDS212A09300	9,300	.3661	103	61	49	1,6	40	10
4162373	TDS202A09347	4162632	TDS212A09347	9,347	.3680	103	61	49	1,6	40	10
4162374	TDS202A09400	4162633	TDS212A09400	9,400	.3701	103	61	49	1,6	40	10
4162375	TDS202A09500	4162634	TDS212A09500	9,500	.3740	103	61	49	1,6	40	10
4162376	TDS202A09525	4162635	TDS212A09525	9,525	.3750	103	61	49	1,6	40	10
4162377	TDS202A09600	4162636	TDS212A09600	9,600	.3780	103	61	49	1,6	40	10
4162378	TDS202A09700	4162637	TDS212A09700	9,700	.3819	103	61	49	1,7	40	10
4162379	TDS202A09800	4162638	TDS212A09800	9,800	.3858	103	61	49	1,7	40	10
4162380	TDS202A09900	4162639	TDS212A09900	9,900	.3898	103	61	49	1,7	40	10

(continued)

(TDS202A • TDS212A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162381	TDS202A09921	4162640	TDS212A09921	9,921	.3906	103	61	49	1,7	40	10
4167196	TDS202A10000	4162408	TDS212A10000	10,000	.3937	103	61	49	1,7	40	10
4167198	TDS202A10100	4162409	TDS212A10100	10,100	.3976	118	71	56	1,7	45	12
4167199	TDS202A10200	4162410	TDS212A10200	10,200	.4016	118	71	56	1,7	45	12
4167200	TDS202A10300	4162411	TDS212A10300	10,300	.4055	118	71	56	1,8	45	12
4167201	TDS202A10320	4162412	TDS212A10320	10,320	.4063	118	71	56	1,8	45	12
4167202	TDS202A10400	4162423	TDS212A10400	10,400	.4094	118	71	56	1,8	45	12
4167203	TDS202A10500	4162424	TDS212A10500	10,500	.4134	118	71	56	1,8	45	12
4167204	TDS202A10600	4162425	TDS212A10600	10,600	.4173	118	71	56	1,8	45	12
4167205	TDS202A10700	4162426	TDS212A10700	10,700	.4213	118	71	56	1,8	45	12
4167206	TDS202A10716	4162427	TDS212A10716	10,716	.4219	118	71	56	1,8	45	12
4167207	TDS202A10800	4162428	TDS212A10800	10,800	.4252	118	71	56	1,8	45	12
4167208	TDS202A10900	4162429	TDS212A10900	10,900	.4291	118	71	56	1,9	45	12
4167209	TDS202A11000	4162430	TDS212A11000	11,000	.4331	118	71	56	1,9	45	12
4167210	TDS202A11100	4162431	TDS212A11100	11,100	.4370	118	71	56	1,9	45	12
4167211	TDS202A11113	4162432	TDS212A11113	11,113	.4375	118	71	56	1,9	45	12
4167212	TDS202A11200	4162433	TDS212A11200	11,200	.4409	118	71	56	1,9	45	12
4167213	TDS202A11300	4162434	TDS212A11300	11,300	.4449	118	71	56	1,9	45	12
4167214	TDS202A11400	4162435	TDS212A11400	11,400	.4488	118	71	56	2,0	45	12
4167215	TDS202A11500	4162436	TDS212A11500	11,500	.4528	118	71	56	2,0	45	12
4167216	TDS202A11509	4162437	TDS212A11509	11,509	.4531	118	71	56	2,0	45	12
4167217	TDS202A11600	4162438	TDS212A11600	11,600	.4567	118	71	56	2,0	45	12
4167218	TDS202A11700	4162439	TDS212A11700	11,700	.4606	118	71	56	2,0	45	12
4167219	TDS202A11800	4162440	TDS212A11800	11,800	.4646	118	71	56	2,0	45	12
4167220	TDS202A11900	4162441	TDS212A11900	11,900	.4685	118	71	56	2,0	45	12
4167221	TDS202A11908	4162442	TDS212A11908	11,908	.4688	118	71	56	2,0	45	12
4167222	TDS202A12000	4162443	TDS212A12000	12,000	.4724	118	71	56	2,1	45	12
4167223	TDS202A12100	4162444	TDS212A12100	12,100	.4764	124	77	60	2,1	45	14
4167224	TDS202A12200	4162445	TDS212A12200	12,200	.4803	124	77	60	2,1	45	14
4167225	TDS202A12300	4162446	TDS212A12300	12,300	.4843	124	77	60	2,1	45	14
4167226	TDS202A12304	4162447	TDS212A12304	12,304	.4844	124	77	60	2,1	45	14
4167227	TDS202A12400	4162448	TDS212A12400	12,400	.4882	124	77	60	2,1	45	14
4167228	TDS202A12500	4162449	TDS212A12500	12,500	.4921	124	77	60	2,1	45	14
4167229	TDS202A12600	4162450	TDS212A12600	12,600	.4961	124	77	60	2,2	45	14
4167230	TDS202A12700	4162451	TDS212A12700	12,700	.5000	124	77	60	2,2	45	14
4167231	TDS202A12800	4162452	TDS212A12800	12,800	.5039	124	77	60	2,2	45	14
4167232	TDS202A12900	4162453	TDS212A12900	12,900	.5079	124	77	60	2,2	45	14
4167233	TDS202A13000	4162454	TDS212A13000	13,000	.5118	124	77	60	2,2	45	14
4167234	TDS202A13096	4162455	TDS212A13096	13,096	.5156	124	77	60	2,3	45	14
4167235	TDS202A13100	4162456	TDS212A13100	13,100	.5157	124	77	60	2,3	45	14

(continued)

(TDS202A • TDS212A • 5 x D — continued)



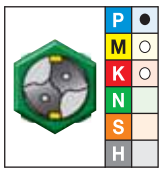


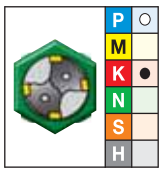
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4167236	TDS202A13200	4162457	TDS212A13200	13,200	.5197	124	77	60	2,3	45	14
4167237	TDS202A13300	4162458	TDS212A13300	13,300	.5236	124	77	60	2,3	45	14
4167238	TDS202A13400	4162459	TDS212A13400	13,400	.5276	124	77	60	2,3	45	14
4167239	TDS202A13500	4162460	TDS212A13500	13,500	.5315	124	77	60	2,3	45	14
4167240	TDS202A13600	4162461	TDS212A13600	13,600	.5354	124	77	60	2,3	45	14
4167241	TDS202A13700	4162462	TDS212A13700	13,700	.5394	124	77	60	2,4	45	14
4167242	TDS202A13800	4162463	TDS212A13800	13,800	.5433	124	77	60	2,4	45	14
4167243	TDS202A13891	4162464	TDS212A13891	13,891	.5469	124	77	60	2,4	45	14
4167244	TDS202A13900	4162465	TDS212A13900	13,900	.5472	124	77	60	2,4	45	14
4167245	TDS202A14000	4162466	TDS212A14000	14,000	.5512	124	77	60	2,4	45	14
4167246	TDS202A14100	4162467	TDS212A14100	14,100	.5551	133	83	63	2,4	48	16
4167247	TDS202A14200	4162468	TDS212A14200	14,200	.5591	133	83	63	2,5	48	16
4167248	TDS202A14288	4162469	TDS212A14288	14,288	.5625	133	83	63	2,5	48	16
4167249	TDS202A14300	4162470	TDS212A14300	14,300	.5630	133	83	63	2,5	48	16
4167250	TDS202A14400	4162471	TDS212A14400	14,400	.5669	133	83	63	2,5	48	16
4167251	TDS202A14500	4162472	TDS212A14500	14,500	.5709	133	83	63	2,5	48	16
4167252	TDS202A14600	4162473	TDS212A14600	14,600	.5748	133	83	63	2,5	48	16
4167253	TDS202A14684	4162474	TDS212A14684	14,684	.5781	133	83	63	2,5	48	16
4167254	TDS202A14700	4162475	TDS212A14700	14,700	.5787	133	83	63	2,5	48	16
4167255	TDS202A14800	4162476	TDS212A14800	14,800	.5827	133	83	63	2,6	48	16
4167256	TDS202A14900	4162477	TDS212A14900	14,900	.5866	133	83	63	2,6	48	16
4167257	TDS202A15000	4162478	TDS212A15000	15,000	.5906	133	83	63	2,6	48	16
4167258	TDS202A15083	4162479	TDS212A15083	15,083	.5938	133	83	63	2,6	48	16
4167259	TDS202A15100	4162480	TDS212A15100	15,100	.5945	133	83	63	2,6	48	16
4167260	TDS202A15200	4162481	TDS212A15200	15,200	.5984	133	83	63	2,6	48	16
4167261	TDS202A15300	4162482	TDS212A15300	15,300	.6024	133	83	63	2,6	48	16
4167262	TDS202A15400	4162483	TDS212A15400	15,400	.6063	133	83	63	2,7	48	16
4167263	TDS202A15479	4162484	TDS212A15479	15,479	.6094	133	83	63	2,7	48	16
4167264	TDS202A15500	4162485	TDS212A15500	15,500	.6102	133	83	63	2,7	48	16
4167265	TDS202A15600	4162486	TDS212A15600	15,600	.6142	133	83	63	2,7	48	16
4167266	TDS202A15700	4162487	TDS212A15700	15,700	.6181	133	83	63	2,7	48	16
4167267	TDS202A15800	4162488	TDS212A15800	15,800	.6220	133	83	63	2,7	48	16
4167268	TDS202A15875	4162489	TDS212A15875	15,875	.6250	133	83	63	2,7	48	16
4167269	TDS202A15900	4162490	TDS212A15900	15,900	.6260	133	83	63	2,8	48	16
4167270	TDS202A16000	4162491	TDS212A16000	16,000	.6299	133	83	63	2,8	48	16
4167271	TDS202A16100	4162492	TDS212A16100	16,100	.6339	143	93	71	2,8	48	18
4167272	TDS202A16200	4162493	TDS212A16200	16,200	.6378	143	93	71	2,8	48	18
4167273	TDS202A16271	4162494	TDS212A16271	16,271	.6406	143	93	71	2,8	48	18
4167274	TDS202A16300	4162495	TDS212A16300	16,300	.6417	143	93	71	2,8	48	18
4167275	TDS202A16400	4162496	TDS212A16400	16,400	.6457	143	93	71	2,8	48	18

(continued)

(TDS202A • TDS212A • 5 x D — continued)

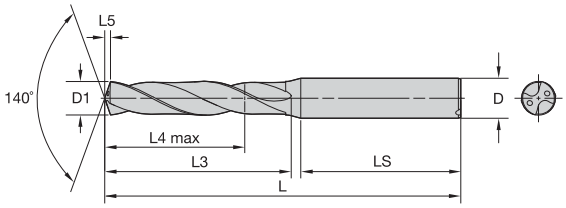


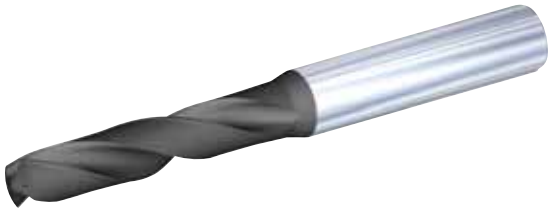


● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4167276	TDS202A16500	4162497	TDS212A16500	16,500	.6496	143	93	71	2,9	48	18
4167277	TDS202A16600	4162498	TDS212A16600	16,600	.6535	143	93	71	2,9	48	18
4167278	TDS202A16670	4162499	TDS212A16670	16,670	.6563	143	93	71	2,9	48	18
4167279	TDS202A16700	4162500	TDS212A16700	16,700	.6575	143	93	71	2,9	48	18
4167280	TDS202A16800	4162501	TDS212A16800	16,800	.6614	143	93	71	2,9	48	18
4167281	TDS202A16900	4162502	TDS212A16900	16,900	.6654	143	93	71	2,9	48	18
4167282	TDS202A17000	4162503	TDS212A17000	17,000	.6693	143	93	71	2,9	48	18
4167283	TDS202A17100	4162504	TDS212A17100	17,100	.6732	143	93	71	3,0	48	18
4167284	TDS202A17200	4162505	TDS212A17200	17,200	.6772	143	93	71	3,0	48	18
4167285	TDS202A17300	4162506	TDS212A17300	17,300	.6811	143	93	71	3,0	48	18
4167286	TDS202A17400	4162507	TDS212A17400	17,400	.6850	143	93	71	3,0	48	18
4167287	TDS202A17463	4162508	TDS212A17463	17,463	.6875	143	93	71	3,0	48	18
4167288	TDS202A17500	4162509	TDS212A17500	17,500	.6890	143	93	71	3,0	48	18
4167289	TDS202A17600	4162510	TDS212A17600	17,600	.6929	143	93	71	3,1	48	18
4167290	TDS202A17700	4162511	TDS212A17700	17,700	.6969	143	93	71	3,1	48	18
4167291	TDS202A17800	4162512	TDS212A17800	17,800	.7008	143	93	71	3,1	48	18
4167292	TDS202A17859	4162513	TDS212A17859	17,859	.7031	143	93	71	3,1	48	18
4167293	TDS202A17900	4162514	TDS212A17900	17,900	.7047	143	93	71	3,1	48	18
4163313	TDS202A18000	4160528	TDS212A18000	18,000	.7087	143	93	71	3,1	48	18
4163314	TDS202A18100	4160464	TDS212A18100	18,100	.7126	153	101	77	3,1	50	20
4163305	TDS202A18200	4160465	TDS212A18200	18,200	.7165	153	101	77	3,2	50	20
4163306	TDS202A18258	4160466	TDS212A18258	18,258	.7188	153	101	77	3,2	50	20
4163307	TDS202A18300	4160467	TDS212A18300	18,300	.7205	153	101	77	3,2	50	20
4163308	TDS202A18400	4160468	TDS212A18400	18,400	.7244	153	101	77	3,2	50	20
4163309	TDS202A18500	4160469	TDS212A18500	18,500	.7283	153	101	77	3,2	50	20
4163310	TDS202A18600	4160470	TDS212A18600	18,600	.7323	153	101	77	3,2	50	20
4163311	TDS202A18654	4160471	TDS212A18654	18,654	.7344	153	101	77	3,2	50	20
4163312	TDS202A18700	4160472	TDS212A18700	18,700	.7362	153	101	77	3,2	50	20
4163323	TDS202A18800	4160583	TDS212A18800	18,800	.7402	153	101	77	3,3	50	20
4163324	TDS202A18900	4160584	TDS212A18900	18,900	.7441	153	101	77	3,3	50	20
4163325	TDS202A19000	4160585	TDS212A19000	19,000	.7480	153	101	77	3,3	50	20
4163326	TDS202A19050	4160586	TDS212A19050	19,050	.7500	153	101	77	3,3	50	20
4163327	TDS202A19100	4160587	TDS212A19100	19,100	.7520	153	101	77	3,3	50	20
4163328	TDS202A19200	4160588	TDS212A19200	19,200	.7559	153	101	77	3,3	50	20
4163329	TDS202A19300	4160589	TDS212A19300	19,300	.7598	153	101	77	3,4	50	20
4163330	TDS202A19400	4160590	TDS212A19400	19,400	.7638	153	101	77	3,4	50	20
4163331	TDS202A19500	4160591	TDS212A19500	19,500	.7677	153	101	77	3,4	50	20
4163332	TDS202A19600	4160592	TDS212A19600	19,600	.7717	153	101	77	3,4	50	20
4163333	TDS202A19700	4160593	TDS212A19700	19,700	.7756	153	101	77	3,4	50	20
4163334	TDS202A19800	4160594	TDS212A19800	19,800	.7795	153	101	77	3,4	50	20
4163335	TDS202A19900	4160595	TDS212A19900	19,900	.7835	153	101	77	3,5	50	20
4163336	TDS202A20000	4160596	TDS212A20000	20,000	.7874	153	101	77	3,5	50	20

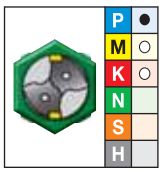


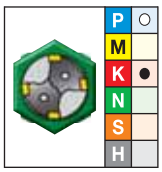




For information on L, L3, and L4 max, see page T143.

■ TDS401A • TDS411A • 3 x D





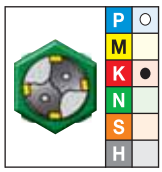
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163315	TDS401A03000	4157799	TDS411A03000	3,000	.1181	62	20	14	0,5	36	6
4163337	TDS401A03048	4157800	TDS411A03048	3,048	.1200	62	20	14	0,5	36	6
4163338	TDS401A03100	4157801	TDS411A03100	3,100	.1220	62	20	14	0,5	36	6
4163339	TDS401A03175	4157802	TDS411A03175	3,175	.1250	62	20	14	0,5	36	6
4163340	TDS401A03200	4157803	TDS411A03200	3,200	.1260	62	20	14	0,5	36	6
4163341	TDS401A03264	4157804	TDS411A03264	3,264	.1285	62	20	14	0,5	36	6
4163342	TDS401A03300	4157805	TDS411A03300	3,300	.1299	62	20	14	0,5	36	6
4163463	TDS401A03400	4157806	TDS411A03400	3,400	.1339	62	20	14	0,6	36	6
4163464	TDS401A03455	4157807	TDS411A03455	3,455	.1360	62	20	14	0,6	36	6
4163465	TDS401A03500	4157808	TDS411A03500	3,500	.1378	62	20	14	0,6	36	6
4163466	TDS401A03571	4157809	TDS411A03571	3,571	.1406	62	20	14	0,6	36	6
4163467	TDS401A03600	4157810	TDS411A03600	3,600	.1417	62	20	14	0,6	36	6
4163468	TDS401A03658	4157811	TDS411A03658	3,658	.1440	62	20	14	0,6	36	6
4163469	TDS401A03700	4157812	TDS411A03700	3,700	.1457	62	20	14	0,6	36	6
4163470	TDS401A03734	4157813	TDS411A03734	3,734	.1470	62	20	14	0,6	36	6
4163471	TDS401A03800	4157814	TDS411A03800	3,800	.1496	66	24	17	0,6	36	6
4163472	TDS401A03900	4157815	TDS411A03900	3,900	.1535	66	24	17	0,6	36	6
4163473	TDS401A03970	4157816	TDS411A03970	3,970	.1563	66	24	17	0,7	36	6
4163474	TDS401A04000	4157817	TDS411A04000	4,000	.1575	66	24	17	0,7	36	6
4163475	TDS401A04039	4157818	TDS411A04039	4,039	.1590	66	24	17	0,7	36	6
4163476	TDS401A04090	4157819	TDS411A04090	4,090	.1610	66	24	17	0,7	36	6
4163477	TDS401A04100	4157820	TDS411A04100	4,100	.1614	66	24	17	0,7	36	6
4163478	TDS401A04200	4157821	TDS411A04200	4,200	.1654	66	24	17	0,7	36	6
4163479	TDS401A04217	4157822	TDS411A04217	4,217	.1660	66	24	17	0,7	36	6

(continued)

(TDS401A • TDS411A • 3 x D — continued)



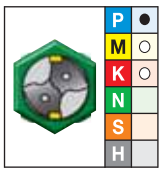


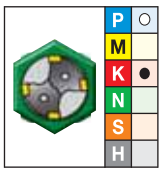
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163480	TDS401A04300	4157823	TDS411A04300	4,300	.1693	66	24	17	0,7	36	6
4163481	TDS401A04366	4157824	TDS411A04366	4,366	.1719	66	24	17	0,7	36	6
4163482	TDS401A04400	4157825	TDS411A04400	4,400	.1732	66	24	17	0,7	36	6
4163483	TDS401A04500	4157826	TDS411A04500	4,500	.1772	66	24	17	0,7	36	6
4163484	TDS401A04600	4157827	TDS411A04600	4,600	.1811	66	24	17	0,8	36	6
4163485	TDS401A04623	4157828	TDS411A04623	4,623	.1820	66	24	17	0,8	36	6
4163486	TDS401A04700	4157829	TDS411A04700	4,700	.1850	66	24	17	0,8	36	6
4163487	TDS401A04763	4157830	TDS411A04763	4,763	.1875	66	28	20	0,8	36	6
4163488	TDS401A04800	4157831	TDS411A04800	4,800	.1890	66	28	20	0,8	36	6
4163489	TDS401A04852	4157832	TDS411A04852	4,852	.1910	66	28	20	0,8	36	6
4163490	TDS401A04900	4157833	TDS411A04900	4,900	.1929	66	28	20	0,8	36	6
4163491	TDS401A05000	4157834	TDS411A05000	5,000	.1969	66	28	20	0,8	36	6
4163492	TDS401A05100	4157835	TDS411A05100	5,100	.2008	66	28	20	0,8	36	6
4163493	TDS401A05106	4157836	TDS411A05106	5,106	.2010	66	28	20	0,8	36	6
4163494	TDS401A05159	4157837	TDS411A05159	5,159	.2031	66	28	20	0,9	36	6
4163495	TDS401A05200	4157838	TDS411A05200	5,200	.2047	66	28	20	0,9	36	6
4163496	TDS401A05300	4157839	TDS411A05300	5,300	.2087	66	28	20	0,9	36	6
4163497	TDS401A05400	4157840	TDS411A05400	5,400	.2126	66	28	20	0,9	36	6
4163498	TDS401A05410	4157841	TDS411A05410	5,410	.2130	66	28	20	0,9	36	6
4163499	TDS401A05500	4157842	TDS411A05500	5,500	.2165	66	28	20	0,9	36	6
4163500	TDS401A05558	4157843	TDS411A05558	5,558	.2188	66	28	20	0,9	36	6
4163501	TDS401A05600	4157844	TDS411A05600	5,600	.2205	66	28	20	0,9	36	6
4163502	TDS401A05616	4157845	TDS411A05616	5,616	.2211	66	28	20	0,9	36	6
4163503	TDS401A05700	4157846	TDS411A05700	5,700	.2244	66	28	20	1,0	36	6
4163504	TDS401A05800	4157847	TDS411A05800	5,800	.2283	66	28	20	1,0	36	6
4163505	TDS401A05900	4157848	TDS411A05900	5,900	.2323	66	28	20	1,0	36	6
4163506	TDS401A05954	4157849	TDS411A05954	5,954	.2344	66	28	20	1,0	36	6
4163507	TDS401A06000	4157850	TDS411A06000	6,000	.2362	66	28	20	1,0	36	6
4163508	TDS401A06100	4157851	TDS411A06100	6,100	.2402	79	34	24	1,0	36	8
4163509	TDS401A06200	4157852	TDS411A06200	6,200	.2441	79	34	24	1,0	36	8
4163510	TDS401A06300	4157853	TDS411A06300	6,300	.2480	79	34	24	1,1	36	8
4163511	TDS401A06350	4157854	TDS411A06350	6,350	.2500	79	34	24	1,1	36	8
4163512	TDS401A06400	4157855	TDS411A06400	6,400	.2520	79	34	24	1,1	36	8
4163513	TDS401A06500	4157856	TDS411A06500	6,500	.2559	79	34	24	1,1	36	8
4163514	TDS401A06528	4157857	TDS411A06528	6,528	.2570	79	34	24	1,1	36	8
4163515	TDS401A06600	4157858	TDS411A06600	6,600	.2598	79	34	24	1,1	36	8
4163516	TDS401A06630	4157859	TDS411A06630	6,630	.2610	79	34	24	1,1	36	8
4163517	TDS401A06700	4157860	TDS411A06700	6,700	.2638	79	34	24	1,1	36	8
4163518	TDS401A06746	4157861	TDS411A06746	6,746	.2656	79	34	24	1,1	36	8
4163519	TDS401A06800	4157862	TDS411A06800	6,800	.2677	79	34	24	1,1	36	8

(continued)

(TDS401A • TDS411A • 3 x D — continued)





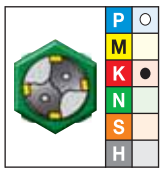
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163520	TDS401A06900	4157863	TDS411A06900	6,900	.2717	79	34	24	1,2	36	8
4163521	TDS401A07000	4157864	TDS411A07000	7,000	.2756	79	34	24	1,2	36	8
4163522	TDS401A07100	4157865	TDS411A07100	7,100	.2795	79	41	29	1,2	36	8
4163523	TDS401A07145	4157866	TDS411A07145	7,145	.2813	79	41	29	1,2	36	8
4163524	TDS401A07200	4157867	TDS411A07200	7,200	.2835	79	41	29	1,2	36	8
4163525	TDS401A07300	4157868	TDS411A07300	7,300	.2874	79	41	29	1,2	36	8
4163526	TDS401A07400	4157869	TDS411A07400	7,400	.2913	79	41	29	1,3	36	8
4163527	TDS401A07500	4157870	TDS411A07500	7,500	.2953	79	41	29	1,3	36	8
4163528	TDS401A07541	4157871	TDS411A07541	7,541	.2969	79	41	29	1,3	36	8
4163529	TDS401A07600	4157872	TDS411A07600	7,600	.2992	79	41	29	1,3	36	8
4163530	TDS401A07700	4157873	TDS411A07700	7,700	.3031	79	41	29	1,3	36	8
4163531	TDS401A07800	4157874	TDS411A07800	7,800	.3071	79	41	29	1,3	36	8
4163532	TDS401A07900	4157875	TDS411A07900	7,900	.3110	79	41	29	1,3	36	8
4163533	TDS401A07938	4157876	TDS411A07938	7,938	.3125	79	41	29	1,3	36	8
4163534	TDS401A08000	4157877	TDS411A08000	8,000	.3150	79	41	29	1,4	36	8
4163535	TDS401A08100	4157878	TDS411A08100	8,100	.3189	89	47	35	1,4	40	10
4163536	TDS401A08200	4157879	TDS411A08200	8,200	.3228	89	47	35	1,4	40	10
4163537	TDS401A08300	4157880	TDS411A08300	8,300	.3268	89	47	35	1,4	40	10
4163538	TDS401A08334	4157881	TDS411A08334	8,334	.3281	89	47	35	1,4	40	10
4163539	TDS401A08400	4157882	TDS411A08400	8,400	.3307	89	47	35	1,4	40	10
4163540	TDS401A08433	4157883	TDS411A08433	8,433	.3320	89	47	35	1,4	40	10
4163541	TDS401A08500	4157884	TDS411A08500	8,500	.3346	89	47	35	1,4	40	10
4163542	TDS401A08600	4157885	TDS411A08600	8,600	.3386	89	47	35	1,5	40	10
4163543	TDS401A08700	4157886	TDS411A08700	8,700	.3425	89	47	35	1,5	40	10
4163544	TDS401A08733	4157887	TDS411A08733	8,733	.3438	89	47	35	1,5	40	10
4163545	TDS401A08800	4157888	TDS411A08800	8,800	.3465	89	47	35	1,5	40	10
4163546	TDS401A08900	4157889	TDS411A08900	8,900	.3504	89	47	35	1,5	40	10
4163547	TDS401A09000	4157890	TDS411A09000	9,000	.3543	89	47	35	1,5	40	10
4163548	TDS401A09100	4157891	TDS411A09100	9,100	.3583	89	47	35	1,5	40	10
4163549	TDS401A09129	4157892	TDS411A09129	9,129	.3594	89	47	35	1,6	40	10
4163550	TDS401A09200	4157893	TDS411A09200	9,200	.3622	89	47	35	1,6	40	10
4163551	TDS401A09300	4157894	TDS411A09300	9,300	.3661	89	47	35	1,6	40	10
4163552	TDS401A09347	4157895	TDS411A09347	9,347	.3680	89	47	35	1,6	40	10
4163553	TDS401A09400	4157896	TDS411A09400	9,400	.3701	89	47	35	1,6	40	10
4163554	TDS401A09500	4157897	TDS411A09500	9,500	.3740	89	47	35	1,6	40	10
4163555	TDS401A09525	4157898	TDS411A09525	9,525	.3750	89	47	35	1,6	40	10
4163556	TDS401A09600	4157899	TDS411A09600	9,600	.3780	89	47	35	1,6	40	10
4163557	TDS401A09700	4157900	TDS411A09700	9,700	.3819	89	47	35	1,7	40	10
4163558	TDS401A09800	4157901	TDS411A09800	9,800	.3858	89	47	35	1,7	40	10
4163559	TDS401A09900	4157902	TDS411A09900	9,900	.3898	89	47	35	1,7	40	10

(continued)

(TDS401A • TDS411A • 3 x D — continued)



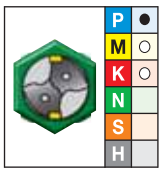


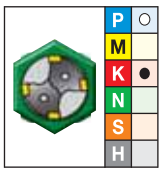
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163560	TDS401A09921	4157903	TDS411A09921	9,921	.3906	89	47	35	1,7	40	10
4162950	TDS401A10000	4156562	TDS411A10000	10,000	.3937	89	47	35	1,7	40	10
4162951	TDS401A10100	4156603	TDS411A10100	10,100	.3976	102	55	40	1,7	45	12
4162952	TDS401A10200	4156604	TDS411A10200	10,200	.4016	102	55	40	1,7	45	12
4163343	TDS401A10300	4156605	TDS411A10300	10,300	.4055	102	55	40	1,8	45	12
4163344	TDS401A10320	4156606	TDS411A10320	10,320	.4063	102	55	40	1,8	45	12
4163345	TDS401A10400	4156607	TDS411A10400	10,400	.4094	102	55	40	1,8	45	12
4163346	TDS401A10500	4156608	TDS411A10500	10,500	.4134	102	55	40	1,8	45	12
4163347	TDS401A10600	4156609	TDS411A10600	10,600	.4173	102	55	40	1,8	45	12
4163348	TDS401A10700	4156610	TDS411A10700	10,700	.4213	102	55	40	1,8	45	12
4163349	TDS401A10716	4156611	TDS411A10716	10,716	.4219	102	55	40	1,8	45	12
4163350	TDS401A10800	4156612	TDS411A10800	10,800	.4252	102	55	40	1,8	45	12
4163351	TDS401A10900	4156613	TDS411A10900	10,900	.4291	102	55	40	1,9	45	12
4163352	TDS401A11000	4156614	TDS411A11000	11,000	.4331	102	55	40	1,9	45	12
4163353	TDS401A11100	4156615	TDS411A11100	11,100	.4370	102	55	40	1,9	45	12
4163354	TDS401A11113	4156616	TDS411A11113	11,113	.4375	102	55	40	1,9	45	12
4163355	TDS401A11200	4156617	TDS411A11200	11,200	.4409	102	55	40	1,9	45	12
4163356	TDS401A11300	4156618	TDS411A11300	11,300	.4449	102	55	40	1,9	45	12
4163357	TDS401A11400	4156619	TDS411A11400	11,400	.4488	102	55	40	2,0	45	12
4163358	TDS401A11500	4156620	TDS411A11500	11,500	.4528	102	55	40	2,0	45	12
4163359	TDS401A11509	4156621	TDS411A11509	11,509	.4531	102	55	40	2,0	45	12
4163360	TDS401A11600	4156622	TDS411A11600	11,600	.4567	102	55	40	2,0	45	12
4163361	TDS401A11700	4156623	TDS411A11700	11,700	.4606	102	55	40	2,0	45	12
4163362	TDS401A11800	4156624	TDS411A11800	11,800	.4646	102	55	40	2,0	45	12
4163363	TDS401A11900	4156625	TDS411A11900	11,900	.4685	102	55	40	2,0	45	12
4163364	TDS401A11908	4156626	TDS411A11908	11,908	.4688	102	55	40	2,0	45	12
4163365	TDS401A12000	4156627	TDS411A12000	12,000	.4724	102	55	40	2,1	45	12
4163366	TDS401A12100	4156628	TDS411A12100	12,100	.4764	107	60	43	2,1	45	14
4163367	TDS401A12200	4156629	TDS411A12200	12,200	.4803	107	60	43	2,1	45	14
4163368	TDS401A12300	4156630	TDS411A12300	12,300	.4843	107	60	43	2,1	45	14
4163369	TDS401A12304	4156631	TDS411A12304	12,304	.4844	107	60	43	2,1	45	14
4163370	TDS401A12400	4156632	TDS411A12400	12,400	.4882	107	60	43	2,1	45	14
4163371	TDS401A12500	4156633	TDS411A12500	12,500	.4921	107	60	43	2,1	45	14
4163372	TDS401A12600	4156634	TDS411A12600	12,600	.4961	107	60	43	2,2	45	14
4163373	TDS401A12700	4156635	TDS411A12700	12,700	.5000	107	60	43	2,2	45	14
4163374	TDS401A12800	4156636	TDS411A12800	12,800	.5039	107	60	43	2,2	45	14
4163375	TDS401A12900	4156637	TDS411A12900	12,900	.5079	107	60	43	2,2	45	14
4163376	TDS401A13000	4156638	TDS411A13000	13,000	.5118	107	60	43	2,2	45	14
4163377	TDS401A13096	4156639	TDS411A13096	13,096	.5156	107	60	43	2,3	45	14
4163378	TDS401A13100	4156640	TDS411A13100	13,100	.5157	107	60	43	2,3	45	14

(continued)

(TDS401A • TDS411A • 3 x D — continued)





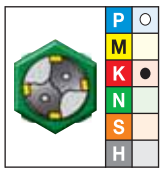
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163379	TDS401A13200	4156641	TDS411A13200	13,200	.5197	107	60	43	2,3	45	14
4163380	TDS401A13300	4156642	TDS411A13300	13,300	.5236	107	60	43	2,3	45	14
4163381	TDS401A13400	4156643	TDS411A13400	13,400	.5276	107	60	43	2,3	45	14
4163382	TDS401A13500	4156644	TDS411A13500	13,500	.5315	107	60	43	2,3	45	14
4163383	TDS401A13600	4156645	TDS411A13600	13,600	.5354	107	60	43	2,3	45	14
4163384	TDS401A13700	4156646	TDS411A13700	13,700	.5394	107	60	43	2,4	45	14
4163385	TDS401A13800	4156647	TDS411A13800	13,800	.5433	107	60	43	2,4	45	14
4163386	TDS401A13891	4156648	TDS411A13891	13,891	.5469	107	60	43	2,4	45	14
4163387	TDS401A13900	4156649	TDS411A13900	13,900	.5472	107	60	43	2,4	45	14
4163388	TDS401A14000	4156650	TDS411A14000	14,000	.5512	107	60	43	2,4	45	14
4163389	TDS401A14100	4156651	TDS411A14100	14,100	.5551	115	65	45	2,4	48	16
4163390	TDS401A14200	4156652	TDS411A14200	14,200	.5591	115	65	45	2,5	48	16
4163391	TDS401A14288	4156653	TDS411A14288	14,288	.5625	115	65	45	2,5	48	16
4163392	TDS401A14300	4156654	TDS411A14300	14,300	.5630	115	65	45	2,5	48	16
4163393	TDS401A14400	4156655	TDS411A14400	14,400	.5669	115	65	45	2,5	48	16
4163394	TDS401A14500	4156656	TDS411A14500	14,500	.5709	115	65	45	2,5	48	16
4163395	TDS401A14600	4156657	TDS411A14600	14,600	.5748	115	65	45	2,5	48	16
4163396	TDS401A14684	4156658	TDS411A14684	14,684	.5781	115	65	45	2,5	48	16
4163397	TDS401A14700	4156659	TDS411A14700	14,700	.5787	115	65	45	2,5	48	16
4163398	TDS401A14800	4156660	TDS411A14800	14,800	.5827	115	65	45	2,6	48	16
4163399	TDS401A14900	4156661	TDS411A14900	14,900	.5866	115	65	45	2,6	48	16
4163400	TDS401A15000	4156662	TDS411A15000	15,000	.5906	115	65	45	2,6	48	16
4163401	TDS401A15083	4156663	TDS411A15083	15,083	.5938	115	65	45	2,6	48	16
4163402	TDS401A15100	4156664	TDS411A15100	15,100	.5945	115	65	45	2,6	48	16
4163403	TDS401A15200	4156665	TDS411A15200	15,200	.5984	115	65	45	2,6	48	16
4163404	TDS401A15300	4156666	TDS411A15300	15,300	.6024	115	65	45	2,6	48	16
4163405	TDS401A15400	4156667	TDS411A15400	15,400	.6063	115	65	45	2,7	48	16
4163406	TDS401A15479	4156668	TDS411A15479	15,479	.6094	115	65	45	2,7	48	16
4163407	TDS401A15500	4156669	TDS411A15500	15,500	.6102	115	65	45	2,7	48	16
4163408	TDS401A15600	4156670	TDS411A15600	15,600	.6142	115	65	45	2,7	48	16
4163409	TDS401A15700	4156671	TDS411A15700	15,700	.6181	115	65	45	2,7	48	16
4163410	TDS401A15800	4156672	TDS411A15800	15,800	.6220	115	65	45	2,7	48	16
4163411	TDS401A15875	4156673	TDS411A15875	15,875	.6250	115	65	45	2,7	48	16
4163412	TDS401A15900	4156674	TDS411A15900	15,900	.6260	115	65	45	2,8	48	16
4163413	TDS401A16000	4156675	TDS411A16000	16,000	.6299	115	65	45	2,8	48	16
4163414	TDS401A16100	4156676	TDS411A16100	16,100	.6339	123	73	51	2,8	48	18
4163415	TDS401A16200	4156677	TDS411A16200	16,200	.6378	123	73	51	2,8	48	18
4163416	TDS401A16271	4156678	TDS411A16271	16,271	.6406	123	73	51	2,8	48	18
4163417	TDS401A16300	4156679	TDS411A16300	16,300	.6417	123	73	51	2,8	48	18
4163418	TDS401A16400	4156680	TDS411A16400	16,400	.6457	123	73	51	2,8	48	18

(continued)

(TDS401A • TDS411A • 3 x D — continued)

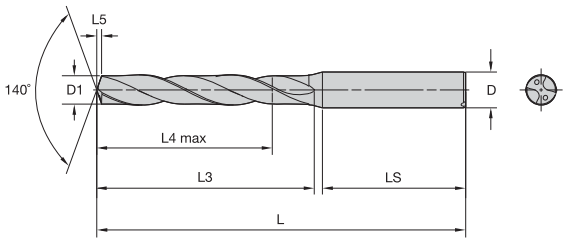




● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163419	TDS401A16500	4156681	TDS411A16500	16,500	.6496	123	73	51	2,9	48	18
4163420	TDS401A16600	4156682	TDS411A16600	16,600	.6535	123	73	51	2,9	48	18
4163421	TDS401A16670	4156683	TDS411A16670	16,670	.6563	123	73	51	2,9	48	18
4163422	TDS401A16700	4156684	TDS411A16700	16,700	.6575	123	73	51	2,9	48	18
4163423	TDS401A16800	4156685	TDS411A16800	16,800	.6614	123	73	51	2,9	48	18
4163424	TDS401A16900	4156686	TDS411A16900	16,900	.6654	123	73	51	2,9	48	18
4163425	TDS401A17000	4156687	TDS411A17000	17,000	.6693	123	73	51	2,9	48	18
4163426	TDS401A17100	4156688	TDS411A17100	17,100	.6732	123	73	51	3,0	48	18
4163427	TDS401A17200	4156689	TDS411A17200	17,200	.6772	123	73	51	3,0	48	18
4163428	TDS401A17300	4156690	TDS411A17300	17,300	.6811	123	73	51	3,0	48	18
4163429	TDS401A17400	4156691	TDS411A17400	17,400	.6850	123	73	51	3,0	48	18
4163430	TDS401A17463	4156692	TDS411A17463	17,463	.6875	123	73	51	3,0	48	18
4163431	TDS401A17500	4156693	TDS411A17500	17,500	.6890	123	73	51	3,0	48	18
4163432	TDS401A17600	4156694	TDS411A17600	17,600	.6929	123	73	51	3,1	48	18
4163433	TDS401A17700	4156695	TDS411A17700	17,700	.6969	123	73	51	3,1	48	18
4163434	TDS401A17800	4156696	TDS411A17800	17,800	.7008	123	73	51	3,1	48	18
4163435	TDS401A17859	4156697	TDS411A17859	17,859	.7031	123	73	51	3,1	48	18
4163436	TDS401A17900	4156698	TDS411A17900	17,900	.7047	123	73	51	3,1	48	18
4163271	TDS401A18000	4156699	TDS411A18000	18,000	.7087	123	73	51	3,1	48	18
4163272	TDS401A18100	4156700	TDS411A18100	18,100	.7126	131	79	55	3,1	50	20
4163283	TDS401A18200	4156701	TDS411A18200	18,200	.7165	131	79	55	3,2	50	20
4163284	TDS401A18258	4156702	TDS411A18258	18,258	.7188	131	79	55	3,2	50	20
4163285	TDS401A18300	4156713	TDS411A18300	18,300	.7205	131	79	55	3,2	50	20
4163286	TDS401A18400	4156714	TDS411A18400	18,400	.7244	131	79	55	3,2	50	20
4163287	TDS401A18500	4156715	TDS411A18500	18,500	.7283	131	79	55	3,2	50	20
4163288	TDS401A18600	4156716	TDS411A18600	18,600	.7323	131	79	55	3,2	50	20
4163289	TDS401A18654	4156717	TDS411A18654	18,654	.7344	131	79	55	3,2	50	20
4163290	TDS401A18700	4156718	TDS411A18700	18,700	.7362	131	79	55	3,2	50	20
4163291	TDS401A18800	4156719	TDS411A18800	18,800	.7402	131	79	55	3,3	50	20
4163292	TDS401A18900	4156720	TDS411A18900	18,900	.7441	131	79	55	3,3	50	20
4163293	TDS401A19000	4156721	TDS411A19000	19,000	.7480	131	79	55	3,3	50	20
4163294	TDS401A19050	4156722	TDS411A19050	19,050	.7500	131	79	55	3,3	50	20
4163295	TDS401A19100	4156723	TDS411A19100	19,100	.7520	131	79	55	3,3	50	20
4163296	TDS401A19200	4156724	TDS411A19200	19,200	.7559	131	79	55	3,3	50	20
4163297	TDS401A19300	4156725	TDS411A19300	19,300	.7598	131	79	55	3,4	50	20
4163298	TDS401A19400	4156726	TDS411A19400	19,400	.7638	131	79	55	3,4	50	20
4163299	TDS401A19500	4156727	TDS411A19500	19,500	.7677	131	79	55	3,4	50	20
4163300	TDS401A19600	4156728	TDS411A19600	19,600	.7717	131	79	55	3,4	50	20
4163301	TDS401A19700	4156729	TDS411A19700	19,700	.7756	131	79	55	3,4	50	20
4163302	TDS401A19800	4156730	TDS411A19800	19,800	.7795	131	79	55	3,4	50	20
4163303	TDS401A19900	4156731	TDS411A19900	19,900	.7835	131	79	55	3,5	50	20
4163304	TDS401A20000	4156732	TDS411A20000	20,000	.7874	131	79	55	3,5	50	20



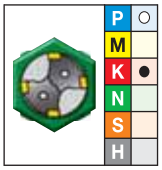




For information on L, L3, and L4 max, see page T143.

■ TDS402A • TDS412A • 5 x D



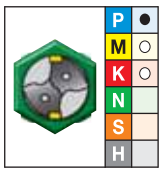


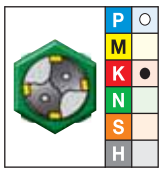
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162967	TDS402A03000	4158757	TDS412A03000	3,000	.1181	66	28	23	0,5	36	6
4162968	TDS402A03048	4158758	TDS412A03048	3,048	.1200	66	28	23	0,5	36	6
4162969	TDS402A03100	4158759	TDS412A03100	3,100	.1220	66	28	23	0,5	36	6
4162970	TDS402A03175	4158760	TDS412A03175	3,175	.1250	66	28	23	0,5	36	6
4162972	TDS402A03200	4158761	TDS412A03200	3,200	.1260	66	28	23	0,5	36	6
4162983	TDS402A03264	4158762	TDS412A03264	3,264	.1285	66	28	23	0,5	36	6
4162984	TDS402A03300	4158793	TDS412A03300	3,300	.1299	66	28	23	0,5	36	6
4162985	TDS402A03400	4158794	TDS412A03400	3,400	.1339	66	28	23	0,6	36	6
4162986	TDS402A03455	4158795	TDS412A03455	3,455	.1360	66	28	23	0,6	36	6
4162987	TDS402A03500	4158796	TDS412A03500	3,500	.1378	66	28	23	0,6	36	6
4162988	TDS402A03571	4158797	TDS412A03571	3,571	.1406	66	28	23	0,6	36	6
4162989	TDS402A03600	4158798	TDS412A03600	3,600	.1417	66	28	23	0,6	36	6
4162990	TDS402A03658	4158799	TDS412A03658	3,658	.1440	66	28	23	0,6	36	6
4162991	TDS402A03700	4158800	TDS412A03700	3,700	.1457	66	28	23	0,6	36	6
4162992	TDS402A03734	4158801	TDS412A03734	3,734	.1470	66	28	23	0,6	36	6
4162993	TDS402A03800	4158802	TDS412A03800	3,800	.1496	74	36	29	0,6	36	6
4162994	TDS402A03900	4158803	TDS412A03900	3,900	.1535	74	36	29	0,6	36	6
4162995	TDS402A03970	4158804	TDS412A03970	3,970	.1563	74	36	29	0,7	36	6
4162996	TDS402A04000	4158805	TDS412A04000	4,000	.1575	74	36	29	0,7	36	6
4162997	TDS402A04039	4158806	TDS412A04039	4,039	.1590	74	36	29	0,7	36	6
4162998	TDS402A04090	4158807	TDS412A04090	4,090	.1610	74	36	29	0,7	36	6
4162999	TDS402A04100	4158808	TDS412A04100	4,100	.1614	74	36	29	0,7	36	6
4163000	TDS402A04200	4158809	TDS412A04200	4,200	.1654	74	36	29	0,7	36	6
4163001	TDS402A04217	4158810	TDS412A04217	4,217	.1660	74	36	29	0,7	36	6

(continued)

(TDS402A • TDS412A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163002	TDS402A04300	4158811	TDS412A04300	4,300	.1693	74	36	29	0,7	36	6
4163013	TDS402A04366	4158812	TDS412A04366	4,366	.1719	74	36	29	0,7	36	6
4163014	TDS402A04400	4158813	TDS412A04400	4,400	.1732	74	36	29	0,7	36	6
4163015	TDS402A04500	4158814	TDS412A04500	4,500	.1772	74	36	29	0,7	36	6
4163016	TDS402A04600	4158815	TDS412A04600	4,600	.1811	74	36	29	0,8	36	6
4163017	TDS402A04623	4158816	TDS412A04623	4,623	.1820	74	36	29	0,8	36	6
4163018	TDS402A04700	4158817	TDS412A04700	4,700	.1850	74	36	29	0,8	36	6
4163019	TDS402A04763	4158818	TDS412A04763	4,763	.1875	82	44	35	0,8	36	6
4163020	TDS402A04800	4158819	TDS412A04800	4,800	.1890	82	44	35	0,8	36	6
4163021	TDS402A04852	4158820	TDS412A04852	4,852	.1910	82	44	35	0,8	36	6
4163022	TDS402A04900	4158821	TDS412A04900	4,900	.1929	82	44	35	0,8	36	6
4163023	TDS402A05000	4158822	TDS412A05000	5,000	.1969	82	44	35	0,8	36	6
4163024	TDS402A05100	4158823	TDS412A05100	5,100	.2008	82	44	35	0,8	36	6
4163025	TDS402A05106	4158824	TDS412A05106	5,106	.2010	82	44	35	0,8	36	6
4163026	TDS402A05159	4158825	TDS412A05159	5,159	.2031	82	44	35	0,9	36	6
4163027	TDS402A05200	4158826	TDS412A05200	5,200	.2047	82	44	35	0,9	36	6
4163028	TDS402A05300	4158827	TDS412A05300	5,300	.2087	82	44	35	0,9	36	6
4163029	TDS402A05400	4158828	TDS412A05400	5,400	.2126	82	44	35	0,9	36	6
4163030	TDS402A05410	4158829	TDS412A05410	5,410	.2130	82	44	35	0,9	36	6
4163031	TDS402A05500	4158830	TDS412A05500	5,500	.2165	82	44	35	0,9	36	6
4163032	TDS402A05558	4158831	TDS412A05558	5,558	.2188	82	44	35	0,9	36	6
4163034	TDS402A05600	4158832	TDS412A05600	5,600	.2205	82	44	35	0,9	36	6
4163035	TDS402A05616	4158833	TDS412A05616	5,616	.2211	82	44	35	0,9	36	6
4163036	TDS402A05700	4158834	TDS412A05700	5,700	.2244	82	44	35	1,0	36	6
4163037	TDS402A05800	4158835	TDS412A05800	5,800	.2283	82	44	35	1,0	36	6
4163038	TDS402A05900	4158836	TDS412A05900	5,900	.2323	82	44	35	1,0	36	6
4163039	TDS402A05954	4158837	TDS412A05954	5,954	.2344	82	44	35	1,0	36	6
4163040	TDS402A06000	4158838	TDS412A06000	6,000	.2362	82	44	35	1,0	36	6
4163041	TDS402A06100	4158839	TDS412A06100	6,100	.2402	91	53	43	1,0	36	8
4163042	TDS402A06200	4158840	TDS412A06200	6,200	.2441	91	53	43	1,0	36	8
4163043	TDS402A06300	4158841	TDS412A06300	6,300	.2480	91	53	43	1,1	36	8
4163044	TDS402A06350	4158842	TDS412A06350	6,350	.2500	91	53	43	1,1	36	8
4163045	TDS402A06400	4158843	TDS412A06400	6,400	.2520	91	53	43	1,1	36	8
4163046	TDS402A06500	4158844	TDS412A06500	6,500	.2559	91	53	43	1,1	36	8
4163047	TDS402A06528	4158845	TDS412A06528	6,528	.2570	91	53	43	1,1	36	8
4163048	TDS402A06600	4158846	TDS412A06600	6,600	.2598	91	53	43	1,1	36	8
4163049	TDS402A06630	4158847	TDS412A06630	6,630	.2610	91	53	43	1,1	36	8
4163050	TDS402A06700	4158848	TDS412A06700	6,700	.2638	91	53	43	1,1	36	8
4163051	TDS402A06746	4158849	TDS412A06746	6,746	.2656	91	53	43	1,1	36	8
4163052	TDS402A06800	4158850	TDS412A06800	6,800	.2677	91	53	43	1,1	36	8

(continued)

(TDS402A • TDS412A • 5 x D — continued)



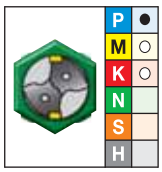


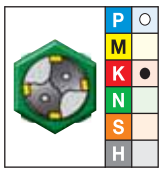
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163053	TDS402A06900	4158851	TDS412A06900	6,900	.2717	91	53	43	1,2	36	8
4163054	TDS402A07000	4158852	TDS412A07000	7,000	.2756	91	53	43	1,2	36	8
4163055	TDS402A07100	4158853	TDS412A07100	7,100	.2795	91	53	43	1,2	36	8
4163056	TDS402A07145	4158854	TDS412A07145	7,145	.2813	91	53	43	1,2	36	8
4163057	TDS402A07200	4158855	TDS412A07200	7,200	.2835	91	53	43	1,2	36	8
4163058	TDS402A07300	4158856	TDS412A07300	7,300	.2874	91	53	43	1,2	36	8
4163059	TDS402A07400	4158857	TDS412A07400	7,400	.2913	91	53	43	1,3	36	8
4163060	TDS402A07500	4158858	TDS412A07500	7,500	.2953	91	53	43	1,3	36	8
4163061	TDS402A07541	4158859	TDS412A07541	7,541	.2969	91	53	43	1,3	36	8
4163062	TDS402A07600	4158860	TDS412A07600	7,600	.2992	91	53	43	1,3	36	8
4163063	TDS402A07700	4158861	TDS412A07700	7,700	.3031	91	53	43	1,3	36	8
4163064	TDS402A07800	4158862	TDS412A07800	7,800	.3071	91	53	43	1,3	36	8
4163065	TDS402A07900	4158863	TDS412A07900	7,900	.3110	91	53	43	1,3	36	8
4163066	TDS402A07938	4158864	TDS412A07938	7,938	.3125	91	53	43	1,3	36	8
4163067	TDS402A08000	4158865	TDS412A08000	8,000	.3150	91	53	43	1,4	36	8
4163068	TDS402A08100	4158866	TDS412A08100	8,100	.3189	103	61	49	1,4	40	10
4163069	TDS402A08200	4158867	TDS412A08200	8,200	.3228	103	61	49	1,4	40	10
4163070	TDS402A08300	4158868	TDS412A08300	8,300	.3268	103	61	49	1,4	40	10
4163071	TDS402A08334	4158869	TDS412A08334	8,334	.3281	103	61	49	1,4	40	10
4163072	TDS402A08400	4158870	TDS412A08400	8,400	.3307	103	61	49	1,4	40	10
4163073	TDS402A08433	4158871	TDS412A08433	8,433	.3320	103	61	49	1,4	40	10
4163074	TDS402A08500	4158872	TDS412A08500	8,500	.3346	103	61	49	1,4	40	10
4163075	TDS402A08600	4158873	TDS412A08600	8,600	.3386	103	61	49	1,5	40	10
4163077	TDS402A08700	4158874	TDS412A08700	8,700	.3425	103	61	49	1,5	40	10
4163078	TDS402A08733	4158875	TDS412A08733	8,733	.3438	103	61	49	1,5	40	10
4163079	TDS402A08800	4158876	TDS412A08800	8,800	.3465	103	61	49	1,5	40	10
4163080	TDS402A08900	4158877	TDS412A08900	8,900	.3504	103	61	49	1,5	40	10
4163081	TDS402A09000	4158878	TDS412A09000	9,000	.3543	103	61	49	1,5	40	10
4163082	TDS402A09100	4158879	TDS412A09100	9,100	.3583	103	61	49	1,5	40	10
4163083	TDS402A09129	4158880	TDS412A09129	9,129	.3594	103	61	49	1,6	40	10
4163084	TDS402A09200	4158881	TDS412A09200	9,200	.3622	103	61	49	1,6	40	10
4163085	TDS402A09300	4158882	TDS412A09300	9,300	.3661	103	61	49	1,6	40	10
4163086	TDS402A09347	4158883	TDS412A09347	9,347	.3680	103	61	49	1,6	40	10
4163087	TDS402A09400	4158884	TDS412A09400	9,400	.3701	103	61	49	1,6	40	10
4163088	TDS402A09500	4158885	TDS412A09500	9,500	.3740	103	61	49	1,6	40	10
4163089	TDS402A09525	4158886	TDS412A09525	9,525	.3750	103	61	49	1,6	40	10
4163090	TDS402A09600	4158887	TDS412A09600	9,600	.3780	103	61	49	1,6	40	10
4163091	TDS402A09700	4158888	TDS412A09700	9,700	.3819	103	61	49	1,7	40	10
4163092	TDS402A09800	4158889	TDS412A09800	9,800	.3858	103	61	49	1,7	40	10
4163093	TDS402A09900	4158890	TDS412A09900	9,900	.3898	103	61	49	1,7	40	10

(continued)

(TDS402A • TDS412A • 5 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163094	TDS402A09921	4158891	TDS412A09921	9,921	.3906	103	61	49	1,7	40	10
4162803	TDS402A10000	4156602	TDS412A10000	10,000	.3937	103	61	49	1,7	40	10
4162804	TDS402A10100	4156733	TDS412A10100	10,100	.3976	118	71	56	1,7	45	12
4162805	TDS402A10200	4156734	TDS412A10200	10,200	.4016	118	71	56	1,7	45	12
4162806	TDS402A10300	4156735	TDS412A10300	10,300	.4055	118	71	56	1,8	45	12
4162807	TDS402A10320	4156736	TDS412A10320	10,320	.4063	118	71	56	1,8	45	12
4162808	TDS402A10400	4156737	TDS412A10400	10,400	.4094	118	71	56	1,8	45	12
4162809	TDS402A10500	4156738	TDS412A10500	10,500	.4134	118	71	56	1,8	45	12
4162810	TDS402A10600	4156739	TDS412A10600	10,600	.4173	118	71	56	1,8	45	12
4162811	TDS402A10700	4156740	TDS412A10700	10,700	.4213	118	71	56	1,8	45	12
4162812	TDS402A10716	4156741	TDS412A10716	10,716	.4219	118	71	56	1,8	45	12
4162813	TDS402A10800	4156742	TDS412A10800	10,800	.4252	118	71	56	1,8	45	12
4162814	TDS402A10900	4156743	TDS412A10900	10,900	.4291	118	71	56	1,9	45	12
4162815	TDS402A11000	4156744	TDS412A11000	11,000	.4331	118	71	56	1,9	45	12
4162816	TDS402A11100	4156745	TDS412A11100	11,100	.4370	118	71	56	1,9	45	12
4162817	TDS402A11113	4156746	TDS412A11113	11,113	.4375	118	71	56	1,9	45	12
4162818	TDS402A11200	4156747	TDS412A11200	11,200	.4409	118	71	56	1,9	45	12
4162819	TDS402A11300	4156748	TDS412A11300	11,300	.4449	118	71	56	1,9	45	12
4162820	TDS402A11400	4156749	TDS412A11400	11,400	.4488	118	71	56	2,0	45	12
4162821	TDS402A11500	4156750	TDS412A11500	11,500	.4528	118	71	56	2,0	45	12
4162822	TDS402A11509	4156751	TDS412A11509	11,509	.4531	118	71	56	2,0	45	12
4162823	TDS402A11600	4156752	TDS412A11600	11,600	.4567	118	71	56	2,0	45	12
4162824	TDS402A11700	4156753	TDS412A11700	11,700	.4606	118	71	56	2,0	45	12
4162825	TDS402A11800	4156754	TDS412A11800	11,800	.4646	118	71	56	2,0	45	12
4162826	TDS402A11900	4156755	TDS412A11900	11,900	.4685	118	71	56	2,0	45	12
4162827	TDS402A11908	4156756	TDS412A11908	11,908	.4688	118	71	56	2,0	45	12
4162828	TDS402A12000	4156757	TDS412A12000	12,000	.4724	118	71	56	2,1	45	12
4162829	TDS402A12100	4156758	TDS412A12100	12,100	.4764	124	77	60	2,1	45	14
4162830	TDS402A12200	4156759	TDS412A12200	12,200	.4803	124	77	60	2,1	45	14
4162831	TDS402A12300	4156760	TDS412A12300	12,300	.4843	124	77	60	2,1	45	14
4162832	TDS402A12304	4156761	TDS412A12304	12,304	.4844	124	77	60	2,1	45	14
4162833	TDS402A12400	4156762	TDS412A12400	12,400	.4882	124	77	60	2,1	45	14
4162834	TDS402A12500	4156763	TDS412A12500	12,500	.4921	124	77	60	2,1	45	14
4162835	TDS402A12600	4156764	TDS412A12600	12,600	.4961	124	77	60	2,2	45	14
4162836	TDS402A12700	4156765	TDS412A12700	12,700	.5000	124	77	60	2,2	45	14
4162837	TDS402A12800	4156766	TDS412A12800	12,800	.5039	124	77	60	2,2	45	14
4162838	TDS402A12900	4156767	TDS412A12900	12,900	.5079	124	77	60	2,2	45	14
4162839	TDS402A13000	4156768	TDS412A13000	13,000	.5118	124	77	60	2,2	45	14
4162840	TDS402A13096	4156769	TDS412A13096	13,096	.5156	124	77	60	2,3	45	14
4162841	TDS402A13100	4156770	TDS412A13100	13,100	.5157	124	77	60	2,3	45	14

(continued)

(TDS402A • TDS412A • 5 x D — continued)



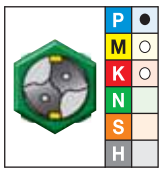


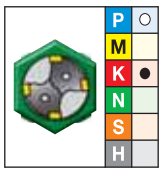
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162842	TDS402A13200	4156771	TDS412A13200	13,200	.5197	124	77	60	2,3	45	14
4162843	TDS402A13300	4156772	TDS412A13300	13,300	.5236	124	77	60	2,3	45	14
4162844	TDS402A13400	4156773	TDS412A13400	13,400	.5276	124	77	60	2,3	45	14
4162845	TDS402A13500	4156774	TDS412A13500	13,500	.5315	124	77	60	2,3	45	14
4162846	TDS402A13600	4156775	TDS412A13600	13,600	.5354	124	77	60	2,3	45	14
4162847	TDS402A13700	4156776	TDS412A13700	13,700	.5394	124	77	60	2,4	45	14
4162848	TDS402A13800	4156777	TDS412A13800	13,800	.5433	124	77	60	2,4	45	14
4162849	TDS402A13891	4156778	TDS412A13891	13,891	.5469	124	77	60	2,4	45	14
4162850	TDS402A13900	4156779	TDS412A13900	13,900	.5472	124	77	60	2,4	45	14
4162851	TDS402A14000	4156780	TDS412A14000	14,000	.5512	124	77	60	2,4	45	14
4162852	TDS402A14100	4156781	TDS412A14100	14,100	.5551	133	83	63	2,4	48	16
4162853	TDS402A14200	4156782	TDS412A14200	14,200	.5591	133	83	63	2,5	48	16
4162854	TDS402A14288	4156783	TDS412A14288	14,288	.5625	133	83	63	2,5	48	16
4162855	TDS402A14300	4156784	TDS412A14300	14,300	.5630	133	83	63	2,5	48	16
4162856	TDS402A14400	4156785	TDS412A14400	14,400	.5669	133	83	63	2,5	48	16
4162857	TDS402A14500	4156786	TDS412A14500	14,500	.5709	133	83	63	2,5	48	16
4162858	TDS402A14600	4156787	TDS412A14600	14,600	.5748	133	83	63	2,5	48	16
4162859	TDS402A14684	4156788	TDS412A14684	14,684	.5781	133	83	63	2,5	48	16
4162860	TDS402A14700	4156789	TDS412A14700	14,700	.5787	133	83	63	2,5	48	16
4162861	TDS402A14800	4156790	TDS412A14800	14,800	.5827	133	83	63	2,6	48	16
4162862	TDS402A14900	4156791	TDS412A14900	14,900	.5866	133	83	63	2,6	48	16
4162863	TDS402A15000	4156792	TDS412A15000	15,000	.5906	133	83	63	2,6	48	16
4162864	TDS402A15083	4156793	TDS412A15083	15,083	.5938	133	83	63	2,6	48	16
4162865	TDS402A15100	4156794	TDS412A15100	15,100	.5945	133	83	63	2,6	48	16
4162866	TDS402A15200	4156795	TDS412A15200	15,200	.5984	133	83	63	2,6	48	16
4162867	TDS402A15300	4156796	TDS412A15300	15,300	.6024	133	83	63	2,6	48	16
4162868	TDS402A15400	4156797	TDS412A15400	15,400	.6063	133	83	63	2,7	48	16
4162869	TDS402A15479	4156798	TDS412A15479	15,479	.6094	133	83	63	2,7	48	16
4162870	TDS402A15500	4156799	TDS412A15500	15,500	.6102	133	83	63	2,7	48	16
4162871	TDS402A15600	4156800	TDS412A15600	15,600	.6142	133	83	63	2,7	48	16
4162872	TDS402A15700	4156801	TDS412A15700	15,700	.6181	133	83	63	2,7	48	16
4162873	TDS402A15800	4156802	TDS412A15800	15,800	.6220	133	83	63	2,7	48	16
4162874	TDS402A15875	4156803	TDS412A15875	15,875	.6250	133	83	63	2,7	48	16
4162875	TDS402A15900	4156804	TDS412A15900	15,900	.6260	133	83	63	2,8	48	16
4162876	TDS402A16000	4156805	TDS412A16000	16,000	.6299	133	83	63	2,8	48	16
4162877	TDS402A16100	4156806	TDS412A16100	16,100	.6339	143	93	71	2,8	48	18
4162878	TDS402A16200	4156807	TDS412A16200	16,200	.6378	143	93	71	2,8	48	18
4162879	TDS402A16271	4156808	TDS412A16271	16,271	.6406	143	93	71	2,8	48	18
4162880	TDS402A16300	4156809	TDS412A16300	16,300	.6417	143	93	71	2,8	48	18
4162881	TDS402A16400	4156810	TDS412A16400	16,400	.6457	143	93	71	2,8	48	18

(continued)

(TDS402A • TDS412A • 5 x D — continued)

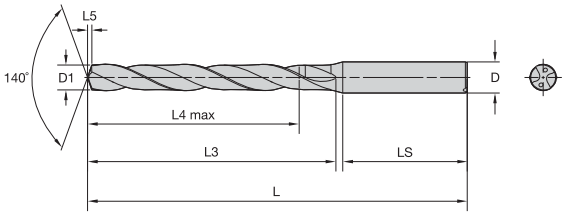




● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162882	TDS402A16500	4156811	TDS412A16500	16,500	.6496	143	93	71	2,9	48	18
4162883	TDS402A16600	4156812	TDS412A16600	16,600	.6535	143	93	71	2,9	48	18
4162884	TDS402A16670	4156813	TDS412A16670	16,670	.6563	143	93	71	2,9	48	18
4162885	TDS402A16700	4156814	TDS412A16700	16,700	.6575	143	93	71	2,9	48	18
4162886	TDS402A16800	4156815	TDS412A16800	16,800	.6614	143	93	71	2,9	48	18
4162887	TDS402A16900	4156816	TDS412A16900	16,900	.6654	143	93	71	2,9	48	18
4162888	TDS402A17000	4156817	TDS412A17000	17,000	.6693	143	93	71	2,9	48	18
4162889	TDS402A17100	4156818	TDS412A17100	17,100	.6732	143	93	71	3,0	48	18
4162890	TDS402A17200	4156819	TDS412A17200	17,200	.6772	143	93	71	3,0	48	18
4162891	TDS402A17300	4156820	TDS412A17300	17,300	.6811	143	93	71	3,0	48	18
4162892	TDS402A17400	4156821	TDS412A17400	17,400	.6850	143	93	71	3,0	48	18
4162893	TDS402A17463	4156822	TDS412A17463	17,463	.6875	143	93	71	3,0	48	18
4162894	TDS402A17500	4156823	TDS412A17500	17,500	.6890	143	93	71	3,0	48	18
4162895	TDS402A17600	4156824	TDS412A17600	17,600	.6929	143	93	71	3,1	48	18
4162896	TDS402A17700	4156825	TDS412A17700	17,700	.6969	143	93	71	3,1	48	18
4162897	TDS402A17800	4156826	TDS412A17800	17,800	.7008	143	93	71	3,1	48	18
4162898	TDS402A17859	4156827	TDS412A17859	17,859	.7031	143	93	71	3,1	48	18
4162899	TDS402A17900	4156828	TDS412A17900	17,900	.7047	143	93	71	3,1	48	18
4162274	TDS402A18000	4156853	TDS412A18000	18,000	.7087	143	93	71	3,1	48	18
4162275	TDS402A18100	4156854	TDS412A18100	18,100	.7126	153	101	77	3,1	50	20
4162276	TDS402A18200	4156855	TDS412A18200	18,200	.7165	153	101	77	3,2	50	20
4162277	TDS402A18258	4156856	TDS412A18258	18,258	.7188	153	101	77	3,2	50	20
4162278	TDS402A18300	4156857	TDS412A18300	18,300	.7205	153	101	77	3,2	50	20
4162279	TDS402A18400	4156858	TDS412A18400	18,400	.7244	153	101	77	3,2	50	20
4162280	TDS402A18500	4156859	TDS412A18500	18,500	.7283	153	101	77	3,2	50	20
4162281	TDS402A18600	4156860	TDS412A18600	18,600	.7323	153	101	77	3,2	50	20
4162282	TDS402A18654	4156861	TDS412A18654	18,654	.7344	153	101	77	3,2	50	20
4162393	TDS402A18700	4156862	TDS412A18700	18,700	.7362	153	101	77	3,2	50	20
4162394	TDS402A18800	4156863	TDS412A18800	18,800	.7402	153	101	77	3,3	50	20
4162395	TDS402A18900	4156864	TDS412A18900	18,900	.7441	153	101	77	3,3	50	20
4162396	TDS402A19000	4156865	TDS412A19000	19,000	.7480	153	101	77	3,3	50	20
4162397	TDS402A19050	4156866	TDS412A19050	19,050	.7500	153	101	77	3,3	50	20
4162398	TDS402A19100	4156867	TDS412A19100	19,100	.7520	153	101	77	3,3	50	20
4162399	TDS402A19200	4156868	TDS412A19200	19,200	.7559	153	101	77	3,3	50	20
4162400	TDS402A19300	4156869	TDS412A19300	19,300	.7598	153	101	77	3,4	50	20
4162401	TDS402A19400	4156870	TDS412A19400	19,400	.7638	153	101	77	3,4	50	20
4162402	TDS402A19500	4156871	TDS412A19500	19,500	.7677	153	101	77	3,4	50	20
4162403	TDS402A19600	4156872	TDS412A19600	19,600	.7717	153	101	77	3,4	50	20
4162404	TDS402A19700	4156873	TDS412A19700	19,700	.7756	153	101	77	3,4	50	20
4162405	TDS402A19800	4156874	TDS412A19800	19,800	.7795	153	101	77	3,4	50	20
4162406	TDS402A19900	4156875	TDS412A19900	19,900	.7835	153	101	77	3,5	50	20
4162407	TDS402A20000	4156876	TDS412A20000	20,000	.7874	153	101	77	3,5	50	20



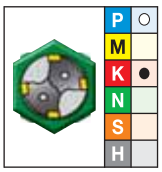




For information on L, L3, and L4 max, see page T143.

■ TDS403A • TDS413A • 8 x D



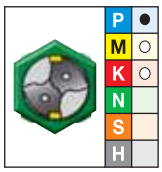


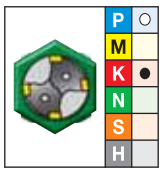
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162796	TDS403A03000	4156972	TDS413A03000	3,000	.1181	78	40	33	0,5	36	6
4162797	TDS403A03048	4156993	TDS413A03048	3,048	.1200	78	40	33	0,5	36	6
4162798	TDS403A03100	4156994	TDS413A03100	3,100	.1220	78	40	33	0,5	36	6
4162799	TDS403A03175	4156995	TDS413A03175	3,175	.1250	78	40	33	0,5	36	6
4162800	TDS403A03200	4156996	TDS413A03200	3,200	.1260	78	40	33	0,5	36	6
4162801	TDS403A03264	4156997	TDS413A03264	3,264	.1285	78	40	33	0,5	36	6
4162802	TDS403A03300	4156998	TDS413A03300	3,300	.1299	78	40	33	0,5	36	6
4163163	TDS403A03400	4156999	TDS413A03400	3,400	.1339	78	40	33	0,6	36	6
4163164	TDS403A03455	4157000	TDS413A03455	3,455	.1360	78	40	33	0,6	36	6
4163165	TDS403A03500	4157001	TDS413A03500	3,500	.1378	78	40	33	0,6	36	6
4163166	TDS403A03571	4157002	TDS413A03571	3,571	.1406	78	40	33	0,6	36	6
4163167	TDS403A03600	4157003	TDS413A03600	3,600	.1417	78	40	33	0,6	36	6
4163168	TDS403A03658	4157004	TDS413A03658	3,658	.1440	78	40	33	0,6	36	6
4163169	TDS403A03700	4157005	TDS413A03700	3,700	.1457	78	40	33	0,6	36	6
4163170	TDS403A03734	4157006	TDS413A03734	3,734	.1470	78	40	33	0,6	36	6
4163171	TDS403A03800	4157007	TDS413A03800	3,800	.1496	87	49	41	0,6	36	6
4163172	TDS403A03900	4157008	TDS413A03900	3,900	.1535	87	49	41	0,6	36	6
4163173	TDS403A03970	4157009	TDS413A03970	3,970	.1563	87	49	41	0,7	36	6
4163174	TDS403A04000	4157010	TDS413A04000	4,000	.1575	87	49	41	0,7	36	6
4163175	TDS403A04039	4157011	TDS413A04039	4,039	.1590	87	49	41	0,7	36	6
4163176	TDS403A04090	4157012	TDS413A04090	4,090	.1610	87	49	41	0,7	36	6
4163177	TDS403A04100	4157013	TDS413A04100	4,100	.1614	87	49	41	0,7	36	6
4163178	TDS403A04200	4157014	TDS413A04200	4,200	.1654	87	49	41	0,7	36	6
4163179	TDS403A04217	4157015	TDS413A04217	4,217	.1660	87	49	41	0,7	36	6
4163180	TDS403A04300	4157016	TDS413A04300	4,300	.1693	87	49	41	0,7	36	6
4163181	TDS403A04366	4157017	TDS413A04366	4,366	.1719	87	49	41	0,7	36	6
4163182	TDS403A04400	4157018	TDS413A04400	4,400	.1732	87	49	41	0,7	36	6
4163193	TDS403A04500	4157019	TDS413A04500	4,500	.1772	87	49	41	0,7	36	6

(continued)

(TDS403A • TDS413A • 8 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163194	TDS403A04600	4157020	TDS413A04600	4,600	.1811	87	49	41	0,8	36	6
4163195	TDS403A04623	4157021	TDS413A04623	4,623	.1820	87	49	41	0,8	36	6
4163196	TDS403A04700	4157022	TDS413A04700	4,700	.1850	87	49	41	0,8	36	6
4163197	TDS403A04763	4157023	TDS413A04763	4,763	.1875	94	56	48	0,8	36	6
4163198	TDS403A04800	4157024	TDS413A04800	4,800	.1890	94	56	48	0,8	36	6
4163199	TDS403A04852	4157025	TDS413A04852	4,852	.1910	94	56	48	0,8	36	6
4163200	TDS403A04900	4157026	TDS413A04900	4,900	.1929	94	56	48	0,8	36	6
4163201	TDS403A05000	4157027	TDS413A05000	5,000	.1969	94	56	48	0,8	36	6
4163202	TDS403A05100	4157028	TDS413A05100	5,100	.2008	94	56	48	0,8	36	6
4163203	TDS403A05106	4157029	TDS413A05106	5,106	.2010	94	56	48	0,8	36	6
4163204	TDS403A05159	4157030	TDS413A05159	5,159	.2031	94	56	48	0,9	36	6
4163205	TDS403A05200	4157031	TDS413A05200	5,200	.2047	94	56	48	0,9	36	6
4163206	TDS403A05300	4157032	TDS413A05300	5,300	.2087	94	56	48	0,9	36	6
4163207	TDS403A05400	4157033	TDS413A05400	5,400	.2126	94	56	48	0,9	36	6
4163208	TDS403A05410	4157034	TDS413A05410	5,410	.2130	94	56	48	0,9	36	6
4163209	TDS403A05500	4157035	TDS413A05500	5,500	.2165	94	56	48	0,9	36	6
4163210	TDS403A05558	4157036	TDS413A05558	5,558	.2188	94	56	48	0,9	36	6
4163211	TDS403A05600	4157037	TDS413A05600	5,600	.2205	94	56	48	0,9	36	6
4163212	TDS403A05616	4157038	TDS413A05616	5,616	.2211	94	56	48	0,9	36	6
4163213	TDS403A05700	4157039	TDS413A05700	5,700	.2244	94	56	48	1,0	36	6
4163214	TDS403A05800	4157040	TDS413A05800	5,800	.2283	94	56	48	1,0	36	6
4163215	TDS403A05900	4157041	TDS413A05900	5,900	.2323	94	56	48	1,0	36	6
4163216	TDS403A05954	4157042	TDS413A05954	5,954	.2344	94	56	48	1,0	36	6
4163217	TDS403A06000	4157043	TDS413A06000	6,000	.2362	94	56	48	1,0	36	6
4163218	TDS403A06100	4157044	TDS413A06100	6,100	.2402	105	67	57	1,0	36	8
4163219	TDS403A06200	4157045	TDS413A06200	6,200	.2441	105	67	57	1,0	36	8
4163220	TDS403A06300	4157046	TDS413A06300	6,300	.2480	105	67	57	1,1	36	8
4163221	TDS403A06350	4157047	TDS413A06350	6,350	.2500	105	67	57	1,1	36	8
4163222	TDS403A06400	4157048	TDS413A06400	6,400	.2520	105	67	57	1,1	36	8
4163223	TDS403A06500	4157049	TDS413A06500	6,500	.2559	105	67	57	1,1	36	8
4163224	TDS403A06528	4157050	TDS413A06528	6,528	.2570	105	67	57	1,1	36	8
4163225	TDS403A06600	4157051	TDS413A06600	6,600	.2598	105	67	57	1,1	36	8
4163226	TDS403A06630	4157052	TDS413A06630	6,630	.2610	105	67	57	1,1	36	8
4163227	TDS403A06700	4157053	TDS413A06700	6,700	.2638	105	67	57	1,1	36	8
4163228	TDS403A06746	4157054	TDS413A06746	6,746	.2656	105	67	57	1,1	36	8
4163229	TDS403A06800	4157055	TDS413A06800	6,800	.2677	105	67	57	1,1	36	8
4163230	TDS403A06900	4157056	TDS413A06900	6,900	.2717	105	67	57	1,2	36	8
4163231	TDS403A07000	4157057	TDS413A07000	7,000	.2756	105	67	57	1,2	36	8
4163232	TDS403A07100	4157058	TDS413A07100	7,100	.2795	110	72	61	1,2	36	8
4163233	TDS403A07145	4157059	TDS413A07145	7,145	.2813	110	72	61	1,2	36	8

(continued)

(TDS403A • TDS413A • 8 x D — continued)



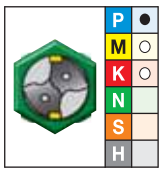


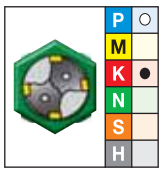
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4163234	TDS403A07200	4157060	TDS413A07200	7,200	.2835	110	72	61	1,2	36	8
4163235	TDS403A07300	4157061	TDS413A07300	7,300	.2874	110	72	61	1,2	36	8
4163236	TDS403A07400	4157062	TDS413A07400	7,400	.2913	110	72	61	1,3	36	8
4163237	TDS403A07500	4157063	TDS413A07500	7,500	.2953	110	72	61	1,3	36	8
4163238	TDS403A07541	4157064	TDS413A07541	7,541	.2969	110	72	61	1,3	36	8
4163239	TDS403A07600	4157065	TDS413A07600	7,600	.2992	110	72	61	1,3	36	8
4163240	TDS403A07700	4157066	TDS413A07700	7,700	.3031	110	72	61	1,3	36	8
4163241	TDS403A07800	4157067	TDS413A07800	7,800	.3071	110	72	61	1,3	36	8
4163242	TDS403A07900	4157068	TDS413A07900	7,900	.3110	110	72	61	1,3	36	8
4163243	TDS403A07938	4157069	TDS413A07938	7,938	.3125	110	72	61	1,3	36	8
4163244	TDS403A08000	4157070	TDS413A08000	8,000	.3150	110	72	61	1,4	36	8
4163245	TDS403A08100	4157071	TDS413A08100	8,100	.3189	122	80	68	1,4	40	10
4163246	TDS403A08200	4157072	TDS413A08200	8,200	.3228	122	80	68	1,4	40	10
4163247	TDS403A08300	4157073	TDS413A08300	8,300	.3268	122	80	68	1,4	40	10
4163248	TDS403A08334	4157074	TDS413A08334	8,334	.3281	122	80	68	1,4	40	10
4163249	TDS403A08400	4157075	TDS413A08400	8,400	.3307	122	80	68	1,4	40	10
4163250	TDS403A08433	4157076	TDS413A08433	8,433	.3320	122	80	68	1,4	40	10
4163251	TDS403A08500	4157077	TDS413A08500	8,500	.3346	122	80	68	1,4	40	10
4163252	TDS403A08600	4157078	TDS413A08600	8,600	.3386	122	80	68	1,5	40	10
4163253	TDS403A08700	4157079	TDS413A08700	8,700	.3425	122	80	68	1,5	40	10
4163254	TDS403A08733	4157080	TDS413A08733	8,733	.3438	122	80	68	1,5	40	10
4163255	TDS403A08800	4157081	TDS413A08800	8,800	.3465	122	80	68	1,5	40	10
4163256	TDS403A08900	4157082	TDS413A08900	8,900	.3504	122	80	68	1,5	40	10
4163257	TDS403A09000	4157083	TDS413A09000	9,000	.3543	122	80	68	1,5	40	10
4163258	TDS403A09100	4157084	TDS413A09100	9,100	.3583	122	80	68	1,5	40	10
4163259	TDS403A09129	4157085	TDS413A09129	9,129	.3594	122	80	68	1,6	40	10
4163260	TDS403A09200	4157086	TDS413A09200	9,200	.3622	122	80	68	1,6	40	10
4163261	TDS403A09300	4157087	TDS413A09300	9,300	.3661	122	80	68	1,6	40	10
4163262	TDS403A09347	4157088	TDS413A09347	9,347	.3680	122	80	68	1,6	40	10
4163263	TDS403A09400	4157089	TDS413A09400	9,400	.3701	122	80	68	1,6	40	10
4163264	TDS403A09500	4157090	TDS413A09500	9,500	.3740	122	80	68	1,6	40	10
4163265	TDS403A09525	4157091	TDS413A09525	9,525	.3750	122	80	68	1,6	40	10
4163266	TDS403A09600	4157092	TDS413A09600	9,600	.3780	122	80	68	1,6	40	10
4163267	TDS403A09700	4157093	TDS413A09700	9,700	.3819	122	80	68	1,7	40	10
4163268	TDS403A09800	4157094	TDS413A09800	9,800	.3858	122	80	68	1,7	40	10
4163269	TDS403A09900	4157095	TDS413A09900	9,900	.3898	122	80	68	1,7	40	10
4163270	TDS403A09921	4157096	TDS413A09921	9,921	.3906	122	80	68	1,7	40	10
4162679	TDS403A10000	4156836	TDS413A10000	10,000	.3937	122	80	68	1,7	40	10
4162680	TDS403A10100	4156837	TDS413A10100	10,100	.3976	141	94	79	1,7	45	12
4162382	TDS403A10200	4156838	TDS413A10200	10,200	.4016	141	94	79	1,7	45	12

(continued)

(TDS403A • TDS413A • 8 x D — continued)





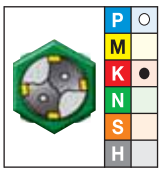
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162703	TDS403A10300	4156839	TDS413A10300	10,300	.4055	141	94	79	1,8	45	12
4162704	TDS403A10320	4156840	TDS413A10320	10,320	.4063	141	94	79	1,8	45	12
4162705	TDS403A10400	4156841	TDS413A10400	10,400	.4094	141	94	79	1,8	45	12
4162706	TDS403A10500	4156842	TDS413A10500	10,500	.4134	141	94	79	1,8	45	12
4162707	TDS403A10600	4156883	TDS413A10600	10,600	.4173	141	94	79	1,8	45	12
4162708	TDS403A10700	4156884	TDS413A10700	10,700	.4213	141	94	79	1,8	45	12
4162709	TDS403A10716	4156885	TDS413A10716	10,716	.4219	141	94	79	1,8	45	12
4162710	TDS403A10800	4156886	TDS413A10800	10,800	.4252	141	94	79	1,8	45	12
4162711	TDS403A10900	4156887	TDS413A10900	10,900	.4291	141	94	79	1,9	45	12
4162712	TDS403A11000	4156888	TDS413A11000	11,000	.4331	141	94	79	1,9	45	12
4162713	TDS403A11100	4156889	TDS413A11100	11,100	.4370	141	94	79	1,9	45	12
4162714	TDS403A11113	4156890	TDS413A11113	11,113	.4375	141	94	79	1,9	45	12
4162715	TDS403A11200	4156891	TDS413A11200	11,200	.4409	141	94	79	1,9	45	12
4162716	TDS403A11300	4156892	TDS413A11300	11,300	.4449	141	94	79	1,9	45	12
4162717	TDS403A11400	4156893	TDS413A11400	11,400	.4488	141	94	79	2,0	45	12
4162718	TDS403A11500	4156894	TDS413A11500	11,500	.4528	141	94	79	2,0	45	12
4162719	TDS403A11509	4156895	TDS413A11509	11,509	.4531	141	94	79	2,0	45	12
4162720	TDS403A11600	4156896	TDS413A11600	11,600	.4567	141	94	79	2,0	45	12
4162721	TDS403A11700	4156897	TDS413A11700	11,700	.4606	141	94	79	2,0	45	12
4162722	TDS403A11800	4156898	TDS413A11800	11,800	.4646	141	94	79	2,0	45	12
4162723	TDS403A11900	4156899	TDS413A11900	11,900	.4685	141	94	79	2,0	45	12
4162724	TDS403A11908	4156900	TDS413A11908	11,908	.4688	141	94	79	2,0	45	12
4162725	TDS403A12000	4156901	TDS413A12000	12,000	.4724	141	94	79	2,1	45	12
4162726	TDS403A12100	4156902	TDS413A12100	12,100	.4764	155	108	91	2,1	45	14
4162727	TDS403A12200	4156903	TDS413A12200	12,200	.4803	155	108	91	2,1	45	14
4162728	TDS403A12300	4156904	TDS413A12300	12,300	.4843	155	108	91	2,1	45	14
4162729	TDS403A12304	4156905	TDS413A12304	12,304	.4844	155	108	91	2,1	45	14
4162730	TDS403A12400	4156906	TDS413A12400	12,400	.4882	155	108	91	2,1	45	14
4162681	TDS403A12500	4148984	TDS413A12500	12,500	.4921	155	108	91	2,1	45	14
4162731	TDS403A12600	4156907	TDS413A12600	12,600	.4961	155	108	91	2,2	45	14
4162732	TDS403A12700	4156908	TDS413A12700	12,700	.5000	155	108	91	2,2	45	14
4162733	TDS403A12800	4156909	TDS413A12800	12,800	.5039	155	108	91	2,2	45	14
4162734	TDS403A12900	4156910	TDS413A12900	12,900	.5079	155	108	91	2,2	45	14
4162735	TDS403A13000	4156911	TDS413A13000	13,000	.5118	155	108	91	2,2	45	14
4162736	TDS403A13096	4156912	TDS413A13096	13,096	.5156	155	108	91	2,3	45	14
4162737	TDS403A13100	4156913	TDS413A13100	13,100	.5157	155	108	91	2,3	45	14
4162738	TDS403A13200	4156914	TDS413A13200	13,200	.5197	155	108	91	2,3	45	14
4162739	TDS403A13300	4156915	TDS413A13300	13,300	.5236	155	108	91	2,3	45	14
4162740	TDS403A13400	4156916	TDS413A13400	13,400	.5276	155	108	91	2,3	45	14
4162741	TDS403A13500	4156917	TDS413A13500	13,500	.5315	155	108	91	2,3	45	14

(continued)

(TDS403A • TDS413A • 8 x D — continued)



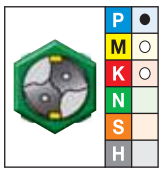


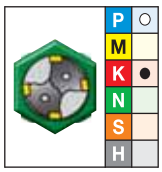
● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162742	TDS403A13600	4156918	TDS413A13600	13,600	.5354	155	108	91	2,3	45	14
4162743	TDS403A13700	4156919	TDS413A13700	13,700	.5394	155	108	91	2,4	45	14
4162744	TDS403A13800	4156920	TDS413A13800	13,800	.5433	155	108	91	2,4	45	14
4162745	TDS403A13891	4156921	TDS413A13891	13,891	.5469	155	108	91	2,4	45	14
4162746	TDS403A13900	4156922	TDS413A13900	13,900	.5472	155	108	91	2,4	45	14
4162747	TDS403A14000	4156923	TDS413A14000	14,000	.5512	155	108	91	2,4	45	14
4162748	TDS403A14100	4156924	TDS413A14100	14,100	.5551	171	121	101	2,4	48	16
4162749	TDS403A14200	4156925	TDS413A14200	14,200	.5591	171	121	101	2,5	48	16
4162750	TDS403A14288	4156926	TDS413A14288	14,288	.5625	171	121	101	2,5	48	16
4162751	TDS403A14300	4156927	TDS413A14300	14,300	.5630	171	121	101	2,5	48	16
4162752	TDS403A14400	4156928	TDS413A14400	14,400	.5669	171	121	101	2,5	48	16
4162753	TDS403A14500	4156929	TDS413A14500	14,500	.5709	171	121	101	2,5	48	16
4162754	TDS403A14600	4156930	TDS413A14600	14,600	.5748	171	121	101	2,5	48	16
4162755	TDS403A14684	4156931	TDS413A14684	14,684	.5781	171	121	101	2,5	48	16
4162756	TDS403A14700	4156932	TDS413A14700	14,700	.5787	171	121	101	2,5	48	16
4162757	TDS403A14800	4156933	TDS413A14800	14,800	.5827	171	121	101	2,6	48	16
4162758	TDS403A14900	4156934	TDS413A14900	14,900	.5866	171	121	101	2,6	48	16
4162759	TDS403A15000	4156935	TDS413A15000	15,000	.5906	171	121	101	2,6	48	16
4162760	TDS403A15083	4156936	TDS413A15083	15,083	.5938	171	121	101	2,6	48	16
4162761	TDS403A15100	4156937	TDS413A15100	15,100	.5945	171	121	101	2,6	48	16
4162762	TDS403A15200	4156938	TDS413A15200	15,200	.5984	171	121	101	2,6	48	16
4162763	TDS403A15300	4156939	TDS413A15300	15,300	.6024	171	121	101	2,6	48	16
4162764	TDS403A15400	4156940	TDS413A15400	15,400	.6063	171	121	101	2,7	48	16
4162765	TDS403A15479	4156941	TDS413A15479	15,479	.6094	171	121	101	2,7	48	16
4162766	TDS403A15500	4156942	TDS413A15500	15,500	.6102	171	121	101	2,7	48	16
4162767	TDS403A15600	4156943	TDS413A15600	15,600	.6142	171	121	101	2,7	48	16
4162768	TDS403A15700	4156944	TDS413A15700	15,700	.6181	171	121	101	2,7	48	16
4162769	TDS403A15800	4156945	TDS413A15800	15,800	.6220	171	121	101	2,7	48	16
4162770	TDS403A15875	4156946	TDS413A15875	15,875	.6250	171	121	101	2,7	48	16
4162771	TDS403A15900	4156947	TDS413A15900	15,900	.6260	171	121	101	2,8	48	16
4162772	TDS403A16000	4156948	TDS413A16000	16,000	.6299	171	121	101	2,8	48	16
4162773	TDS403A16100	4156949	TDS413A16100	16,100	.6339	185	135	113	2,8	48	18
4162774	TDS403A16200	4156950	TDS413A16200	16,200	.6378	185	135	113	2,8	48	18
4162775	TDS403A16271	4156951	TDS413A16271	16,271	.6406	185	135	113	2,8	48	18
4162776	TDS403A16300	4156952	TDS413A16300	16,300	.6417	185	135	113	2,8	48	18
4162777	TDS403A16400	4156953	TDS413A16400	16,400	.6457	185	135	113	2,8	48	18
4162778	TDS403A16500	4156954	TDS413A16500	16,500	.6496	185	135	113	2,9	48	18
4162779	TDS403A16600	4156955	TDS413A16600	16,600	.6535	185	135	113	2,9	48	18
4162780	TDS403A16670	4156956	TDS413A16670	16,670	.6563	185	135	113	2,9	48	18
4162781	TDS403A16700	4156957	TDS413A16700	16,700	.6575	185	135	113	2,9	48	18

(continued)

(TDS403A • TDS413A • 8 x D — continued)





● first choice
○ alternate choice

grade WP20PD TiAlN		grade WK15PD AlCrN		D1 diameter							
order #	catalogue #	order #	catalogue #	mm	in	L	L3	L4 max	L5	LS	D
4162782	TDS403A16800	4156958	TDS413A16800	16,800	.6614	185	135	113	2,9	48	18
4162783	TDS403A16900	4156959	TDS413A16900	16,900	.6654	185	135	113	2,9	48	18
4162784	TDS403A17000	4156960	TDS413A17000	17,000	.6693	185	135	113	2,9	48	18
4162785	TDS403A17100	4156961	TDS413A17100	17,100	.6732	185	135	113	3,0	48	18
4162786	TDS403A17200	4156962	TDS413A17200	17,200	.6772	185	135	113	3,0	48	18
4162787	TDS403A17300	4156963	TDS413A17300	17,300	.6811	185	135	113	3,0	48	18
4162788	TDS403A17400	4156964	TDS413A17400	17,400	.6850	185	135	113	3,0	48	18
4162789	TDS403A17463	4156965	TDS413A17463	17,463	.6875	185	135	113	3,0	48	18
4162790	TDS403A17500	4156966	TDS413A17500	17,500	.6890	185	135	113	3,0	48	18
4162791	TDS403A17600	4156967	TDS413A17600	17,600	.6929	185	135	113	3,1	48	18
4162792	TDS403A17700	4156968	TDS413A17700	17,700	.6969	185	135	113	3,1	48	18
4162793	TDS403A17800	4156969	TDS413A17800	17,800	.7008	185	135	113	3,1	48	18
4162794	TDS403A17859	4156970	TDS413A17859	17,859	.7031	185	135	113	3,1	48	18
4162795	TDS403A17900	4156971	TDS413A17900	17,900	.7047	185	135	113	3,1	48	18
4162515	TDS403A18000	4157206	TDS413A18000	18,000	.7087	185	135	113	3,1	48	18
4162516	TDS403A18100	4157207	TDS413A18100	18,100	.7126	200	148	124	3,1	50	20
4162517	TDS403A18200	4157208	TDS413A18200	18,200	.7165	200	148	124	3,2	50	20
4162518	TDS403A18258	4157209	TDS413A18258	18,258	.7188	200	148	124	3,2	50	20
4162519	TDS403A18300	4157210	TDS413A18300	18,300	.7205	200	148	124	3,2	50	20
4162520	TDS403A18400	4157211	TDS413A18400	18,400	.7244	200	148	124	3,2	50	20
4162521	TDS403A18500	4157212	TDS413A18500	18,500	.7283	200	148	124	3,2	50	20
4162522	TDS403A18600	4157253	TDS413A18600	18,600	.7323	200	148	124	3,2	50	20
4162663	TDS403A18654	4157254	TDS413A18654	18,654	.7344	200	148	124	3,2	50	20
4162664	TDS403A18700	4157255	TDS413A18700	18,700	.7362	200	148	124	3,2	50	20
4162665	TDS403A18800	4157256	TDS413A18800	18,800	.7402	200	148	124	3,3	50	20
4162666	TDS403A18900	4157257	TDS413A18900	18,900	.7441	200	148	124	3,3	50	20
4162667	TDS403A19000	4157258	TDS413A19000	19,000	.7480	200	148	124	3,3	50	20
4162668	TDS403A19050	4157259	TDS413A19050	19,050	.7500	200	148	124	3,3	50	20
4162669	TDS403A19100	4157260	TDS413A19100	19,100	.7520	200	148	124	3,3	50	20
4162670	TDS403A19200	4157261	TDS413A19200	19,200	.7559	200	148	124	3,3	50	20
4162671	TDS403A19300	4157262	TDS413A19300	19,300	.7598	200	148	124	3,4	50	20
4162672	TDS403A19400	4157263	TDS413A19400	19,400	.7638	200	148	124	3,4	50	20
4162673	TDS403A19500	4157264	TDS413A19500	19,500	.7677	200	148	124	3,4	50	20
4162674	TDS403A19600	4157265	TDS413A19600	19,600	.7717	200	148	124	3,4	50	20
4162675	TDS403A19700	4157266	TDS413A19700	19,700	.7756	200	148	124	3,4	50	20
4162676	TDS403A19800	4157267	TDS413A19800	19,800	.7795	200	148	124	3,4	50	20
4162677	TDS403A19900	4157268	TDS413A19900	19,900	.7835	200	148	124	3,5	50	20
4162678	TDS403A20000	4157269	TDS413A20000	20,000	.7874	200	148	124	3,5	50	20

■ TOP DRILL S • TDS202 • WP20PD™ • Flood Coolant • Metric



Material Group		Cutting Speed – vc Range – m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	70	–	140	mm/r	0,08–0,15	0,10–0,18	0,12–0,25	0,15–0,30	0,15–0,34	0,20–0,38	0,23–0,45	0,28–0,55
P	2, 3, 4, 6, 7	70	–	140	mm/r	0,08–0,16	0,10–0,19	0,12–0,25	0,15–0,30	0,19–0,34	0,22–0,38	0,28–0,48	0,34–0,60
P	5, 9, 10, 11	60	–	120	mm/r	0,08–0,16	0,10–0,19	0,12–0,25	0,14–0,30	0,17–0,33	0,20–0,38	0,24–0,48	0,29–0,60
P	12, 13.1, 13.2	40	–	60	mm/r	0,06–0,10	0,08–0,12	0,10–0,20	0,10–0,22	0,13–0,24	0,14–0,27	0,18–0,32	0,24–0,42
M	14.1	30	–	50	mm/r	0,05–0,09	0,06–0,11	0,08–0,13	0,09–0,15	0,10–0,17	0,12–0,20	0,14–0,22	0,16–0,25
M	14.3	40	–	60	mm/r	0,05–0,10	0,07–0,12	0,09–0,13	0,10–0,18	0,10–0,20	0,12–0,22	0,14–0,25	0,16–0,28
M	14.2, 14.4	30	–	50	mm/r	0,05–0,09	0,07–0,11	0,08–0,12	0,09–0,15	0,10–0,17	0,12–0,19	0,14–0,21	0,16–0,25

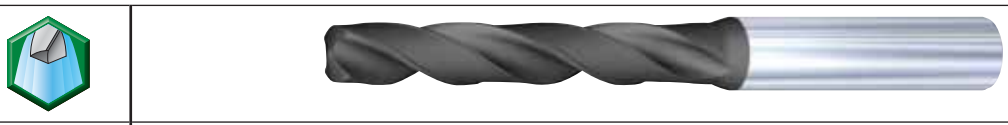
■ TOP DRILL S • TDS401/TDS402/TDS403 • WP20PD • Through Coolant • Metric



Material Group		Cutting Speed – vc Range – m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	80	–	180	mm/r	0,08–0,16	0,11–0,19	0,13–0,26	0,16–0,32	0,16–0,36	0,21–0,40	0,24–0,47	0,29–0,58
P	2, 3, 4, 6, 7	80	–	160	mm/r	0,09–0,17	0,11–0,20	0,13–0,26	0,16–0,32	0,20–0,36	0,23–0,40	0,29–0,50	0,36–0,63
P	5, 9, 10, 11	80	–	140	mm/r	0,08–0,17	0,11–0,20	0,12–0,26	0,15–0,32	0,18–0,35	0,21–0,40	0,25–0,50	0,30–0,63
P	12, 13.1, 13.2	50	–	80	mm/r	0,06–0,11	0,08–0,13	0,11–0,21	0,10–0,23	0,13–0,25	0,14–0,28	0,29–0,33	0,25–0,44
M	14.1	40	–	60	mm/r	0,05–0,09	0,06–0,12	0,08–0,14	0,09–0,16	0,11–0,18	0,13–0,21	0,15–0,23	0,17–0,26
M	14.3	40	–	70	mm/r	0,05–0,11	0,07–0,13	0,09–0,14	0,11–0,19	0,11–0,21	0,13–0,23	0,15–0,26	0,17–0,29
M	14.2, 14.4	35	–	50	mm/r	0,05–0,09	0,07–0,12	0,08–0,13	0,09–0,16	0,11–0,18	0,13–0,20	0,15–0,22	0,17–0,26

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

■ TOP DRILL S • TDS212 • WK15PD™ • Flood Coolant • Metric



Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
K	15, 16	70	–	170	mm/r	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74	0,31–0,60	0,38–0,74
K	17, 18, 19	80	–	140	mm/r	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60	0,31–0,48	0,38–0,60
K	20	70	–	130	mm/r	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60	0,24–0,48	0,30–0,60

■ TOP DRILL S • TDS411/TDS412/TDS413 • WK15PD • Through Coolant • Metric



Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
K	15, 16	80	–	190	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
K	17, 18, 19	90	–	170	mm/r	0,12–0,16	0,13–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
K	20	80	–	150	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013



TOP DRILL S+

The WIDIA™ line of TOP DRILL S+ enables superior performance across a wide variety of even the most complex and challenging applications, such as drilling through inclined entries, x-holes, and exits. Proprietary technology ensures the highest speed and feed rates available. Advanced grade and geometry features define the TOP DRILL S+ as a true troubleshooter.

- Suitable for a broad range of materials and applications.
- Ensures increased tool life and enhanced wear resistance.
- Facilitates consistent chip forming and breaking.

The versatile TOP DRILL S+ provides reliable performance across a broad scope of applications, including alloyed and unalloyed steel, cast iron, and some stainless steels and high-temperature alloys.

- Four-margin design ensures stability, consistency, and improved hole quality.
- PVD coating provides increased tool life and wear resistance.
- Through tool coolant and solid versions available standard.

Use as Pilot Drill

- Ideal point angle and tolerance make the TOP DRILL S+™ drill the preferred pilot drill for TDD Series solid carbide deep-hole drills.

TOP DRILL S+ Drill-Point Design

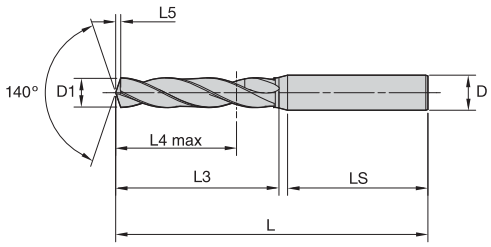
- Low thrust. Works well on a variety of machines.
- Excellent centring capabilities.
- Easy to regrind.

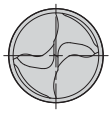
Four-Margin Land Design

- Improves hole straightness and roundness.
- Provides good alignment and stability in tough drilling applications — even when drilling through cross holes.



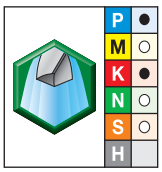








TDS301A • 3 x D

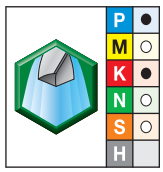


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964222	TDS301A03000	3,000	.1181	6	20	14	0,48	36	62
2964233	TDS301A03100	3,100	.1220	6	20	14	0,50	36	62
2964234	TDS301A03200	3,200	.1260	6	20	14	0,52	36	62
2964235	TDS301A03250	3,250	.1280	6	20	14	0,53	36	62
2964236	TDS301A03300	3,300	.1299	6	20	14	0,54	36	62
2964237	TDS301A03400	3,400	.1339	6	20	14	0,55	36	62
2964238	TDS301A03500	3,500	.1378	6	20	14	0,57	36	62
2964239	TDS301A03600	3,600	.1417	6	20	14	0,59	36	62
2964240	TDS301A03700	3,700	.1457	6	20	14	0,61	36	62
2964241	TDS301A03800	3,800	.1496	6	24	17	0,62	36	66
2964242	TDS301A03900	3,900	.1535	6	24	17	0,64	36	66
2964243	TDS301A04000	4,000	.1575	6	24	17	0,66	36	66
2964244	TDS301A04100	4,100	.1614	6	24	17	0,67	36	66
2964245	TDS301A04200	4,200	.1654	6	24	17	0,69	36	66
2964246	TDS301A04300	4,300	.1693	6	24	17	0,71	36	66
2964247	TDS301A04370	4,370	.1720	6	24	17	0,72	36	66
2964248	TDS301A04400	4,400	.1732	6	24	17	0,73	36	66
2964249	TDS301A04500	4,500	.1772	6	24	17	0,74	36	66
2964250	TDS301A04600	4,600	.1811	6	24	17	0,76	36	66
2964251	TDS301A04650	4,650	.1831	6	24	17	0,77	36	66
2964252	TDS301A04700	4,700	.1850	6	24	17	0,78	36	66
2964273	TDS301A04760	4,760	.1874	6	28	20	0,79	36	66
2964274	TDS301A04800	4,800	.1890	6	28	20	0,80	36	66
2964275	TDS301A04900	4,900	.1929	6	28	20	0,81	36	66

(continued)

(TDS301A • 3 x D — continued)



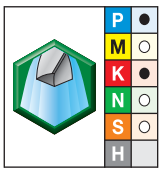
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964276	TDS301A05000	5,000	.1969	6	28	20	0,83	36	66
2964277	TDS301A05100	5,100	.2008	6	28	20	0,85	36	66
2964278	TDS301A05160	5,160	.2031	6	28	20	0,86	36	66
2964279	TDS301A05200	5,200	.2047	6	28	20	0,87	36	66
2964280	TDS301A05300	5,300	.2087	6	28	20	0,88	36	66
2964281	TDS301A05400	5,400	.2126	6	28	20	0,90	36	66
2964282	TDS301A05500	5,500	.2165	6	28	20	0,92	36	66
2964293	TDS301A05550	5,550	.2185	6	28	20	0,93	36	66
2964294	TDS301A05560	5,560	.2189	6	28	20	0,93	36	66
2964295	TDS301A05600	5,600	.2205	6	28	20	0,94	36	66
2964296	TDS301A05700	5,700	.2244	6	28	20	0,95	36	66
2964297	TDS301A05800	5,800	.2283	6	28	20	0,97	36	66
2964298	TDS301A05900	5,900	.2323	6	28	20	0,99	36	66
2964299	TDS301A05950	5,950	.2343	6	28	20	1,00	36	66
2964300	TDS301A06000	6,000	.2362	6	28	20	1,00	36	66
2964301	TDS301A06100	6,100	.2402	8	34	24	1,02	36	79
2964302	TDS301A06200	6,200	.2441	8	34	24	1,04	36	79
2964313	TDS301A06300	6,300	.2480	8	34	24	1,06	36	79
2964314	TDS301A06350	6,350	.2500	8	34	24	1,07	36	79
2964315	TDS301A06400	6,400	.2520	8	34	24	1,07	36	79
2964316	TDS301A06500	6,500	.2559	8	34	24	1,09	36	79
2964317	TDS301A06600	6,600	.2598	8	34	24	1,11	36	79
2964318	TDS301A06700	6,700	.2638	8	34	24	1,13	36	79
2964319	TDS301A06750	6,750	.2657	8	34	24	1,14	36	79
2964320	TDS301A06800	6,800	.2677	8	34	24	1,14	36	79
2964321	TDS301A06900	6,900	.2717	8	34	24	1,16	36	79
2964322	TDS301A07000	7,000	.2756	8	34	24	1,18	36	79
2964333	TDS301A07100	7,100	.2795	8	41	29	1,20	36	79
2964334	TDS301A07140	7,140	.2811	8	41	29	1,20	36	79
2964335	TDS301A07200	7,200	.2835	8	41	29	1,21	36	79
2964336	TDS301A07300	7,300	.2874	8	41	29	1,23	36	79
2964337	TDS301A07400	7,400	.2913	8	41	29	1,25	36	79
2964338	TDS301A07500	7,500	.2953	8	41	29	1,27	36	79
2964339	TDS301A07540	7,540	.2969	8	41	29	1,27	36	79
2964340	TDS301A07600	7,600	.2992	8	41	29	1,29	36	79
2964341	TDS301A07700	7,700	.3031	8	41	29	1,30	36	79
2964342	TDS301A07800	7,800	.3071	8	41	29	1,32	36	79
2964353	TDS301A07900	7,900	.3110	8	41	29	1,34	36	79
2964354	TDS301A07940	7,940	.3126	8	41	29	1,34	36	79
2964355	TDS301A08000	8,000	.3150	8	41	29	1,36	36	79

(continued)

(TDS301A • 3 x D — continued)

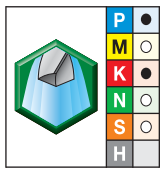


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964356	TDS301A08100	8,100	.3189	10	47	35	1,37	40	89
2964357	TDS301A08200	8,200	.3228	10	47	35	1,39	40	89
2964358	TDS301A08300	8,300	.3268	10	47	35	1,41	40	89
2964359	TDS301A08330	8,330	.3280	10	47	35	1,41	40	89
2964360	TDS301A08400	8,400	.3307	10	47	35	1,43	40	89
2964361	TDS301A08500	8,500	.3346	10	47	35	1,44	40	89
2964362	TDS301A08600	8,600	.3386	10	47	35	1,46	40	89
2964373	TDS301A08700	8,700	.3425	10	47	35	1,48	40	89
2964374	TDS301A08800	8,800	.3465	10	47	35	1,50	40	89
2964375	TDS301A08900	8,900	.3504	10	47	35	1,51	40	89
2964376	TDS301A09000	9,000	.3543	10	47	35	1,53	40	89
2964377	TDS301A09100	9,100	.3583	10	47	35	1,55	40	89
2964378	TDS301A09130	9,130	.3594	10	47	35	1,55	40	89
2964379	TDS301A09200	9,200	.3622	10	47	35	1,57	40	89
2964380	TDS301A09300	9,300	.3661	10	47	35	1,58	40	89
2964381	TDS301A09400	9,400	.3701	10	47	35	1,60	40	89
2964382	TDS301A09500	9,500	.3740	10	47	35	1,62	40	89
2964393	TDS301A09520	9,520	.3748	10	47	35	1,62	40	89
2964394	TDS301A09600	9,600	.3780	10	47	35	1,64	40	89
2964395	TDS301A09700	9,700	.3819	10	47	35	1,65	40	89
2964396	TDS301A09800	9,800	.3858	10	47	35	1,67	40	89
2964397	TDS301A09900	9,900	.3898	10	47	35	1,69	40	89
2964398	TDS301A09920	9,920	.3906	10	47	35	1,69	40	89
2964399	TDS301A10000	10,000	.3937	10	47	35	1,71	40	89
2964400	TDS301A10100	10,100	.3976	12	55	40	1,73	45	102
2964401	TDS301A10200	10,200	.4016	12	55	40	1,74	45	102
2964402	TDS301A10300	10,300	.4055	12	55	40	1,76	45	102
2964413	TDS301A10320	10,320	.4063	12	55	40	1,76	45	102
2964414	TDS301A10400	10,400	.4094	12	55	40	1,78	45	102
2964415	TDS301A10500	10,500	.4134	12	55	40	1,80	45	102
2964416	TDS301A10600	10,600	.4173	12	55	40	1,81	45	102
2964417	TDS301A10700	10,700	.4213	12	55	40	1,83	45	102
2964418	TDS301A10720	10,720	.4220	12	55	40	1,83	45	102
2964419	TDS301A10800	10,800	.4252	12	55	40	1,85	45	102
2964420	TDS301A10900	10,900	.4291	12	55	40	1,87	45	102
2964421	TDS301A11000	11,000	.4331	12	55	40	1,88	45	102
2964423	TDS301A11100	11,100	.4370	12	55	40	1,90	45	102
2964424	TDS301A11110	11,110	.4374	12	55	40	1,90	45	102
2964425	TDS301A11200	11,200	.4409	12	55	40	1,92	45	102
2964426	TDS301A11300	11,300	.4449	12	55	40	1,94	45	102

(continued)

(TDS301A • 3 x D — continued)

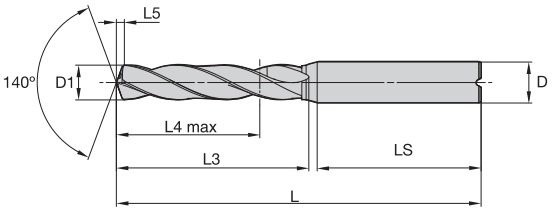


● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964427	TDS301A11400	11,400	.4488	12	55	40	1,95	45	102
2964428	TDS301A11500	11,500	.4528	12	55	40	1,97	45	102
2964429	TDS301A11600	11,600	.4567	12	55	40	1,99	45	102
2964430	TDS301A11700	11,700	.4606	12	55	40	2,01	45	102
2964431	TDS301A11800	11,800	.4646	12	55	40	2,03	45	102
2964432	TDS301A11900	11,900	.4685	12	55	40	2,04	45	102
2964433	TDS301A11910	11,910	.4689	12	55	40	2,04	45	102
2964434	TDS301A12000	12,000	.4724	12	55	40	2,06	45	102
2964435	TDS301A12300	12,300	.4843	14	60	43	2,11	45	107
2964436	TDS301A12500	12,500	.4921	14	60	43	2,15	45	107
2964437	TDS301A12700	12,700	.5000	14	60	43	2,18	45	107
2964438	TDS301A12800	12,800	.5039	14	60	43	2,20	45	107
2964439	TDS301A13000	13,000	.5118	14	60	43	2,24	45	107
2964440	TDS301A13500	13,500	.5315	14	60	43	2,33	45	107
2964441	TDS301A13800	13,800	.5433	14	60	43	2,38	45	107
2964442	TDS301A14000	14,000	.5512	14	60	43	2,41	45	107
2964443	TDS301A14290	14,290	.5626	16	65	45	2,47	48	115
2964444	TDS301A14500	14,500	.5709	16	65	45	2,50	48	115
2964445	TDS301A14800	14,800	.5827	16	65	45	2,56	48	115
2964446	TDS301A15000	15,000	.5906	16	65	45	2,59	48	115
2964447	TDS301A15500	15,500	.6102	16	65	45	2,68	48	115
2964448	TDS301A15800	15,800	.6220	16	65	45	2,73	48	115
2964449	TDS301A15870	15,870	.6248	16	65	45	2,75	48	115
2964450	TDS301A16000	16,000	.6299	16	65	45	2,77	48	115
2964451	TDS301A16500	16,500	.6496	18	73	51	2,86	48	123
2964452	TDS301A16670	16,670	.6563	18	73	51	2,89	48	123
2964453	TDS301A16800	16,800	.6614	18	73	51	2,91	48	123
2964454	TDS301A17000	17,000	.6693	18	73	51	2,95	48	123
2964455	TDS301A17500	17,500	.6890	18	73	51	3,04	48	123
2964456	TDS301A17800	17,800	.7008	18	73	51	3,09	48	123
2964457	TDS301A18000	18,000	.7087	18	73	51	3,12	48	123
2964458	TDS301A18500	18,500	.7283	20	79	55	3,21	50	131
2964459	TDS301A18800	18,800	.7402	20	79	55	3,27	50	131
2964460	TDS301A19000	19,000	.7480	20	79	55	3,30	50	131
2964461	TDS301A19050	19,050	.7500	20	79	55	3,31	50	131
2964462	TDS301A19500	19,500	.7677	20	79	55	3,39	50	131
2964463	TDS301A19800	19,800	.7795	20	79	55	3,44	50	131
2964464	TDS301A20000	20,000	.7874	20	79	55	3,48	50	131

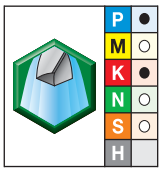








■ TDS501A • 3 x D

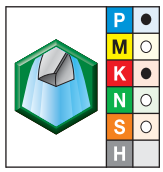


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964947	TDS501A03000	3,000	.1181	6	20	14	0,48	36	62
2964948	TDS501A03100	3,100	.1220	6	20	14	0,50	36	62
4051234	TDS501A03175	3,175	.1250	6	20	14	0,64	36	62
2964949	TDS501A03200	3,200	.1260	6	20	14	0,52	36	62
2964950	TDS501A03250	3,250	.1280	6	20	14	0,53	36	62
2964951	TDS501A03300	3,300	.1299	6	20	14	0,54	36	62
2964952	TDS501A03400	3,400	.1339	6	20	14	0,55	36	62
4051233	TDS501A03455	3,450	.1358	6	20	14	0,56	36	62
2964953	TDS501A03500	3,500	.1378	6	20	14	0,57	36	62
5661464	TDS501A03571	3,571	.1406	6	20	14	0,58	36	62
2964954	TDS501A03600	3,600	.1417	6	20	14	0,59	36	62
2964955	TDS501A03700	3,700	.1457	6	20	14	0,61	36	62
2964956	TDS501A03800	3,800	.1496	6	24	17	0,62	36	66
2964957	TDS501A03900	3,900	.1535	6	24	17	0,64	36	66
2964958	TDS501A04000	4,000	.1575	6	24	17	0,66	36	66
2964959	TDS501A04100	4,100	.1614	6	24	17	0,67	36	66
2964960	TDS501A04200	4,200	.1654	6	24	17	0,69	36	66
2964961	TDS501A04300	4,300	.1693	6	24	17	0,71	36	66
2964962	TDS501A04370	4,370	.1720	6	24	17	0,72	36	66
2964963	TDS501A04400	4,400	.1732	6	24	17	0,73	36	66
2964964	TDS501A04500	4,500	.1772	6	24	17	0,74	36	66
2964965	TDS501A04600	4,600	.1811	6	24	17	0,76	36	66
5661502	TDS501A04623	4,623	.1820	6	24	17	0,77	36	66
2964966	TDS501A04650	4,650	.1831	6	24	17	0,77	36	66

(continued)

(TDS501A • 3 x D — continued)

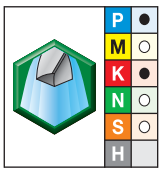


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964967	TDS501A04700	4,700	.1850	6	24	17	0,78	36	66
5661503	TDS501A04763	4,763	.1875	6	28	20	0,79	36	66
2964969	TDS501A04800	4,800	.1890	6	28	20	0,80	36	66
2964970	TDS501A04900	4,900	.1929	6	28	20	0,81	36	66
2964971	TDS501A05000	5,000	.1969	6	28	20	0,83	36	66
2964972	TDS501A05100	5,100	.2008	6	28	20	0,85	36	66
2964973	TDS501A05160	5,160	.2031	6	28	20	0,86	36	66
2964974	TDS501A05200	5,200	.2047	6	28	20	0,87	36	66
2964975	TDS501A05300	5,300	.2087	6	28	20	0,88	36	66
2964976	TDS501A05400	5,400	.2126	6	28	20	0,90	36	66
5661504	TDS501A05410	5,410	.2130	6	28	20	0,90	36	66
2964977	TDS501A05500	5,500	.2165	6	28	20	0,92	36	66
2964978	TDS501A05550	5,550	.2185	6	28	20	0,93	36	66
5661505	TDS501A05558	5,558	.2188	6	28	20	0,93	36	66
2964980	TDS501A05600	5,600	.2205	6	28	20	0,94	36	66
2964981	TDS501A05700	5,700	.2244	6	28	20	0,95	36	66
2964982	TDS501A05800	5,800	.2283	6	28	20	0,97	36	66
2964983	TDS501A05900	5,900	.2323	6	28	20	0,99	36	66
2964984	TDS501A05950	5,950	.2343	6	28	20	1,00	36	66
2964985	TDS501A06000	6,000	.2362	6	28	20	1,00	36	66
2964986	TDS501A06100	6,100	.2402	8	34	24	1,02	36	79
2964987	TDS501A06200	6,200	.2441	8	34	24	1,04	36	79
2964988	TDS501A06300	6,300	.2480	8	34	24	1,06	36	79
2964989	TDS501A06350	6,350	.2500	8	34	24	1,07	36	79
2964990	TDS501A06400	6,400	.2520	8	34	24	1,07	36	79
2964991	TDS501A06500	6,500	.2559	8	34	24	1,09	36	79
5661506	TDS501A06528	6,528	.2570	8	34	24	1,10	36	79
2964992	TDS501A06600	6,600	.2598	8	34	24	1,11	36	79
2964993	TDS501A06700	6,700	.2638	8	34	24	1,13	36	79
5661507	TDS501A06746	6,746	.2656	8	34	24	1,14	36	79
2964995	TDS501A06800	6,800	.2677	8	34	24	1,14	36	79
2964996	TDS501A06900	6,900	.2717	8	34	24	1,16	36	79
2964997	TDS501A07000	7,000	.2756	8	34	24	1,18	36	79
2964998	TDS501A07100	7,100	.2795	8	41	29	1,20	36	79
5661509	TDS501A07145	7,145	.2813	8	41	29	1,21	36	79
2965000	TDS501A07200	7,200	.2835	8	41	29	1,21	36	79
2965001	TDS501A07300	7,300	.2874	8	41	29	1,23	36	79
2965002	TDS501A07400	7,400	.2913	8	41	29	1,25	36	79
2965003	TDS501A07500	7,500	.2953	8	41	29	1,27	36	79
2965004	TDS501A07541	7,540	.2969	8	41	29	1,27	36	79

(continued)

(TDS501A • 3 x D — continued)



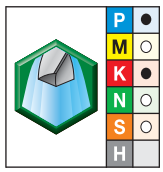
● first choice
○ alternate choice

grade WU25PD TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2965005	TDS501A07600	7,600	.2992	8	41	29	1,29	36	79
2965006	TDS501A07700	7,700	.3031	8	41	29	1,30	36	79
2965007	TDS501A07800	7,800	.3071	8	41	29	1,32	36	79
2965008	TDS501A07900	7,900	.3110	8	41	29	1,34	36	79
5661540	TDS501A07938	7,938	.3125	8	41	29	1,34	36	79
2965010	TDS501A08000	8,000	.3150	8	41	29	1,36	36	79
2965011	TDS501A08100	8,100	.3189	10	47	35	1,37	40	89
2965012	TDS501A08200	8,200	.3228	10	47	35	1,39	40	89
2965013	TDS501A08300	8,300	.3268	10	47	35	1,41	40	89
5661541	TDS501A08334	8,334	.3281	10	47	35	1,41	40	89
2965015	TDS501A08400	8,400	.3307	10	47	35	1,43	40	89
5661542	TDS501A08433	8,433	.3320	10	47	35	1,43	40	89
2965016	TDS501A08500	8,500	.3346	10	47	35	1,44	40	89
2965017	TDS501A08600	8,600	.3386	10	47	35	1,46	40	89
2965018	TDS501A08700	8,700	.3425	10	47	35	1,48	40	89
5661543	TDS501A08733	8,733	.3438	10	47	35	1,48	40	89
2965019	TDS501A08800	8,800	.3465	10	47	35	1,50	40	89
2965020	TDS501A08900	8,900	.3504	10	47	35	1,51	40	89
2965021	TDS501A09000	9,000	.3543	10	47	35	1,53	40	89
2965022	TDS501A09100	9,100	.3583	10	47	35	1,55	40	89
2965023	TDS501A09129	9,130	.3594	10	47	35	1,55	40	89
2965024	TDS501A09200	9,200	.3622	10	47	35	1,57	40	89
2965025	TDS501A09300	9,300	.3661	10	47	35	1,58	40	89
5661544	TDS501A09347	9,347	.3680	10	47	35	1,59	40	89
2965026	TDS501A09400	9,400	.3701	10	47	35	1,60	40	89
2965027	TDS501A09500	9,500	.3740	10	47	35	1,62	40	89
2965029	TDS501A09600	9,600	.3780	10	47	35	1,64	40	89
2965030	TDS501A09700	9,700	.3819	10	47	35	1,65	40	89
5661546	TDS501A09750	9,750	.3839	10	47	35	1,66	40	89
2965031	TDS501A09800	9,800	.3858	10	47	35	1,67	40	89
2965032	TDS501A09900	9,900	.3898	10	47	35	1,69	40	89
2965033	TDS501A09921	9,920	.3906	10	47	35	1,69	40	89
2965034	TDS501A10000	10,000	.3937	10	47	35	1,71	40	89
2965035	TDS501A10100	10,100	.3976	12	55	40	1,73	45	102
2965036	TDS501A10200	10,200	.4016	12	55	40	1,74	45	102
2965037	TDS501A10300	10,300	.4055	12	55	40	1,76	45	102
2965038	TDS501A10320	10,320	.4063	12	55	40	1,76	45	102
2965039	TDS501A10400	10,400	.4094	12	55	40	1,78	45	102
2965040	TDS501A10500	10,500	.4134	12	55	40	1,80	45	102
2965041	TDS501A10600	10,600	.4173	12	55	40	1,81	45	102

(continued)

(TDS501A • 3 x D — continued)



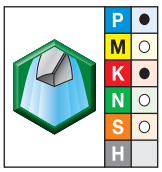
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2965042	TDS501A10700	10,700	.4213	12	55	40	1,83	45	102
5661547	TDS501A10716	10,716	.4219	12	55	40	1,83	45	102
2965044	TDS501A10800	10,800	.4252	12	55	40	1,85	45	102
2965045	TDS501A10900	10,900	.4291	12	55	40	1,87	45	102
2965046	TDS501A11000	11,000	.4331	12	55	40	1,88	45	102
2965047	TDS501A11100	11,100	.4370	12	55	40	1,90	45	102
2965048	TDS501A11113	11,113	.4375	12	55	40	1,90	45	102
2964736	TDS501A11200	11,200	.4409	12	55	40	1,92	45	102
2964737	TDS501A11300	11,300	.4449	12	55	40	1,94	45	102
2964738	TDS501A11400	11,400	.4488	12	55	40	1,95	45	102
2964739	TDS501A11500	11,500	.4528	12	55	40	1,97	45	102
2964740	TDS501A11600	11,600	.4567	12	55	40	1,99	45	102
2964741	TDS501A11700	11,700	.4606	12	55	40	2,01	45	102
2964742	TDS501A11800	11,800	.4646	12	55	40	2,03	45	102
2965053	TDS501A11900	11,900	.4685	12	55	40	2,04	45	102
2965054	TDS501A11910	11,910	.4689	12	55	40	2,04	45	102
2965055	TDS501A12000	12,000	.4724	12	55	40	2,06	45	102
2965056	TDS501A12300	12,300	.4843	14	60	43	2,11	45	107
5661548	TDS501A12304	12,304	.4844	14	60	43	2,11	45	107
2965057	TDS501A12500	12,500	.4921	14	60	43	2,15	45	107
2965058	TDS501A12700	12,700	.5000	14	60	43	2,18	45	107
2965059	TDS501A12800	12,800	.5039	14	60	43	2,20	45	107
2965060	TDS501A13000	13,000	.5118	14	60	43	2,24	45	107
4051235	TDS501A13100	13,100	.5157	14	60	43	2,79	45	107
2965061	TDS501A13500	13,500	.5315	14	60	43	2,33	45	107
2965062	TDS501A13800	13,800	.5433	14	60	43	2,38	45	107
2965063	TDS501A14000	14,000	.5512	14	60	43	2,41	45	107
2965064	TDS501A14290	14,290	.5626	16	65	45	2,47	48	115
2965065	TDS501A14500	14,500	.5709	16	65	45	2,50	48	115
2965066	TDS501A14800	14,800	.5827	16	65	45	2,56	48	115
2965067	TDS501A15000	15,000	.5906	16	65	45	2,59	48	115
2965068	TDS501A15500	15,500	.6102	16	65	45	2,68	48	115
2965069	TDS501A15800	15,800	.6220	16	65	45	2,73	48	115
2965070	TDS501A15870	15,870	.6248	16	65	45	2,75	48	115
2965071	TDS501A16000	16,000	.6299	16	65	45	2,77	48	115
2965072	TDS501A16500	16,500	.6496	18	73	51	2,86	48	123
2965073	TDS501A16670	16,670	.6563	18	73	51	2,89	48	123
2965074	TDS501A16800	16,800	.6614	18	73	51	2,91	48	123
2965075	TDS501A17000	17,000	.6693	18	73	51	2,95	48	123
2965076	TDS501A17500	17,500	.6890	18	73	51	3,04	48	123

(continued)

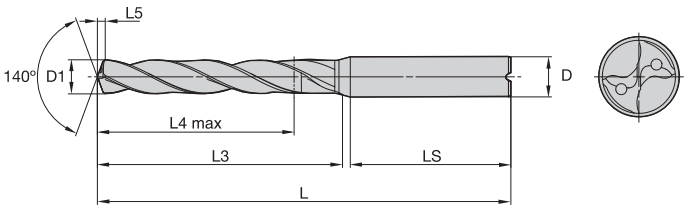
(TDS501A • 3 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2965077	TDS501A17800	17,800	.7008	18	73	51	3,09	48	123
2965078	TDS501A18000	18,000	.7087	18	73	51	3,12	48	123
2965079	TDS501A18500	18,500	.7283	20	79	55	3,21	50	131
2965080	TDS501A18800	18,800	.7402	20	79	55	3,27	50	131
2965081	TDS501A19000	19,000	.7480	20	79	55	3,30	50	131
2965082	TDS501A19050	19,050	.7500	20	79	55	3,31	50	131
2965083	TDS501A19500	19,500	.7677	20	79	55	3,39	50	131
2965084	TDS501A19800	19,800	.7795	20	79	55	3,44	50	131
2965085	TDS501A20000	20,000	.7874	20	79	55	3,48	50	131







TDS502A • 5 x D

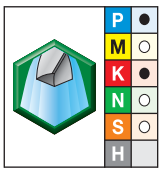


● first choice
○ alternate choice

grade WU25PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964803	TDS502A03000	3,000	.1181	6	28	23	0,48	36	66
2964804	TDS502A03100	3,100	.1220	6	28	23	0,50	36	66
4051237	TDS502A03175	3,175	.1250	6	28	23	0,64	36	66
2964805	TDS502A03200	3,200	.1260	6	28	23	0,52	36	66
2964806	TDS502A03250	3,250	.1280	6	28	23	0,53	36	66
2964807	TDS502A03300	3,300	.1299	6	28	23	0,54	36	66
2964808	TDS502A03400	3,400	.1339	6	28	23	0,55	36	66
4051236	TDS502A03455	3,455	.1360	6	28	23	0,70	36	66
2964809	TDS502A03500	3,500	.1378	6	28	23	0,57	36	66
2964810	TDS502A03600	3,600	.1417	6	28	23	0,59	36	66
2964811	TDS502A03700	3,700	.1457	6	28	23	0,61	36	66
2964812	TDS502A03800	3,800	.1496	6	36	29	0,62	36	74
2964813	TDS502A03900	3,900	.1535	6	36	29	0,64	36	74
2964814	TDS502A04000	4,000	.1575	6	36	29	0,66	36	74
2964815	TDS502A04100	4,100	.1614	6	36	29	0,67	36	74
2964816	TDS502A04200	4,200	.1654	6	36	29	0,69	36	74
2964817	TDS502A04300	4,300	.1693	6	36	29	0,71	36	74
2964818	TDS502A04370	4,370	.1720	6	36	29	0,72	36	74
2964819	TDS502A04400	4,400	.1732	6	36	29	0,73	36	74
2964820	TDS502A04500	4,500	.1772	6	36	29	0,74	36	74
2964821	TDS502A04600	4,600	.1811	6	36	29	0,76	36	74
2964822	TDS502A04650	4,650	.1831	6	36	29	0,77	36	74
2964823	TDS502A04700	4,700	.1850	6	36	29	0,78	36	74
2964824	TDS502A04760	4,760	.1874	6	44	35	0,79	36	82

(continued)

(TDS502A • 5 x D — continued)

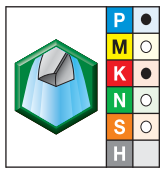


● first choice
○ alternate choice

grade WU25PD TiAIN		D1 diameter							
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L
2964825	TDS502A04800	4,800	.1890	6	44	35	0,80	36	82
2964826	TDS502A04900	4,900	.1929	6	44	35	0,81	36	82
2964827	TDS502A05000	5,000	.1969	6	44	35	0,83	36	82
2964828	TDS502A05100	5,100	.2008	6	44	35	0,85	36	82
2964829	TDS502A05160	5,160	.2031	6	44	35	0,86	36	82
2964830	TDS502A05200	5,200	.2047	6	44	35	0,87	36	82
2964831	TDS502A05300	5,300	.2087	6	44	35	0,88	36	82
2964832	TDS502A05400	5,400	.2126	6	44	35	0,90	36	82
2964833	TDS502A05500	5,500	.2165	6	44	35	0,92	36	82
2964834	TDS502A05550	5,550	.2185	6	44	35	0,93	36	82
2964835	TDS502A05560	5,560	.2189	6	44	35	0,93	36	82
2964836	TDS502A05600	5,600	.2205	6	44	35	0,94	36	82
2964837	TDS502A05700	5,700	.2244	6	44	35	0,95	36	82
2964838	TDS502A05800	5,800	.2283	6	44	35	0,97	36	82
2964839	TDS502A05900	5,900	.2323	6	44	35	0,99	36	82
2964840	TDS502A05950	5,950	.2343	6	44	35	1,00	36	82
2964841	TDS502A06000	6,000	.2362	6	44	35	1,00	36	82
2964842	TDS502A06100	6,100	.2402	8	53	43	1,02	36	91
2964843	TDS502A06200	6,200	.2441	8	53	43	1,04	36	91
2964844	TDS502A06300	6,300	.2480	8	53	43	1,06	36	91
2964845	TDS502A06350	6,350	.2500	8	53	43	1,07	36	91
2964846	TDS502A06400	6,400	.2520	8	53	43	1,07	36	91
2964847	TDS502A06500	6,500	.2559	8	53	43	1,09	36	91
2964848	TDS502A06600	6,600	.2598	8	53	43	1,11	36	91
2964849	TDS502A06700	6,700	.2638	8	53	43	1,13	36	91
2964850	TDS502A06750	6,750	.2657	8	53	43	1,14	36	91
2964851	TDS502A06800	6,800	.2677	8	53	43	1,14	36	91
2964852	TDS502A06900	6,900	.2717	8	53	43	1,16	36	91
2964853	TDS502A07000	7,000	.2756	8	53	43	1,18	36	91
2964854	TDS502A07100	7,100	.2795	8	53	43	1,20	36	91
2964855	TDS502A07140	7,140	.2811	8	53	43	1,20	36	91
2964856	TDS502A07200	7,200	.2835	8	53	43	1,21	36	91
2964857	TDS502A07300	7,300	.2874	8	53	43	1,23	36	91
2964858	TDS502A07400	7,400	.2913	8	53	43	1,25	36	91
2964859	TDS502A07500	7,500	.2953	8	53	43	1,27	36	91
2964860	TDS502A07540	7,540	.2969	8	53	43	1,27	36	91
2964861	TDS502A07600	7,600	.2992	8	53	43	1,29	36	91
2964862	TDS502A07700	7,700	.3031	8	53	43	1,30	36	91
2964863	TDS502A07800	7,800	.3071	8	53	43	1,32	36	91
2964864	TDS502A07900	7,900	.3110	8	53	43	1,34	36	91

(continued)

(TDS502A • 5 x D — continued)



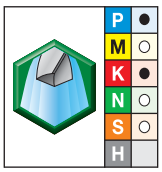
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964865	TDS502A07940	7,940	.3126	8	53	43	1,34	36	91
2964866	TDS502A08000	8,000	.3150	8	53	43	1,36	36	91
2964867	TDS502A08100	8,100	.3189	10	61	49	1,37	40	103
2964868	TDS502A08200	8,200	.3228	10	61	49	1,39	40	103
2964869	TDS502A08300	8,300	.3268	10	61	49	1,41	40	103
2964870	TDS502A08330	8,330	.3280	10	61	49	1,41	40	103
2964871	TDS502A08400	8,400	.3307	10	61	49	1,43	40	103
2964872	TDS502A08500	8,500	.3346	10	61	49	1,44	40	103
2964873	TDS502A08600	8,600	.3386	10	61	49	1,46	40	103
2964874	TDS502A08700	8,700	.3425	10	61	49	1,48	40	103
2964875	TDS502A08800	8,800	.3465	10	61	49	1,50	40	103
2964876	TDS502A08900	8,900	.3504	10	61	49	1,51	40	103
2964877	TDS502A09000	9,000	.3543	10	61	49	1,53	40	103
2964878	TDS502A09100	9,100	.3583	10	61	49	1,55	40	103
2964879	TDS502A09130	9,130	.3594	10	61	49	1,55	40	103
2964880	TDS502A09200	9,200	.3622	10	61	49	1,57	40	103
2964881	TDS502A09300	9,300	.3661	10	61	49	1,58	40	103
2964882	TDS502A09400	9,400	.3701	10	61	49	1,60	40	103
2964883	TDS502A09500	9,500	.3740	10	61	49	1,62	40	103
2964884	TDS502A09520	9,520	.3748	10	61	49	1,62	40	103
2964885	TDS502A09600	9,600	.3780	10	61	49	1,64	40	103
2964886	TDS502A09700	9,700	.3819	10	61	49	1,65	40	103
2964887	TDS502A09800	9,800	.3858	10	61	49	1,67	40	103
2964888	TDS502A09900	9,900	.3898	10	61	49	1,69	40	103
2964889	TDS502A09920	9,920	.3906	10	61	49	1,69	40	103
2964890	TDS502A10000	10,000	.3937	10	61	49	1,71	40	103
2964891	TDS502A10100	10,100	.3976	12	71	56	1,73	45	118
2964892	TDS502A10200	10,200	.4016	12	71	56	1,74	45	118
2964893	TDS502A10300	10,300	.4055	12	71	56	1,76	45	118
2964894	TDS502A10320	10,320	.4063	12	71	56	1,76	45	118
2964895	TDS502A10400	10,400	.4094	12	71	56	1,78	45	118
2964896	TDS502A10500	10,500	.4134	12	71	56	1,80	45	118
2964897	TDS502A10600	10,600	.4173	12	71	56	1,81	45	118
2964898	TDS502A10700	10,700	.4213	12	71	56	1,83	45	118
2964899	TDS502A10720	10,720	.4220	12	71	56	1,83	45	118
2964900	TDS502A10800	10,800	.4252	12	71	56	1,85	45	118
2964901	TDS502A10900	10,900	.4291	12	71	56	1,87	45	118
2964902	TDS502A11000	11,000	.4331	12	71	56	1,88	45	118
2964903	TDS502A11100	11,100	.4370	12	71	56	1,90	45	118
2964904	TDS502A11110	11,110	.4374	12	71	56	1,90	45	118

(continued)

(TDS502A • 5 x D — continued)

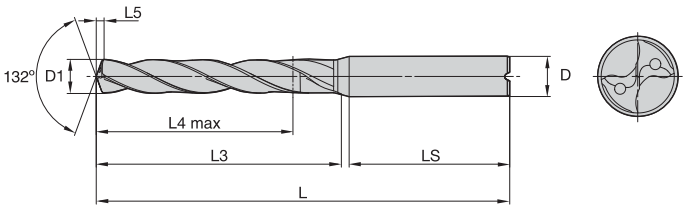


● first choice
○ alternate choice

grade WU25PD TiAIN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2964905	TDS502A11200	11,200	.4409	12	71	56	1,92	45	118
2964906	TDS502A11300	11,300	.4449	12	71	56	1,94	45	118
2968374	TDS502A11400	11,400	.4488	12	71	56	1,95	45	118
2968375	TDS502A11500	11,500	.4528	12	71	56	1,97	45	118
2968376	TDS502A11600	11,600	.4567	12	71	56	1,99	45	118
2968377	TDS502A11700	11,700	.4606	12	71	56	2,01	45	118
2968378	TDS502A11800	11,800	.4646	12	71	56	2,03	45	118
2968379	TDS502A11900	11,900	.4685	12	71	56	2,04	45	118
2968380	TDS502A11910	11,910	.4689	12	71	56	2,04	45	118
2968381	TDS502A12000	12,000	.4724	12	71	56	2,06	45	118
2968382	TDS502A12300	12,300	.4843	14	77	60	2,11	45	124
2968393	TDS502A12500	12,500	.4921	14	77	60	2,15	45	124
2968394	TDS502A12700	12,700	.5000	14	77	60	2,18	45	124
2968395	TDS502A12800	12,800	.5039	14	77	60	2,20	45	124
2968396	TDS502A13000	13,000	.5118	14	77	60	2,24	45	124
4051238	TDS502A13100	13,100	.5157	14	77	60	2,79	45	124
2968397	TDS502A13500	13,500	.5315	14	77	60	2,33	45	124
2968398	TDS502A13800	13,800	.5433	14	77	60	2,38	45	124
2968399	TDS502A14000	14,000	.5512	14	77	60	2,41	45	124
2968400	TDS502A14290	14,290	.5626	16	83	63	2,47	48	133
2968401	TDS502A14500	14,500	.5709	16	83	63	2,50	48	133
2968402	TDS502A14800	14,800	.5827	16	83	63	2,56	48	133
2968403	TDS502A15000	15,000	.5906	16	83	63	2,59	48	133
2968404	TDS502A15500	15,500	.6102	16	83	63	2,68	48	133
2968405	TDS502A15800	15,800	.6220	16	83	63	2,73	48	133
2968406	TDS502A15870	15,870	.6248	16	83	63	2,75	48	133
2968407	TDS502A16000	16,000	.6299	16	83	63	2,77	48	133
2968408	TDS502A16500	16,500	.6496	18	93	71	2,86	48	143
2968409	TDS502A16670	16,670	.6563	18	93	71	2,89	48	143
2968410	TDS502A16800	16,800	.6614	18	93	71	2,91	48	143
2968411	TDS502A17000	17,000	.6693	18	93	71	2,95	48	143
2968412	TDS502A17500	17,500	.6890	18	93	71	3,04	48	143
2968413	TDS502A17800	17,800	.7008	18	93	71	3,09	48	143
2968414	TDS502A18000	18,000	.7087	18	93	71	3,12	48	143
2968415	TDS502A18500	18,500	.7283	20	101	77	3,21	50	153
2968416	TDS502A18800	18,800	.7402	20	101	77	3,27	50	153
2968417	TDS502A19000	19,000	.7480	20	101	77	3,30	50	153
2968418	TDS502A19050	19,050	.7500	20	101	77	3,31	50	153
2968419	TDS502A19500	19,500	.7677	20	101	77	3,39	50	153
2968420	TDS502A19800	19,800	.7795	20	101	77	3,44	50	153
2968421	TDS502A20000	20,000	.7874	20	101	77	3,48	50	153







TDS503A • 8 x D



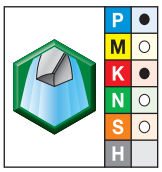
grade WU25PD TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2968422	TDS503A03000	3,000	.1181	6	40	33	0,61	36	78
4051239	TDS503A03100	3,100	.1220	6	40	33	0,63	36	78
4051240	TDS503A03175	3,175	.1250	6	40	33	0,64	36	78
4051241	TDS503A03200	3,200	.1260	6	40	33	0,65	36	78
4051242	TDS503A03250	3,250	.1280	6	40	33	0,66	36	78
2968503	TDS503A03300	3,300	.1299	6	40	33	0,67	36	78
4051243	TDS503A03400	3,400	.1339	6	40	33	0,69	36	78
4051244	TDS503A03455	3,455	.1360	6	40	33	0,70	36	78
2968504	TDS503A03500	3,500	.1378	6	40	33	0,71	36	78
2968505	TDS503A03700	3,700	.1457	6	40	33	0,76	36	78
2968506	TDS503A03800	3,800	.1496	6	49	41	0,78	36	87
4051245	TDS503A03900	3,900	.1535	6	49	41	0,80	36	87
2968507	TDS503A04000	4,000	.1575	6	49	41	0,82	36	87
4051246	TDS503A04100	4,100	.1614	6	49	41	0,84	36	87
2968508	TDS503A04200	4,200	.1654	6	49	41	0,86	36	87
4051247	TDS503A04300	4,300	.1693	6	49	41	0,88	36	87
2968509	TDS503A04370	4,370	.1720	6	49	41	0,90	36	87
4051248	TDS503A04400	4,400	.1732	6	49	41	0,91	36	87
2968510	TDS503A04500	4,500	.1772	6	49	41	0,93	36	87
4051249	TDS503A04600	4,600	.1811	6	49	41	0,95	36	87
4051250	TDS503A04650	4,650	.1831	6	49	41	0,96	36	87
2968511	TDS503A04700	4,700	.1850	6	49	41	0,97	36	87
2968512	TDS503A04760	4,760	.1874	6	56	48	0,98	36	94
2968513	TDS503A04800	4,800	.1890	6	56	48	0,99	36	94

(continued)

(TDS503A • 8 x D — continued)



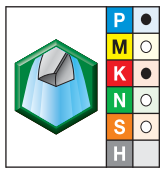
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
4051251	TDS503A04900	4,900	.1929	6	56	48	1,01	36	94
2968514	TDS503A05000	5,000	.1969	6	56	48	1,03	36	94
4051252	TDS503A05100	5,100	.2008	6	56	48	1,06	36	94
2968515	TDS503A05160	5,160	.2031	6	56	48	1,07	36	94
4051253	TDS503A05200	5,200	.2047	6	56	48	1,08	36	94
4051254	TDS503A05300	5,300	.2087	6	56	48	1,10	36	94
4051255	TDS503A05400	5,400	.2126	6	56	48	1,12	36	94
2968516	TDS503A05500	5,500	.2165	6	56	48	1,14	36	94
4051256	TDS503A05550	5,550	.2185	6	56	48	1,15	36	94
2968517	TDS503A05560	5,560	.2189	6	56	48	1,15	36	94
4051257	TDS503A05600	5,600	.2205	6	56	48	1,16	36	94
4051258	TDS503A05700	5,700	.2244	6	56	48	1,18	36	94
2968518	TDS503A05800	5,800	.2283	6	56	48	1,21	36	94
4051259	TDS503A05900	5,900	.2323	6	56	48	1,23	36	94
2968519	TDS503A05950	5,950	.2343	6	56	48	1,24	36	94
2968520	TDS503A06000	6,000	.2362	6	56	48	1,25	36	94
4051260	TDS503A06100	6,100	.2402	8	67	57	1,27	36	105
4051261	TDS503A06200	6,200	.2441	8	67	57	1,29	36	105
4051262	TDS503A06300	6,300	.2480	8	67	57	1,31	36	105
2968521	TDS503A06350	6,350	.2500	8	67	57	1,32	36	105
4051263	TDS503A06400	6,400	.2520	8	67	57	1,33	36	105
2968522	TDS503A06500	6,500	.2559	8	67	57	1,36	36	105
4051264	TDS503A06600	6,600	.2598	8	67	57	1,38	36	105
4051265	TDS503A06700	6,700	.2638	8	67	57	1,40	36	105
2968523	TDS503A06750	6,750	.2657	8	67	57	1,41	36	105
2968524	TDS503A06800	6,800	.2677	8	67	57	1,42	36	105
4051266	TDS503A06900	6,900	.2717	8	67	57	1,44	36	105
2968525	TDS503A07000	7,000	.2756	8	67	57	1,46	36	105
4051267	TDS503A07100	7,100	.2795	8	72	61	1,49	36	110
2968526	TDS503A07140	7,140	.2811	8	72	61	1,49	36	110
4051268	TDS503A07200	7,200	.2835	8	72	61	1,51	36	110
4051269	TDS503A07300	7,300	.2874	8	72	61	1,53	36	110
4051270	TDS503A07400	7,400	.2913	8	72	61	1,55	36	110
2968527	TDS503A07500	7,500	.2953	8	72	61	1,57	36	110
2968528	TDS503A07540	7,540	.2969	8	72	61	1,58	36	110
3998454	TDS503A07600	7,600	.2992	8	72	61	1,59	36	110
4051271	TDS503A07700	7,700	.3031	8	72	61	1,62	36	110
2968529	TDS503A07800	7,800	.3071	8	72	61	1,64	36	110
4051272	TDS503A07900	7,900	.3110	8	72	61	1,66	36	110
2968530	TDS503A07940	7,940	.3126	8	72	61	1,67	36	110

(continued)

(TDS503A • 8 x D — continued)



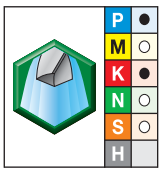
● first choice
○ alternate choice

grade WU25PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
2968531	TDS503A08000	8,000	.3150	8	72	61	1,68	36	110
4051273	TDS503A08100	8,100	.3189	10	80	68	1,70	40	122
4051274	TDS503A08200	8,200	.3228	10	80	68	1,72	40	122
4051275	TDS503A08300	8,300	.3268	10	80	68	1,75	40	122
2968532	TDS503A08330	8,330	.3280	10	80	68	1,75	40	122
4051276	TDS503A08400	8,400	.3307	10	80	68	1,77	40	122
2968533	TDS503A08500	8,500	.3346	10	80	68	1,79	40	122
4051277	TDS503A08600	8,600	.3386	10	80	68	1,81	40	122
4051278	TDS503A08700	8,700	.3425	10	80	68	1,83	40	122
4051279	TDS503A08800	8,800	.3465	10	80	68	1,85	40	122
4051280	TDS503A08900	8,900	.3504	10	80	68	1,88	40	122
2968534	TDS503A09000	9,000	.3543	10	80	68	1,90	40	122
4051281	TDS503A09100	9,100	.3583	10	80	68	1,92	40	122
2968535	TDS503A09130	9,130	.3594	10	80	68	1,93	40	122
4051282	TDS503A09200	9,200	.3622	10	80	68	1,94	40	122
4051283	TDS503A09300	9,300	.3661	10	80	68	1,96	40	122
4051284	TDS503A09400	9,400	.3701	10	80	68	1,98	40	122
2968536	TDS503A09500	9,500	.3740	10	80	68	2,01	40	122
2968537	TDS503A09520	9,520	.3748	10	80	68	2,01	40	122
4051285	TDS503A09600	9,600	.3780	10	80	68	2,03	40	122
4051286	TDS503A09700	9,700	.3819	10	80	68	2,05	40	122
2968538	TDS503A09800	9,800	.3858	10	80	68	2,07	40	122
4051287	TDS503A09900	9,900	.3898	10	80	68	2,09	40	122
2968539	TDS503A09920	9,920	.3906	10	80	68	2,10	40	122
2968540	TDS503A10000	10,000	.3937	10	80	68	2,11	40	122
4051288	TDS503A10100	10,100	.3976	12	94	79	2,14	45	141
2968541	TDS503A10200	10,200	.4016	12	94	79	2,16	45	141
4051289	TDS503A10300	10,300	.4055	12	94	79	2,18	45	141
2968542	TDS503A10320	10,320	.4063	12	94	79	2,18	45	141
4051290	TDS503A10400	10,400	.4094	12	94	79	2,20	45	141
2968543	TDS503A10500	10,500	.4134	12	94	79	2,22	45	141
4051291	TDS503A10600	10,600	.4173	12	94	79	2,24	45	141
4051292	TDS503A10700	10,700	.4213	12	94	79	2,27	45	141
2968544	TDS503A10720	10,720	.4220	12	94	79	2,27	45	141
2968545	TDS503A10800	10,800	.4252	12	94	79	2,29	45	141
4051293	TDS503A10900	10,900	.4291	12	94	79	2,31	45	141
2968546	TDS503A11000	11,000	.4331	12	94	79	2,33	45	141
4051294	TDS503A11100	11,100	.4370	12	94	79	2,35	45	141
3998456	TDS503A11110	11,110	.4374	12	94	79	2,35	45	141
4051295	TDS503A11200	11,200	.4409	12	94	79	2,37	45	141

(continued)

(TDS503A • 8 x D — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	D	L3	L4 max	L5	LS	L
4051296	TDS503A11300	11,300	.4449	12	94	79	2,40	45	141
4051297	TDS503A11400	11,400	.4488	12	94	79	2,42	45	141
2968547	TDS503A11500	11,500	.4528	12	94	79	2,44	45	141
4051298	TDS503A11600	11,600	.4567	12	94	79	2,46	45	141
4051299	TDS503A11700	11,700	.4606	12	94	79	2,48	45	141
2968548	TDS503A11800	11,800	.4646	12	94	79	2,50	45	141
4051300	TDS503A11900	11,900	.4685	12	94	79	2,53	45	141
2968549	TDS503A11910	11,910	.4689	12	94	79	2,53	45	141
2968550	TDS503A12000	12,000	.4724	12	94	79	2,55	45	141
2968551	TDS503A12300	12,300	.4843	14	108	91	2,61	45	155
2968552	TDS503A12500	12,500	.4921	14	108	91	2,66	45	155
2968553	TDS503A12700	12,700	.5000	14	108	91	2,70	45	155
2968554	TDS503A12800	12,800	.5039	14	108	91	2,72	45	155
2968555	TDS503A13000	13,000	.5118	14	108	91	2,77	45	155
4051301	TDS503A13100	13,100	.5157	14	108	91	2,79	45	155
2968556	TDS503A13500	13,500	.5315	14	108	91	2,87	45	155
2968557	TDS503A13800	13,800	.5433	14	108	91	2,94	45	155
2968558	TDS503A14000	14,000	.5512	14	108	91	2,98	45	155
2968559	TDS503A14290	14,290	.5626	16	121	101	3,05	48	171
2968560	TDS503A14500	14,500	.5709	16	121	101	3,09	48	171
2968561	TDS503A14800	14,800	.5827	16	121	101	3,16	48	171
2968562	TDS503A15000	15,000	.5906	16	121	101	3,20	48	171
2968563	TDS503A15500	15,500	.6102	16	121	101	3,31	48	171
2968564	TDS503A15800	15,800	.6220	16	121	101	3,38	48	171
2968565	TDS503A15870	15,870	.6248	16	121	101	3,39	48	171
2968566	TDS503A16000	16,000	.6299	16	121	101	3,42	48	171
4051302	TDS503A16500	16,500	.6496	18	135	113	3,53	48	185
4051303	TDS503A16670	16,670	.6563	18	135	113	3,57	48	185
4051304	TDS503A16800	16,800	.6614	18	135	113	3,59	48	185
4051305	TDS503A17000	17,000	.6693	18	135	113	3,64	48	185
4051306	TDS503A17500	17,500	.6890	18	135	113	3,75	48	185
4051307	TDS503A17800	17,800	.7008	18	135	113	3,81	48	185
4051308	TDS503A18000	18,000	.7087	18	135	113	3,86	48	185
4051309	TDS503A18500	18,500	.7283	20	148	124	3,97	50	200
4051310	TDS503A18800	18,800	.7402	20	148	124	4,03	50	200
4051311	TDS503A19000	19,000	.7480	20	148	124	4,07	50	200
4051312	TDS503A19050	19,050	.7500	20	148	124	4,09	50	200
4051313	TDS503A19500	19,500	.7677	20	148	124	4,18	50	200
4051314	TDS503A19800	19,800	.7795	20	148	124	4,25	50	200
4051315	TDS503A20000	20,000	.7874	20	148	124	4,29	50	200

■ TOP DRILL S+ • TDS301 • WU25PD™ • Flood Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	80	–	130	mm/r	0,06–0,12	0,10–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
	2, 3, 4, 6, 7	60	–	120	mm/r	0,07–0,13	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
	5, 9, 10, 11	60	–	120	mm/r	0,07–0,13	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
	12, 13.1, 13.2	40	–	70	mm/r	0,05–0,08	0,06–0,11	0,09–0,16	0,11–0,20	0,13–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14.1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14.3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,08–0,16	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,06	0,38–0,74
	17, 18, 19	130	–	160	mm/r	0,08–0,13	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
	20	100	–	170	mm/r	0,06–0,13	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,25–0,48	0,30–0,60
N	21	100	–	300	mm/r	0,10–0,18	0,12–0,20	0,15–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,60
	22, 23, 24	100	–	300	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,55	0,40–0,65
	25	100	–	300	mm/r	0,15–0,18	0,16–0,20	0,18–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,55
	26, 27, 28	100	–	250	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,50	0,40–0,60
S	31, 32	20	–	30	mm/r	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
	33, 34, 35	10	–	30	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
	36	20	–	40	mm/r	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
	37	20	–	50	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

	Metric tolerance	
nominal size range	D1 tolerance	D tolerance h6
>3–6	0,004/0,016	0,000/–0,008
>6–10	0,006/0,021	0,000/–0,009
>10–18	0,007/0,025	0,000/–0,011
>18–21	0,008/0,029	0,000/–0,013

■ TOP DRILL S+ • TDS501 TDS502 TDS503 • WU25PD™ • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	180	mm/r	0,08–0,16	0,09–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
	2, 3, 4, 6, 7	80	–	120	mm/r	0,09–0,17	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
	5, 9, 10, 11	70	–	120	mm/r	0,08–0,17	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
	12, 13.1, 13.2	50	–	80	mm/r	0,05–0,09	0,06–0,11	0,09–0,16	0,11–0,20	0,14–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14.1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14.3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
	17, 18, 19	130	–	160	mm/r	0,11–0,17	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
	20	100	–	170	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60
N	21	100	–	350	mm/r	0,10–0,18	0,12–0,20	0,15–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,60
	22, 23, 24	100	–	300	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,55	0,40–0,65
	25	100	–	300	mm/r	0,15–0,18	0,16–0,20	0,18–0,25	0,20–0,30	0,25–0,35	0,30–0,40	0,35–0,50	0,40–0,55
	26, 27, 28	100	–	250	mm/r	0,10–0,20	0,12–0,25	0,15–0,30	0,20–0,35	0,25–0,40	0,30–0,45	0,35–0,50	0,40–0,60
S	31, 32	20	–	30	mm/r	0,03–0,06	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,13	0,10–0,14	0,12–0,16	0,14–0,18
	33, 34, 35	10	–	30	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16
	36	20	–	40	mm/r	0,02–0,04	0,02–0,05	0,04–0,07	0,06–0,09	0,07–0,10	0,08–0,11	0,09–0,13	0,10–0,15
	37	20	–	50	mm/r	0,02–0,04	0,03–0,06	0,05–0,08	0,07–0,10	0,08–0,11	0,09–0,12	0,10–0,14	0,11–0,16

Metric tolerance

nominal size range	D1 tolerance	D tolerance h6
>3–6	0,004/0,016	0,000/–0,008
>6–10	0,006/0,021	0,000/–0,009
>10–18	0,007/0,025	0,000/–0,011
>18–21	0,008/0,029	0,000/–0,013

Good for You, Better for the Environment!

The WIDIA™ Carbide Recycling Program can turn accumulated scrap carbide tooling in your shop into cash.

Carbide Recycling

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

We pay cash for used carbide tooling, including coated or non-coated carbide inserts, drills, end mills, reamers, and taps, regardless of brand.

It's good for the environment and a responsible way to dispose of scrap carbide.

Our carbide recycling program features:

- Easy-to-use web portal that shows what your scrap carbide is worth before sending it to us.
- Online forms that make it easy to ship scrap carbide to WIDIA.
- Green Box™ containers for safe, convenient shipping of scrap carbide to WIDIA.
- Cash payment for used carbide tooling.



For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

Deep-Hole Drilling without Piloting •

WIDIA™ TOP DRILL S+™ 12 x D

The versatile TOP DRILL S+ provides reliable performance across a broad scope of applications, including alloyed and unalloyed steel, cast iron, and some stainless steels and high-temperature alloys. TDS+ is now available in 12 x D, adding to its already wide range of options from 3–8 x D.



TOP DRILL S+ 12 x D

TDS+ 12 x D is capable of drilling an array of materials. The 4-margin land configuration offers stability, minimises chipping and jamming, and promotes chip evacuation. Because TDS+ 12 x D does not require a pilot drill, it increases efficiency by reducing the number of steps required for basic applications.

- 12 x D fits the gap between 8 x D and 15 x D.
- One drill that covers all materials.
- Can be used without a pilot.



Extra stability
The TDS+ 4-margin land design from head to end of flute provides stability in cross holes and inclined exits.

Minimised chip jamming
Special gash and flute form for effective chip formation across a variety of materials.

Easy chip evacuation
The TDS+ utilises the same technology developed for WIDIA deep-hole drills. The polished surface enables effective chip evacuation from deep holes.

Improved Productivity

- Excellent centring capability — the new TDS+ 12 x D point is engineered to provide excellent centring capability.
- No pilot drill required — save time and money by reducing the number of steps required for your 12 x D application.

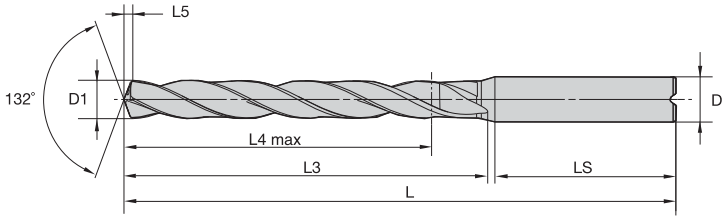
Increased Tool Life

- Minimised runout — cylindrical body design provides guidance, and precision h6 shank is standard for better runout and less breakage.
- New WU20PD™ grade — designed specifically for long tool life.
- Factory regrind service — available through your WIDIA™ reconditioning service.

WIDIA Advantage

- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Get more predictable results from local regrind services using OEM standards to recondition, ensuring value throughout the entire life of the drill.
- Broad range of standard lengths, diameters, and coolant options in one line. Includes extensive intermediate metric, inch, fraction, and wire size, including tap drill sizes.

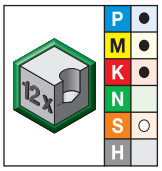






For information on L, L3, and L4 max, see page T143.

TDS504A • 12 x D



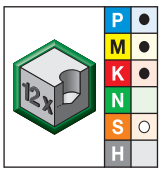
grade WU20PD
TiAlN

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4173459	TDS504A03000	3,000	.1181	93	44	52,0	0,6	36	6
4173460	TDS504A03175	3,175	.1250	93	44	52,0	0,7	36	6
4173461	TDS504A03264	3,264	.1285	93	44	53,0	0,7	36	6
4173545	TDS504A03455	3,455	.1360	93	44	53,0	0,7	36	6
4173462	TDS504A03500	3,500	.1378	93	44	53,0	0,7	36	6
4173546	TDS504A03734	3,734	.1470	93	45	54,0	0,8	36	6
4173463	TDS504A03970	3,970	.1563	107	56	66,0	0,8	36	6
4173464	TDS504A04000	4,000	.1575	107	56	66,0	0,8	36	6
4173465	TDS504A04500	4,500	.1772	107	56	67,0	0,9	36	6
4173466	TDS504A04600	4,600	.1811	107	57	68,0	1,0	36	6
4173467	TDS504A04763	4,763	.1875	125	69	82,0	1,0	36	6
4173468	TDS504A04800	4,800	.1890	125	69	82,0	1,0	36	6
4173469	TDS504A05000	5,000	.1969	125	70	83,0	1,1	36	6
4173470	TDS504A05100	5,100	.2008	125	70	83,0	1,1	36	6
4173471	TDS504A05200	5,200	.2047	125	70	83,0	1,1	36	6
4173472	TDS504A05300	5,300	.2087	125	71	84,0	1,1	36	6
4173473	TDS504A05410	5,410	.2130	125	71	84,0	1,1	36	6
4173474	TDS504A05500	5,500	.2165	125	71	84,0	1,2	36	6
4173475	TDS504A05558	5,558	.2188	125	71	84,0	1,2	36	6
4173476	TDS504A05600	5,600	.2205	125	72	85,0	1,2	36	6
4173477	TDS504A05700	5,700	.2244	125	72	85,0	1,2	36	6
4173478	TDS504A05800	5,800	.2283	125	71	85,0	1,2	36	6
4173479	TDS504A06000	6,000	.2362	125	72	86,0	1,3	36	6
4173480	TDS504A06200	6,200	.2441	139	82	97,0	1,3	36	8

(continued)

(TDS504A • 12 x D — continued)



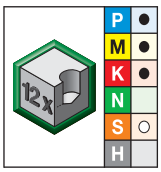
● first choice
○ alternate choice

grade WU20PD
TiAlN

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4173481	TDS504A06350	6,350	.2500	139	83	98,0	1,3	36	8
4173482	TDS504A06500	6,500	.2559	139	83	98,0	1,4	36	8
4173483	TDS504A06528	6,528	.2570	139	83	98,0	1,4	36	8
4173484	TDS504A06600	6,600	.2598	139	84	99,0	1,4	36	8
4173485	TDS504A06746	6,746	.2656	139	83	99,0	1,4	36	8
4173486	TDS504A06800	6,800	.2677	139	83	99,0	1,4	36	8
4173487	TDS504A06909	6,909	.2720	139	84	100,0	1,5	36	8
4173488	TDS504A07000	7,000	.2756	139	84	100,0	1,5	36	8
4173489	TDS504A07145	7,145	.2813	153	94	111,0	1,5	36	8
4173490	TDS504A07500	7,500	.2953	153	95	112,0	1,6	36	8
4173491	TDS504A07541	7,541	.2969	153	95	112,0	1,6	36	8
4173492	TDS504A07700	7,700	.3031	153	96	113,0	1,6	36	8
4173493	TDS504A07800	7,800	.3071	153	95	113,0	1,7	36	8
4173494	TDS504A07938	7,938	.3125	153	96	114,0	1,7	36	8
4173495	TDS504A08000	8,000	.3150	153	96	114,0	1,7	36	8
4173496	TDS504A08100	8,100	.3189	185	116	136,0	1,7	40	10
4173497	TDS504A08334	8,334	.3281	185	117	137,0	1,8	40	10
4173498	TDS504A08433	8,433	.3320	185	117	137,0	1,8	40	10
4173499	TDS504A08500	8,500	.3346	185	117	137,0	1,8	40	10
4173500	TDS504A08700	8,700	.3425	185	118	138,0	1,9	40	10
4173501	TDS504A08733	8,733	.3438	185	117	138,0	1,9	40	10
4173502	TDS504A09000	9,000	.3543	185	118	139,0	1,9	40	10
4173503	TDS504A09100	9,100	.3583	185	118	139,0	1,9	40	10
4173504	TDS504A09129	9,129	.3594	185	118	139,0	1,9	40	10
4173547	TDS504A09347	9,347	.3680	185	119	140,0	2,0	40	10
4173505	TDS504A09500	9,500	.3740	185	119	140,0	2,0	40	10
4173506	TDS504A09525	9,525	.3750	185	119	140,0	2,0	40	10
4173507	TDS504A09921	9,921	.3906	185	120	142,0	2,1	40	10
4173508	TDS504A10000	10,000	.3937	185	120	142,0	2,1	40	10
4173509	TDS504A10200	10,200	.4016	218	140	164,0	2,2	45	12
4173510	TDS504A10300	10,300	.4055	218	141	165,0	2,2	45	12
4173511	TDS504A10320	10,320	.4063	218	141	165,0	2,2	45	12
4173512	TDS504A10500	10,500	.4134	218	141	165,0	2,2	45	12
4173513	TDS504A10716	10,716	.4219	218	142	166,0	2,3	45	12
4173514	TDS504A10800	10,800	.4252	218	141	166,0	2,3	45	12
4173515	TDS504A11000	11,000	.4331	218	142	167,0	2,4	45	12
4173516	TDS504A11113	11,113	.4375	218	142	167,0	2,4	45	12
4173517	TDS504A11500	11,500	.4528	218	143	168,0	2,5	45	12
4173518	TDS504A11800	11,800	.4646	218	143	169,0	2,5	45	12
4173519	TDS504A12000	12,000	.4724	218	144	170,0	2,6	45	12

(continued)

(TDS504A • 12 x D — continued)



● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter							
order #	catalogue #	mm	in	L	L4 max	L3	L5	LS	D
4173520	TDS504A12100	12,100	.4764	246	164	192,0	2,6	45	14
4173521	TDS504A12304	12,304	.4844	246	165	193,0	2,6	45	14
4148906	TDS504A12500	12,500	.4921	246	165	193,0	2,7	45	14
4173522	TDS504A12700	12,700	.5000	246	166	194,0	2,7	45	14
4173523	TDS504A13000	13,000	.5118	246	166	195,0	2,8	45	14
4173524	TDS504A13100	13,100	.5157	246	166	195,0	2,8	45	14
4173525	TDS504A13500	13,500	.5315	246	167	196,0	2,9	45	14
4173526	TDS504A14000	14,000	.5512	246	168	198,0	3,0	45	14
4173527	TDS504A14100	14,100	.5551	277	188	220,0	3,0	48	16
4173528	TDS504A14288	14,288	.5625	277	188	220,0	3,1	48	16
4173529	TDS504A14500	14,500	.5709	277	189	221,0	3,1	48	16
4173530	TDS504A14684	14,684	.5781	277	190	222,0	3,2	48	16
4173531	TDS504A15000	15,000	.5906	277	190	223,0	3,2	48	16
4173532	TDS504A15500	15,500	.6102	277	191	224,0	3,3	48	16
4173533	TDS504A15875	15,875	.6250	277	192	225,0	3,4	48	16
4173534	TDS504A16000	16,000	.6299	277	192	226,0	3,4	48	16
4173535	TDS504A16500	16,500	.6496	305	213	249,0	3,6	48	18
4173536	TDS504A17000	17,000	.6693	305	214	250,0	3,7	48	18
4173537	TDS504A17463	17,463	.6875	305	215	252,0	3,8	48	18
4173538	TDS504A17500	17,500	.6890	305	215	252,0	3,8	48	18
4173539	TDS504A18000	18,000	.7087	305	216	253,0	3,9	48	18
4173540	TDS504A18500	18,500	.7283	334	237	277,0	4,0	50	20
4173541	TDS504A19000	19,000	.7480	334	238	278,0	4,1	50	20
4173542	TDS504A19050	19,050	.7500	334	239	279,0	4,1	50	20
4173543	TDS504A19500	19,500	.7677	334	239	280,0	4,2	50	20
4173544	TDS504A20000	20,000	.7874	334	240	281,0	4,3	50	20

■ TOP DRILL S+ • TDS504 • WU20PD™ • Through Coolant • Metric



Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	180	mm/r	0,08–0,16	0,09–0,18	0,12–0,24	0,14–0,29	0,17–0,34	0,20–0,39	0,24–0,47	0,31–0,60
	2, 3, 4, 6, 7	80	–	120	mm/r	0,09–0,17	0,10–0,19	0,14–0,25	0,17–0,31	0,21–0,37	0,24–0,42	0,29–0,52	0,38–0,65
	5, 9, 10, 11	70	–	120	mm/r	0,08–0,17	0,09–0,19	0,13–0,25	0,16–0,31	0,19–0,37	0,21–0,42	0,26–0,52	0,32–0,65
	12, 13	50	–	80	mm/r	0,05–0,09	0,06–0,11	0,09–0,16	0,11–0,20	0,14–0,24	0,15–0,27	0,20–0,35	0,26–0,45
M	14,1	30	–	50	mm/r	0,04–0,07	0,05–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
	14,3	30	–	60	mm/r	0,04–0,08	0,06–0,10	0,08–0,12	0,09–0,14	0,10–0,16	0,12–0,18	0,14–0,20	0,16–0,22
	14.2, 14.4	30	–	50	mm/r	0,04–0,07	0,06–0,09	0,08–0,11	0,09–0,12	0,10–0,14	0,12–0,16	0,14–0,18	0,16–0,20
K	15, 16	100	–	210	mm/r	0,11–0,22	0,12–0,24	0,16–0,31	0,20–0,38	0,23–0,44	0,25–0,49	0,31–0,60	0,38–0,74
	17, 18, 19	130	–	160	mm/r	0,11–0,17	0,12–0,19	0,16–0,25	0,20–0,31	0,23–0,36	0,25–0,40	0,31–0,48	0,38–0,60
	20	100	–	170	mm/r	0,08–0,17	0,09–0,19	0,12–0,25	0,14–0,30	0,17–0,35	0,19–0,40	0,24–0,48	0,30–0,60

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013

Top Drill Deep-Hole Drills



Solid carbide deep-hole drills outperform gun drills and HSS deep-hole drills in deep-hole applications up to 30 x D by increasing metal removal rates by 3–4 times. Increased MRR equals bottom-line savings to customers in throughput, machine time, and personnel hours.

The TDD1*Z* Series in the WU20PD™ grade offers secure and consistent performance, excellent hole quality, and reduced cycle times. The standard lines are available from 3 to 13mm and lengths of 15, 20, 25, and 30 x D. It eliminates the traditional HSS or gun drilling without pecking, at up to 100% increased penetration rates.

132° TDS Point Geometry

- Low thrust.
- Excellent centring capabilities.
- Easy to regrind.

30° Helix with Optimised Flute Profile

- Reduces risk of chip jamming and catastrophic failure.

Four-Margin Lands

- Improves hole straightness.
- Improves hole alignment when drilling through cross holes and inclined exits.

Highly Polished Surfaces

- Reduction of friction in the chip flute and on the lands, resulting in superior chip evacuation.
- Shorter drilling time through omission of reversing cycles.

WU20PD™ Grade

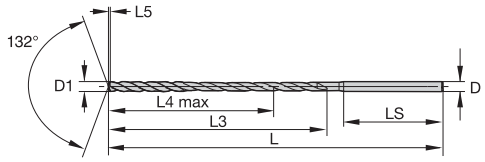
- Advanced TiAlN multilayer PVD coating for steel and cast iron.
- Ultra fine-grain carbide ensures process reliability at high feed rates.



Customisation

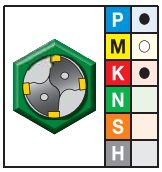
- Intermediate sizes, even up to 16mm diameter, available as semi-standards.
- Length variations, including longer versions up to 550mm, available as custom solutions.
- For drilling non-ferrous and uncoated materials, sharp versions are recommended and available as custom solutions.
- Excellent surface finish and concentricity.







■ Deep Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 15 x D • Z Shank

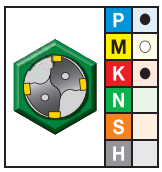


● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899626	TDD105Z03000	3,000	.1181	3	53	45	0,6	30	86	TDS501A03000
3899627	TDD105Z03175	3,175	.1250	4	67	58	0,6	32	105	TDS501A03175
3899628	TDD105Z03500	3,500	.1378	4	68	59	0,7	32	105	TDS501A03500
3899629	TDD105Z03571	3,571	.1406	4	68	59	0,7	32	105	TDS501A03571
3899630	TDD105Z03800	3,800	.1496	4	69	60	0,8	32	105	TDS501A03800
3899631	TDD105Z03970	3,970	.1563	4	70	60	0,8	32	105	TDS501A03970
3899632	TDD105Z04000	4,000	.1575	4	70	60	0,8	32	105	TDS501A04000
3899683	TDD105Z04039	4,039	.1590	5	84	73	0,8	34	124	TDS501A04039
3899684	TDD105Z04300	4,300	.1693	5	85	74	0,9	34	124	TDS501A04300
3899685	TDD105Z04500	4,500	.1772	5	85	74	0,9	34	124	TDS501A04500
3899686	TDD105Z04623	4,623	.1820	5	86	74	1,0	34	124	TDS501A04623
3899687	TDD105Z04763	4,763	.1875	5	86	75	1,0	34	124	TDS501A04763
3899688	TDD105Z05000	5,000	.1969	5	87	75	1,0	34	124	TDS501A05000
3899689	TDD105Z05159	5,159	.2031	6	102	88	1,1	36	143	TDS501A05160
3899690	TDD105Z05410	5,410	.2130	6	102	89	1,1	36	143	TDS501A05410
3899691	TDD105Z05500	5,500	.2165	6	102	89	1,1	36	143	TDS501A05500
3899692	TDD105Z05558	5,558	.2188	6	102	89	1,2	36	143	TDS501A05558
3899693	TDD105Z05800	5,800	.2283	6	103	90	1,2	36	143	TDS501A05800
3899694	TDD105Z06000	6,000	.2362	6	104	90	1,2	36	143	TDS501A06000
3899695	TDD105Z06200	6,200	.2441	7	118	103	1,3	38	162	TDS501A06200
3899696	TDD105Z06350	6,350	.2500	7	119	104	1,3	38	162	TDS501A06350
3899697	TDD105Z06500	6,500	.2559	7	119	104	1,4	38	162	TDS501A06500
3899698	TDD105Z06528	6,528	.2570	7	119	104	1,4	38	162	TDS501A06528
3899699	TDD105Z06746	6,746	.2656	7	120	105	1,4	38	162	TDS501A06746

(continued)

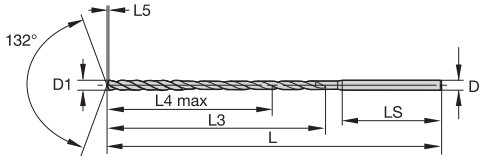
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 15 x D • Z Shank — continued)



● first choice
○ alternate choice

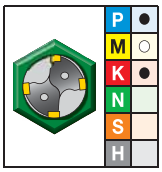
grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899700	TDD105Z06800	6,800	.2677	7	120	105	1,4	38	162	TDS501A06800
3899701	TDD105Z06909	6,909	.2720	7	121	105	1,4	38	162	TDS501A06909
3899702	TDD105Z07000	7,000	.2756	7	121	105	1,5	38	162	TDS501A07000
3900612	TDD105Z07145	7,145	.2813	8	135	118	1,5	40	181	TDS501A07145
3900633	TDD105Z07500	7,500	.2953	8	136	119	1,6	40	181	TDS501A07500
3899764	TDD106Z07500	7,500	.2953	8	174	157	1,6	40	221	TDS501A07500
3900634	TDD105Z07541	7,541	.2969	8	136	119	1,6	40	181	TDS501A07541
3900635	TDD105Z07938	7,938	.3125	8	138	120	1,7	40	181	TDS501A07938
3900636	TDD105Z08000	8,000	.3150	8	138	120	1,7	40	181	TDS501A08000
3900637	TDD105Z08334	8,334	.3281	9	153	134	1,8	42	200	TDS501A08334
3900638	TDD105Z08433	8,433	.3320	9	153	134	1,8	42	200	TDS501A08433
3900639	TDD105Z08500	8,500	.3346	9	153	134	1,8	42	200	TDS501A08500
3900640	TDD105Z08733	8,733	.3438	9	154	135	1,8	42	200	TDS501A08733
3900641	TDD105Z09000	9,000	.3543	9	155	135	1,9	42	200	TDS501A09000
3900642	TDD105Z09347	9,347	.3680	10	170	149	2,0	44	219	TDS501A09347
3900643	TDD105Z09500	9,500	.3740	10	170	149	2,0	44	219	TDS501A09500
3900644	TDD105Z09525	9,525	.3750	10	170	149	2,0	44	219	TDS501A09525
3900645	TDD105Z09750	9,750	.3839	10	171	150	2,1	44	219	TDS501A09750
3900647	TDD105Z10000	10,000	.3937	10	172	150	2,1	44	219	TDS501A10000
3900648	TDD105Z10200	10,200	.4016	11	186	163	2,2	46	238	TDS501A10200
3900649	TDD105Z10320	10,317	.4062	11	187	164	2,2	46	238	TDS501A10317
3900650	TDD105Z10500	10,500	.4134	11	187	164	2,2	46	238	TDS501A10500
3900651	TDD105Z10716	10,716	.4219	11	188	164	2,3	46	238	TDS501A10716
3900652	TDD105Z11000	11,000	.4331	11	203	178	2,3	46	238	TDS501A11000
3900653	TDD105Z11113	11,113	.4375	12	203	178	2,4	48	257	TDS501A11113
3900654	TDD105Z11500	11,500	.4528	12	204	179	2,4	48	257	TDS501A11500
3900656	TDD105Z12000	12,000	.4724	12	206	180	2,5	48	257	TDS501A12000
3900657	TDD105Z12304	12,304	.4844	13	221	194	2,6	50	276	TDS501A12304
3900658	TDD105Z12500	12,500	.4921	13	221	194	2,7	50	276	TDS501A12500
3900659	TDD105Z12700	12,700	.5000	13	222	194	2,7	50	276	TDS501A12700
3900660	TDD105Z13000	13,000	.5118	13	223	195	2,8	50	276	TDS501A13000







Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 20 x D • Z Shank

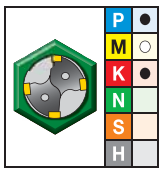


● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899782	TDD106Z03000	3,000	.1181	3	68	60	0,6	30	101	TDS501A03000
3899803	TDD106Z03175	3,175	.1250	4	83	74	0,6	32	125	TDS501A03175
3899804	TDD106Z03500	3,500	.1378	4	86	77	0,7	32	125	TDS501A03500
3899805	TDD106Z03571	3,571	.1406	4	86	77	0,7	32	125	TDS501A03571
3899806	TDD106Z03800	3,800	.1496	4	88	79	0,8	32	125	TDS501A03800
3899807	TDD106Z03970	3,970	.1563	4	89	80	0,8	32	125	TDS501A03970
3899808	TDD106Z04000	4,000	.1575	4	90	80	0,8	32	125	TDS501A04000
3899809	TDD106Z04039	4,039	.1590	5	104	93	0,8	34	149	TDS501A04039
3899810	TDD106Z04300	4,300	.1693	5	106	95	0,9	34	149	TDS501A04300
3899811	TDD106Z04500	4,500	.1772	5	108	97	0,9	34	149	TDS501A04500
3899812	TDD106Z04623	4,623	.1820	5	109	97	1,0	34	149	TDS501A04623
3899813	TDD106Z04763	4,763	.1875	5	110	98	1,0	34	149	TDS501A04763
3899814	TDD106Z05000	5,000	.1969	5	112	100	1,0	34	149	TDS501A05000
3899815	TDD106Z05159	5,159	.2031	6	128	114	1,1	36	173	TDS501A05160
3899816	TDD106Z05410	5,410	.2130	6	129	116	1,1	36	173	TDS501A05410
3899818	TDD106Z05500	5,500	.2165	6	130	117	1,1	36	173	TDS501A05500
3899819	TDD106Z05558	5,558	.2188	6	130	117	1,2	36	173	TDS501A05558
3899820	TDD106Z05800	5,800	.2283	6	132	119	1,2	36	173	TDS501A05800
3899821	TDD106Z06000	6,000	.2362	6	134	120	1,2	36	173	TDS501A06000
3899822	TDD106Z06200	6,200	.2441	7	149	134	1,3	38	197	TDS501A06200
3899823	TDD106Z06350	6,350	.2500	7	151	136	1,3	38	197	TDS501A06350
3899824	TDD106Z06500	6,500	.2559	7	152	137	1,4	38	197	TDS501A06500
3899825	TDD106Z06528	6,528	.2570	7	152	137	1,4	38	197	TDS501A06528
3899826	TDD106Z06746	6,746	.2656	7	154	138	1,4	38	197	TDS501A06746

(continued)

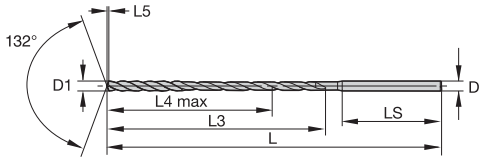
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 20 x D • Z Shank — continued)



● first choice
○ alternate choice

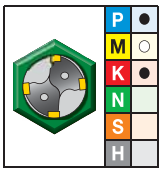
grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899827	TDD106Z06800	6,800	.2677	7	154	139	1,4	38	197	TDS501A06800
3899828	TDD106Z06909	6,909	.2720	7	155	139	1,4	38	197	TDS501A06909
3899829	TDD106Z07000	7,000	.2756	7	156	140	1,5	38	197	TDS501A07000
3899763	TDD106Z07145	7,145	.2813	8	171	154	1,5	40	221	TDS501A07145
3899765	TDD106Z07541	7,541	.2969	8	174	157	1,6	40	221	TDS501A07541
3899766	TDD106Z07938	7,938	.3125	8	177	160	1,7	40	221	TDS501A07938
3899767	TDD106Z08000	8,000	.3150	8	178	160	1,7	40	221	TDS501A08000
3899768	TDD106Z08334	8,334	.3281	9	195	175	1,8	42	245	TDS501A08334
3899769	TDD106Z08433	8,433	.3320	9	195	176	1,8	42	245	TDS501A08433
3899770	TDD106Z08500	8,500	.3346	9	196	177	1,8	42	245	TDS501A08500
3899771	TDD106Z08733	8,733	.3438	9	198	178	1,8	42	245	TDS501A08733
3899772	TDD106Z09000	9,000	.3543	9	200	180	1,9	42	245	TDS501A09000
3899783	TDD106Z09347	9,347	.3680	10	217	195	2,0	44	269	TDS501A09347
3899784	TDD106Z09500	9,500	.3740	10	218	197	2,0	44	269	TDS501A09500
3899785	TDD106Z09525	9,525	.3750	10	218	197	2,0	44	269	TDS501A09525
3899786	TDD106Z09750	9,750	.3839	10	220	198	2,1	44	269	TDS501A09750
3899787	TDD106Z09921	9,921	.3906	10	221	199	2,1	44	269	TDS501A09921
3899788	TDD106Z10000	10,000	.3937	10	222	200	2,1	44	269	TDS501A10000
3899789	TDD106Z10200	10,200	.4016	11	237	214	2,2	46	293	TDS501A10200
3899790	TDD106Z10320	10,317	.4062	11	238	215	2,2	46	293	TDS501A10317
3899791	TDD106Z10500	10,500	.4134	11	240	217	2,2	46	293	TDS501A10500
3899792	TDD106Z10716	10,716	.4219	11	242	218	2,3	46	293	TDS501A10716
3899793	TDD106Z11000	11,000	.4331	11	258	233	2,3	46	317	TDS501A11000
3899794	TDD106Z11113	11,113	.4375	12	259	234	2,4	48	317	TDS501A11113
3899795	TDD106Z11500	11,500	.4528	12	262	237	2,4	48	317	TDS501A11500
3899797	TDD106Z12000	12,000	.4724	12	266	240	2,5	48	317	TDS501A12000
3899799	TDD106Z12500	12,500	.4921	13	284	257	2,7	50	341	TDS501A12500
3899800	TDD106Z12700	12,700	.5000	13	285	258	2,7	50	341	TDS501A12700
3899801	TDD106Z13000	13,000	.5118	13	288	260	2,8	50	341	TDS501A13000







Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 25 x D • Z Shank

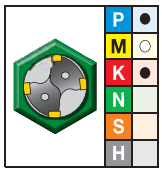


● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899708	TDD107Z03000	3,000	.1181	3	83	75	0,6	30	116	TDS501A03000
3899709	TDD107Z03175	3,175	.1250	4	99	90	0,6	32	145	TDS501A03175
3899710	TDD107Z03500	3,500	.1378	4	103	94	0,7	32	145	TDS501A03500
3899712	TDD107Z03800	3,800	.1496	4	107	98	0,8	32	145	TDS501A03800
3899733	TDD107Z03970	3,970	.1563	4	109	100	0,8	32	145	TDS501A03970
3899734	TDD107Z04000	4,000	.1575	4	110	100	0,8	32	145	TDS501A04000
3899735	TDD107Z04039	4,039	.1590	5	124	113	0,8	34	174	TDS501A04039
3899737	TDD107Z04500	4,500	.1772	5	130	119	0,9	34	174	TDS501A04500
3899739	TDD107Z04763	4,763	.1875	5	134	122	1,0	34	174	TDS501A04763
3899740	TDD107Z05000	5,000	.1969	5	137	125	1,0	34	174	TDS501A05000
3899743	TDD107Z05500	5,500	.2165	6	157	144	1,1	36	203	TDS501A05500
3899744	TDD107Z05558	5,558	.2188	6	158	145	1,2	36	203	TDS501A05558
3899745	TDD107Z05800	5,800	.2283	6	161	148	1,2	36	203	TDS501A05800
3899746	TDD107Z06000	6,000	.2362	6	164	150	1,2	36	203	TDS501A06000
3899748	TDD107Z06350	6,350	.2500	7	182	167	1,3	38	232	TDS501A06350
3899749	TDD107Z06500	6,500	.2559	7	184	169	1,4	38	232	TDS501A06500
3899750	TDD107Z06528	6,528	.2570	7	185	169	1,4	38	232	TDS501A06528
3899751	TDD107Z06746	6,746	.2656	7	188	172	1,4	38	232	TDS501A06746
3899753	TDD107Z06909	6,909	.2720	7	190	174	1,4	38	232	TDS501A06909
3899754	TDD107Z07000	7,000	.2756	7	191	175	1,5	38	232	TDS501A07000
3899567	TDD107Z07541	7,541	.2969	8	212	194	1,6	40	261	TDS501A07541
3899568	TDD107Z07938	7,938	.3125	8	217	199	1,7	40	261	TDS501A07938
3899569	TDD107Z08000	8,000	.3150	8	218	200	1,7	40	261	TDS501A08000
3899571	TDD107Z08433	8,433	.3320	9	237	218	1,8	42	290	TDS501A08433

(continued)

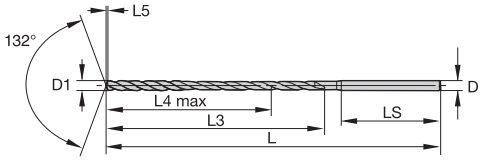
(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 25 x D • Z Shank — continued)



● first choice
○ alternate choice

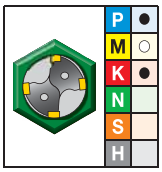
grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899572	TDD107Z08500	8,500	.3346	9	238	219	1,8	42	290	TDS501A08500
3899603	TDD107Z08733	8,733	.3438	9	241	222	1,8	42	290	TDS501A08733
3899604	TDD107Z09000	9,000	.3543	9	245	225	1,9	42	290	TDS501A09000
3899605	TDD107Z09347	9,347	.3680	10	263	242	2,0	44	319	TDS501A09347
3899606	TDD107Z09500	9,500	.3740	10	265	244	2,0	44	319	TDS501A09500
3899607	TDD107Z09525	9,525	.3750	10	266	244	2,0	44	319	TDS501A09525
3899610	TDD107Z10000	10,000	.3937	10	272	250	2,1	44	319	TDS501A10000
3899611	TDD107Z10300	10,200	.4016	11	288	265	2,2	46	348	TDS501A10300
3899612	TDD107Z10320	10,317	.4062	11	290	267	2,2	46	348	TDS501A10317
3899613	TDD107Z10500	10,500	.4134	11	292	269	2,2	46	348	TDS501A10500
3899614	TDD107Z10716	10,716	.4219	11	295	272	2,3	46	348	TDS501A10716
3899615	TDD107Z11000	11,000	.4331	11	313	288	2,3	46	377	TDS501A11000
3899616	TDD107Z11113	11,113	.4375	12	314	289	2,4	48	377	TDS501A11113
3899617	TDD107Z11500	11,500	.4528	12	319	294	2,4	48	377	TDS501A11500
3899619	TDD107Z12000	12,000	.4724	12	326	300	2,5	48	377	TDS501A12000
3899621	TDD107Z12500	12,500	.4921	13	346	319	2,7	50	406	TDS501A12500
3899622	TDD107Z12700	12,700	.5000	13	349	321	2,7	50	406	TDS501A12700
3899623	TDD107Z13000	13,000	.5118	13	353	325	2,8	50	406	TDS501A13000







Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 30 x D • Z Shank

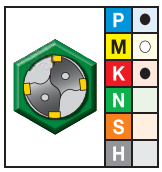


● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899539	TDD108Z03000	3,000	.1181	3	98	90	0,6	30	131	TDS501A03000
3899540	TDD108Z03175	3,175	.1250	4	115	106	0,6	32	165	TDS501A03175
3899541	TDD108Z03500	3,500	.1378	4	121	112	0,7	32	165	TDS501A03500
3899542	TDD108Z03571	3,571	.1406	4	122	113	0,7	32	165	TDS501A03571
3899573	TDD108Z03800	3,800	.1496	4	126	117	0,8	32	165	TDS501A03800
3899574	TDD108Z03970	3,970	.1563	4	129	119	0,8	32	165	TDS501A03970
3899575	TDD108Z04000	4,000	.1575	4	130	120	0,8	32	165	TDS501A04000
3899576	TDD108Z04039	4,039	.1590	5	144	134	0,8	34	199	TDS501A04039
3899577	TDD108Z04300	4,300	.1693	5	149	138	0,9	34	199	TDS501A04300
3899578	TDD108Z04500	4,500	.1772	5	153	142	0,9	34	199	TDS501A04500
3899579	TDD108Z04623	4,623	.1820	5	155	144	1,0	34	199	TDS501A04623
3899580	TDD108Z04763	4,763	.1875	5	157	146	1,0	34	199	TDS501A04763
3899581	TDD108Z05000	5,000	.1969	5	162	150	1,0	34	199	TDS501A05000
3899582	TDD108Z05159	5,159	.2031	6	180	166	1,1	36	233	TDS501A05160
3899583	TDD108Z05410	5,410	.2130	6	183	170	1,1	36	233	TDS501A05410
3899584	TDD108Z05500	5,500	.2165	6	185	172	1,1	36	233	TDS501A05500
3899585	TDD108Z05558	5,558	.2188	6	186	172	1,2	36	233	TDS501A05558
3899586	TDD108Z05800	5,800	.2283	6	190	177	1,2	36	233	TDS501A05800
3899587	TDD108Z06000	6,000	.2362	6	194	180	1,2	36	233	TDS501A06000
3899588	TDD108Z06200	6,200	.2441	7	211	196	1,3	38	267	TDS501A06200
3899589	TDD108Z06350	6,350	.2500	7	214	199	1,3	38	267	TDS501A06350
3899590	TDD108Z06500	6,500	.2559	7	217	202	1,4	38	267	TDS501A06500
3899591	TDD108Z06528	6,528	.2570	7	217	202	1,4	38	267	TDS501A06528
3899592	TDD108Z06746	6,746	.2656	7	221	206	1,4	38	267	TDS501A06746

(continued)

(Deep-Hole Drills for Steel and Cast Iron • 2 Flute • WU20PD™ • 30 x D • Z Shank — continued)



● first choice
○ alternate choice

grade WU20PD TiAlN		D1 diameter								
order #	catalogue #	mm	in	D	L3	L4 max	L5	LS	L	pilot drill
3899593	TDD108Z06800	6,800	.2677	7	222	207	1,4	38	267	TDS501A06800
3899594	TDD108Z06909	6,909	.2720	7	224	208	1,4	38	267	TDS501A06909
3899595	TDD108Z07000	7,000	.2756	7	226	210	1,5	38	267	TDS501A07000
3899600	TDD108Z07145	7,145	.2813	8	242	225	1,5	40	301	TDS501A07145
3899601	TDD108Z07500	7,500	.2953	8	249	232	1,6	40	301	TDS501A07500
3899653	TDD108Z07938	7,938	.3125	8	257	239	1,7	40	301	TDS501A07938
3899654	TDD108Z08000	8,000	.3150	8	258	240	1,7	40	301	TDS501A08000
3899655	TDD108Z08334	8,334	.3281	9	278	259	1,8	42	335	TDS501A08334
3899657	TDD108Z08500	8,500	.3346	9	281	262	1,8	42	335	TDS501A08500
3899658	TDD108Z08733	8,733	.3438	9	285	265	1,8	42	335	TDS501A08733
3899659	TDD108Z09000	9,000	.3543	9	290	270	1,9	42	335	TDS501A09000
3899661	TDD108Z09500	9,500	.3740	10	313	292	2,0	44	369	TDS501A09500
3899662	TDD108Z09525	9,525	.3750	10	313	292	2,0	44	369	TDS501A09525
3899663	TDD108Z09750	9,750	.3839	10	317	296	2,1	44	369	TDS501A09750
3899665	TDD108Z10000	10,000	.3937	10	322	300	2,1	44	369	TDS501A10000
3899666	TDD108Z10200	10,200	.4016	11	339	316	2,2	46	403	TDS501A10200
3899667	TDD108Z10320	10,317	.4062	11	342	318	2,2	46	403	TDS501A10317
3899668	TDD108Z10500	10,500	.4134	11	345	322	2,2	46	403	TDS501A10500
3899670	TDD108Z11000	11,000	.4331	11	368	343	2,3	46	437	TDS501A11000
3899671	TDD108Z11113	11,113	.4375	12	370	345	2,4	48	437	TDS501A11113
3899672	TDD108Z11500	11,500	.4528	12	377	352	2,4	48	437	TDS501A11500
3899674	TDD108Z12000	12,000	.4724	12	386	360	2,5	48	437	TDS501A12000
3899675	TDD108Z12304	12,304	.4844	13	405	378	2,6	50	471	TDS501A12304
3899676	TDD108Z12500	12,500	.4921	13	409	382	2,7	50	471	TDS501A12500
3899677	TDD108Z12700	12,700	.5000	13	412	385	2,7	50	471	TDS501A12700
3899678	TDD108Z13000	13,000	.5118	13	418	390	2,8	50	471	TDS501A13000

■ Series TDD • Deep-Hole SC Drills • Through Coolant Applications • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate (f) by Diameter							
		min	–	max	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
P	1	90	–	130	mm/r	0,08–0,12	0,12–0,18	0,18–0,20	0,20–0,22	0,22–0,25	0,25–0,28	0,28–0,30	0,30–0,34
	2	80	–	115	mm/r	0,08–0,12	0,12–0,18	0,18–0,20	0,20–0,22	0,22–0,25	0,25–0,28	0,28–0,30	0,30–0,34
	3	70	–	110	mm/r	0,05–0,10	0,10–0,16	0,16–0,18	0,18–0,20	0,20–0,22	0,22–0,24	0,24–0,26	0,26–0,28
	4	65	–	95	mm/r	0,05–0,10	0,10–0,16	0,16–0,18	0,18–0,20	0,20–0,22	0,22–0,24	0,24–0,26	0,26–0,28
K	1	105	–	145	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38
	2	85	–	120	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38
	3	100	–	140	mm/r	0,10–0,15	0,15–0,20	0,20–0,25	0,25–0,28	0,28–0,30	0,30–0,33	0,33–0,36	0,36–0,38

Metric tolerance

nominal size range	D1 tolerance	D1 tolerance	D tolerance h6
>3–6	0,000/-0,012	>3–6	0,000/-0,008
>6–10	0,000/-0,015	>6–10	0,000/-0,009
>10–13	0,000/-0,018	>10–13	0,000/-0,011

WIDIA™ TOP DRILL™ Deep-Hole Drills Customisation



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Diameters

- Intermediate sizes, even up to 16mm diameter, available as semi-standards.

Lengths

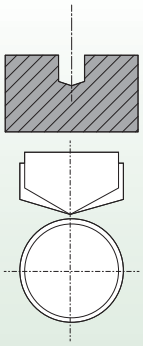
- Length variations, including longer versions up to 550mm depending on diameter, available as custom solutions.

Material-Specific

- For drilling non-ferrous materials, sharp and uncoated versions are recommended and available as custom solutions.

Consult the custom solutions department for specific applications.

WIDIA™

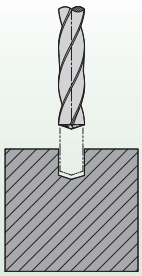


1) Pilot Drill Hole — IMPORTANT!

- The point angle of the pilot drill must be greater than one of the following deep-hole drills to protect its cutting corners.
- The diameter size of the pilot drill must be greater than one of the deep-hole drills to enable easy fit and protect margin lands. The required difference in diameter is covered by design with the different position of tolerance.
- Drill Ø = nominal Ø up to nominal +0,010mm.
- Depth of pilot hole: minimum 2 x D.
- Deeper pilot holes are preferable.

Recommendations:

- Use a conical (TDS*) or split-point drill to pilot (do not use a TDG, VariDrill™, or TDS 12 x D or any competitive drill).
- Check the pilot drill for wear, which can lead to premature wear on the TDD10* cutting edge and possibly catastrophic failure.
- TOP DRILL S™ for steel or cast iron (TDS4* series) and TOP DRILL S +™ for multiple applications (TDS501* series 3 x D and TD502* series 5 x D) with a 140° point angle are recommended.
- TDS503* series 8 x D and TDS504* series 12 x D is not recommended as the point angle is 132°!

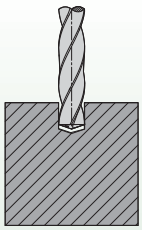


2) Feed TDD10* into Pilot Hole

- Max 500 RPM and recommended feed rate; no rapid traverse.
- Run anti-clockwise, especially in horizontal applications to protect the cutting edge, when entering the pilot hole.
- Depth: 1mm above the bottom of pilot hole.
- Feed TDD10* into pilot hole

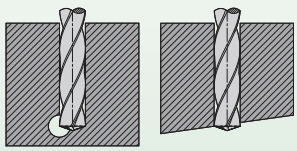
Recommendations:

- Reduce cutting speed to minimise imbalances in machine spindle/adaptor!



3) Drill Hole

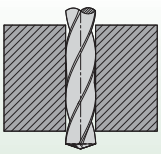
Cutting Parameters: Start recommended speed and feed rate at 1mm from the bottom of the pilot hole, clockwise.



Recommendations:

- DO NOT PECK OR DWELL up to 30 x D!
- With long-chipping steel materials, it may be necessary to increase feed rate by 10–20% to provide optimal chip control.
- For long-chipping aluminium materials, it may be necessary to decrease feed rate and increase speed.
- Reduce feed rate on angled exits and crossholes by 50–60%.

HP feed recommendations are usually higher than with competitive SC drills!



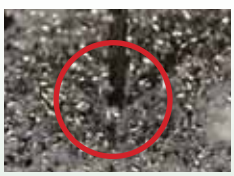
4) Drill Retraction

Cutting Parameters: 50–500 RPM and feed rate 2–6 m/min.

Recommendations:

To achieve the best tool performance, we recommend using the deep-hole drill with a hydraulic chuck.

Reduce cutting speed to minimise imbalances in machine spindle/adaptor!





5) Vertical Applications

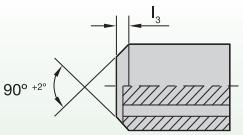
- If the pilot holes are close to each other, chips can fall into the neighboring hole.
- Do not enter a pilot hole that might contain chips with a deep hole drill to avoid chip jamming, wear, or breakage.
- If required holes are close to each other, use smart drilling strategies, make sure the pilot holes are getting properly cleaned, or switch to horizontal drilling.

Horizontal drilling process preferred for optimum chip evacuation.



6) Coolant

- For increased stability, the coolant channels of the TDD10* are smaller than on typical WIDIA™ drills.
- Steady supply of coolant delivered to the cutting edges necessary. If coolant supply is not steady or is unequal through both channels, check:
  - Coolant filtering system.
  - Sealing of adaptor/spindle.
  - Chips blocking the coolant hole on the drill shank.
- Make sure that the coolant supply reaches the cutting edge before drilling begins.
- Pressure by diameter: <5mm 40–50 bar maximum; >5mm 25 bar minimum.



MQL back end according to DIN 69090-3

7) Minimal Quantity Lubrication

- On MQL applications, make sure that the coolant is directly supplied from the chuck into the back end of the drill shank (without gap) to avoid leakage.
- Pressure should be between 1–10 bar depending on coolant hole size.
- Spray contains an amount of oil less than 50 ml/h.
- If required, the shank can be evenly optimised for MQL applications with enlarged 90° chamfer instead of 40°.



8) Shanks

- Other than normal SC Drills, TDD10* series have a “Z” shank, increasing with 1mm-steps.
- For drills with uneven shank size, use reduction sleeves to adapt the shank to the customer´s toolholder.
- The clamping force is better with increasing diameter.
- If required, DIN-shanks (even, 2mm steps) are available as custom solutions.

Achieve the best tool performance with hydraulic chucks.

	12mm hydraulic reducer sleeve		20mm hydraulic reducer sleeve		25mm hydraulic reducer sleeve		32mm hydraulic reducer sleeve		.500" hydraulic reducer sleeve		.750" hydraulic reducer sleeve	
D1	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number	order number	catalogue number
3	3026450	12MHC030M	3026648	20MHC030M	3026662	25MHC030M	–	–	2248993	50HC030M	2248995	75HC030M
4	3026451	12MHC040M	3026649	20MHC040M	3026663	25MHC040M	–	–	1606050	50HC040M	2248996	75HC040M
5	3026452	12MHC050M	3026650	20MHC050M	3026664	25MHC050M	–	–	2248994	50HC050M	2248997	75HC050M
6	3026643	12MHC060M	3026651	20MHC060M	3026665	25MHC060M	3026675	32MHC060M	1606061	50HC060M	1093271	75HC060M
7	3026644	12MHC070M	3026652	20MHC070M	3026666	25MHC070M	3026676	32MHC070M	–	–	–	–
8	3026645	12MHC080M	3026653	20MHC080M	3026667	25MHC080M	3026677	32MHC080M	1606062	50HC080M	1093272	75HC080M
9	3026646	12MHC090M	3026654	20MHC090M	3026668	25MHC090M	3026678	32MHC090M	–	–	–	–
10	3026647	12MHC100M	3026655	20MHC100M	3026669	25MHC100M	3026679	32MHC100M	1606064	50HC100M	1093273	75HC100M
11	–	–	3026656	20MHC110M	–	–	3026680	32MHC110M	–	–	–	–
12	–	–	3026657	20MHC120M	3026669	25MHC120M	3026681	32MHC120M	–	–	1093524	75HC120M
13	–	–	3026658	20MHC130M	–	–	3026682	32MHC130M	–	–	–	–
14	–	–	3026659	20MHC140M	3026671	25MHC140M	3026683	32MHC140M	–	–	1093525	75HC140M
15	–	–	3026660	20MHC150M	–	–	3026684	32MHC150M	–	–	–	–
16	–	–	3026661	20MHC160M	3026672	25MHC160M	3026685	32MHC160M	–	–	1093526	75HC160M

TOP DRILL G



TOP DRILL G is WIDIA's solution for difficult drilling applications. Designed specifically for non-ferrous materials, TDG can be used on challenging applications with tighter hole tolerance, inclined planes, intersecting holes, and cored holes. The design of these drills also makes them appropriate for drilling custom aluminium applications.

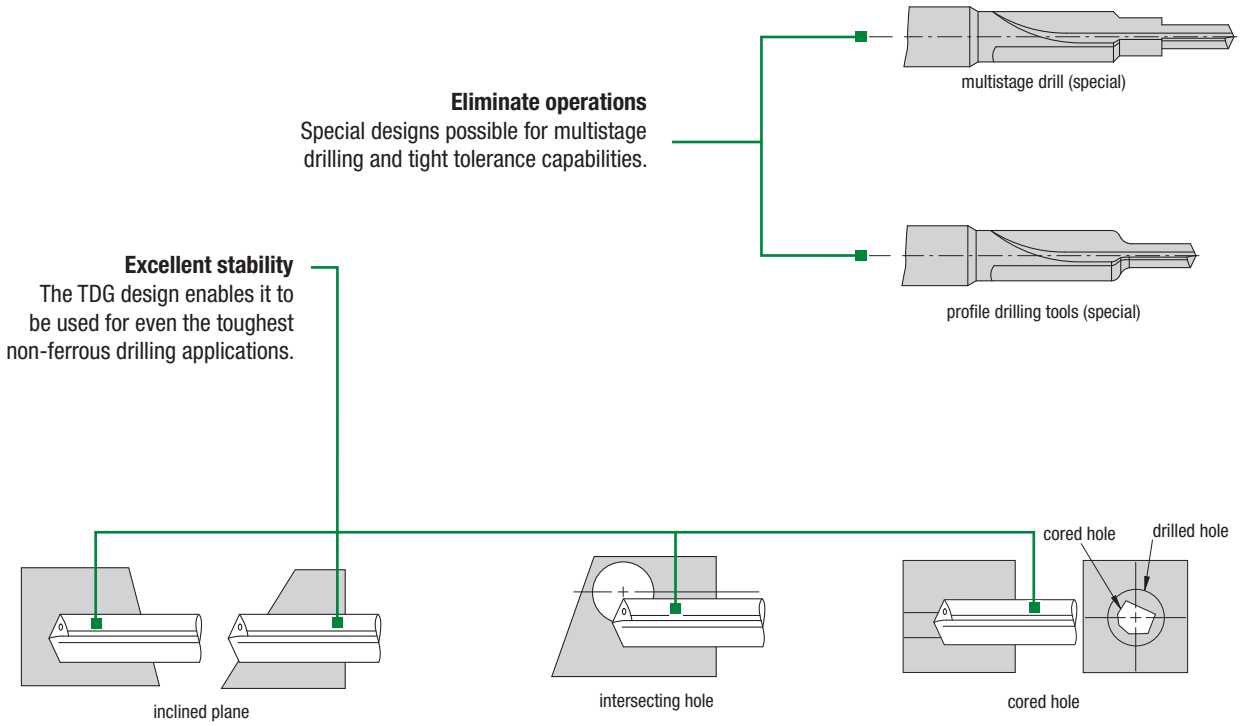
- Next generation of GGX WIDIA-Rübig™ series.
- Targeted for aluminium and non-ferrous materials.
- Can be used in challenging conditions.
- Good for multi-step drills.

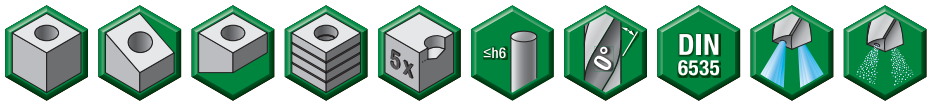
TOP DRILL G™ Design

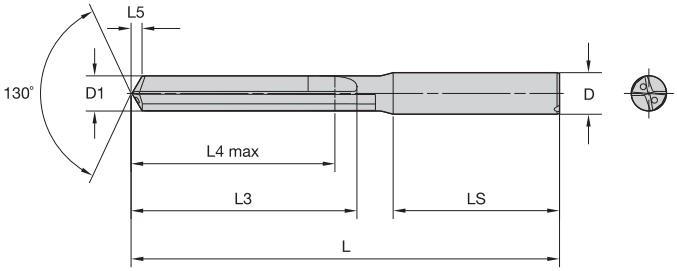
TDG is designed to handle the toughest non-ferrous drilling applications. The WN10HD™ grade is the latest in application-specific technology. This advanced grade, combined with the TDG's optimal concentricity and safe transmission of torque, gives it long tool life and extreme repeatability. The design of TDG is optimised to evacuate "sticky" chips that result from drilling non-ferrous materials. Easily evacuating these difficult-to-remove chips results in better hole quality due to less heat and friction while drilling.

WIDIA™ Advantage

- Lower cost-per-hole due to high MRR and long tool life.
- Consistent performance from internally controlled supply chain:
  Powder > Rod > Grinding > Coating
- Part of the complete WIDIA holemaking solution.
- Get more predictable results from local regrind services using OEM standards to recondition, ensuring value throughout the entire life of the drill.
- Broad range of standard lengths, diameters, and coolant options in one line. Includes extensive intermediate metric, inch, fraction, and wire sizes, including tap drill sizes.



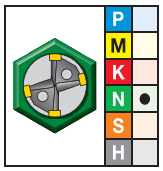






For information on L, L3, and L4 max, see page T143.

■ TDG532A • 5 x D



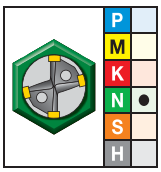
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157950	TDG532A03000	3,000	.1181	66	23	28	0,7	36	6
4157951	TDG532A03048	3,048	.1200	66	23	28	0,7	36	6
4157952	TDG532A03100	3,100	.1220	66	23	28	0,7	36	6
4157973	TDG532A03175	3,175	.1250	66	23	28	0,7	36	6
4157974	TDG532A03200	3,200	.1260	66	23	28	0,7	36	6
4157975	TDG532A03264	3,264	.1285	66	23	28	0,8	36	6
4157976	TDG532A03300	3,300	.1299	66	23	28	0,8	36	6
4157977	TDG532A03400	3,400	.1339	66	23	28	0,8	36	6
4157978	TDG532A03455	3,455	.1360	66	23	28	0,8	36	6
4157979	TDG532A03500	3,500	.1378	66	23	28	0,8	36	6
4157980	TDG532A03571	3,571	.1406	66	23	28	0,8	36	6
4157981	TDG532A03600	3,600	.1417	66	23	28	0,8	36	6
4157982	TDG532A03658	3,658	.1440	66	23	28	0,9	36	6
4157983	TDG532A03700	3,700	.1457	66	23	28	0,9	36	6
4157984	TDG532A03734	3,734	.1470	66	23	28	0,9	36	6
4157985	TDG532A03800	3,800	.1496	74	29	36	0,9	36	6
4157986	TDG532A03900	3,900	.1535	74	29	36	0,9	36	6
4157987	TDG532A03970	3,970	.1563	74	29	36	0,9	36	6
4157988	TDG532A04000	4,000	.1575	74	29	36	0,9	36	6
4157989	TDG532A04039	4,039	.1590	74	29	36	0,9	36	6
4157990	TDG532A04090	4,090	.1610	74	29	36	1,0	36	6
4157991	TDG532A04100	4,100	.1614	74	29	36	1,0	36	6
4157992	TDG532A04200	4,200	.1654	74	29	36	1,0	36	6
4157993	TDG532A04217	4,217	.1660	74	29	36	1,0	36	6

(continued)

(TDG532A • 5 x D — continued)



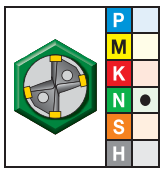
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157994	TDG532A04300	4,300	.1693	74	29	36	1,0	36	6
4157995	TDG532A04366	4,366	.1719	74	29	36	1,0	36	6
4157996	TDG532A04400	4,400	.1732	74	29	36	1,0	36	6
4157997	TDG532A04500	4,500	.1772	74	29	36	1,0	36	6
4157998	TDG532A04600	4,600	.1811	74	29	36	1,1	36	6
4157999	TDG532A04623	4,623	.1820	74	29	36	1,1	36	6
4158000	TDG532A04700	4,700	.1850	74	29	36	1,1	36	6
4158001	TDG532A04763	4,763	.1875	82	35	44	1,1	36	6
4158002	TDG532A04800	4,800	.1890	82	35	44	1,1	36	6
4158003	TDG532A04852	4,852	.1910	82	35	44	1,1	36	6
4158004	TDG532A04900	4,900	.1929	82	35	44	1,1	36	6
4158005	TDG532A05000	5,000	.1969	82	35	44	1,2	36	6
4158006	TDG532A05100	5,100	.2008	82	35	44	1,2	36	6
4158007	TDG532A05106	5,106	.2010	82	35	44	1,2	36	6
4158008	TDG532A05159	5,159	.2031	82	35	44	1,2	36	6
4158009	TDG532A05200	5,200	.2047	82	35	44	1,2	36	6
4158010	TDG532A05300	5,300	.2087	82	35	44	1,2	36	6
4158011	TDG532A05400	5,400	.2126	82	35	44	1,3	36	6
4158012	TDG532A05410	5,410	.2130	82	35	44	1,3	36	6
4158013	TDG532A05500	5,500	.2165	82	35	44	1,3	36	6
4158014	TDG532A05558	5,558	.2188	82	35	44	1,3	36	6
4158015	TDG532A05600	5,600	.2205	82	35	44	1,3	36	6
4158016	TDG532A05616	5,616	.2211	82	35	44	1,3	36	6
4158017	TDG532A05700	5,700	.2244	82	35	44	1,3	36	6
4158018	TDG532A05800	5,800	.2283	82	35	44	1,4	36	6
4158019	TDG532A05900	5,900	.2323	82	35	44	1,4	36	6
4158020	TDG532A05954	5,954	.2344	82	35	44	1,4	36	6
4158021	TDG532A06000	6,000	.2362	82	35	44	1,4	36	6
4158022	TDG532A06100	6,100	.2402	91	43	53	1,4	36	8
4158023	TDG532A06200	6,200	.2441	91	43	53	1,4	36	8
4158024	TDG532A06300	6,300	.2480	91	43	53	1,5	36	8
4158025	TDG532A06350	6,350	.2500	91	43	53	1,5	36	8
4158026	TDG532A06400	6,400	.2520	91	43	53	1,5	36	8
4158027	TDG532A06500	6,500	.2559	91	43	53	1,5	36	8
4158028	TDG532A06528	6,528	.2570	91	43	53	1,5	36	8
4158029	TDG532A06600	6,600	.2598	91	43	53	1,5	36	8
4158030	TDG532A06630	6,630	.2610	91	43	53	1,5	36	8
4158031	TDG532A06700	6,700	.2638	91	43	53	1,6	36	8
4158032	TDG532A06746	6,746	.2656	91	43	53	1,6	36	8
4158033	TDG532A06800	6,800	.2677	91	43	53	1,6	36	8

(continued)

(TDG532A • 5 x D — continued)



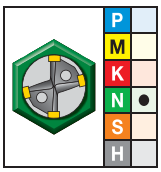
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158034	TDG532A06900	6,900	.2717	91	43	53	1,6	36	8
4158035	TDG532A07000	7,000	.2756	91	43	53	1,6	36	8
4158036	TDG532A07100	7,100	.2795	91	43	53	1,7	36	8
4158037	TDG532A07145	7,145	.2813	91	43	53	1,7	36	8
4158038	TDG532A07200	7,200	.2835	91	43	53	1,7	36	8
4158039	TDG532A07300	7,300	.2874	91	43	53	1,7	36	8
4158040	TDG532A07400	7,400	.2913	91	43	53	1,7	36	8
4158041	TDG532A07500	7,500	.2953	91	43	53	1,7	36	8
4158042	TDG532A07541	7,541	.2969	91	43	53	1,8	36	8
4158043	TDG532A07600	7,600	.2992	91	43	53	1,8	36	8
4158044	TDG532A07700	7,700	.3031	91	43	53	1,8	36	8
4158045	TDG532A07800	7,800	.3071	91	43	53	1,8	36	8
4158046	TDG532A07900	7,900	.3110	91	43	53	1,8	36	8
4158047	TDG532A07938	7,938	.3125	91	43	53	1,9	36	8
4158048	TDG532A08000	8,000	.3150	91	43	53	1,9	36	8
4158049	TDG532A08100	8,100	.3189	103	49	61	1,9	40	10
4158050	TDG532A08200	8,200	.3228	103	49	61	1,9	40	10
4158051	TDG532A08300	8,300	.3268	103	49	61	1,9	40	10
4158052	TDG532A08334	8,334	.3281	103	49	61	1,9	40	10
4158053	TDG532A08400	8,400	.3307	103	49	61	2,0	40	10
4158054	TDG532A08433	8,433	.3320	103	49	61	2,0	40	10
4158055	TDG532A08500	8,500	.3346	103	49	61	2,0	40	10
4158056	TDG532A08600	8,600	.3386	103	49	61	2,0	40	10
4158057	TDG532A08700	8,700	.3425	103	49	61	2,0	40	10
4158058	TDG532A08733	8,733	.3438	103	49	61	2,0	40	10
4158059	TDG532A08800	8,800	.3465	103	49	61	2,1	40	10
4158060	TDG532A08900	8,900	.3504	103	49	61	2,1	40	10
4158061	TDG532A09000	9,000	.3543	103	49	61	2,1	40	10
4158062	TDG532A09100	9,100	.3583	103	49	61	2,1	40	10
4158063	TDG532A09129	9,129	.3594	103	49	61	2,1	40	10
4158064	TDG532A09200	9,200	.3622	103	49	61	2,1	40	10
4158065	TDG532A09300	9,300	.3661	103	49	61	2,2	40	10
4158066	TDG532A09347	9,347	.3680	103	49	61	2,2	40	10
4158067	TDG532A09400	9,400	.3701	103	49	61	2,2	40	10
4158068	TDG532A09500	9,500	.3740	103	49	61	2,2	40	10
4158069	TDG532A09525	9,525	.3750	103	49	61	2,2	40	10
4158070	TDG532A09600	9,600	.3780	103	49	61	2,2	40	10
4158071	TDG532A09700	9,700	.3819	103	49	61	2,3	40	10
4158072	TDG532A09800	9,800	.3858	103	49	61	2,3	40	10
4158073	TDG532A09900	9,900	.3898	103	49	61	2,3	40	10

(continued)

(TDG532A • 5 x D — continued)



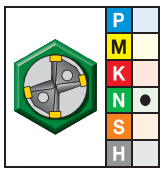
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158074	TDG532A09921	9,921	.3906	103	49	61	2,3	40	10
4158081	TDG532A10000	10,000	.3937	103	49	61	2,3	40	10
4158082	TDG532A10100	10,100	.3976	118	56	71	2,4	45	12
4158353	TDG532A10200	10,200	.4016	118	56	71	2,4	45	12
4158354	TDG532A10300	10,300	.4055	118	56	71	2,4	45	12
4158355	TDG532A10320	10,320	.4063	118	56	71	2,4	45	12
4158356	TDG532A10400	10,400	.4094	118	56	71	2,4	45	12
4158357	TDG532A10500	10,500	.4134	118	56	71	2,4	45	12
4158358	TDG532A10600	10,600	.4173	118	56	71	2,5	45	12
4158359	TDG532A10700	10,700	.4213	118	56	71	2,5	45	12
4158360	TDG532A10716	10,716	.4219	118	56	71	2,5	45	12
4158361	TDG532A10800	10,800	.4252	118	56	71	2,5	45	12
4158362	TDG532A10900	10,900	.4291	118	56	71	2,5	45	12
4158363	TDG532A11000	11,000	.4331	118	56	71	2,6	45	12
4158364	TDG532A11100	11,100	.4370	118	56	71	2,6	45	12
4158365	TDG532A11113	11,113	.4375	118	56	71	2,6	45	12
4158366	TDG532A11200	11,200	.4409	118	56	71	2,6	45	12
4158367	TDG532A11300	11,300	.4449	118	56	71	2,6	45	12
4158368	TDG532A11400	11,400	.4488	118	56	71	2,7	45	12
4158369	TDG532A11500	11,500	.4528	118	56	71	2,7	45	12
4158370	TDG532A11509	11,509	.4531	118	56	71	2,7	45	12
4158371	TDG532A11600	11,600	.4567	118	56	71	2,7	45	12
4158372	TDG532A11700	11,700	.4606	118	56	71	2,7	45	12
4158373	TDG532A11800	11,800	.4646	118	56	71	2,8	45	12
4158374	TDG532A11900	11,900	.4685	118	56	71	2,8	45	12
4158375	TDG532A11908	11,908	.4688	118	56	71	2,8	45	12
4158376	TDG532A12000	12,000	.4724	118	56	71	2,8	45	12
4158377	TDG532A12100	12,100	.4764	124	60	77	2,8	45	14
4158378	TDG532A12200	12,200	.4803	124	60	77	2,8	45	14
4158379	TDG532A12300	12,300	.4843	124	60	77	2,9	45	14
4158380	TDG532A12304	12,304	.4844	124	60	77	2,9	45	14
4158381	TDG532A12400	12,400	.4882	124	60	77	2,9	45	14
4158382	TDG532A12500	12,500	.4921	124	60	77	2,9	45	14
4158383	TDG532A12600	12,600	.4961	124	60	77	2,9	45	14
4158384	TDG532A12700	12,700	.5000	124	60	77	3,0	45	14
4158385	TDG532A12800	12,800	.5039	124	60	77	3,0	45	14
4158386	TDG532A12900	12,900	.5079	124	60	77	3,0	45	14
4158387	TDG532A13000	13,000	.5118	124	60	77	3,0	45	14
4158388	TDG532A13096	13,096	.5156	124	60	77	3,1	45	14
4158389	TDG532A13100	13,100	.5157	124	60	77	3,1	45	14

(continued)

(TDG532A • 5 x D — continued)



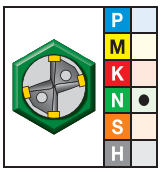
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158390	TDG532A13200	13,200	.5197	124	60	77	3,1	45	14
4158391	TDG532A13300	13,300	.5236	124	60	77	3,1	45	14
4158392	TDG532A13400	13,400	.5276	124	60	77	3,1	45	14
4158448	TDG532A13490	13,490	.5311	124	60	77	3,1	45	14
4158393	TDG532A13500	13,500	.5315	124	60	77	3,1	45	14
4158394	TDG532A13600	13,600	.5354	124	60	77	3,2	45	14
4158395	TDG532A13700	13,700	.5394	124	60	77	3,2	45	14
4158396	TDG532A13800	13,800	.5433	124	60	77	3,2	45	14
4158397	TDG532A13891	13,891	.5469	124	60	77	3,2	45	14
4158398	TDG532A13900	13,900	.5472	124	60	77	3,2	45	14
4158399	TDG532A14000	14,000	.5512	124	60	77	3,3	45	14
4158400	TDG532A14100	14,100	.5551	133	63	83	3,3	48	16
4158401	TDG532A14200	14,200	.5591	133	63	83	3,3	48	16
4158402	TDG532A14288	14,288	.5625	133	63	83	3,3	48	16
4158403	TDG532A14300	14,300	.5630	133	63	83	3,3	48	16
4158404	TDG532A14400	14,400	.5669	133	63	83	3,4	48	16
4158405	TDG532A14500	14,500	.5709	133	63	83	3,4	48	16
4158406	TDG532A14600	14,600	.5748	133	63	83	3,4	48	16
4158407	TDG532A14684	14,684	.5781	133	63	83	3,4	48	16
4158408	TDG532A14700	14,700	.5787	133	63	83	3,4	48	16
4158409	TDG532A14800	14,800	.5827	133	63	83	3,5	48	16
4158410	TDG532A14900	14,900	.5866	133	63	83	3,5	48	16
4158411	TDG532A15000	15,000	.5906	133	63	83	3,5	48	16
4158412	TDG532A15083	15,083	.5938	133	63	83	3,5	48	16
4158413	TDG532A15100	15,100	.5945	133	63	83	3,5	48	16
4158414	TDG532A15200	15,200	.5984	133	63	83	3,5	48	16
4158415	TDG532A15300	15,300	.6024	133	63	83	3,6	48	16
4158416	TDG532A15400	15,400	.6063	133	63	83	3,6	48	16
4158417	TDG532A15479	15,479	.6094	133	63	83	3,6	48	16
4158418	TDG532A15500	15,500	.6102	133	63	83	3,6	48	16
4158419	TDG532A15600	15,600	.6142	133	63	83	3,6	48	16
4158420	TDG532A15700	15,700	.6181	133	63	83	3,7	48	16
4158421	TDG532A15800	15,800	.6220	133	63	83	3,7	48	16
4158422	TDG532A15875	15,875	.6250	133	63	83	3,7	48	16
4158423	TDG532A15900	15,900	.6260	133	63	83	3,7	48	16
4158424	TDG532A16000	16,000	.6299	133	63	83	3,7	48	16
4158425	TDG532A16100	16,100	.6339	143	71	93	3,8	48	18
4158426	TDG532A16200	16,200	.6378	143	71	93	3,8	48	18
4158427	TDG532A16271	16,271	.6406	143	71	93	3,8	48	18
4158428	TDG532A16300	16,300	.6417	143	71	93	3,8	48	18

(continued)

(TDG532A • 5 x D — continued)



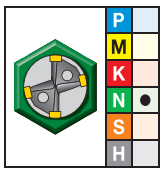
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158429	TDG532A16400	16,400	.6457	143	71	93	3,8	48	18
4158430	TDG532A16500	16,500	.6496	143	71	93	3,8	48	18
4158431	TDG532A16600	16,600	.6535	143	71	93	3,9	48	18
4158432	TDG532A16670	16,670	.6563	143	71	93	3,9	48	18
4158433	TDG532A16700	16,700	.6575	143	71	93	3,9	48	18
4158434	TDG532A16800	16,800	.6614	143	71	93	3,9	48	18
4158435	TDG532A16900	16,900	.6654	143	71	93	3,9	48	18
4158436	TDG532A17000	17,000	.6693	143	71	93	4,0	48	18
4158437	TDG532A17100	17,100	.6732	143	71	93	4,0	48	18
4158438	TDG532A17200	17,200	.6772	143	71	93	4,0	48	18
4158439	TDG532A17300	17,300	.6811	143	71	93	4,0	48	18
4158440	TDG532A17400	17,400	.6850	143	71	93	4,1	48	18
4158441	TDG532A17463	17,463	.6875	143	71	93	4,1	48	18
4158442	TDG532A17500	17,500	.6890	143	71	93	4,1	48	18
4158443	TDG532A17600	17,600	.6929	143	71	93	4,1	48	18
4158444	TDG532A17700	17,700	.6969	143	71	93	4,1	48	18
4158445	TDG532A17800	17,800	.7008	143	71	93	4,2	48	18
4158446	TDG532A17859	17,859	.7031	143	71	93	4,2	48	18
4158447	TDG532A17900	17,900	.7047	143	71	93	4,2	48	18
4158555	TDG532A18000	18,000	.7087	143	71	93	4,2	48	18
4158557	TDG532A18100	18,100	.7126	153	77	101	4,2	50	20
4158559	TDG532A18200	18,200	.7165	153	77	101	4,2	50	20
4158561	TDG532A18258	18,258	.7188	153	77	101	4,3	50	20
4158573	TDG532A18300	18,300	.7205	153	77	101	4,3	50	20
4158575	TDG532A18400	18,400	.7244	153	77	101	4,3	50	20
4158577	TDG532A18500	18,500	.7283	153	77	101	4,3	50	20
4158579	TDG532A18600	18,600	.7323	153	77	101	4,3	50	20
4158581	TDG532A18654	18,654	.7344	153	77	101	4,3	50	20
4158584	TDG532A18700	18,700	.7362	153	77	101	4,4	50	20
4158585	TDG532A18800	18,800	.7402	153	77	101	4,4	50	20
4158587	TDG532A18900	18,900	.7441	153	77	101	4,4	50	20
4158589	TDG532A19000	19,000	.7480	153	77	101	4,4	50	20
4158591	TDG532A19050	19,050	.7500	153	77	101	4,4	50	20
4158603	TDG532A19100	19,100	.7520	153	77	101	4,5	50	20
4158605	TDG532A19200	19,200	.7559	153	77	101	4,5	50	20
4158607	TDG532A19300	19,300	.7598	153	77	101	4,5	50	20
4158609	TDG532A19400	19,400	.7638	153	77	101	4,5	50	20
4158611	TDG532A19500	19,500	.7677	153	77	101	4,5	50	20
4158613	TDG532A19600	19,600	.7717	153	77	101	4,6	50	20
4158616	TDG532A19700	19,700	.7756	153	77	101	4,6	50	20

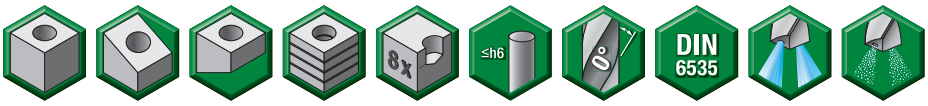
(continued)

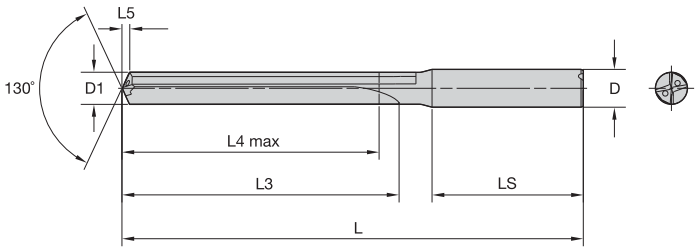
(TDG532A • 5 x D — continued)



● first choice
○ alternate choice

grade WN10HD		D1 diameter							
order #	catalogue #	mm	in	L	L4 max	L3	L5	LS	D
4158618	**TDG532A19800**	19,800	.7795	153	77	101	4,6	50	20
4158620	**TDG532A19900**	19,900	.7835	153	77	101	4,6	50	20
4158622	**TDG532A20000**	20,000	.7874	153	77	101	4,7	50	20
4158634	**TDG532A21000**	21,000	.8268	167	85	114	4,9	50	20
4158636	**TDG532A22000**	22,000	.8661	167	85	114	5,1	50	20
4158637	**TDG532A23000**	23,000	.9055	184	98	126	5,4	56	25

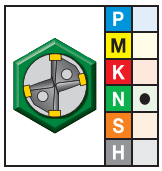






For information on L, L3, and L4 max, see page T143.

TDG533A • 8 x D



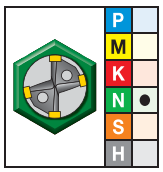
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158475	TDG533A03000	3,000	.1181	78	33	40	0,7	36	6
4158476	TDG533A03048	3,048	.1200	78	33	40	0,7	36	6
4158477	TDG533A03100	3,100	.1220	78	33	40	0,7	36	6
4158478	TDG533A03175	3,175	.1250	78	33	40	0,7	36	6
4158479	TDG533A03200	3,200	.1260	78	33	40	0,7	36	6
4158480	TDG533A03264	3,264	.1285	78	33	40	0,8	36	6
4158481	TDG533A03300	3,300	.1299	78	33	40	0,8	36	6
4158482	TDG533A03400	3,400	.1339	78	33	40	0,8	36	6
4158553	TDG533A03455	3,455	.1360	78	33	40	0,8	36	6
4158554	TDG533A03500	3,500	.1378	78	33	40	0,8	36	6
4158556	TDG533A03571	3,571	.1406	78	33	40	0,8	36	6
4158558	TDG533A03600	3,600	.1417	78	33	40	0,8	36	6
4158560	TDG533A03658	3,658	.1440	78	33	40	0,9	36	6
4158562	TDG533A03700	3,700	.1457	78	33	40	0,9	36	6
4158574	TDG533A03734	3,734	.1470	78	33	40	0,9	36	6
4158576	TDG533A03800	3,800	.1496	87	41	49	0,9	36	6
4158578	TDG533A03900	3,900	.1535	87	41	49	0,9	36	6
4158580	TDG533A03970	3,970	.1563	87	41	49	0,9	36	6
4158582	TDG533A04000	4,000	.1575	87	41	49	0,9	36	6
4158583	TDG533A04039	4,039	.1590	87	41	49	0,9	36	6
4158586	TDG533A04090	4,090	.1610	87	41	49	1,0	36	6
4158588	TDG533A04100	4,100	.1614	87	41	49	1,0	36	6
4158590	TDG533A04200	4,200	.1654	87	41	49	1,0	36	6
4158592	TDG533A04217	4,217	.1660	87	41	49	1,0	36	6

(continued)

(TDG533A • 8 x D — continued)



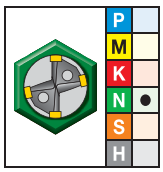
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158604	TDG533A04300	4,300	.1693	87	41	49	1,0	36	6
4158606	TDG533A04366	4,366	.1719	87	41	49	1,0	36	6
4158608	TDG533A04400	4,400	.1732	87	41	49	1,0	36	6
4158610	TDG533A04500	4,500	.1772	87	41	49	1,0	36	6
4158612	TDG533A04600	4,600	.1811	87	41	49	1,1	36	6
4158614	TDG533A04623	4,623	.1820	87	41	49	1,1	36	6
4158615	TDG533A04700	4,700	.1850	87	41	49	1,1	36	6
4158617	TDG533A04763	4,763	.1875	94	48	56	1,1	36	6
4158619	TDG533A04800	4,800	.1890	94	48	56	1,1	36	6
4158621	TDG533A04852	4,852	.1910	94	48	56	1,1	36	6
4158633	TDG533A04900	4,900	.1929	94	48	56	1,1	36	6
4158635	TDG533A05000	5,000	.1969	94	48	56	1,2	36	6
4158638	TDG533A05100	5,100	.2008	94	48	56	1,2	36	6
4158639	TDG533A05106	5,106	.2010	94	48	56	1,2	36	6
4158640	TDG533A05159	5,159	.2031	94	48	56	1,2	36	6
4158641	TDG533A05200	5,200	.2047	94	48	56	1,2	36	6
4158642	TDG533A05300	5,300	.2087	94	48	56	1,2	36	6
4158653	TDG533A05400	5,400	.2126	94	48	56	1,3	36	6
4158654	TDG533A05410	5,410	.2130	94	48	56	1,3	36	6
4158655	TDG533A05500	5,500	.2165	94	48	56	1,3	36	6
4158656	TDG533A05558	5,558	.2188	94	48	56	1,3	36	6
4158657	TDG533A05600	5,600	.2205	94	48	56	1,3	36	6
4158658	TDG533A05616	5,616	.2211	94	48	56	1,3	36	6
4158659	TDG533A05700	5,700	.2244	94	48	56	1,3	36	6
4158660	TDG533A05800	5,800	.2283	94	48	56	1,4	36	6
4158661	TDG533A05900	5,900	.2323	94	48	56	1,4	36	6
4158662	TDG533A05954	5,954	.2344	94	48	56	1,4	36	6
4158673	TDG533A06000	6,000	.2362	94	48	56	1,4	36	6
4158674	TDG533A06100	6,100	.2402	105	57	67	1,4	36	8
4158675	TDG533A06200	6,200	.2441	105	57	67	1,4	36	8
4158676	TDG533A06300	6,300	.2480	105	57	67	1,5	36	8
4158677	TDG533A06350	6,350	.2500	105	57	67	1,5	36	8
4158678	TDG533A06400	6,400	.2520	105	57	67	1,5	36	8
4158679	TDG533A06500	6,500	.2559	105	57	67	1,5	36	8
4158680	TDG533A06528	6,528	.2570	105	57	67	1,5	36	8
4158681	TDG533A06600	6,600	.2598	105	57	67	1,5	36	8
4158682	TDG533A06630	6,630	.2610	105	57	67	1,5	36	8
4158693	TDG533A06700	6,700	.2638	105	57	67	1,6	36	8
4158694	TDG533A06746	6,746	.2656	105	57	67	1,6	36	8
4158695	TDG533A06800	6,800	.2677	105	57	67	1,6	36	8

(continued)

(TDG533A • 8 x D — continued)



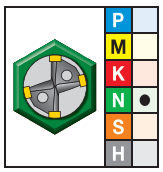
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158696	TDG533A06900	6,900	.2717	105	57	67	1,6	36	8
4158697	TDG533A07000	7,000	.2756	105	57	67	1,6	36	8
4158698	TDG533A07100	7,100	.2795	110	61	72	1,7	36	8
4158699	TDG533A07145	7,145	.2813	110	61	72	1,7	36	8
4158700	TDG533A07200	7,200	.2835	110	61	72	1,7	36	8
4158701	TDG533A07300	7,300	.2874	110	61	72	1,7	36	8
4158702	TDG533A07400	7,400	.2913	110	61	72	1,7	36	8
4158713	TDG533A07500	7,500	.2953	110	61	72	1,7	36	8
4158714	TDG533A07541	7,541	.2969	110	61	72	1,8	36	8
4158715	TDG533A07600	7,600	.2992	110	61	72	1,8	36	8
4158716	TDG533A07700	7,700	.3031	110	61	72	1,8	36	8
4158717	TDG533A07800	7,800	.3071	110	61	72	1,8	36	8
4158718	TDG533A07900	7,900	.3110	110	61	72	1,8	36	8
4158719	TDG533A07938	7,938	.3125	110	61	72	1,9	36	8
4158720	TDG533A08000	8,000	.3150	110	61	72	1,9	36	8
4158721	TDG533A08100	8,100	.3189	122	68	80	1,9	40	10
4158722	TDG533A08200	8,200	.3228	122	68	80	1,9	40	10
4158733	TDG533A08300	8,300	.3268	122	68	80	1,9	40	10
4158734	TDG533A08334	8,334	.3281	122	68	80	1,9	40	10
4158735	TDG533A08400	8,400	.3307	122	68	80	2,0	40	10
4158736	TDG533A08433	8,433	.3320	122	68	80	2,0	40	10
4158737	TDG533A08500	8,500	.3346	122	68	80	2,0	40	10
4158738	TDG533A08600	8,600	.3386	122	68	80	2,0	40	10
4158739	TDG533A08700	8,700	.3425	122	68	80	2,0	40	10
4158740	TDG533A08733	8,733	.3438	122	68	80	2,0	40	10
4158741	TDG533A08800	8,800	.3465	122	68	80	2,1	40	10
4158742	TDG533A08900	8,900	.3504	122	68	80	2,1	40	10
4158743	TDG533A09000	9,000	.3543	122	68	80	2,1	40	10
4158744	TDG533A09100	9,100	.3583	122	68	80	2,1	40	10
4158745	TDG533A09129	9,129	.3594	122	68	80	2,1	40	10
4158746	TDG533A09200	9,200	.3622	122	68	80	2,1	40	10
4158747	TDG533A09300	9,300	.3661	122	68	80	2,2	40	10
4158748	TDG533A09347	9,347	.3680	122	68	80	2,2	40	10
4158749	TDG533A09400	9,400	.3701	122	68	80	2,2	40	10
4158750	TDG533A09500	9,500	.3740	122	68	80	2,2	40	10
4158751	TDG533A09525	9,525	.3750	122	68	80	2,2	40	10
4158752	TDG533A09600	9,600	.3780	122	68	80	2,2	40	10
4158753	TDG533A09700	9,700	.3819	122	68	80	2,3	40	10
4158754	TDG533A09800	9,800	.3858	122	68	80	2,3	40	10
4158755	TDG533A09900	9,900	.3898	122	68	80	2,3	40	10

(continued)

(TDG533A • 8 x D — continued)



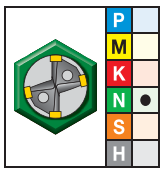
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158756	TDG533A09921	9,921	.3906	122	68	80	2,3	40	10
4158520	TDG533A10000	10,000	.3937	122	68	80	2,3	40	10
4158521	TDG533A10100	10,100	.3976	141	79	94	2,4	45	12
4158522	TDG533A10200	10,200	.4016	141	79	94	2,4	45	12
4158533	TDG533A10300	10,300	.4055	141	79	94	2,4	45	12
4158534	TDG533A10320	10,320	.4063	141	79	94	2,4	45	12
4158535	TDG533A10400	10,400	.4094	141	79	94	2,4	45	12
4158536	TDG533A10500	10,500	.4134	141	79	94	2,4	45	12
4158537	TDG533A10600	10,600	.4173	141	79	94	2,5	45	12
4158538	TDG533A10700	10,700	.4213	141	79	94	2,5	45	12
4158539	TDG533A10716	10,716	.4219	141	79	94	2,5	45	12
4158540	TDG533A10800	10,800	.4252	141	79	94	2,5	45	12
4158541	TDG533A10900	10,900	.4291	141	79	94	2,5	45	12
4158542	TDG533A11000	11,000	.4331	141	79	94	2,6	45	12
4158543	TDG533A11100	11,100	.4370	141	79	94	2,6	45	12
4158544	TDG533A11113	11,113	.4375	141	79	94	2,6	45	12
4158545	TDG533A11200	11,200	.4409	141	79	94	2,6	45	12
4158546	TDG533A11300	11,300	.4449	141	79	94	2,6	45	12
4158547	TDG533A11400	11,400	.4488	141	79	94	2,7	45	12
4158548	TDG533A11500	11,500	.4528	141	79	94	2,7	45	12
4158549	TDG533A11509	11,509	.4531	141	79	94	2,7	45	12
4158550	TDG533A11600	11,600	.4567	141	79	94	2,7	45	12
4158551	TDG533A11700	11,700	.4606	141	79	94	2,7	45	12
4158552	TDG533A11800	11,800	.4646	141	79	94	2,8	45	12
4158563	TDG533A11900	11,900	.4685	141	79	94	2,8	45	12
4158564	TDG533A11908	11,908	.4688	141	79	94	2,8	45	12
4158565	TDG533A12000	12,000	.4724	141	79	94	2,8	45	12
4158566	TDG533A12100	12,100	.4764	155	91	108	2,8	45	14
4158567	TDG533A12200	12,200	.4803	155	91	108	2,8	45	14
4158568	TDG533A12300	12,300	.4843	155	91	108	2,9	45	14
4158569	TDG533A12304	12,304	.4844	155	91	108	2,9	45	14
4158570	TDG533A12400	12,400	.4882	155	91	108	2,9	45	14
4158571	TDG533A12500	12,500	.4921	155	91	108	2,9	45	14
4158572	TDG533A12600	12,600	.4961	155	91	108	2,9	45	14
4158593	TDG533A12700	12,700	.5000	155	91	108	3,0	45	14
4158594	TDG533A12800	12,800	.5039	155	91	108	3,0	45	14
4158595	TDG533A12900	12,900	.5079	155	91	108	3,0	45	14
4158596	TDG533A13000	13,000	.5118	155	91	108	3,0	45	14
4158597	TDG533A13096	13,096	.5156	155	91	108	3,1	45	14
4158598	TDG533A13100	13,100	.5157	155	91	108	3,1	45	14

(continued)

(TDG533A • 8 x D — continued)



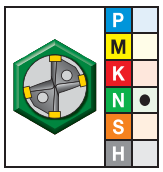
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158599	TDG533A13200	13,200	.5197	155	91	108	3,1	45	14
4158600	TDG533A13300	13,300	.5236	155	91	108	3,1	45	14
4158601	TDG533A13400	13,400	.5276	155	91	108	3,1	45	14
4158727	TDG533A13490	13,490	.5311	155	91	108	3,1	45	14
4158602	TDG533A13500	13,500	.5315	155	91	108	3,1	45	14
4158623	TDG533A13600	13,600	.5354	155	91	108	3,2	45	14
4158624	TDG533A13700	13,700	.5394	155	91	108	3,2	45	14
4158625	TDG533A13800	13,800	.5433	155	91	108	3,2	45	14
4158626	TDG533A13891	13,891	.5469	155	91	108	3,2	45	14
4158627	TDG533A13900	13,900	.5472	155	91	108	3,2	45	14
4158628	TDG533A14000	14,000	.5512	155	91	108	3,3	45	14
4158629	TDG533A14100	14,100	.5551	171	101	121	3,3	48	16
4158630	TDG533A14200	14,200	.5591	171	101	121	3,3	48	16
4158631	TDG533A14288	14,288	.5625	171	101	121	3,3	48	16
4158632	TDG533A14300	14,300	.5630	171	101	121	3,3	48	16
4158643	TDG533A14400	14,400	.5669	171	101	121	3,4	48	16
4158644	TDG533A14500	14,500	.5709	171	101	121	3,4	48	16
4158645	TDG533A14600	14,600	.5748	171	101	121	3,4	48	16
4158646	TDG533A14684	14,684	.5781	171	101	121	3,4	48	16
4158647	TDG533A14700	14,700	.5787	171	101	121	3,4	48	16
4158648	TDG533A14800	14,800	.5827	171	101	121	3,5	48	16
4158649	TDG533A14900	14,900	.5866	171	101	121	3,5	48	16
4158650	TDG533A15000	15,000	.5906	171	101	121	3,5	48	16
4158651	TDG533A15083	15,083	.5938	171	101	121	3,5	48	16
4158652	TDG533A15100	15,100	.5945	171	101	121	3,5	48	16
4158663	TDG533A15200	15,200	.5984	171	101	121	3,5	48	16
4158664	TDG533A15300	15,300	.6024	171	101	121	3,6	48	16
4158665	TDG533A15400	15,400	.6063	171	101	121	3,6	48	16
4158666	TDG533A15479	15,479	.6094	171	101	121	3,6	48	16
4158667	TDG533A15500	15,500	.6102	171	101	121	3,6	48	16
4158668	TDG533A15600	15,600	.6142	171	101	121	3,6	48	16
4158669	TDG533A15700	15,700	.6181	171	101	121	3,7	48	16
4158670	TDG533A15800	15,800	.6220	171	101	121	3,7	48	16
4158671	TDG533A15875	15,875	.6250	171	101	121	3,7	48	16
4158672	TDG533A15900	15,900	.6260	171	101	121	3,7	48	16
4158683	TDG533A16000	16,000	.6299	171	101	121	3,7	48	16
4158684	TDG533A16100	16,100	.6339	185	113	135	3,8	48	18
4158685	TDG533A16200	16,200	.6378	185	113	135	3,8	48	18
4158686	TDG533A16271	16,271	.6406	185	113	135	3,8	48	18
4158687	TDG533A16300	16,300	.6417	185	113	135	3,8	48	18

(continued)

(TDG533A • 8 x D — continued)

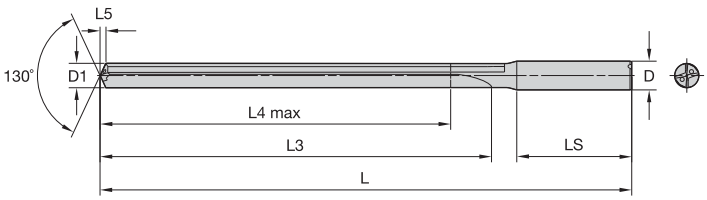


grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4158688	TDG533A16400	16,400	.6457	185	113	135	3,8	48	18
4158689	TDG533A16500	16,500	.6496	185	113	135	3,8	48	18
4158690	TDG533A16600	16,600	.6535	185	113	135	3,9	48	18
4158691	TDG533A16670	16,670	.6563	185	113	135	3,9	48	18
4158692	TDG533A16700	16,700	.6575	185	113	135	3,9	48	18
4158703	TDG533A16800	16,800	.6614	185	113	135	3,9	48	18
4158704	TDG533A16900	16,900	.6654	185	113	135	3,9	48	18
4158705	TDG533A17000	17,000	.6693	185	113	135	4,0	48	18
4158706	TDG533A17100	17,100	.6732	185	113	135	4,0	48	18
4158707	TDG533A17200	17,200	.6772	185	113	135	4,0	48	18
4158708	TDG533A17300	17,300	.6811	185	113	135	4,0	48	18
4158709	TDG533A17400	17,400	.6850	185	113	135	4,1	48	18
4158710	TDG533A17463	17,463	.6875	185	113	135	4,1	48	18
4158711	TDG533A17500	17,500	.6890	185	113	135	4,1	48	18
4158712	TDG533A17600	17,600	.6929	185	113	135	4,1	48	18
4158723	TDG533A17700	17,700	.6969	185	113	135	4,1	48	18
4158724	TDG533A17800	17,800	.7008	185	113	135	4,2	48	18
4158725	TDG533A17859	17,859	.7031	185	113	135	4,2	48	18
4158726	TDG533A17900	17,900	.7047	185	113	135	4,2	48	18
4157333	TDG533A18000	18,000	.7087	185	113	135	4,2	48	18
4157334	TDG533A18100	18,100	.7126	200	124	148	4,2	50	20
4157335	TDG533A18200	18,200	.7165	200	124	148	4,2	50	20
4157336	TDG533A18258	18,258	.7188	200	124	148	4,3	50	20
4157337	TDG533A18300	18,300	.7205	200	124	148	4,3	50	20
4157338	TDG533A18400	18,400	.7244	200	124	148	4,3	50	20
4157339	TDG533A18500	18,500	.7283	200	124	148	4,3	50	20
4157340	TDG533A18600	18,600	.7323	200	124	148	4,3	50	20
4157341	TDG533A18654	18,654	.7344	200	124	148	4,3	50	20
4157342	TDG533A18700	18,700	.7362	200	124	148	4,4	50	20
4157343	TDG533A18800	18,800	.7402	200	124	148	4,4	50	20
4157344	TDG533A18900	18,900	.7441	200	124	148	4,4	50	20
4157345	TDG533A19000	19,000	.7480	200	124	148	4,4	50	20
4157346	TDG533A19050	19,050	.7500	200	124	148	4,4	50	20
4157347	TDG533A19100	19,100	.7520	200	124	148	4,5	50	20
4157348	TDG533A19200	19,200	.7559	200	124	148	4,5	50	20
4157349	TDG533A19300	19,300	.7598	200	124	148	4,5	50	20
4157350	TDG533A19400	19,400	.7638	200	124	148	4,5	50	20
4157351	TDG533A19500	19,500	.7677	200	124	148	4,5	50	20
4157352	TDG533A19600	19,600	.7717	200	124	148	4,6	50	20
4157353	TDG533A19700	19,700	.7756	200	124	148	4,6	50	20
4157354	TDG533A19800	19,800	.7795	200	124	148	4,6	50	20
4157355	TDG533A19900	19,900	.7835	200	124	148	4,6	50	20
4157356	TDG533A20000	20,000	.7874	200	124	148	4,7	50	20

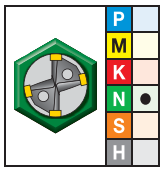






For information on L, L3, and L4 max, see page T143.

TDG534A • 12 x D



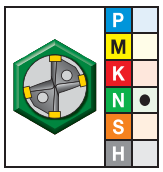
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157357	TDG534A03000	3,000	.1181	93	44	55	0,7	36	6
4157358	TDG534A03048	3,048	.1200	93	44	55	0,7	36	6
4157359	TDG534A03100	3,100	.1220	93	44	55	0,7	36	6
4157360	TDG534A03175	3,175	.1250	93	44	55	0,7	36	6
4157361	TDG534A03200	3,200	.1260	93	43	55	0,7	36	6
4157362	TDG534A03264	3,264	.1285	93	44	55	0,8	36	6
4157363	TDG534A03300	3,300	.1299	93	44	55	0,8	36	6
4157364	TDG534A03400	3,400	.1339	93	44	55	0,8	36	6
4157365	TDG534A03455	3,455	.1360	93	44	55	0,8	36	6
4157366	TDG534A03500	3,500	.1378	93	44	55	0,8	36	6
4157367	TDG534A03571	3,571	.1406	93	45	55	0,8	36	6
4157368	TDG534A03600	3,600	.1417	93	45	55	0,8	36	6
4157369	TDG534A03658	3,658	.1440	93	45	55	0,9	36	6
4157370	TDG534A03700	3,700	.1457	93	45	55	0,9	36	6
4157371	TDG534A03734	3,734	.1470	93	45	55	0,9	36	6
4157372	TDG534A03800	3,800	.1496	107	55	69	0,9	36	6
4157373	TDG534A03900	3,900	.1535	107	56	69	0,9	36	6
4157374	TDG534A03970	3,970	.1563	107	56	69	0,9	36	6
4157375	TDG534A04000	4,000	.1575	107	56	69	0,9	36	6
4157376	TDG534A04039	4,039	.1590	107	56	69	0,9	36	6
4157377	TDG534A04090	4,090	.1610	107	55	69	1,0	36	6
4157378	TDG534A04100	4,100	.1614	107	55	69	1,0	36	6
4157379	TDG534A04200	4,200	.1654	107	56	69	1,0	36	6
4157380	TDG534A04217	4,217	.1660	107	56	69	1,0	36	6

(continued)

(TDG534A • 12 x D — continued)



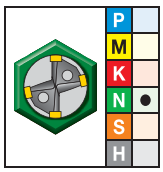
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157381	TDG534A04300	4,300	.1693	107	56	69	1,0	36	6
4157382	TDG534A04366	4,366	.1719	107	56	69	1,0	36	6
4157383	TDG534A04400	4,400	.1732	107	56	69	1,0	36	6
4157384	TDG534A04500	4,500	.1772	107	56	69	1,0	36	6
4157385	TDG534A04600	4,600	.1811	107	57	69	1,1	36	6
4157386	TDG534A04623	4,623	.1820	107	57	69	1,1	36	6
4157387	TDG534A04700	4,700	.1850	107	57	69	1,1	36	6
4157388	TDG534A04763	4,763	.1875	125	69	87	1,1	36	6
4157389	TDG534A04800	4,800	.1890	125	69	87	1,1	36	6
4157390	TDG534A04852	4,852	.1910	125	69	87	1,1	36	6
4157391	TDG534A04900	4,900	.1929	125	69	87	1,1	36	6
4157392	TDG534A05000	5,000	.1969	125	70	87	1,2	36	6
4157393	TDG534A05100	5,100	.2008	125	70	87	1,2	36	6
4157394	TDG534A05106	5,106	.2010	125	70	87	1,2	36	6
4157395	TDG534A05159	5,159	.2031	125	70	87	1,2	36	6
4157396	TDG534A05200	5,200	.2047	125	70	87	1,2	36	6
4157397	TDG534A05300	5,300	.2087	125	71	87	1,2	36	6
4157398	TDG534A05400	5,400	.2126	125	71	87	1,3	36	6
4157399	TDG534A05410	5,410	.2130	125	71	87	1,3	36	6
4157400	TDG534A05500	5,500	.2165	125	71	87	1,3	36	6
4157401	TDG534A05558	5,558	.2188	125	71	87	1,3	36	6
4157402	TDG534A05600	5,600	.2205	125	72	87	1,3	36	6
4157403	TDG534A05616	5,616	.2211	125	72	87	1,3	36	6
4157404	TDG534A05700	5,700	.2244	125	72	87	1,3	36	6
4157405	TDG534A05800	5,800	.2283	125	71	87	1,4	36	6
4157406	TDG534A05900	5,900	.2323	125	71	87	1,4	36	6
4157407	TDG534A05954	5,954	.2344	125	72	87	1,4	36	6
4157408	TDG534A06000	6,000	.2362	125	72	87	1,4	36	6
4157409	TDG534A06100	6,100	.2402	139	82	101	1,4	36	8
4157410	TDG534A06200	6,200	.2441	139	82	101	1,4	36	8
4157411	TDG534A06300	6,300	.2480	139	83	101	1,5	36	8
4157412	TDG534A06350	6,350	.2500	139	83	101	1,5	36	8
4157413	TDG534A06400	6,400	.2520	139	83	101	1,5	36	8
4157414	TDG534A06500	6,500	.2559	139	83	101	1,5	36	8
4157415	TDG534A06528	6,528	.2570	139	83	101	1,5	36	8
4157416	TDG534A06600	6,600	.2598	139	84	101	1,5	36	8
4157417	TDG534A06630	6,630	.2610	139	84	101	1,5	36	8
4157418	TDG534A06700	6,700	.2638	139	84	101	1,6	36	8
4157419	TDG534A06746	6,746	.2656	139	83	101	1,6	36	8
4157420	TDG534A06800	6,800	.2677	139	83	101	1,6	36	8

(continued)

(TDG534A • 12 x D — continued)



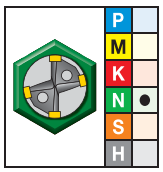
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157421	TDG534A06900	6,900	.2717	139	83	101	1,6	36	8
4157422	TDG534A07000	7,000	.2756	139	84	101	1,6	36	8
4157423	TDG534A07100	7,100	.2795	153	94	115	1,7	36	8
4157424	TDG534A07145	7,145	.2813	153	94	115	1,7	36	8
4157425	TDG534A07200	7,200	.2835	153	94	115	1,7	36	8
4157426	TDG534A07300	7,300	.2874	153	95	115	1,7	36	8
4157427	TDG534A07400	7,400	.2913	153	95	115	1,7	36	8
4157428	TDG534A07500	7,500	.2953	153	95	115	1,7	36	8
4157429	TDG534A07541	7,541	.2969	153	95	115	1,8	36	8
4157430	TDG534A07600	7,600	.2992	153	96	115	1,8	36	8
4157431	TDG534A07700	7,700	.3031	153	96	115	1,8	36	8
4157432	TDG534A07800	7,800	.3071	153	95	115	1,8	36	8
4157433	TDG534A07900	7,900	.3110	153	95	115	1,8	36	8
4157434	TDG534A07938	7,938	.3125	153	96	115	1,9	36	8
4157435	TDG534A08000	8,000	.3150	153	96	115	1,9	36	8
4157436	TDG534A08100	8,100	.3189	185	116	143	1,9	40	10
4157437	TDG534A08200	8,200	.3228	185	116	143	1,9	40	10
4157438	TDG534A08300	8,300	.3268	185	117	143	1,9	40	10
4157439	TDG534A08334	8,334	.3281	185	117	143	1,9	40	10
4157440	TDG534A08400	8,400	.3307	185	117	143	2,0	40	10
4157441	TDG534A08433	8,433	.3320	185	117	143	2,0	40	10
4157442	TDG534A08500	8,500	.3346	185	117	143	2,0	40	10
4157443	TDG534A08600	8,600	.3386	185	118	143	2,0	40	10
4157444	TDG534A08700	8,700	.3425	185	118	143	2,0	40	10
4157445	TDG534A08733	8,733	.3438	185	117	143	2,0	40	10
4157446	TDG534A08800	8,800	.3465	185	117	143	2,1	40	10
4157447	TDG534A08900	8,900	.3504	185	117	143	2,1	40	10
4157448	TDG534A09000	9,000	.3543	185	118	143	2,1	40	10
4157449	TDG534A09100	9,100	.3583	185	118	143	2,1	40	10
4157450	TDG534A09129	9,129	.3594	185	118	143	2,1	40	10
4157451	TDG534A09200	9,200	.3622	185	118	143	2,1	40	10
4157452	TDG534A09300	9,300	.3661	185	119	143	2,2	40	10
4157453	TDG534A09347	9,347	.3680	185	119	143	2,2	40	10
4157454	TDG534A09400	9,400	.3701	185	119	143	2,2	40	10
4157455	TDG534A09500	9,500	.3740	185	119	143	2,2	40	10
4157456	TDG534A09525	9,525	.3750	185	119	143	2,2	40	10
4157457	TDG534A09600	9,600	.3780	185	120	143	2,2	40	10
4157458	TDG534A09700	9,700	.3819	185	120	143	2,3	40	10
4157459	TDG534A09800	9,800	.3858	185	119	143	2,3	40	10
4157460	TDG534A09900	9,900	.3898	185	119	143	2,3	40	10

(continued)

(TDG534A • 12 x D — continued)



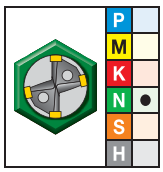
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157461	TDG534A09921	9,921	.3906	185	120	143	2,3	40	10
4157476	TDG534A10000	10,000	.3937	185	120	143	2,3	40	10
4157555	TDG534A10100	10,100	.3976	218	140	171	2,4	45	12
4157556	TDG534A10200	10,200	.4016	218	140	171	2,4	45	12
4157557	TDG534A10300	10,300	.4055	218	141	171	2,4	45	12
4157558	TDG534A10320	10,320	.4063	218	141	171	2,4	45	12
4157559	TDG534A10400	10,400	.4094	218	141	171	2,4	45	12
4157560	TDG534A10500	10,500	.4134	218	141	171	2,4	45	12
4157561	TDG534A10600	10,600	.4173	218	142	171	2,5	45	12
4157562	TDG534A10700	10,700	.4213	218	142	171	2,5	45	12
4157583	TDG534A10716	10,716	.4219	218	142	171	2,5	45	12
4157584	TDG534A10800	10,800	.4252	218	141	171	2,5	45	12
4157585	TDG534A10900	10,900	.4291	218	141	171	2,5	45	12
4157586	TDG534A11000	11,000	.4331	218	142	171	2,6	45	12
4157587	TDG534A11100	11,100	.4370	218	142	171	2,6	45	12
4157588	TDG534A11113	11,113	.4375	218	142	171	2,6	45	12
4157589	TDG534A11200	11,200	.4409	218	142	171	2,6	45	12
4157590	TDG534A11300	11,300	.4449	218	143	171	2,6	45	12
4157591	TDG534A11400	11,400	.4488	218	143	171	2,7	45	12
4157592	TDG534A11500	11,500	.4528	218	143	171	2,7	45	12
4157593	TDG534A11509	11,509	.4531	218	143	171	2,7	45	12
4157594	TDG534A11600	11,600	.4567	218	144	171	2,7	45	12
4157595	TDG534A11700	11,700	.4606	218	144	171	2,7	45	12
4157596	TDG534A11800	11,800	.4646	218	143	171	2,8	45	12
4157597	TDG534A11900	11,900	.4685	218	143	171	2,8	45	12
4157598	TDG534A11908	11,908	.4688	218	143	171	2,8	45	12
4157599	TDG534A12000	12,000	.4724	218	144	171	2,8	45	12
4157600	TDG534A12100	12,100	.4764	246	164	199	2,8	45	14
4157601	TDG534A12200	12,200	.4803	246	164	199	2,8	45	14
4157602	TDG534A12300	12,300	.4843	246	165	199	2,9	45	14
4157603	TDG534A12304	12,304	.4844	246	165	199	2,9	45	14
4157604	TDG534A12400	12,400	.4882	246	165	199	2,9	45	14
4157605	TDG534A12500	12,500	.4921	246	165	199	2,9	45	14
4157606	TDG534A12600	12,600	.4961	246	165	199	2,9	45	14
4157607	TDG534A12700	12,700	.5000	246	166	199	3,0	45	14
4157608	TDG534A12800	12,800	.5039	246	166	199	3,0	45	14
4157609	TDG534A12900	12,900	.5079	246	165	199	3,0	45	14
4157610	TDG534A13000	13,000	.5118	246	166	199	3,0	45	14
4157611	TDG534A13096	13,096	.5156	246	166	199	3,1	45	14
4157612	TDG534A13100	13,100	.5157	246	166	199	3,1	45	14

(continued)

(TDG534A • 12 x D — continued)



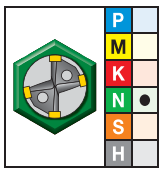
grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157613	TDG534A13200	13,200	.5197	246	166	199	3,1	45	14
4157614	TDG534A13300	13,300	.5236	246	167	199	3,1	45	14
4157615	TDG534A13400	13,400	.5276	246	167	199	3,1	45	14
4157671	TDG534A13490	13,490	.5311	246	167	199	3,1	45	14
4157616	TDG534A13500	13,500	.5315	246	167	199	3,1	45	14
4157617	TDG534A13600	13,600	.5354	246	167	199	3,2	45	14
4157618	TDG534A13700	13,700	.5394	246	168	199	3,2	45	14
4157619	TDG534A13800	13,800	.5433	246	168	199	3,2	45	14
4157620	TDG534A13891	13,891	.5469	246	167	199	3,2	45	14
4157621	TDG534A13900	13,900	.5472	246	167	199	3,2	45	14
4157622	TDG534A14000	14,000	.5512	246	168	199	3,3	45	14
4157623	TDG534A14100	14,100	.5551	277	188	227	3,3	48	16
4157624	TDG534A14200	14,200	.5591	277	188	227	3,3	48	16
4157625	TDG534A14288	14,288	.5625	277	188	227	3,3	48	16
4157626	TDG534A14300	14,300	.5630	277	188	227	3,3	48	16
4157627	TDG534A14400	14,400	.5669	277	189	227	3,4	48	16
4157628	TDG534A14500	14,500	.5709	277	189	227	3,4	48	16
4157629	TDG534A14600	14,600	.5748	277	189	227	3,4	48	16
4157630	TDG534A14684	14,684	.5781	277	190	227	3,4	48	16
4157631	TDG534A14700	14,700	.5787	277	190	227	3,4	48	16
4157632	TDG534A14800	14,800	.5827	277	190	227	3,5	48	16
4157633	TDG534A14900	14,900	.5866	277	190	227	3,5	48	16
4157634	TDG534A15000	15,000	.5906	277	190	227	3,5	48	16
4157635	TDG534A15083	15,083	.5938	277	190	227	3,5	48	16
4157636	TDG534A15100	15,100	.5945	277	190	227	3,5	48	16
4157637	TDG534A15200	15,200	.5984	277	190	227	3,5	48	16
4157638	TDG534A15300	15,300	.6024	277	191	227	3,6	48	16
4157639	TDG534A15400	15,400	.6063	277	191	227	3,6	48	16
4157640	TDG534A15479	15,479	.6094	277	191	227	3,6	48	16
4157641	TDG534A15500	15,500	.6102	277	191	227	3,6	48	16
4157642	TDG534A15600	15,600	.6142	277	191	227	3,6	48	16
4157643	TDG534A15700	15,700	.6181	277	192	227	3,7	48	16
4157644	TDG534A15800	15,800	.6220	277	192	227	3,7	48	16
4157645	TDG534A15875	15,875	.6250	277	192	227	3,7	48	16
4157646	TDG534A15900	15,900	.6260	277	192	227	3,7	48	16
4157647	TDG534A16000	16,000	.6299	277	192	227	3,7	48	16
4157648	TDG534A16100	16,100	.6339	305	212	255	3,8	48	18
4157649	TDG534A16200	16,200	.6378	305	212	255	3,8	48	18
4157650	TDG534A16271	16,271	.6406	305	212	255	3,8	48	18
4157651	TDG534A16300	16,300	.6417	305	212	255	3,8	48	18

(continued)

(TDG534A • 12 x D — continued)



grade WN10HD

● first choice
○ alternate choice

order #	catalogue #	D1 diameter mm	D1 diameter in	L	L4 max	L3	L5	LS	D
4157652	TDG534A16400	16,400	.6457	305	213	255	3,8	48	18
4157653	TDG534A16500	16,500	.6496	305	213	255	3,8	48	18
4157654	TDG534A16600	16,600	.6535	305	213	255	3,9	48	18
4157655	TDG534A16670	16,670	.6563	305	214	255	3,9	48	18
4157656	TDG534A16700	16,700	.6575	305	214	255	3,9	48	18
4157657	TDG534A16800	16,800	.6614	305	214	255	3,9	48	18
4157658	TDG534A16900	16,900	.6654	305	214	255	3,9	48	18
4157659	TDG534A17000	17,000	.6693	305	214	255	4,0	48	18
4157660	TDG534A17100	17,100	.6732	305	214	255	4,0	48	18
4157661	TDG534A17200	17,200	.6772	305	214	255	4,0	48	18
4157662	TDG534A17300	17,300	.6811	305	214	255	4,0	48	18
4157663	TDG534A17400	17,400	.6850	305	215	255	4,1	48	18
4157664	TDG534A17463	17,463	.6875	305	215	255	4,1	48	18
4157665	TDG534A17500	17,500	.6890	305	215	255	4,1	48	18
4157666	TDG534A17600	17,600	.6929	305	215	255	4,1	48	18
4157667	TDG534A17700	17,700	.6969	305	216	255	4,1	48	18
4157668	TDG534A17800	17,800	.7008	305	216	255	4,2	48	18
4157669	TDG534A17859	17,859	.7031	305	216	255	4,2	48	18
4157670	TDG534A17900	17,900	.7047	305	216	255	4,2	48	18
4156877	TDG534A18000	18,000	.7087	305	216	255	4,2	48	18
4156878	TDG534A18100	18,100	.7126	334	237	282	4,2	50	20
4156879	TDG534A18200	18,200	.7165	334	236	282	4,2	50	20
4156880	TDG534A18258	18,258	.7188	334	236	282	4,3	50	20
4156881	TDG534A18300	18,300	.7205	334	236	282	4,3	50	20
4156882	TDG534A18400	18,400	.7244	334	237	282	4,3	50	20
4156973	TDG534A18500	18,500	.7283	334	237	282	4,3	50	20
4156974	TDG534A18600	18,600	.7323	334	237	282	4,3	50	20
4156975	TDG534A18654	18,654	.7344	334	237	282	4,3	50	20
4156976	TDG534A18700	18,700	.7362	334	237	282	4,4	50	20
4156977	TDG534A18800	18,800	.7402	334	238	282	4,4	50	20
4156978	TDG534A18900	18,900	.7441	334	238	282	4,4	50	20
4156979	TDG534A19000	19,000	.7480	334	238	282	4,4	50	20
4156980	TDG534A19050	19,050	.7500	334	239	282	4,4	50	20
4156981	TDG534A19100	19,100	.7520	334	239	282	4,5	50	20
4156982	TDG534A19200	19,200	.7559	334	238	282	4,5	50	20
4156983	TDG534A19300	19,300	.7598	334	238	282	4,5	50	20
4156984	TDG534A19400	19,400	.7638	334	239	282	4,5	50	20
4156985	TDG534A19500	19,500	.7677	334	239	282	4,5	50	20
4156986	TDG534A19600	19,600	.7717	334	239	282	4,6	50	20
4156987	TDG534A19700	19,700	.7756	334	239	282	4,6	50	20
4156988	TDG534A19800	19,800	.7795	334	240	282	4,6	50	20
4156989	TDG534A19900	19,900	.7835	334	240	282	4,6	50	20
4156990	TDG534A20000	20,000	.7874	334	240	282	4,7	50	20

■ TOP DRILL G • TDG532/TDG533/TDG534 • WN10HD™ • Through Coolant • Metric

Material Group		Cutting Speed — vc Range — m/min										
		min	–	min	Tool Diameter (mm)	3,0	4,0	6,0	8,0	10,0	12,0	16,0	20,0
N	21	100	–	450	mm/r	0,16–0,25	0,19–0,29	0,23–0,35	0,27–0,42	0,31–0,50	0,36–0,57	0,44–0,69	0,52–0,82
	22, 23, 24	100	–	300	mm/r	0,15–0,23	0,17–0,28	0,21–0,34	0,25–0,39	0,30–0,46	0,34–0,54	0,42–0,67	0,52–0,82
	26	100	–	250	mm/r	0,16–0,28	0,15–0,32	0,19–0,36	0,23–0,40	0,25–0,44	0,28–0,48	0,32–0,56	0,35–0,63

	Metric tolerance	
nominal size range	D1 tolerance m7	D tolerance h6
>3–6	0,004/0,016	0,000/-0,008
>6–10	0,006/0,021	0,000/-0,009
>10–18	0,007/0,025	0,000/-0,011
>18–25,4	0,008/0,029	0,000/-0,013



WIDIA™ Solid Carbide Drills — Reconditioning

Anyone can regrind your tools — only we can recondition them.

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

How Does WIDIA Do It?

- Reconditioned tooling undergoes the same process as new tools — the same drill point (WIDIA proprietary geometry) and coating are applied back on the tool.
- Tooling is returned to like-new condition, with WIDIA proprietary geometry providing a longer tooling lifecycle and increased performance.
- With current lead-time less than 10 days, customers get tools back quickly — lowering cost-per-tool usage.

Protect your investment by using the WIDIA™ Reconditioning Programme.



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

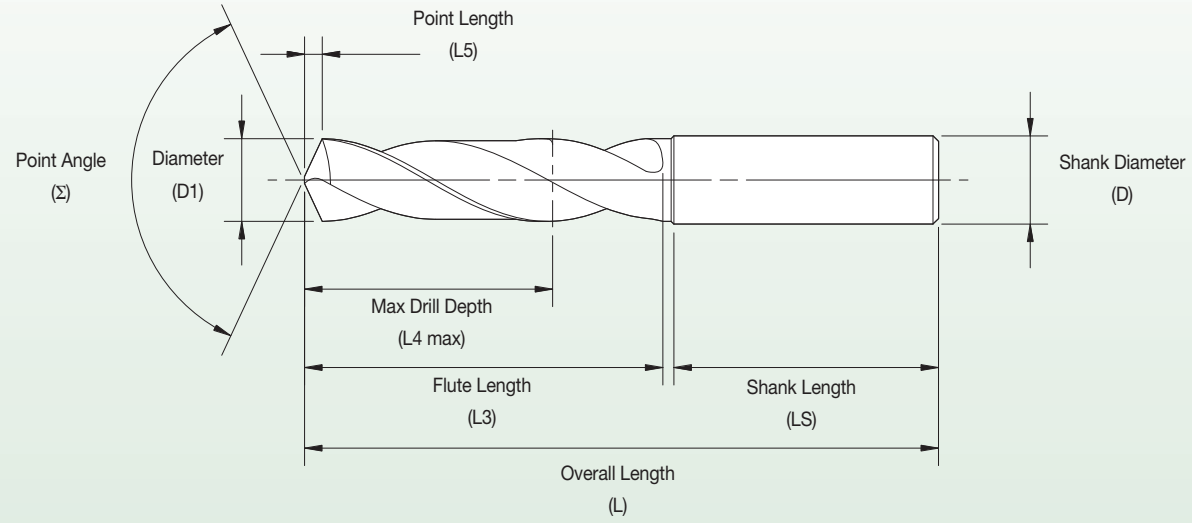
WIDIA Solid Carbide Drills Reconditioning Product Lines.

- VariDrill™
- TOP DRILL S™ for Steel
- TOP DRILL S™ for Cast Iron
- TOP DRILL S+™
- TOP DRILL G™

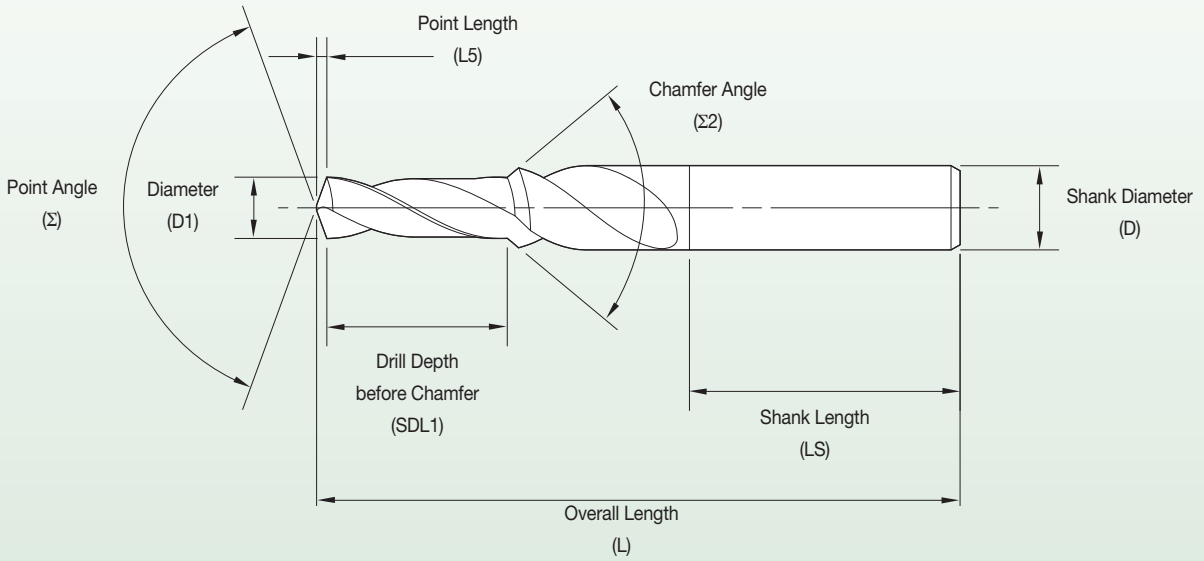
WIDIA™

The Anatomy of a Drill

Use this diagram when describing features of a solid carbide drill.



Use this diagram when describing features of a solid carbide step drill.



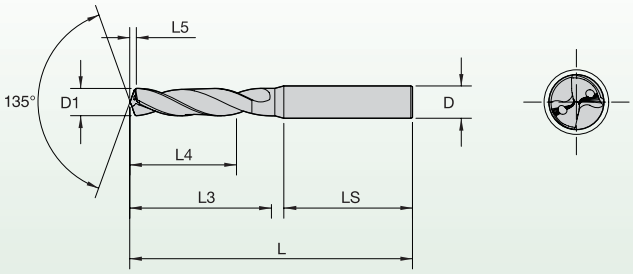
Shank Designs to DIN 6535



Form HE,
2° angle
Design F



Form HA,
straight
design A



Dimensions for WIDIA™ High-Performance Solid Carbide Drills

mm Ø		DIN 6535		SHORT* ~3 x D			LONG* ~5 x D			EXTRA LONG** ~8 x D		
D1 min	D1 max	D	LS	L	L3	L4 max	L	L3	L4 max	L	L3	L4 max
1,000	1,400	4	28	58	7	5	58	9	6	58	12	10
1,401	1,900	4	28	58	9	6	58	12	9	58	18	15
1,901	2,300	4	28	58	13	9	58	18	14	66	26	22
2,301	2,999	4	28	58	17	12	58	22	17	66	30	25
3,000	3,750	6	36	62	20	14	66	28	23	78	40	33
3,751	4,750	6	36	66	24	17	74	36	29	87	49	41
4,751	6,000	6	36	66	28	20	82	44	35	94	56	48
6,001	7,000	8	36	79	34	24	91	53	43	105	67	57
7,001	8,000	8	36	79	41	29	91	53	43	110	72	61
8,001	10,000	10	40	89	47	35	103	61	49	122	80	68
10,001	12,000	12	45	102	55	40	118	71	56	141	94	79
12,001	14,000	14	45	107	60	43	124	77	60	155	108	91
14,001	16,000	16	48	115	65	45	133	83	63	171	121	101
16,001	18,000	18	48	123	73	51	143	93	71	185	135	113
18,001	20,000	20	50	131	79	55	153	101	77	200	148	124
20,001	22,000	20	50	141	86	60	167	112	85	217	162	136
22,001	25,000	25	56	153	95	65	184	126	98	238	180	150

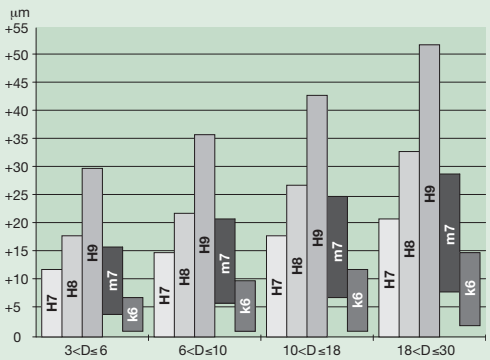
** D1<20mm to DIN 6537K*
D1>20mm to factory standard
*** To factory standard*

NOTE: Solid Carbide Drills from WIDIA in short and regular lengths conform to DIN 6537.
Drills with long lengths conform to WIDIA factory standard.
Solid Carbide Drills with diameter D1>20mm (not DIN 6537) are also standardised to factory standard.

Tolerances of Drills and Holes

High-performance solid carbide drills with tolerances of m7 create holes with tolerances of H9. H8 can be achieved in very good conditions. The drill should be used for holes in H8, and in favourable conditions, H7 can be achieved. Solid carbide drills with H7 create holes in K9–K11. Other drilling tolerances require special solid carbide drill versions.

Tolerances of diameter D1 on:
Spiral Flute
TDG Drill

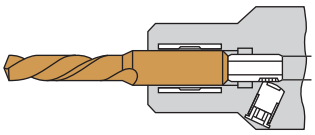


Toolholding Systems

As with any drilling system, components of the entire system contribute to the quality of the machined hole, not just the drill itself.
For maximum efficiency and accuracy, the following toolholding systems are your best choices:

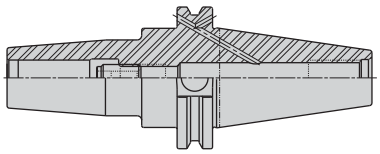
First Choice

Hydraulic chucks



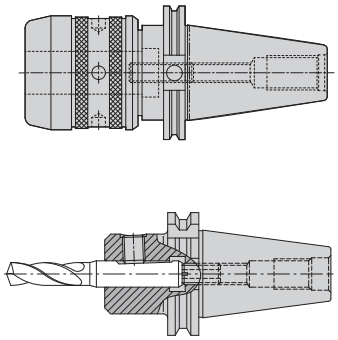
Second Choice

Shrink Fit

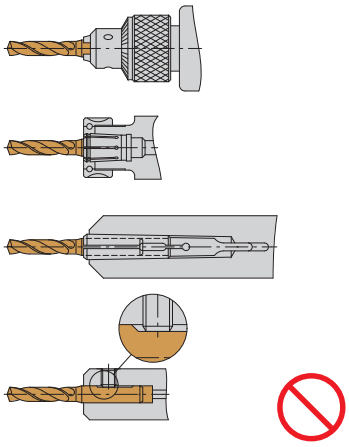


Third Choice

High-performance milling chucks with reduction sleeves



Not Recommended

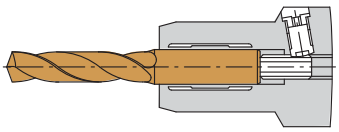


Clamping Chuck

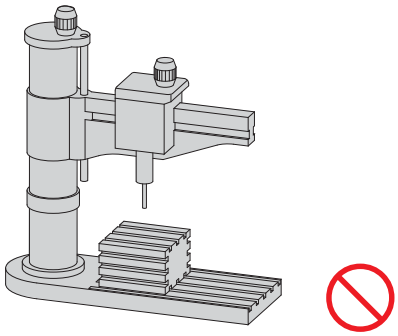
Use of all-purpose drilling chuck collets, clamping sleeves, and Weldon® clamping chucks should be avoided because they do not absorb cutting forces reliably and provide insufficient precision of concentricity.

Highly Recommended

Hydraulic chucks ensure a secure torque transmission with excellent concentricity.



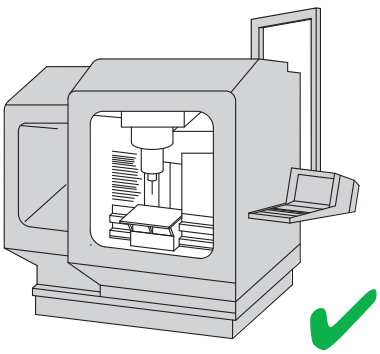
Not Recommended



Machine

Solid carbide drills have a much higher rigidity than conventional high-speed steel drills. This enables the machining of close-tolerance holes with a position accuracy of ±0.025mm. However, it also means that drills require rigid machine tools with good spindles.

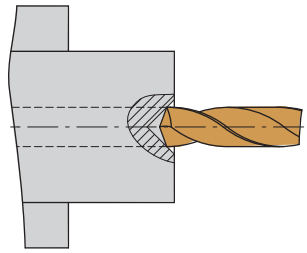
Rigid Machine Tool Recommended



(continued)

(continued)

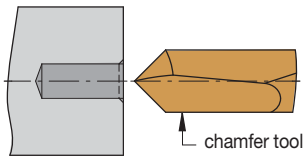
Wrong



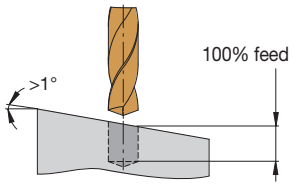
Drilling and Chamfering

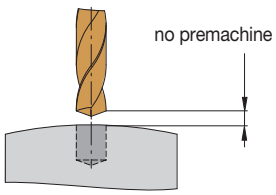
Drill into the solid first, then chamfer.

Correct



Wrong





Drilling on Inclined or Rounded Surfaces

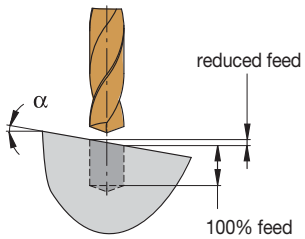
When drilling on inclined or curved surfaces, use a lower feed than the standard value. The reduction of feed required is dependent on the inclination angle of the workpiece surface and the drill type (see table).

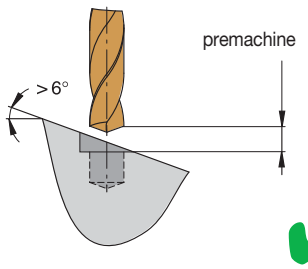
reduced feed (% of standard value)

inclination α	3 x D	5 x D Long	<5 x D
1°	100%	80%	premachine
2°	80–50%	80–50%	premachine
3°	65%	50%	premachine
4°	50%	premachine	premachine
6°	30%	premachine	premachine

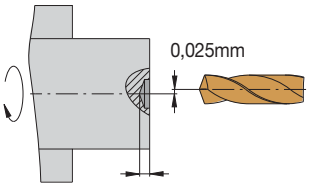
Premachining is usually done with an end mill operation.

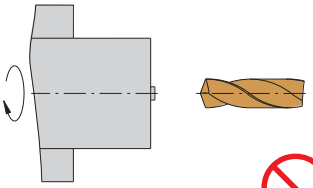
Correct





Wrong





Drilling on Turning Machines

When drilling on turning machines, the drill must be on centre. The tolerance range of the centre position should not exceed ±0.025mm. On bar-turning lathes, do not drill into centre stub or bur. Cut-off tools must be mounted precisely to eliminate centre stub or bur. Do not drill into pre-existing holes.

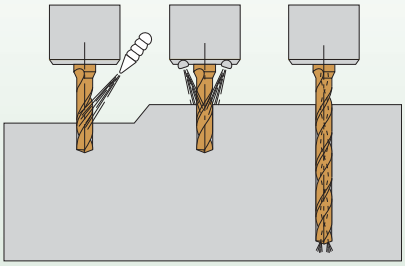
Hole Depths Greater than 3 x D

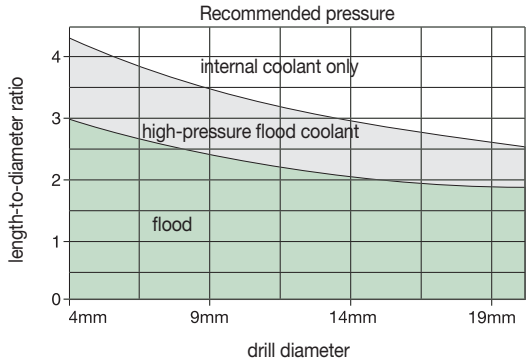
Hole depths that are deeper than three times the drill diameter may require a speed reduction. A 15% lower speed is suggested.

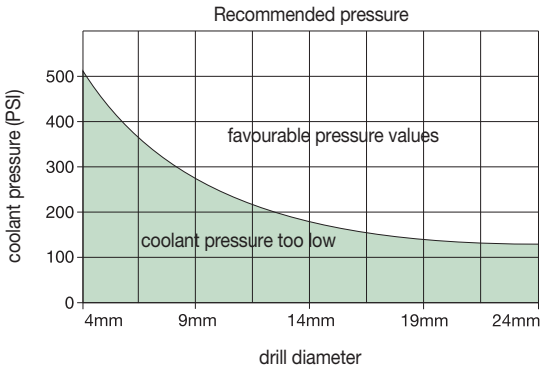
Coolant

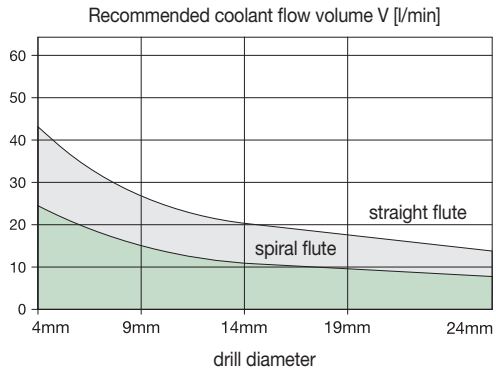
- To optimise their performance, drills must be adequately cooled. With the proper coolant flow, better tool life and higher maximum effective cutting speeds can be achieved.
- If not properly cooled, the drill will heat up rapidly. This causes the drill diameter to expand, which in turn may cause the drill to seize inside the hole.
- Solid carbide drills with internal coolant channels require deeper drilling depths to be effective. The higher the coolant pressure, the better the drilling results. Drill life and hole quality improve with ample coolant flow.
- When using drills without internal coolant flow, try to get at least one coolant jet as parallel to the drill as possible.
- For short-hole applications, drills without internal coolant may often provide better tool life. The tool is more solid, and it does not suffer from thermal shock at the cutting edge.
- It is important to use high coolant concentration to provide lubricity, which will aid in tool life, chip evacuation, and finer surface finishes.
- High-pressure coolant, either through the tool or through a line adjacent and parallel to the tool, should always be considered for increased tool life and production.
- Do not use multi-coolant lines. Use one line with 100% of the flow capacity to evacuate the chips from the hole.

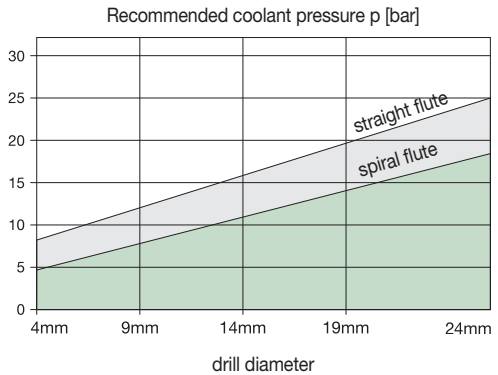
Coolant requirement for carbide drills





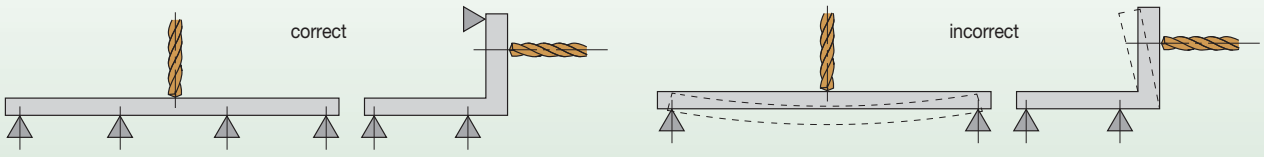




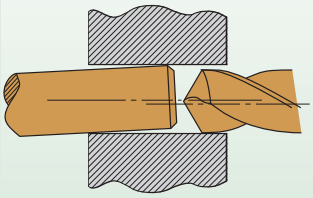
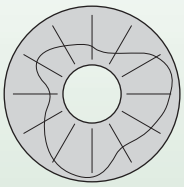
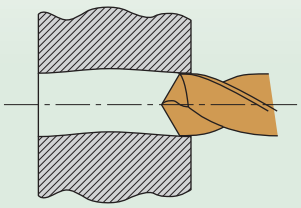


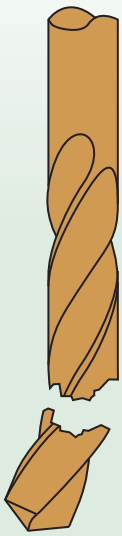
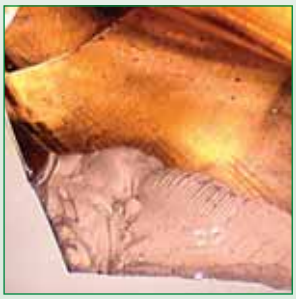
Workpiece Rigidity

Because solid carbide drills have much higher penetration rates, it is important that the workpiece has adequate support.

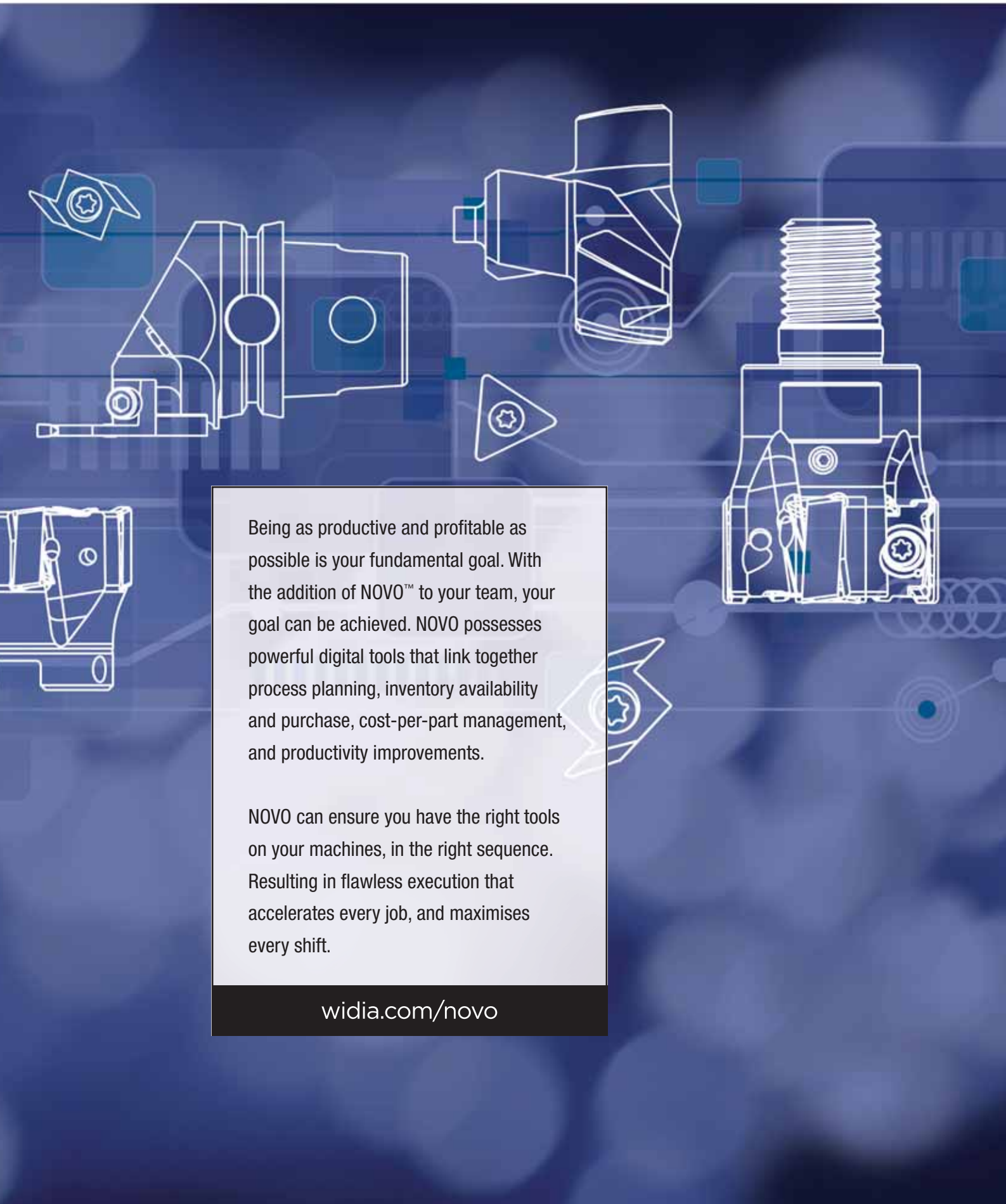


problem	source	solution
heavy wear on the cutting corners 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material.
	cutting conditions	• Reduce cutting speed; increase feed.
splintering on the chisel edge 	**clamping chuck**	• Check clamping accuracy. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions	• Decrease feed; increase speed.
built-up edge 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Increase speed 20–30%.
splintering on the cutting edges 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	cutting conditions caused by built-up edge	• Check cutting values, and possibly increase cutting speed.
		• Examine regularly for built-up edge.
thermal checking/comb cracking 	**cutting conditions**	• Adapt coolant and cutting conditions to reduce thermal shock.

problem	source	solution
hole too big 	**cutting conditions**	• Check cutting values, increase cutting speed, or reduce feed.
	clamping chuck	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	wrong drill	• Check drill diameter. Please note that drills are ground to a positive tolerance. Check concentric running.
hole too small 	**insufficient coolant**	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Decrease feed; increase speed.
	wrong drill	• Check cutting-edge diameter.
hole not cylindrical 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type and drilling depth. Use longer drills.
	cutting conditions	• Reduce feed at entry.

problem	source	solution
drill breakage 	**clamping chuck**	• Check clamping accuracy and torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
	workpiece movement	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material.
	insufficient coolant	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Check cutting values, and possibly reduce feed.
	clamping chuck	• Check torque transmission. Use hydraulic clamping chuck or high-precision chucking system.
splintering on the cutting corners 	**workpiece movement**	• Stabilise workpiece chucking and check stability of machine tool.
	wrong drill	• Check drill type, drilling depth, cooling system, and workpiece material. Possibly use longer drill.
	insufficient coolant	• Check cooling lubricant. In the case of internal coolant supply, increase coolant pressure. In the case of external coolant supply, adjust positioning of coolant jet. Cool from both sides.
	cutting conditions	• Check cutting values, and possibly reduce feed.

NOVO KNOWS
ART TO PART TO PROFIT

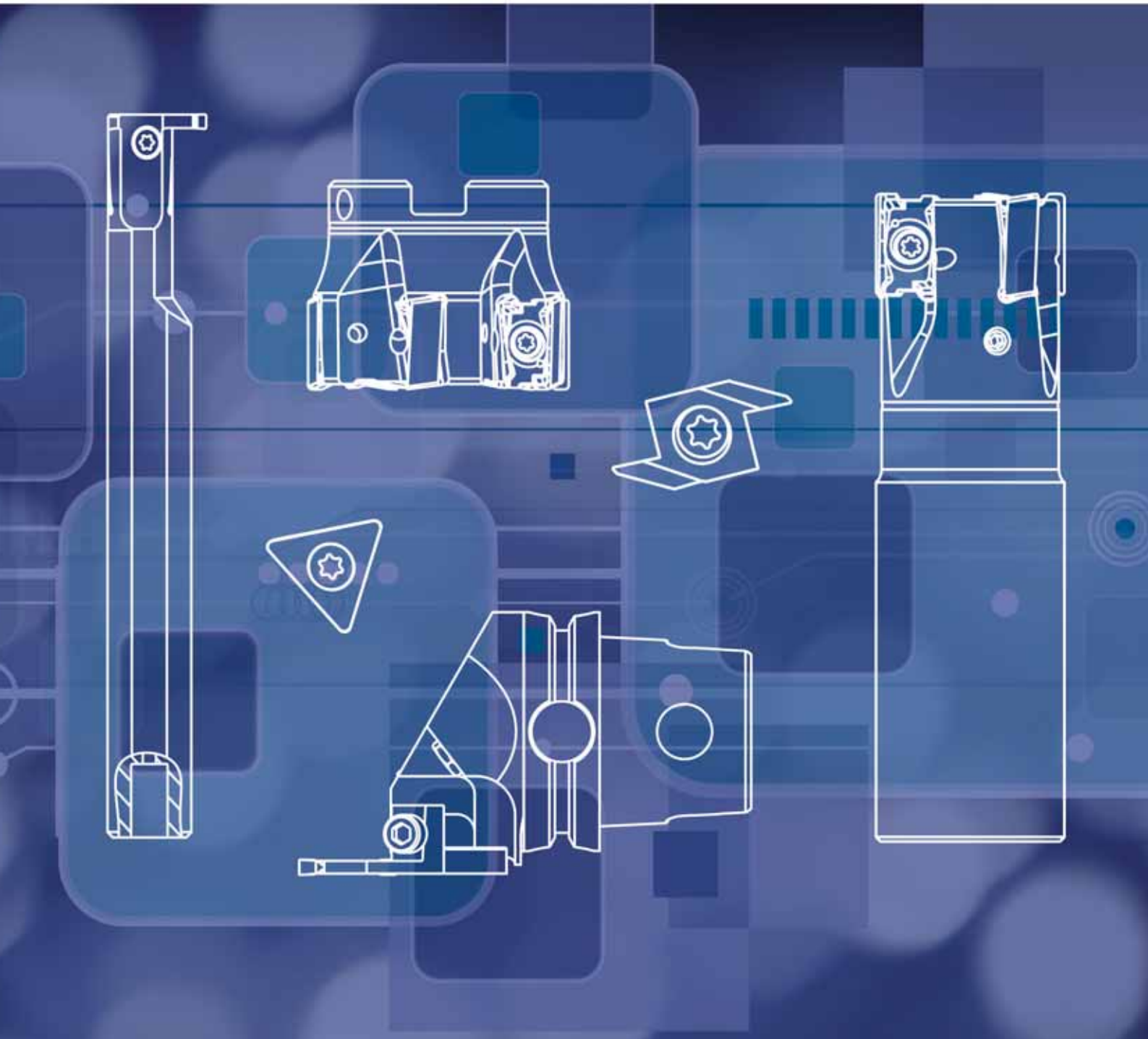


Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift.

widia.com/novo

WIDIA™



01

THE DIGITAL SOURCE FOR DELIVERING
SMART MACHINING SOLUTIONS

widia.com/novo

NOVO™



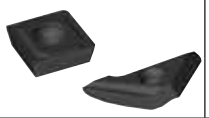
Holemaking • Modular Drills

Introduction U2–U3

TOP DRILL M1 ..... U4–U24

Spade Blades U26–U45



modular drills with internal coolant channel		grade/series	standard* ● first choice ○ alternate choice P	M	K	N	S	H	hole tolerance	standard range diameter range D1 mm min–max	D1 inch min–max	drilling depth L/D1
TOP DRILL M1™ with front clamping mechanism												
	**TOP DRILL M1 inserts**	**WU25PD****	●	○	●				IT9–IT11	7,94–25,99	.3125–1.1023	–
	**chamfering inserts**	**TopSTEP SH– WP20PH**	●	◑	◑	●	○		–	12,50–36,01	.4921–1.4177	–
		TopSTEP VG– WP20PH	●	◑	◑	○	◑		–			
	**TOP DRILL M1 bodies**	–							–	7,94≤Ø<9,50	.3125≤Ø<.3740	max 3–8 x D
										9,50≤Ø<11,00	.3740≤Ø<.4331	
										11,00≤Ø<12,50	.4331≤Ø<.4921	
										12,50≤Ø<14,00	.4921≤Ø<.5512	
										14,00≤Ø<15,50	.5512≤Ø<.6102	
										15,50≤Ø<16,50	.6102≤Ø<.6496	
										16,50≤Ø<20,50	.6496≤Ø<.8071	
										20,50≤Ø<21,00	.8071≤Ø<.8268	
										21,00≤Ø<25,99	.8268≤Ø<1.023	

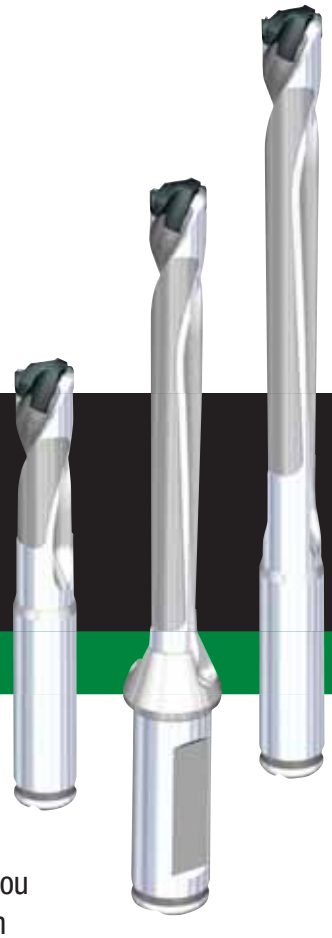
** Apart from our standard drills, we can offer you a wide variety of special coating solutions and edge preparations to fulfill all your needs. If a specific drill is not suitable for your workpiece material, please contact your WIDIA™ distributor for available options.*

*** Grade WU25PD™ was previously named K20FTiAlN.*

● Standard Product
○ Engineered Solutions

engineered solution range			coolant	drilling	inclined exit	counter-sinking	counter-boring	2 flute, 2 margin cooled	corner chamfer	plain shank ≤H6	SCF Shanks	page(s)
diameter range												
D1 mm min–max	D1 inch min–max	max drilling depth										
TOP DRILL M1™ with front clamping mechanism *(continued)*												
7,94–27,99	.3125–1.1020	–		●	●			●	●			U10–U15
12,50–36,01	.4921–1.4177	–				●						U16–U19
		–				●	●					
7,94≤Ø<9,50	.3125≤Ø<.3740	12 x D	●	●	●	○	○			●	●	U6–U8
9,50≤Ø<11,00	.3740≤Ø<.4331	13 x D	●	●	●	○	○			●	●	
11,00≤Ø<12,50	.5424≤Ø<.4921	14 x D	●	●	●	○	○			●	●	
12,50≤Ø<14,00	.4921≤Ø<.5512	15 x D	●	●	●	○	○			●	●	
14,00≤Ø<15,00	.5512≤Ø<.6102	16 x D	●	●	●	○	○			●	●	
15,50≤Ø<16,50	.6102≤Ø<.6496	17 x D	●	●	●	○	○			●	●	
16,50≤Ø<20,50	.6496≤Ø<.8070	18 x D	●	●	●	○	○			●	●	
20,50≤Ø<21,00	.8070≤Ø<.8267	20 x D	●	●	●	○	○			●	●	
21,00≤Ø<27,99	.8267≤Ø<1.1010	500,0mm	●	●	●	○	○			●	●	

TOP DRILL M1



With performance levels and metal removal rates comparable to that of solid carbide drills, WIDIA™ TOP DRILL M1 offers all the quality and performance you need in one versatile, economical package. The unique front clamping system enables inserts to be changed quickly, even inside the machine tool, saving setup time and manufacturing costs.

The TDM1 platform offers UP(M) drill-point design in WU25PD™ grade — a wide application range geometry, specially developed for cost-efficient drilling of steel, cast iron, and stainless steel. It covers diameter ranges from 8–25,99mm within the standard offering in L/D ratios of 3, 5, and 8 x D.

With its high level of performance, wide application range, and proven point geometry, TDM1 combines all of the economic benefits of a modular drilling system with the machining performance and hole quality to tackle even your most challenging operations.

UP Point Design — Versatility and Productivity

- One insert style for all your work in steel, cast iron, and even stainless steels.
- Low cutting forces and excellent centring capabilities.
- Universal point style for consistent performance and excellent hole quality.

Easy Insert Change

- No screws or clamps required.
- Insert blades can be changed with a simple wrench that comes with each holder.

Disposable

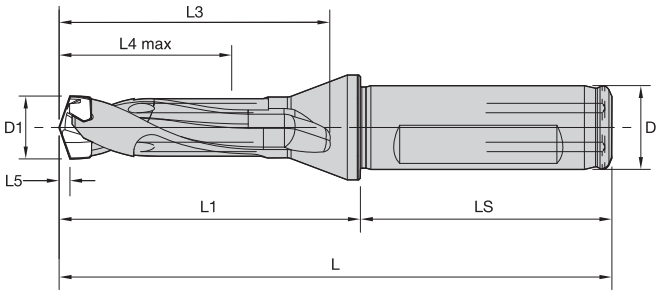
- No reconditioning costs.
- Consistent performance from tip to tip.
- Eliminates number of tools waiting for reconditioning, thus avoiding hidden costs.

Customisation

- All intermediate diameters are quickly available as semi-standards.
- Multiple step drills available as customised solutions.
- New TopSTEP range of inserts offer extended chamfering and counterboring to your one-shot drilling solution.



- Tool body shipped with insert wrench.

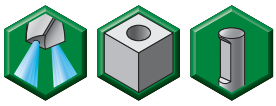


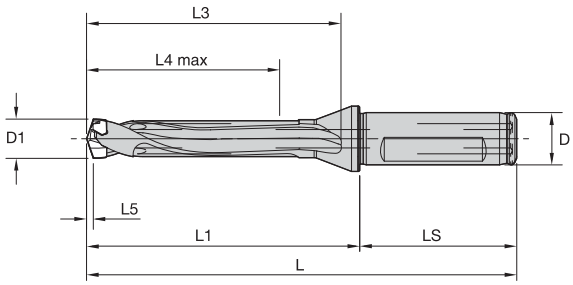


TOP DRILL M1 • 3 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3850904	**TDM080R3SCF12M**	7,94	8,49	12	86	41	35	26	1,5	45	W10
3850906	**TDM085R3SCF12M**	8,50	8,99	12	88	43	37	27	1,6	45	W11
3850908	**TDM090R3SCF12M**	9,00	9,49	12	90	45	39	29	1,7	45	W12
3850910	**TDM095R3SCF12M**	9,50	9,99	12	92	47	41	30	1,8	45	W13
3850912	**TDM100R3SCF16M**	10,00	10,49	16	97	49	43	32	1,9	48	W14
3850924	**TDM105R3SCF16M**	10,50	10,99	16	99	51	45	33	2,0	48	W15
3850926	**TDM110R3SCF16M**	11,00	11,49	16	101	53	47	35	2,1	48	W16
3850928	**TDM115R3SCF16M**	11,50	11,99	16	103	55	49	36	2,2	48	W17
3850930	**TDM120R3SCF16M**	12,00	12,49	16	106	58	52	38	2,3	48	W18
3850932	**TDM125R3SCF16M**	12,50	12,99	16	108	60	54	39	2,4	48	W19
3850934	**TDM130R3SCF16M**	13,00	13,49	16	110	62	56	41	2,5	48	W20
3850936	**TDM135R3SCF16M**	13,50	13,99	16	112	64	58	42	2,6	48	W21
3850938	**TDM140R3SCF16M**	14,00	14,49	16	114	66	60	44	2,7	48	W22
3850940	**TDM145R3SCF16M**	14,50	14,99	16	116	68	62	45	2,8	48	W23
3850942	**TDM150R3SCF20M**	15,00	15,99	20	122	72	66	48	2,8	50	W24
3850944	**TDM160R3SCF20M**	16,00	16,99	20	126	76	70	51	3,0	50	W25
3850946	**TDM170R3SCF20M**	17,00	17,99	20	131	81	75	54	3,2	50	W26
3850948	**TDM180R3SCF25M**	18,00	18,99	25	141	85	79	57	3,4	56	W27
3850950	**TDM190R3SCF25M**	19,00	19,99	25	144	89	83	60	3,6	56	W28
3850952	**TDM200R3SCF25M**	20,00	20,99	25	149	93	87	63	3,8	56	W29
3992070	**TDM210R3SCF25M**	21,00	21,99	25	153	97	91	66	3,7	56	W30
3992071	**TDM220R3SCF25M**	22,00	22,99	25	158	102	96	69	3,9	56	W31
3992072	**TDM230R3SCF25M**	23,00	23,99	25	162	106	100	72	4,1	56	W32
3992483	**TDM240R3SCF25M**	24,00	24,99	25	166	110	104	75	4,2	56	W33
3992484	**TDM250R3SCF25M**	25,00	25,99	25	170	114	108	78	4,4	56	W34

- Tool body shipped with insert wrench.



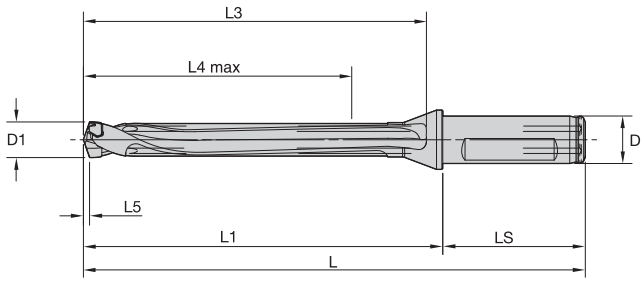




TOP DRILL M1 • 5 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3850905	TDM080R5SCF12M	7,94	8,49	12	104	59	53	43	1,5	45	W10
3850907	TDM085R5SCF12M	8,50	8,99	12	107	62	56	45	1,6	45	W11
3850909	TDM090R5SCF12M	9,00	9,49	12	110	65	59	48	1,7	45	W12
3850911	TDM095R5SCF12M	9,50	9,99	12	114	69	63	50	1,8	45	W13
3850923	TDM100R5SCF16M	10,00	10,49	16	120	72	66	53	1,9	48	W14
3850925	TDM105R5SCF16M	10,50	10,99	16	123	75	69	55	2,0	48	W15
3850927	TDM110R5SCF16M	11,00	11,49	16	126	78	72	58	2,1	48	W16
3850929	TDM115R5SCF16M	11,50	11,99	16	129	81	75	60	2,2	48	W17
3850931	TDM120R5SCF16M	12,00	12,49	16	132	84	78	63	2,3	48	W18
3850933	TDM125R5SCF16M	12,50	12,99	16	135	87	81	65	2,4	48	W19
3850935	TDM130R5SCF16M	13,00	13,49	16	138	90	84	68	2,5	48	W20
3850937	TDM135R5SCF16M	13,50	13,99	16	142	94	88	70	2,6	48	W21
3850939	TDM140R5SCF16M	14,00	14,49	16	145	97	91	73	2,7	48	W22
3850941	TDM145R5SCF16M	14,50	14,99	16	148	100	94	75	2,8	48	W23
3850943	TDM150R5SCF20M	15,00	15,99	20	156	106	100	80	2,8	50	W24
3850945	TDM160R5SCF20M	16,00	16,99	20	162	112	106	85	3,0	50	W25
3850947	TDM170R5SCF20M	17,00	17,99	20	169	119	113	90	3,2	50	W26
3850949	TDM180R5SCF25M	18,00	18,99	25	181	125	119	95	3,4	56	W27
3850951	TDM190R5SCF25M	19,00	19,99	25	187	131	125	100	3,6	56	W28
3850953	TDM200R5SCF25M	20,00	20,99	25	193	137	131	105	3,8	56	W29
3992485	TDM210R5SCF25M	21,00	21,99	25	200	144	138	110	3,7	56	W30
3992486	TDM220R5SCF25M	22,00	22,99	25	206	150	144	115	3,9	56	W31
3992487	TDM230R5SCF25M	23,00	23,99	25	212	156	150	120	4,1	56	W32
3992488	TDM240R5SCF25M	24,00	24,99	25	218	162	156	125	4,2	56	W33
3992489	TDM250R5SCF25M	25,00	25,99	25	225	169	163	130	4,4	56	W34

- Tool body shipped with insert wrench.





TOP DRILL M1 • 8 x D • Flanged • Metric

order number	catalogue number	D1	D1 max	D	L	L1	L3	L4 max	L5	LS	insert blade seat size
3992141	**TDM080R8SCF12M**	7,94	8,49	12	129	84	79	68	1,4	45	W10
3992142	**TDM085R8SCF12M**	8,50	8,99	12	134	89	83	72	1,5	45	W11
3992213	**TDM090R8SCF12M**	9,00	9,49	12	138	93	88	76	1,6	45	W12
3992214	**TDM095R8SCF12M**	9,50	9,99	12	144	99	93	80	1,7	45	W13
3992215	**TDM100R8SCF16M**	10,00	10,49	16	151	103	98	84	1,8	48	W14
3992216	**TDM105R8SCF16M**	10,50	10,99	16	156	108	102	88	1,9	48	W15
3992217	**TDM110R8SCF16M**	11,00	11,49	16	160	112	107	92	2,0	48	W16
3992218	**TDM115R8SCF16M**	11,50	11,99	16	165	117	111	96	2,1	48	W17
3992219	**TDM120R8SCF16M**	12,00	12,49	16	169	121	116	100	2,1	48	W18
3992220	**TDM125R8SCF16M**	12,50	12,99	16	174	126	120	104	2,2	48	W19
3992221	**TDM130R8SCF16M**	13,00	13,49	16	178	130	125	108	2,3	48	W20
3992222	**TDM135R8SCF16M**	13,50	13,99	16	184	136	130	112	2,4	48	W21
3992223	**TDM140R8SCF16M**	14,00	14,49	16	188	140	135	116	2,5	48	W22
3992224	**TDM145R8SCF16M**	14,50	14,99	16	193	145	139	120	2,6	48	W23
3992225	**TDM150R8SCF20M**	15,00	15,99	20	204	154	148	128	2,7	50	W24
3992226	**TDM160R8SCF20M**	16,00	16,99	20	213	163	157	136	2,8	50	W25
3992227	**TDM170R8SCF20M**	17,00	17,99	20	223	173	167	144	3,0	50	W26
3992228	**TDM180R8SCF25M**	18,00	18,99	25	238	182	176	152	3,2	56	W27
3992229	**TDM190R8SCF25M**	19,00	19,99	25	247	191	185	160	3,4	56	W28
3992230	**TDM200R8SCF25M**	20,00	20,99	25	256	200	194	168	3,6	56	W29
3992231	**TDM210R8SCF25M**	21,00	21,99	25	266	210	204	176	3,7	56	W30
3992232	**TDM220R8SCF25M**	22,00	22,99	25	275	219	213	184	3,9	56	W31
3992233	**TDM230R8SCF25M**	23,00	23,99	25	284	228	222	192	4,1	56	W32
3992234	**TDM240R8SCF25M**	24,00	24,99	25	293	237	231	200	4,2	56	W33
3992235	**TDM250R8SCF25M**	25,00	25,99	25	303	247	241	208	4,4	56	W34

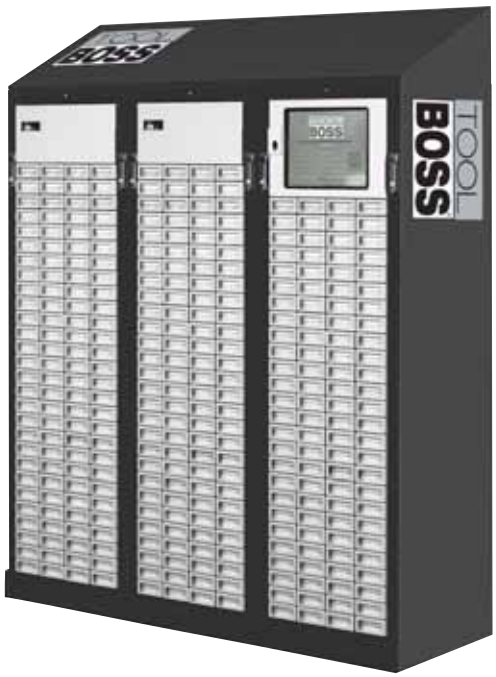


ToolBOSS™

ToolBOSS Vending Solutions

ToolBOSS vending solutions help to reduce costs and improve efficiencies to give you a competitive edge.

- Cut tooling inventory by 50% or more.
- Decrease spending on tooling by up to 30%.
- Reduce administrative costs by as much as 90%.



Customer Offering

Shared Rewards

Free use of ToolBOSS vending machine combined with a comprehensive maintenance and service package based on agreed sales targets for specified contract terms.

Direct Purchase of Equipment

ToolBOSS vending machines are available for purchase. Maintenance and service packages available with annual agreements.

For more information, please contact us at:
Tel: 888 281 8080
na-help.desk@toolboss.com
toolboss.com

NOVO™

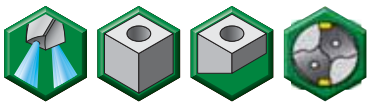
You can also use our NOVO app to guide you to the correct choice!

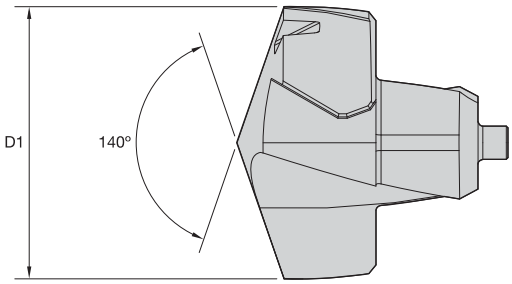
For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™







TOP DRILL M1 • UP(M)



● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3850959	TDM0794UPM	7,94	W10
3848984	TDM0800UPM	8,00	W10
3848985	TDM0810UPM	8,10	W10
3850960	TDM0816UPM	8,16	W10
3850961	TDM0820UPM	8,20	W10
3848986	TDM0830UPM	8,30	W10
3850962	TDM0833UPM	8,33	W10
3848987	TDM0840UPM	8,40	W10
3850963	TDM0843UPM	8,43	W10
3848988	TDM0850UPM	8,50	W11
3848989	TDM0860UPM	8,60	W11
3850964	TDM0861UPM	8,61	W11
3848990	TDM0870UPM	8,70	W11
3850965	TDM0873UPM	8,73	W11
3848991	TDM0880UPM	8,80	W11
3850966	TDM0884UPM	8,84	W11
3848992	TDM0890UPM	8,90	W11
3849043	TDM0900UPM	9,00	W12
3850967	TDM0909UPM	9,09	W12
3849044	TDM0910UPM	9,10	W12
3850968	TDM0913UPM	9,13	W12
3849045	TDM0920UPM	9,20	W12
3849046	TDM0930UPM	9,30	W12
3850969	TDM0935UPM	9,35	W12

(continued)

(TOP DRILL M1 • UP(M) — continued)

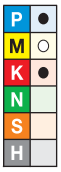


● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3849047	TDM0940UPM	9,40	W12
3849048	TDM0950UPM	9,50	W13
3850970	TDM0953UPM	9,53	W13
3850971	TDM0956UPM	9,56	W13
3850972	TDM0958UPM	9,58	W13
3849049	TDM0960UPM	9,60	W13
3850973	TDM0970UPM	9,70	W13
3850974	TDM0980UPM	9,80	W13
3849050	TDM0990UPM	9,90	W13
3850975	TDM0992UPM	9,92	W13
3849051	TDM1000UPM	10,00	W14
3850976	TDM1002UPM	10,02	W14
3850977	TDM1008UPM	10,08	W14
3849052	TDM1010UPM	10,10	W14
3849053	TDM1020UPM	10,20	W14
3850978	TDM1026UPM	10,26	W14
3849054	TDM1030UPM	10,30	W14
3850979	TDM1032UPM	10,32	W14
3849055	TDM1040UPM	10,40	W14
3850980	TDM1049UPM	10,49	W14
3849056	TDM1050UPM	10,50	W15
3849057	TDM1060UPM	10,60	W15
3849058	TDM1070UPM	10,70	W15
3850981	TDM1072UPM	10,72	W15
3849059	TDM1080UPM	10,80	W15
3849060	TDM1090UPM	10,90	W15
3849061	TDM1100UPM	11,00	W16
3849062	TDM1110UPM	11,10	W16
3850982	TDM1111UPM	11,11	W16
3849063	TDM1120UPM	11,20	W16
3849064	TDM1130UPM	11,30	W16
3849065	TDM1140UPM	11,40	W16
3849066	TDM1150UPM	11,50	W17
3850983	TDM1151UPM	11,51	W17
3849067	TDM1160UPM	11,60	W17
3850984	TDM1161UPM	11,61	W17
3849068	TDM1170UPM	11,70	W17
3849069	TDM1180UPM	11,80	W17
3849070	TDM1190UPM	11,90	W17
3850985	TDM1191UPM	11,91	W17

(continued)

(TOP DRILL M1 • UP(M) — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3849071	TDM1200UPM	12,00	W18
3849072	TDM1210UPM	12,10	W18
3849073	TDM1220UPM	12,20	W18
3850986	TDM1230UPM	12,30	W18
3849074	TDM1240UPM	12,40	W18
3850987	TDM1247UPM	12,47	W18
3849075	TDM1250UPM	12,50	W19
3849076	TDM1260UPM	12,60	W19
3850988	TDM1270UPM	12,70	W19
3849077	TDM1280UPM	12,80	W19
3850989	TDM1290UPM	12,90	W19
3849078	TDM1300UPM	13,00	W20
3850990	TDM1310UPM	13,10	W20
3849079	TDM1320UPM	13,20	W20
3849080	TDM1330UPM	13,30	W20
3849081	TDM1340UPM	13,40	W20
3850991	TDM1349UPM	13,49	W20
3849082	TDM1350UPM	13,50	W21
3849083	TDM1360UPM	13,60	W21
3849084	TDM1370UPM	13,70	W21
3849085	TDM1380UPM	13,80	W21
3850992	TDM1389UPM	13,89	W21
3850993	TDM1390UPM	13,90	W21
3849086	TDM1400UPM	14,00	W22
3849087	TDM1410UPM	14,10	W22
3849088	TDM1420UPM	14,20	W22
3850994	TDM1429UPM	14,29	W22
3849089	TDM1430UPM	14,30	W22
3849090	TDM1440UPM	14,40	W22
3849091	TDM1450UPM	14,50	W23
3849092	TDM1460UPM	14,60	W23
3850995	TDM1467UPM	14,67	W23
3850996	TDM1468UPM	14,68	W23
3849093	TDM1470UPM	14,70	W23
3849094	TDM1480UPM	14,80	W23
3849095	TDM1490UPM	14,90	W23
3849096	TDM1500UPM	15,00	W24
3850997	TDM1508UPM	15,08	W24
3849097	TDM1510UPM	15,10	W24
3849098	TDM1520UPM	15,20	W24

(continued)

(TOP DRILL M1 • UP(M) — continued)

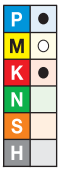


● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3849099	TDM1530UPM	15,30	W24
3849100	TDM1540UPM	15,40	W24
3850998	TDM1548UPM	15,48	W24
3849101	TDM1550UPM	15,50	W24
3849102	TDM1560UPM	15,60	W24
3849103	TDM1570UPM	15,70	W24
3849104	TDM1580UPM	15,80	W24
3850999	TDM1588UPM	15,88	W24
3849105	TDM1600UPM	16,00	W25
3851000	TDM1603UPM	16,03	W25
3851001	TDM1608UPM	16,08	W25
3849106	TDM1610UPM	16,10	W25
4010625	TDM1618UPM	16,18	W25
3849107	TDM1620UPM	16,20	W25
3851002	TDM1627UPM	16,27	W25
3849108	TDM1630UPM	16,30	W25
3849109	TDM1640UPM	16,40	W25
3849110	TDM1650UPM	16,50	W25
3849111	TDM1660UPM	16,60	W25
3851003	TDM1667UPM	16,67	W25
3849112	TDM1670UPM	16,70	W25
3849113	TDM1680UPM	16,80	W25
3851004	TDM1687UPM	16,87	W25
3849114	TDM1690UPM	16,90	W25
3849119	TDM1700UPM	17,00	W26
3851005	TDM1707UPM	17,07	W26
3849120	TDM1710UPM	17,10	W26
3849121	TDM1720UPM	17,20	W26
3849122	TDM1730UPM	17,30	W26
3849193	TDM1740UPM	17,40	W26
3851006	TDM1746UPM	17,46	W26
3849194	TDM1750UPM	17,50	W26
3849195	TDM1760UPM	17,60	W26
3849196	TDM1770UPM	17,70	W26
3849197	TDM1780UPM	17,80	W26
3851007	TDM1786UPM	17,86	W26
3849198	TDM1790UPM	17,90	W26
3849199	TDM1800UPM	18,00	W27
3849200	TDM1810UPM	18,10	W27
3849201	TDM1820UPM	18,20	W27

(continued)

(TOP DRILL M1 • UP(M) — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
3851008	TDM1826UPM	18,26	W27
3849202	TDM1830UPM	18,30	W27
3849203	TDM1840UPM	18,40	W27
3849204	TDM1850UPM	18,50	W27
3849205	TDM1860UPM	18,60	W27
3851009	TDM1865UPM	18,65	W27
3849206	TDM1870UPM	18,70	W27
3849207	TDM1880UPM	18,80	W27
3849208	TDM1890UPM	18,90	W27
3849209	TDM1900UPM	19,00	W28
3851010	TDM1905UPM	19,05	W28
3849210	TDM1910UPM	19,10	W28
3849211	TDM1920UPM	19,20	W28
3851011	TDM1923UPM	19,23	W28
3851012	TDM1925UPM	19,25	W28
3851013	TDM1928UPM	19,28	W28
3849212	TDM1930UPM	19,30	W28
3851014	TDM1935UPM	19,35	W28
3849213	TDM1940UPM	19,40	W28
3851015	TDM1945UPM	19,45	W28
3849214	TDM1950UPM	19,50	W28
3849215	TDM1960UPM	19,60	W28
3849216	TDM1970UPM	19,70	W28
3849217	TDM1980UPM	19,80	W28
3851016	TDM1984UPM	19,84	W28
3849218	TDM1990UPM	19,90	W28
3849219	TDM2000UPM	20,00	W29
3849220	TDM2010UPM	20,10	W29
3849221	TDM2020UPM	20,20	W29
3851017	TDM2024UPM	20,24	W29
3849222	TDM2030UPM	20,30	W29
3849223	TDM2040UPM	20,40	W29
3849224	TDM2050UPM	20,50	W29
3849225	TDM2060UPM	20,60	W29
3851018	TDM2064UPM	20,64	W29
3849226	TDM2070UPM	20,70	W29
3849227	TDM2080UPM	20,80	W29
3849228	TDM2090UPM	20,90	W29
3849229	TDM2099UPM	20,99	W29
4003225	TDM2100UPM	21,00	W30

(continued)

(TOP DRILL M1 • UP(M) — continued)



● first choice
○ alternate choice

grade WU25PD TiAlN			
order #	catalogue #	D1	seat size/series
4003203	TDM2144UPM	21,44	W30
3969291	TDM2150UPM	21,50	W30
4003226	TDM2200UPM	22,00	W31
4003204	TDM2223UPM	22,23	W31
4003205	TDM2245UPM	22,45	W31
4003227	TDM2250UPM	22,50	W31
4003228	TDM2300UPM	23,00	W32
4003229	TDM2350UPM	23,50	W32
4003206	TDM2381UPM	23,81	W32
4003230	TDM2400UPM	24,00	W33
4003231	TDM2450UPM	24,50	W33
4003207	TDM2461UPM	24,61	W33
4003232	TDM2500UPM	25,00	W34
4003208	TDM2540UPM	25,40	W34
4002444	TDM2550UPM	25,50	W34
4003209	TDM2568UPM	25,68	W34
4003210	TDM2581UPM	25,81	W34
3992013	TDM2599UPM	25,99	W34

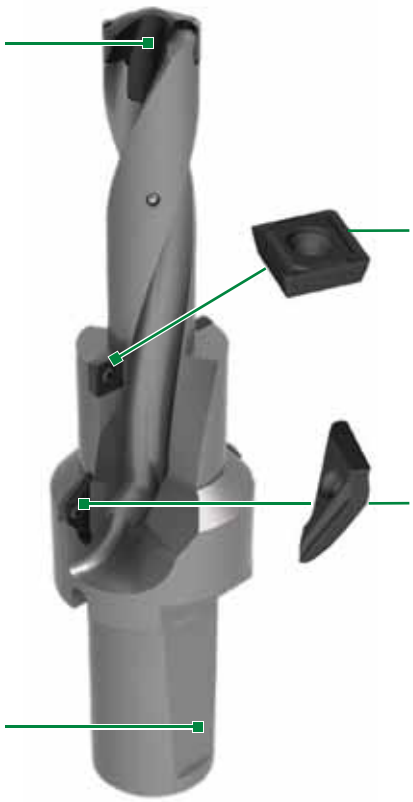
Metric tolerance

D1	tolerance k8
8–10	0,000/+0,022
>10–17	0,000/+0,027
>17–18	0,000/+0,027
>18–21	0,000/+0,033

Modular TOP DRILL M1 Step Drill

Provides high productivity through high-feed, one-shot operations, and excellent tool life.

- Use TopSTEP VG and SH chamfer and counterboring inserts to create your specific TDM1 modular step drill.
- Create complex holes with countersinks, chamfers, or even both operations in one shot.
- Save time, achieve better cost, and run your complex drilling process with higher stability.



Standard
TOP DRILL M1™ inserts.

Standard
TopSTEP SH counterboring insert.

Standard
TopSTEP VG chamfering insert.

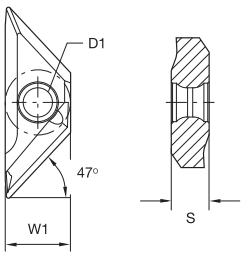
Made-to-Order TDM1 Toolholder
- Available within 3–4 weeks.
- Made custom to your needs.

Let your WIDIA™ representative know about your specific needs. Use the Chamfer and Counterboring Order Planning pages to create and send us your request — available online as well.

TopSTEP VG Chamfering Inserts

- 45° chamfer angle with broad cutting edge.
- Hassle-free usage.
- Very stable and accurate positioning in pocket.
- Two times indexable.
- One universal insert size for a lot of applications.





● first choice
○ alternate choice

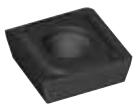
P	●
M	○
K	●
N	○
S	○
H	

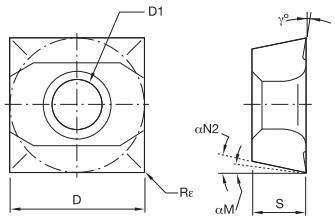
TopSTEP VG Chamfering Inserts

catalogue number	W1	D1	S	WP20PH
VXGX10030234	6,35	2,85	3,48	5983706

TopSTEP SH Conterboring Inserts

- 90° insert can be positioned in alternative angles.
- Very good chip forming and surface quality.
- Two times indexable.
- Stocked standards in six insert sizes.





● first choice
○ alternate choice

P	●
M	○
K	○
N	
S	
H	

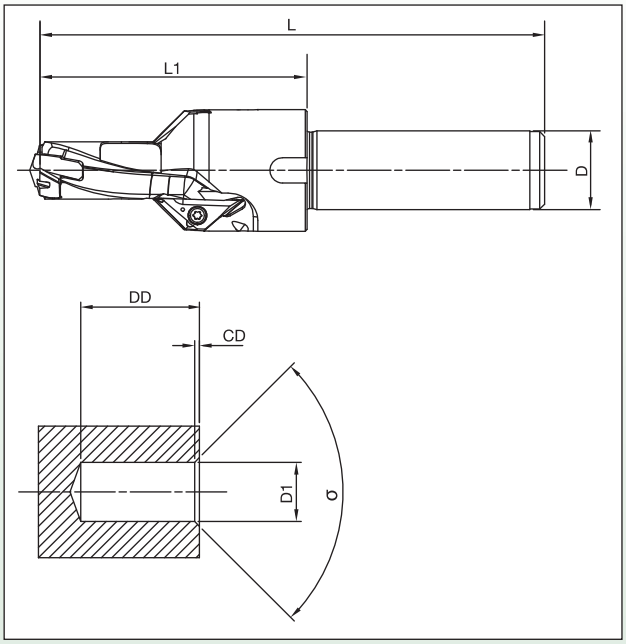
TopSTEP SH Counterboring Inserts

catalogue number	D	D1	S	Rε	αN	αN M	WP20PH
SXHX060204R20	6,35	2,85	2,38	0,40	11	7	5983390
SXHX070304R20	6,35	2,85	2,38	0,40	11	7	5983702
SXHX060208R20	6,35	2,85	2,38	0,80	11	7	5983701
SXHX070308R20	6,35	2,85	2,38	0,80	11	7	5983703
SXHX090304R20	9,52	3,50	3,18	0,40	11	7	5983704
SXHX090308R20	9,52	3,50	3,18	0,80	11	7	5983705

Please utilise guide below to plan your TOP DRILL M1™ modular step drill based on your needs and requirements. Please contact your distributor for a quote.

Option 1 TOP DRILL M1 Drilling and Chamfering

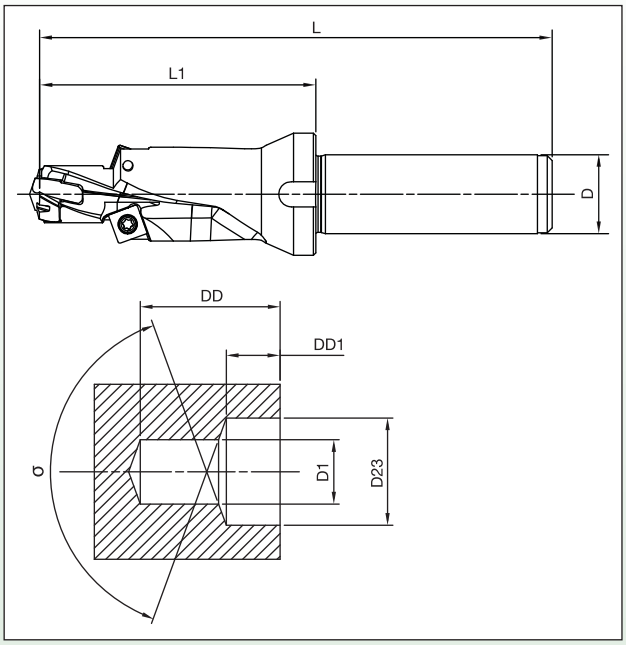
Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cutting Diameter 2 Angle	**σ**	
Chamfering Depth	**[CD]**	





Option 2 TOP DRILL M1 Drilling and Countersinking

Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cut Diameter 23	**[D23]**	
Countersinking Depth	**[DD1]**	
Cutting Diameter 2 Angle	**σ**	

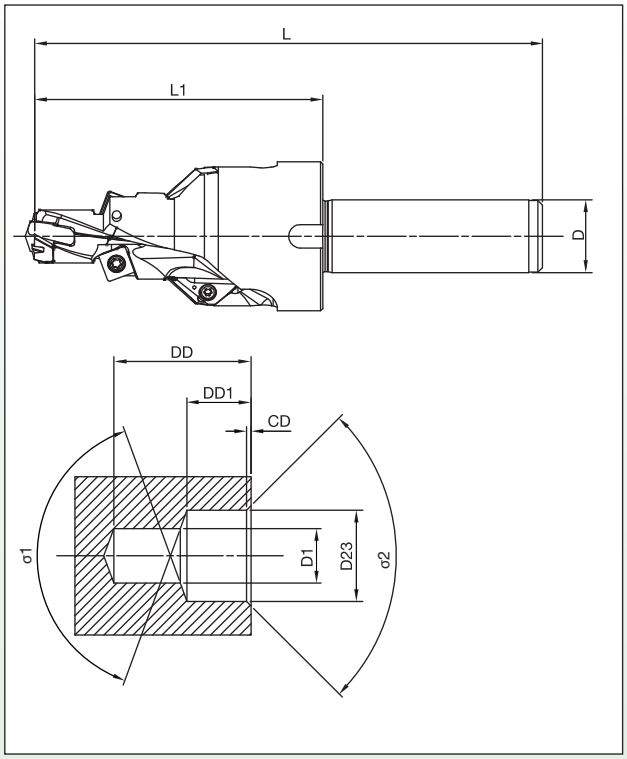




Please utilise guide below to plan your TOP DRILL M1™ modular step drill based on your needs and requirements. Please contact your distributor for a quote.

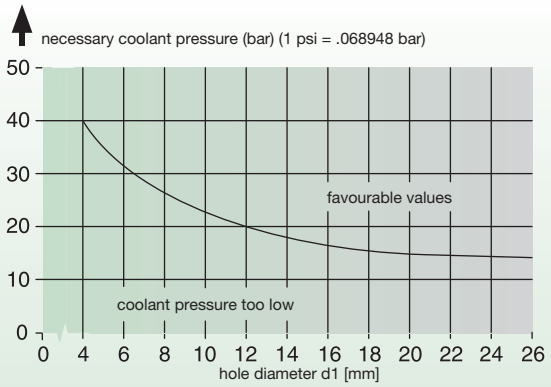
Option 3 TOP DRILL M1 Drilling and Countersinking and Chamfering

Overall Length	**[L]**	
Drill Length	**[L1]**	
Shank Diameter	**[D]**	
Drill Diameter Min	**[D1]**	
Drilling Depth	**[DD]**	
Cut Diameter 23	**[D23]**	
Countersinking Depth	**[DD1]**	
Cutting Diameter 2 Angle	**σ1**	
Cutting Diameter 3 Angle	**σ2**	
Chamfering depth	**[CD]**	





If a more complex tool is required, we need your individual information to serve your specific needs. Please contact your WIDIA™ distributor for further guidance.



Coolant Pressure

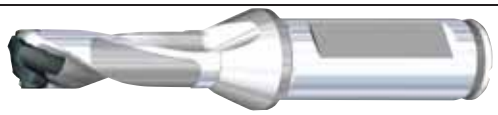
The diagram at left shows the coolant pressure as a function of the hole diameter. The higher the coolant pressure, the better the drilling result. Tool life and hole quality improve with increased coolant flow.

Drilling on Inclined Surfaces

When drilling on inclined or curved surfaces, use a 50% lower feed than the standard value. After the drill margins are fully engaged in the workpiece, increase the feed to the standard value (100%). Premachining is required on surfaces with inclination greater than 3°.

TOP DRILL M1 • UP(M) • WU25PD™ • Speed and Feed Chart • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate							
		min	Starting Value	max	Tool Diameter (mm)	8,0	10,0	12,0	14,0	16,0	20,0	25,0
P	1	90	**125**	170	mm/r	0,11–0,20	0,13–0,25	0,14–0,31	0,17–0,39	0,19–0,45	0,25–0,48	0,30–0,52
	2	105	**140**	180	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,21–0,46	0,23–0,46	0,28–0,50	0,30–0,52
	3	50	**75**	100	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,21–0,46	0,23–0,46	0,28–0,50	0,30–0,52
	4	50	**75**	100	mm/r	0,11–0,28	0,12–0,35	0,16–0,37	0,17–0,36	0,19–0,45	0,22–0,48	0,25–0,50
	5	50	**65**	80	mm/r	0,10–0,20	0,10–0,23	0,10–0,25	0,14–0,29	0,16–0,32	0,18–0,36	0,22–0,42
	6	50	**65**	80	mm/r	0,10–0,20	0,10–0,23	0,10–0,25	0,14–0,29	0,16–0,32	0,18–0,36	0,22–0,42
M	1	40	**80**	110	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
	2	35	**55**	75	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
	3	20	**35**	50	mm/r	0,06–0,22	0,08–0,23	0,09–0,24	0,10–0,25	0,11–0,26	0,13–0,28	0,13–0,32
K	1	60	**95**	170	mm/r	0,15–0,29	0,16–0,32	0,17–0,35	0,21–0,42	0,25–0,48	0,28–0,52	0,32–0,56
	2	60	**75**	90	mm/r	0,15–0,29	0,16–0,30	0,17–0,33	0,21–0,41	0,25–0,48	0,28–0,52	0,32–0,56
	3	40	**65**	90	mm/r	0,16–0,30	0,17–0,33	0,18–0,36	0,20–0,41	0,21–0,44	0,23–0,48	0,25–0,50

NOTE: Through coolant recommended for greater than 3 x D applications.

How to attach inserts



1) Fix drill holder on arbour. For insert exchange, fix arbour on the machine or set on tool presetter.



2) Remove dust using air blast.



3) Put insert into drill holder. (Use gloves to protect your hands.)



4) Turn lightly in a clockwise direction. (Use gloves to protect your hands.)



5) Set the wrench properly.*



6) Make sure the wrench fits with the insert slot for the wrench. (Is the wrench unfixed from the slot?)





7) Slowly turn the wrench in a clockwise direction.



8) Complete.

How to detach inserts



1) Remove dust from insert using air blast.



2) Set the wrench properly.*



3) Fit the wrench to insert slot.



4) Turn the wrench in an anti-clockwise direction.



5) Once lock is released, insert can be turned with fingers. (Use gloves to protect your hands.)



6) Remove insert. (Use gloves to protect your hands.)

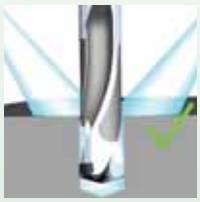
**To order the TDM1 Wrench, please use order number 3861623 and catalogue number 170.315.*

Cautions

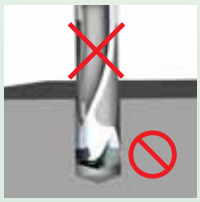
Coolant



1) Internal coolant is recommended.



2) In case of external coolant, cutting depth must be 3 x D or less.

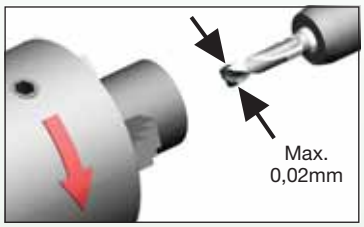


3) Dry cutting is not recommended.
Limited applicability in cast iron materials, MQL strongly recommended.

Usage Precautions

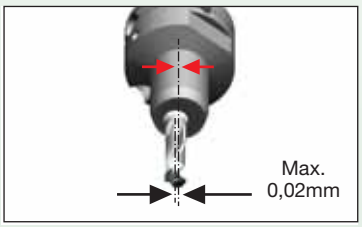
Core deviation

1) For Turning Machines



Set deviation amount under 0,02mm between workpiece and drill.

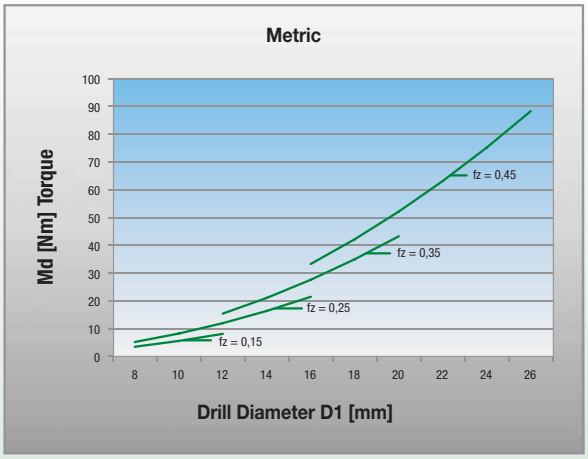
2) For Machining Centres



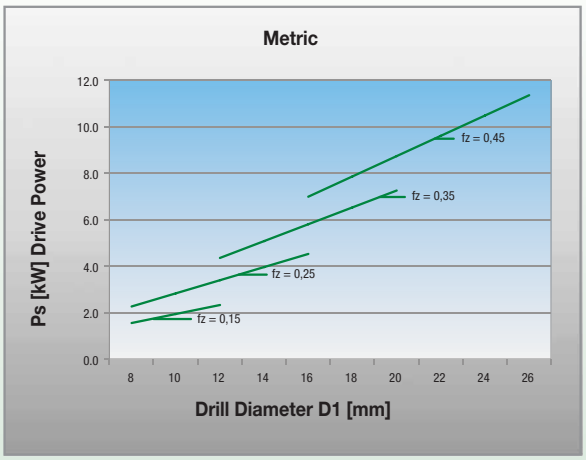
Do not use any arbour with a damaged attachment surface.
Centre of arbour deviation must be within 0,02mm.

Application Recommendation	Workpiece Shape
Flat Face **Recommended**	
Stacked Plates **Recommended**	
Inclined Surface >3° **Not Recommended**	
Half Cylindrical **Not Recommended**	
Hole Expansion **Not Recommended**	
Concave Surface **Not Recommended**	
Pipe Material **Not Recommended**	
Cored Hole **Not Recommended**	

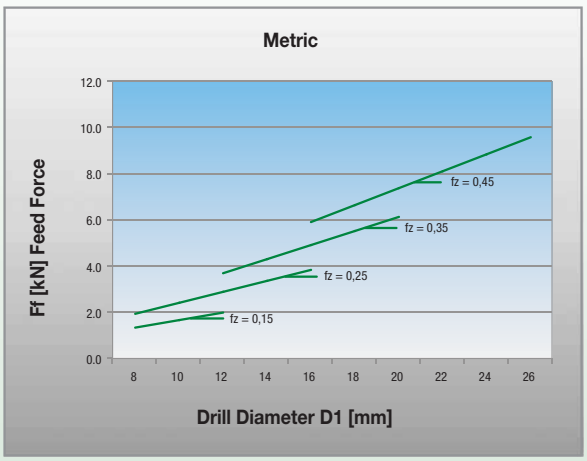
Torque



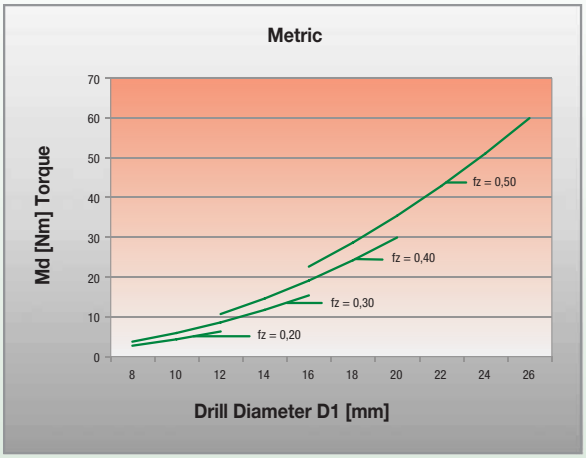
Power



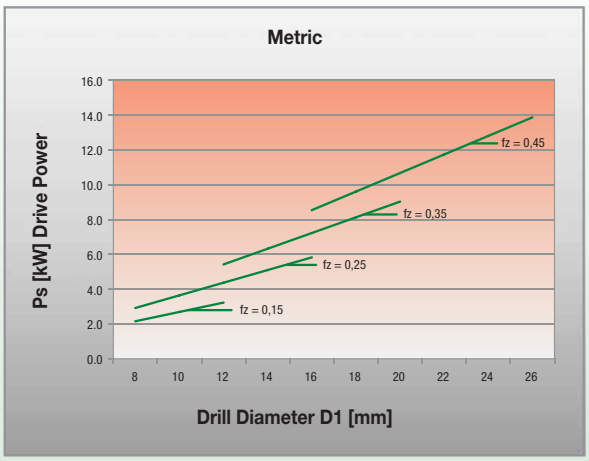
Feed Force



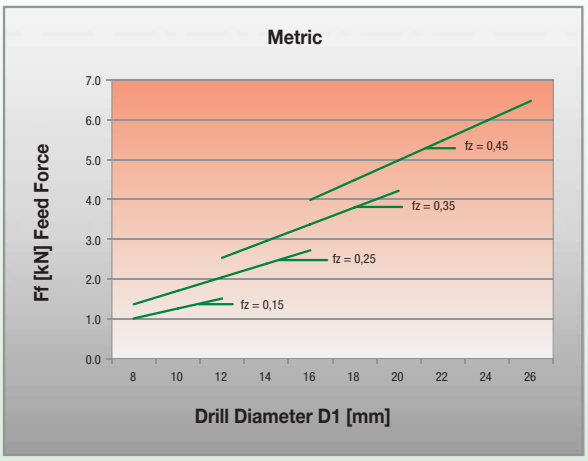
Torque



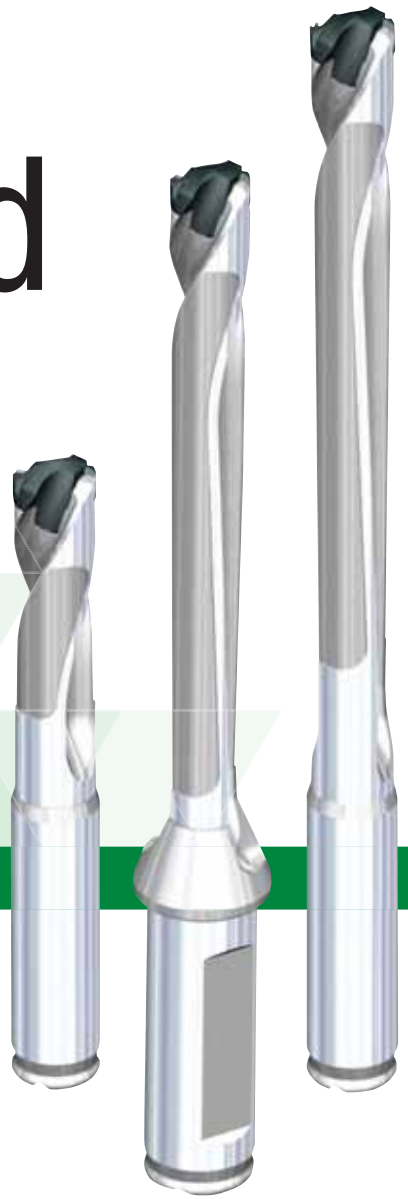
Power



Feed Force



Cut Time and Costs, Not Quality and Performance



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Top Drill M1™

The TDM1 modular drill system offers performance levels and Metal Removal Rates (MRR) comparable to that of solid carbide drills. The unique front clamping system enables inserts to be changed quickly, even inside the machine tool, saving setup time and manufacturing costs.

- UP(M) drill point design in WU25PD™.
- Diameter ranges from 8-25,99mm in L/D ratios of 3, 5, and 8 x D.
- Disposable — eliminates number of tools waiting for reconditioning, avoiding hidden costs.
- All intermediate diameters available as semi-standards. Multiple step drills available as customised solutions. New TopSTEP range of inserts offer extended chamfering and counterboring.

To learn more about the benefits of **WIDIA™ Top Drill M1**, contact your local distributor.

WIDIA™

WIDIA-Metcut™ Spade Blades •
A complement to TOP DRILL M1™

Spade Blades



WIDIA™ provides a comprehensive line of spade blades from 8–114mm (.315–4.5") to cover a wide range of machining environments and materials.

- Fast penetration rates, less downtime, and lower variability.
- Interchangeable with other conventional spade blade holders.
- Improved surface finish — eliminates subsequent hole finishing operations.
- Standard and special drill body/holder offering, including step drill and porting tool configurations.
- Intermediate diameters and specific toolholder length quickly available upon request.

WIDIA-Metcut spade blades are great choices for:

- Universal application for most plain and alloyed steel applications as well as for cast iron and stainless steels.
- Machining environments where rigidity, coolant supply, or speed and feed rates are limiting factors.
- Short run manufacturing and prototyping environments.
- Especially when dealing with larger diameters and deeper holes.

Application Information

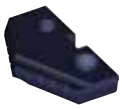
T-15 HSS spade blades are recommended:

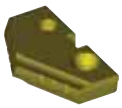
- For providing straighter and more consistent holes with superior surface finishes than can be produced using either HSS twist drills or carbide indexable drills.
- When rigidity of the machine or the fixture requires a more forgiving, durable, and tougher tool; T-15 steel possesses a higher transverse rupture strength and is more impact-resistant than comparable carbide spade blades and/or carbide indexable drills.
- In applications requiring hole depths up through 15x to 20x diameter; pecking may be required for depths above 7x diameter for some materials.
- As a cost-effective alternative to carbide indexable drills since T-15 steel spade blades operate at comparable penetration rates to single-effective indexable drills in materials <35 Rc, and one spade blade holder accommodates multiple diameter blades.

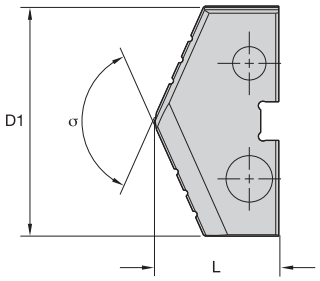


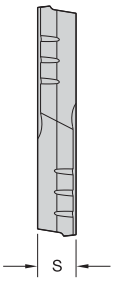
Spade Blade Holders

Generally can accommodate a range of blade sizes up to 1.30–1.35 times the smallest blade size. It is therefore possible to cover the entire range of hole sizes with just a few spade drill holders. Contrast this with the inventories required for indexable drills and steel taper shank drills.


TiAlN

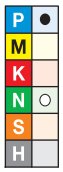

TiN





Seat Size Z

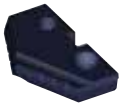




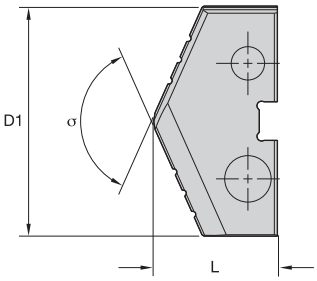
● first choice
○ alternate choice

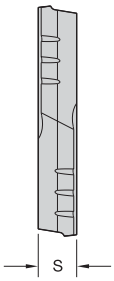
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
2759621	7FZ-0438A	–		11,11	9,19	2,39	132°
2759599	7FZ-0472A	–		12,00	9,19	2,39	132°
2759592	7FZ-0484A	–		12,30	9,19	2,39	132°
2759588	7FZ-0492A	–		12,50	9,19	2,39	132°
2891175	7FZ-0500A	2759581	7FZ-0500T	12,70	9,19	2,39	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

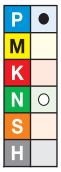

TiN





Seat Size 0

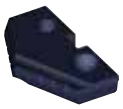


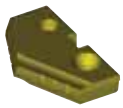


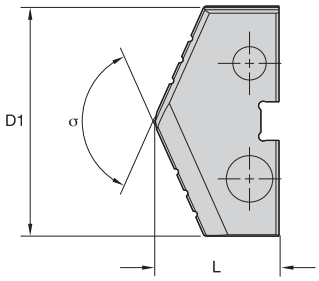
● first choice
○ alternate choice

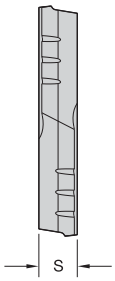
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
2907270	7F0-0509A	–		12,93	10,80	3,18	132°
–		2760494	7F0-0512T	13,00	10,80	3,18	132°
2760492	7F0-0516A	–		13,10	10,80	3,18	132°
2760489	7F0-0531A	2760485	7F0-0531T	13,50	10,80	3,18	132°
2760481	7F0-0547A	2760478	7F0-0547T	13,89	10,80	3,18	132°
2760477	7F0-0551A	2760473	7F0-0551T	14,00	10,80	3,18	132°
2760472	7F0-0563A	2760466	7F0-0563T	14,29	10,80	3,18	132°
2760463	7F0-0571A	–		14,50	10,80	3,18	132°
2760460	7F0-0578A	2760458	7F0-0578T	14,68	10,80	3,18	132°
2760454	7F0-0591A	2760453	7F0-0591T	15,00	10,80	3,18	132°
2760452	7F0-0594A	2760449	7F0-0594T	15,08	10,80	3,18	132°
2760444	7F0-0609A	2760441	7F0-0609T	15,48	10,80	3,18	132°
2760440	7F0-0610A	–		15,50	10,80	3,18	132°
3053979	7F0-0625A	2760430	7F0-0625T	15,88	10,80	3,18	132°
2891178	7F0-0630A	2760424	7F0-0630T	16,00	10,80	3,18	132°
2760420	7F0-0641A	2760418	7F0-0641T	16,27	10,80	3,18	132°
–		2760415	7F0-0650T	16,50	10,80	3,18	132°
2760413	7F0-0656A	1988432	7F0-0656T	16,67	10,80	3,18	132°
2760404	7F0-0669A	–		17,00	10,80	3,18	132°
2760399	7F0-0672A	2760397	7F0-0672T	17,07	10,80	3,18	132°
2760393	7F0-0688A	2760390	7F0-0688T	17,46	10,80	3,18	132°
3083635	7F0-0689A	2760386	7F0-0689T	17,50	10,80	3,18	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

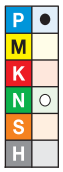

TiN





Seat Size 1

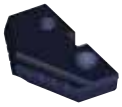


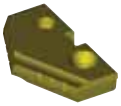


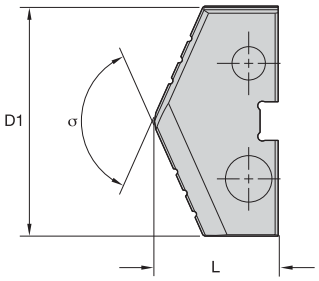
● first choice
○ alternate choice

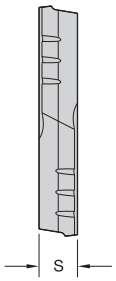
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
2760383	7F1-0703A	2760381	7F1-0703T	17,86	13,84	3,96	132°
2760380	7F1-0709A	2760377	7F1-0709T	18,00	13,84	3,96	132°
–		2760371	7F1-0719T	18,26	13,84	3,96	132°
2760365	7F1-0734A	2760362	7F1-0734T	18,65	13,84	3,96	132°
2760361	7F1-0748A	2760359	7F1-0748T	19,00	13,84	3,96	132°
3114699	7F1-0750A	2387228	7F1-0750T	19,05	13,84	3,96	132°
–		2604191	7F1-0756T	19,20	13,84	3,96	132°
2760344	7F1-0766A	2760341	7F1-0766T	19,45	13,84	3,96	132°
–		2760338	7F1-0768T	19,50	13,84	3,96	132°
2760335	7F1-0781A	2760331	7F1-0781T	19,85	13,84	3,96	132°
2760330	7F1-0787A	2760328	7F1-0787T	20,00	13,84	3,96	132°
–		2760323	7F1-0797T	20,24	13,84	3,96	132°
2255810	7F1-0806A	–		20,47	13,84	3,96	132°
2760319	7F1-0807A	2760316	7F1-0807T	20,50	13,84	3,96	132°
2760315	7F1-0813A	2760310	7F1-0813T	20,64	13,84	3,96	132°
2760305	7F1-0827A	2760303	7F1-0827T	21,00	13,84	3,96	132°
2760302	7F1-0828A	2760300	7F1-0828T	21,03	13,84	3,96	132°
–		2760296	7F1-0844T	21,43	13,84	3,96	132°
2760292	7F1-0859A	2760290	7F1-0859T	21,83	13,84	3,96	132°
2940716	7F1-0866A	2760287	7F1-0866T	22,00	13,84	3,96	132°
1926120	7F1-0875A	2760282	7F1-0875T	22,23	13,84	3,96	132°
2760280	7F1-0891A	2760278	7F1-0891T	22,62	13,84	3,96	132°
2760276	7F1-0906A	2760273	7F1-0906T	23,02	13,84	3,96	132°
3099442	7F1-0922A	2760268	7F1-0922T	23,42	13,84	3,96	132°
2760265	7F1-0938A	2760262	7F1-0938T	23,81	13,84	3,96	132°
2891181	7F1-0945A	2760257	7F1-0945T	24,00	13,84	3,96	132°
2760256	7F1-0953A	2760253	7F1-0953T	24,21	13,84	3,96	132°
–		3339713	7F1-0960T	24,38	13,84	3,96	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

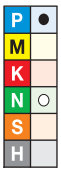

TiN





Seat Size 2





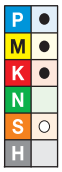
● first choice
○ alternate choice

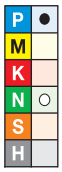
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2760247	7F2-0969T	24,61	16,13	4,76	132°
2760243	7F2-0984A	2760240	7F2-0984T	25,00	16,13	4,76	132°
2760239	7F2-1000A	2760235	7F2-1000T	25,40	16,13	4,76	132°
2760234	7F2-1003A	–		25,48	16,13	4,76	132°
3088200	7F2-1016A	2760226	7F2-1016T	25,80	16,13	4,76	132°
3096208	7F2-1024A	2760223	7F2-1024T	26,00	16,13	4,76	132°
2760222	7F2-1031A	2760219	7F2-1031T	26,20	16,13	4,76	132°
2760216	7F2-1047A	2760214	7F2-1047T	26,59	16,13	4,76	132°
3096207	7F2-1063A	2760207	7F2-1063T	26,99	16,13	4,76	132°
2261849	7F2-1078A	2760203	7F2-1078T	27,61	16,13	4,76	132°
2760199	7F2-1094A	2760196	7F2-1094T	27,78	16,13	4,76	132°
2760195	7F2-1102A	2760194	7F2-1102T	28,00	16,13	4,76	132°
–		2760189	7F2-1109T	28,17	16,13	4,76	132°
2760188	7F2-1125A	2760184	7F2-1125T	28,58	16,13	4,76	132°
3024915	7F2-1141A	–		28,97	16,13	4,76	132°
2760181	7F2-1142A	–		29,00	16,13	4,76	132°
3088746	7F2-1156A	2760174	7F2-1156T	29,37	16,13	4,76	132°
–		2760169	7F2-1172T	29,77	16,13	4,76	132°
2760167	7F2-1181A	2760164	7F2-1181T	30,00	16,13	4,76	132°
2760162	7F2-1188A	2760159	7F2-1188T	30,16	16,13	4,76	132°
–		2760152	7F2-1203T	30,56	16,13	4,76	132°
2760150	7F2-1219A	2760148	7F2-1219T	30,96	16,13	4,76	132°
2760147	7F2-1221A	–		31,00	16,13	4,76	132°
2907272	7F2-1231A	–		31,27	16,13	4,76	132°
–		2760141	7F2-1234T	31,35	16,13	4,76	132°
2760137	7F2-1250A	2760134	7F2-1250T	31,75	16,13	4,76	132°
–		2895976	7F2-1254T	31,85	16,13	4,76	132°
2760131	7F2-1260A	2760128	7F2-1260T	32,00	16,13	4,76	132°
3032539	7F2-1266A	2967699	7F2-1266T	32,15	16,13	4,76	132°
–		2760121	7F2-1281T	32,55	16,13	4,76	132°
2760118	7F2-1299A	–		33,00	16,13	4,76	132°
2760112	7F2-1313A	2760109	7F2-1313T	33,34	16,13	4,76	132°

NOTE: Toolholders available upon request as an Engineered Solution.

(continued)

(Seat Size 2 — continued)

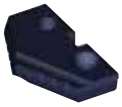




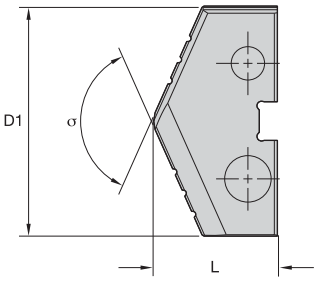
● first choice
○ alternate choice

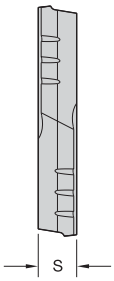
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2760106	7F2-1328T	33,73	16,13	4,76	132°
2760105	7F2-1339A	–		34,00	16,13	4,76	132°
2760101	7F2-1344A	2760098	7F2-1344T	34,13	16,13	4,76	132°
–		2760094	7F2-1359T	34,53	16,13	4,76	132°
1926121	7F2-1375A	2760090	7F2-1375T	34,93	16,13	4,76	132°
2760089	7F2-1378A	–		35,00	16,13	4,76	132°
2759880	7F4-2166A	–		55,02	23,62	7,94	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN


TiN





Seat Size 3

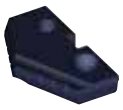




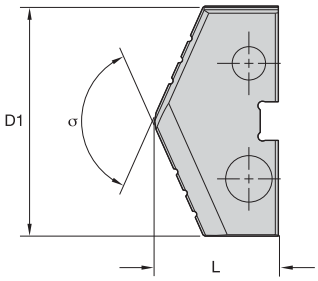
● first choice
○ alternate choice

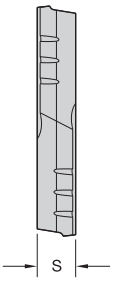
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2760079	7F3-1391T	35,32	20,45	6,35	132°
2760078	7F3-1406A	2760076	7F3-1406T	35,72	20,45	6,35	132°
2760072	7F3-1417A	2760069	7F3-1417T	36,00	20,45	6,35	132°
2760066	7F3-1438A	2760063	7F3-1438T	36,51	20,45	6,35	132°
2760060	7F3-1457A	2760059	7F3-1457T	37,00	20,45	6,35	132°
2760058	7F3-1469A	2760056	7F3-1469T	37,31	20,45	6,35	132°
–		2760053	7F3-1484T	37,70	20,45	6,35	132°
2760051	7F3-1496A	–		38,00	20,45	6,35	132°
2760048	7F3-1500A	2760045	7F3-1500T	38,10	20,45	6,35	132°
–		2760038	7F3-1516T	38,50	20,45	6,35	132°
–		2760035	7F3-1531T	38,90	20,45	6,35	132°
2760034	7F3-1535A	–		39,00	20,45	6,35	132°
2760027	7F3-1563A	2760024	7F3-1563T	39,69	20,45	6,35	132°
2760023	7F3-1575A	2760021	7F3-1575T	40,00	20,45	6,35	132°
–		2760015	7F3-1594T	40,48	20,45	6,35	132°
2760011	7F3-1614A	–		41,00	20,45	6,35	132°
2760008	7F3-1625A	2760004	7F3-1625T	41,28	20,45	6,35	132°
2760001	7F3-1654A	–		42,00	20,45	6,35	132°
–		2759996	7F3-1656T	42,07	20,45	6,35	132°
2759993	7F3-1688A	2759991	7F3-1688T	42,86	20,45	6,35	132°
–		2759989	7F3-1693T	43,00	20,45	6,35	132°
2759987	7F3-1719A	2759985	7F3-1719T	43,66	20,45	6,35	132°
2759984	7F3-1732A	–		44,00	20,45	6,35	132°
2759977	7F3-1750A	2759974	7F3-1750T	44,45	20,45	6,35	132°
–		2759970	7F3-1766T	44,85	20,45	6,35	132°
2759969	7F3-1772A	2759967	7F3-1772T	45,00	20,45	6,35	132°
–		2759963	7F3-1781T	45,25	20,45	6,35	132°
2759960	7F3-1811A	–		46,00	20,45	6,35	132°
2759958	7F3-1813A	2759956	7F3-1813T	46,04	20,45	6,35	132°
–		2759951	7F3-1844T	46,83	20,45	6,35	132°
–		2759949	7F3-1850T	47,00	20,45	6,35	132°
2759945	7F3-1875A	2759942	7F3-1875T	47,63	20,45	6,35	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

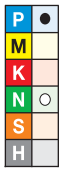

TiN





Seat Size 4





● first choice
○ alternate choice

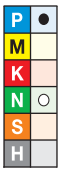
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2759937	7F4-1880T	47,75	23,62	7,95	132°
2759936	7F4-1890A	2759935	7F4-1890T	48,00	23,62	7,95	132°
2759934	7F4-1906A	2759932	7F4-1906T	48,42	23,62	7,95	132°
2759930	7F4-1929A	–		49,00	23,62	7,95	132°
2759927	7F4-1938A	2759925	7F4-1938T	49,21	23,62	7,95	132°
2759921	7F4-1969A	2759919	7F4-1969T	50,00	23,62	7,95	132°
2759916	7F4-2000A	2759913	7F4-2000T	50,80	23,62	7,95	132°
–		2759911	7F4-2008T	51,00	23,62	7,95	132°
–		2952747	7F4-2016T	51,20	23,62	7,95	132°
2759904	7F4-2031A	2759902	7F4-2031T	51,60	23,62	7,95	132°
2759901	7F4-2047A	2759900	7F4-2047T	52,00	23,62	7,95	132°
2759899	7F4-2063A	2759896	7F4-2063T	52,39	23,62	7,95	132°
2895971	7F4-2087A	–		53,00	23,62	7,95	132°
–		2759892	7F4-2094T	53,18	23,62	7,95	132°
2759891	7F4-2125A	2759888	7F4-2125T	53,98	23,62	7,95	132°
2759887	7F4-2126A	–		54,00	23,62	7,95	132°
–		2759882	7F4-2156T	54,77	23,62	7,95	132°
2759880	7F4-2166A	–		55,02	23,62	7,94	132°
–		2759876	7F4-2188T	55,56	23,62	7,95	132°
2759874	7F4-2205A	–		56,00	23,62	7,95	132°
2759872	7F4-2219A	2759870	7F4-2219T	56,36	23,62	7,95	132°
2759868	7F4-2244A	–		57,00	23,62	7,95	132°
2759865	7F4-2250A	2759862	7F4-2250T	57,15	23,62	7,95	132°
–		2759858	7F4-2281T	57,95	23,62	7,95	132°
2759857	7F4-2284A	–		58,00	23,62	7,95	132°
2759854	7F4-2313A	2759852	7F4-2313T	58,74	23,62	7,95	132°
2759851	7F4-2323A	–		59,00	23,62	7,95	132°
–		2759848	7F4-2344T	59,53	23,62	7,95	132°

NOTE: Toolholders available upon request as an Engineered Solution.

(continued)

(Seat Size 4 — continued)

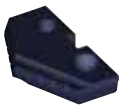




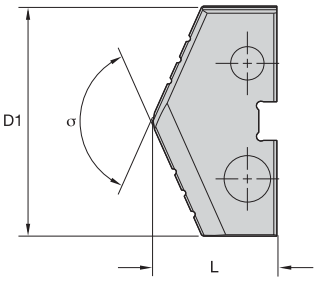
● first choice
○ alternate choice

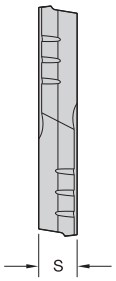
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2759845	7F4-2362T	60,00	23,62	7,95	132°
2759843	7F4-2375A	2759840	7F4-2375T	60,33	23,62	7,95	132°
2759833	7F4-2438A	2759831	7F4-2438T	61,91	23,62	7,95	132°
2759830	7F4-2441A	–		62,00	23,62	7,95	132°
2759828	7F4-2469A	–		62,71	23,62	7,95	132°
–		2759823	7F4-2480T	63,00	23,62	7,95	132°
2759822	7F4-2500A	2759820	7F4-2500T	63,50	23,62	7,95	132°
–		2759816	7F4-2531T	64,30	23,62	7,95	132°
3027222	7F4-2559A	–		65,00	23,62	7,95	132°
2759813	7F4-2563A	2759811	7F4-2563T	65,09	23,62	7,95	132°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

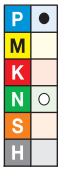

TiN





Seat Size 5

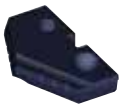




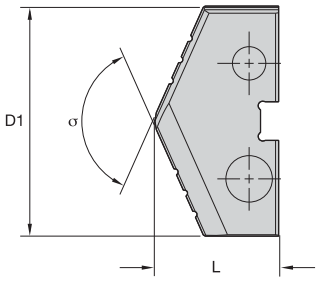
● first choice
○ alternate choice

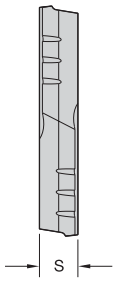
TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		2759808	7F5-2500T	63,50	31,50	11,11	144°
2759802	7F5-2563A	2759801	7F5-2563T	65,09	31,50	11,11	144°
–		2759791	7F5-2625T	66,68	31,50	11,11	144°
–		2759789	7F5-2656T	67,47	31,50	11,11	144°
2759788	7F5-2677A	–		68,00	31,50	11,11	144°
–		2759781	7F5-2719T	69,06	31,50	11,11	144°
2759780	7F5-2750A	2759778	7F5-2750T	69,85	31,50	11,11	144°
2961641	7F5-2756A	–		70,00	31,50	11,11	144°
2759773	7F5-2813A	–		71,44	31,50	11,11	144°
2759766	7F5-2875A	2759764	7F5-2875T	73,03	31,50	11,11	144°
–		2759756	7F5-2938T	74,61	31,50	11,11	144°
2759755	7F5-2969A	2759753	7F5-2969T	75,41	31,50	11,11	144°
2759751	7F5-3000A	2759748	7F5-3000T	76,20	31,50	11,11	144°

NOTE: Toolholders available upon request as an Engineered Solution.


TiAlN

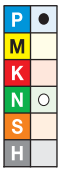

TiN





Seat Size 6





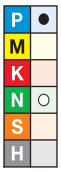
● first choice
○ alternate choice

TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
2759745	7F6-3063A	2759743	7F6-3063T	77,79	31,50	11,11	144°
2759742	7F6-3071A	–		78,00	31,50	11,11	144°
2759739	7F6-3125A	–		79,38	31,50	11,11	144°
2759736	7F6-3150A	–		80,00	31,50	11,11	144°
–		2759731	7F6-3188T	80,96	31,50	11,11	144°
–		2759726	7F6-3250T	82,55	31,50	11,11	144°
–		2759718	7F6-3375T	85,73	31,50	11,13	144°
–		2759715	7F6-3438T	87,31	31,50	11,13	144°
–		2759709	7F6-3500T	88,90	31,50	11,13	144°

NOTE: Toolholders available upon request as an Engineered Solution.

Seat Size 7





● first choice
○ alternate choice

TiAlN		TiN		D1	L	S	
order #	catalogue #	order #	catalogue #	mm	mm	mm	σ
–		3279755	7F7-3543T	90,00	31,50	11,13	144°
–		2759703	7F7-3563T	90,49	31,50	11,13	144°
–		2759698	7F7-3688T	93,66	31,50	11,13	144°
–		2759688	7F7-3938T	96,00	31,50	11,13	144°
2972689	7F7-3813A	–		96,84	31,50	11,13	144°
2759684	7F7-4000A	–		101,60	31,50	11,13	144°

NOTE: Toolholders available upon request as an Engineered Solution.

HSS Spade Blades • Speed and Feed Chart • Metric

Material Group		Hardness BHN	Grade TiN	Grade TiAlN	Feed (mm/rev) Y & Z (9.5–12.7)	0 (13–17.5)	1 (17.86–24)	2 (24.61–35)	3 (35.72–47.63)	4 (48–65.09)	5 (63.5–76.2)	6–7–8 (76.99–114.3)
P	0	85–125	55	–	0,18	0,23	0,30	0,38	0,48	0,58	0,64	0,69
		125–175	50	–	0,15	0,23	0,30	0,38	0,48	0,58	0,61	0,66
		175–225	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
		225–275	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
	1	100–150	60	–	0,20	0,28	0,36	0,43	0,53	0,64	0,66	0,71
		150–200	55	–	0,18	0,25	0,33	0,41	0,51	0,58	0,61	0,66
		200–250	50	–	0,15	0,25	0,33	0,41	0,51	0,58	0,61	0,66
	2	125–175	50	–	0,15	0,23	0,30	0,38	0,48	0,58	0,64	0,69
		175–225	45	–	0,13	0,20	0,25	0,36	0,46	0,53	0,58	0,64
		225–275	45	65	0,13	0,20	0,25	0,36	0,46	0,53	0,56	0,61
		275–325	40	60	0,10	0,18	0,23	0,30	0,41	0,48	0,53	0,58
	3	125–175	45	–	0,18	0,23	0,28	0,36	0,46	0,53	0,58	0,64
		175–225	45	–	0,15	0,20	0,25	0,36	0,43	0,48	0,53	0,58
		225–275	40	55	0,13	0,18	0,25	0,33	0,43	0,48	0,51	0,53
		275–325	35	50	0,10	0,15	0,23	0,30	0,38	0,43	0,46	0,48
		325–375	35	50	0,08	0,15	0,23	0,30	0,38	0,43	0,46	0,48
	4	225–300	25	35	0,13	0,18	0,23	0,25	0,36	0,41	0,46	0,51
		300–350	20	30	0,10	0,18	0,23	0,25	0,36	0,41	0,46	0,51
		350–400	15	25	0,08	0,15	0,20	0,23	0,30	0,36	0,41	0,46
	5	100–150	45	–	0,15	0,25	0,30	0,36	0,46	0,53	0,56	0,61
		150–250	40	60	0,13	0,23	0,25	0,30	0,41	0,48	0,51	0,56
		250–350	30	50	0,10	0,20	0,23	0,25	0,36	0,43	0,46	0,51
	6	150–200	25	–	0,13	0,15	0,20	0,25	0,30	0,38	0,41	0,43
		200–250	20	–	0,10	0,15	0,20	0,25	0,30	0,38	0,41	0,43
		250–300	15	20	0,10	0,13	0,18	0,20	0,25	0,33	0,36	0,38
		300–350	–	15	0,08	0,10	0,15	0,18	0,23	0,30	0,33	0,36
M	1	135–185	25	35	0,15	0,20	0,23	0,28	0,36	0,41	0,46	0,51
		185–275	30	30	0,13	0,18	0,20	0,25	0,30	0,36	0,41	0,46
		275–350	–	25	0,13	0,15	0,18	0,23	0,28	0,33	0,38	0,43
K	1,2	120–150	55	80	0,20	0,30	0,41	0,51	0,61	0,69	0,74	0,79
		150–200	45	75	0,18	0,28	0,36	0,46	0,56	0,64	0,69	0,74
		200–220	40	65	0,15	0,23	0,30	0,41	0,46	0,53	0,58	0,64
		220–260	35	55	0,13	0,18	0,23	0,30	0,36	0,43	0,48	0,53
		260–320	30	45	0,10	0,15	0,18	0,23	0,30	0,36	0,41	0,46
N	1	–	180	–	0,18	0,30	0,38	0,48	0,53	0,61	0,64	0,66
		–	90	–	0,20	0,33	0,41	0,51	0,56	0,64	0,66	0,69
S	1	140–210	–	15	0,13	0,18	0,20	0,25	0,30	0,38	0,41	0,43
		210–280	–	10	0,10	0,15	0,18	0,20	0,25	0,30	0,33	0,36
		280–340	–	10	0,10	0,13	0,15	0,18	0,23	0,28	0,30	0,33



WIDIA™ Knowledge Center

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Classes to Suit Everyone

Doing things the same way year after year can stall productivity. Continuing education and training in the latest machining practices are necessary to stay competitive.

The Knowledge Center offers several ways to get trained: industry- and application-specific courses, customer onsite programs, and online-based certified metalcutting professional courses. In-person classes include lecture, lab, and machining demonstrations.

Regional Training

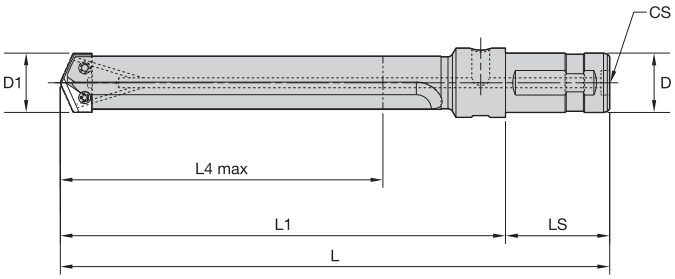
The Regional Application Engineering Program is designed to provide a broad base of knowledge for the selection and use of metalcutting tools. Instruction includes lecture-style presentations and video demonstrations. Participants receive notes and text materials, and the video demonstrations reinforce the theories presented in the lecture.

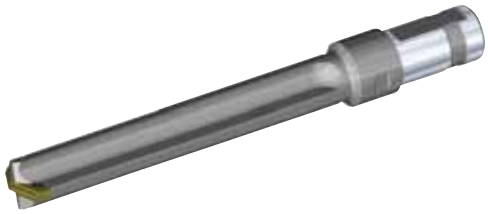
Metalcutting Application Training

The Comprehensive Metalworking Application Course provides a broad base of knowledge for the selection and use of metalcutting tools. Lecture-style presentations and laboratory demonstrations enhance course material through actual cutting tests and reinforce the theories presented in the lecture.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™





Straight Flute Holders • Inch • Short

short	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSS	11,10	.437	12,90	.508	5.75	3.37	1.09	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SS	12,93	.509	17,65	.695	6.35	3.97	1.85	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SS	15,47	.609	17,65	.695	6.35	3.97	1.76	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SS	17,53	.690	24,38	.960	7.23	4.85	2.25	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SS	21,82	.859	24,38	.960	7.23	4.85	2.17	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SS	24,41	.961	35,05	1.380	8.00	5.56	2.77	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S2.5SS	30,15	1.187	35,05	1.380	8.00	5.56	3.59	2.44	1.250	2.5	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SS	35,08	1.381	47,73	1.879	9.88	7.25	3.76	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SS	47,75	1.880	65,28	2.570	11.38	8.75	6.21	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S5SS	63,50	2.500	88,90	3.500	12.50	9.25	5.36	3.25	2.000	5	1/4 - 18 NPT	**56-1025**	**56-2125**

Straight Flute Holders • Inch • Medium

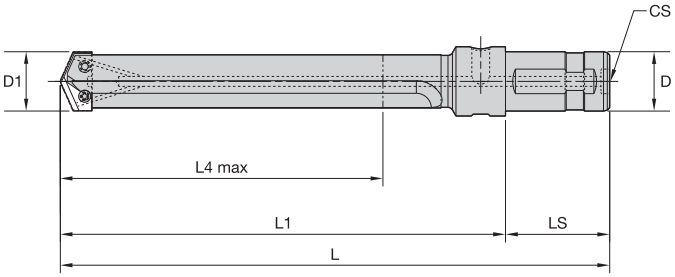
medium	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSM	11,10	.437	12,90	.508	6.76	4.38	2.08	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SM	12,93	.509	17,65	.695	7.71	5.33	2.93	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SM	15,47	.609	17,65	.695	7.71	5.33	2.90	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SM	17,53	.690	24,38	.960	9.18	6.80	4.20	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SM	21,82	.859	24,38	.960	9.18	6.80	4.12	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SM	24,41	.961	35,05	1.380	10.38	7.94	5.15	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S2.5SM	30,15	1.187	35,05	1.380	10.38	7.94	5.03	2.44	1.250	2.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S3SM	35,08	1.381	47,73	1.879	13.88	11.25	7.89	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SM	47,75	1.880	65,28	2.570	15.38	12.75	9.57	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S5SM	63,50	2.500	88,90	3.500	18.25	15.00	11.38	3.25	2.000	5	1/4 - 18 NPT	**56-1025**	**56-2125**
7S7SM	88,93	3.501	114,30	4.500	21.25	14.62	11.50	6.63	3.000	7	1/4 - 18 NPT	**56-1025**	**56-2125**

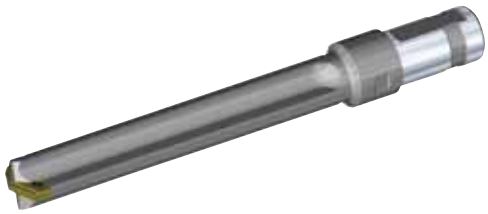
Straight Flute Holders • Inch • Long

	D1		D1 max										
long	mm	in	mm	in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7SZSL	11,10	.437	12,90	.508	7.76	5.38	3.10	2.38	.750	Z	1/8 - 27 NPT	**56-1015**	**56-2026**
7S0SL	12,93	.509	17,65	.695	9.13	6.75	4.60	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SL	15,47	.609	17,65	.695	9.13	6.75	7.36	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SL	17,53	.690	24,38	.960	11.10	8.72	6.34	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SL	24,41	.961	35,05	1.380	12.75	10.31	7.86	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SL	35,08	1.381	47,73	1.879	18.63	16.00	13.28	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SL	47,75	1.880	65,28	2.570	21.50	18.87	15.89	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**
7S7SL	88,93	3.501	114,30	4.500	29.50	22.88	19.25	6.63	3.000	7	1/4 - 18 NPT	**56-1025**	**56-2125**

Straight Flute Holders • Inch • Extra Long

	D1		D1 max										
extra long	mm	in	mm	in	L	L1	L4 max	LS	D	seat size	CS	insert screw	Torx wrench
7S0SE	12,93	.509	17,65	.695	12.17	9.80	7.44	2.38	.750	0	1/8 - 27 NPT	**56-1014**	**56-2017**
7S0.5SE	15,47	.609	17,65	.695	12.17	9.80	7.60	2.38	.750	—	1/8 - 27 NPT	**56-1014**	**56-2017**
7S1SE	17,53	.690	24,38	.960	15.12	12.75	5.67	2.38	1.000	1	1/4 - 18 NPT	**56-1020**	**56-2028**
7S1.5SE	21,82	.859	24,38	.960	15.13	12.75	10.29	2.38	1.000	1.5	1/4 - 18 NPT	**56-1020**	**56-2028**
7S2SE	24,41	.961	35,05	1.380	15.82	13.38	11.07	2.44	1.250	2	1/4 - 18 NPT	**56-1018**	**56-2015**
7S3SE	35,08	1.381	47,73	1.879	25.51	22.88	20.16	2.63	1.500	3	1/4 - 18 NPT	**56-1585**	**56-2020**
7S4SE	47,75	1.880	65,28	2.570	—	—	15.89	2.63	1.500	4	1/4 - 18 NPT	**56-1585**	**56-2020**





Straight Flute Holders • Metric • Short

short	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
8S0SS	13,00	.512	17,50	.689	4.88	2.88	1.91	2.01	.787	0	**56-1014**	**FT7**
8S1SS	17,86	.703	24,00	.945	6.53	4.33	2.16	2.24	.984	1	**56-1020**	**FT8**
8S2SS	24,61	.969	35,00	1.378	7.49	5.13	2.72	2.40	1.260	2	**56-1585**	**FT15**
8S4SS	48,00	1.890	65,09	2.563	10.08	7.32	3.97	2.80	1.575	4	**56-1585**	**FT20**

Straight Flute Holders • Metric • Medium

medium	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	insert screw	Torx wrench
8S0SM	13,00	.512	17,50	.689	6.01	4.00	2.76	2.01	.787	0	**56-1014**	**FT7**
8S1SM	17,86	.703	24,00	.945	8.58	6.33	4.16	2.24	.984	1	**56-1020**	**FT8**
8S2SM	24,61	.969	35,00	1.378	9.53	7.13	4.72	2.40	1.260	2	**56-1018**	**FT15**
8S3SM	35,72	1.406	47,63	1.875	11.11	8.31	5.32	2.80	1.575	3	**56-1585**	**FT20**

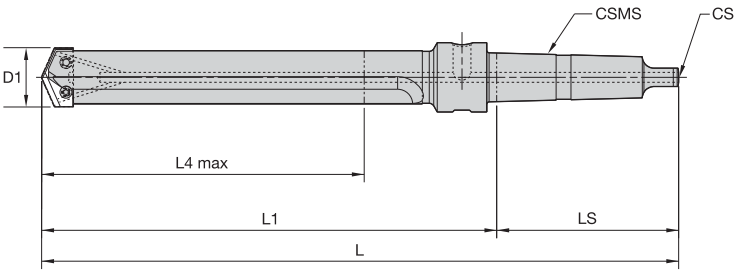
Straight Flute Holders • Metric • Long

long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	CS	 insert screw	 Torx wrench
8S0SL	12,93	.509	17,53	.690	8.01	6.00	4.13	2.01	.787	0	R1/8	**56-1014**	**FT7**
8S1SL	17,86	.703	24,00	.945	10.53	8.33	6.16	2.24	.984	1	—	**56-1020**	**FT8**
8S2SL	24,61	.969	35,00	1.378	11.53	9.13	6.72	2.40	1.260	2	—	**56-1018**	**FT15**

Straight Flute Holders • Metric • Extra Long

extra long	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	D	seat size	 insert screw	 Torx wrench
8S2SE	24,61	.969	35,00	1.378	18.17	15.76	14.27	2.40	1.260	2	**56-1018**	**FT15**

- Through coolant must be used with spade drills depths greater than 1 x D.
- Direct spindle cooling is preferable when using WIDIA™ Spade Blades.
- If spindle cooling is unavailable, then coolant glands or inducers should be used to provide through coolant capability.
- Our holders provide both options; please find available coolant glants below.





Straight Flute Holders • Short

short	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7SZTS	11,10	.437	12,90	.508	6.50	3.56	1.30	3.13	2	Z	8 - 32	**56-1015**	**56-2026**
7S1TS	17,53	.690	24,38	.960	8.73	5.04	2.48	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S2TS	24,41	.961	35,05	1.380	9.44	5.75	3.11	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S2.5TS	30,15	1.187	35,05	1.380	9.44	5.56	3.00	3.88	3	2.5	1/4 - 20	**56-1018**	**56-2015**
7S3TS	35,08	1.381	47,73	1.879	12.13	7.50	4.21	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TS	47,75	1.880	65,28	2.570	13.62	9.00	5.60	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TS	63,50	2.500	88,90	3.500	15.38	9.50	5.63	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**

NOTE: CSMS = Morse taper size.

Straight Flute Holders • Medium

medium	D1 mm	D1 in	D1 max mm	D1 max in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7S0TM	12,93	.509	17,65	.695	8.46	5.52	3.20	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S1TM	17,53	.690	24,38	.960	10.68	6.99	4.43	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S1.5TM	21,82	.859	24,38	.960	10.68	6.80	4.35	3.88	3	1.5	1/4 - 20	**56-1020**	**56-2028**
7S2TM	24,41	.961	35,05	1.380	11.82	8.13	5.49	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S2.5TM-4MT	30,15	1.187	35,05	1.380	12.82	8.19	5.38	4.88	4	2.5	5/16-18	**56-1018**	**56-2015**
7S3TM	35,08	1.381	47,73	1.879	16.13	11.50	8.34	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TM	47,75	1.880	65,28	2.570	17.63	13.00	9.58	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TM	63,50	2.500	88,90	3.500	21.13	15.25	11.38	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**
7S7TM	88,93	3.501	114,30	4.500	22.28	16.40	11.50	6.13	5	7	1/2 - 13	**56-1025**	**56-2125**

NOTE: CSMS = Morse taper size.

Straight Flute Holders • Long

	D1		D1 max										
long	mm	in	mm	in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7SZTL	11,10	.437	12,90	.508	8.51	5.57	3.30	3.13	2	Z	8 - 32	**56-1015**	**56-2026**
7S0TL	12,93	.509	17,65	.695	9.88	6.94	4.60	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S1TL	17,53	.690	24,38	.960	12.60	8.91	6.36	3.88	3	1	1/4 - 20	**56-1020**	**56-2028**
7S2TL	24,41	.961	35,05	1.380	14.19	10.50	7.86	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**
7S3TL	35,08	1.381	47,73	1.879	20.88	16.25	13.28	4.88	4	3	5/16-18	**56-1585**	**56-2020**
7S4TL	47,75	1.880	65,28	2.570	23.75	19.12	15.90	4.88	4	4	5/16-18	**56-1585**	**56-2020**
7S5TL	63,50	2.500	88,90	3.500	26.88	21.00	17.13	6.13	5	5	1/2 - 13	**56-1025**	**56-2125**
7S7TL	88,93	3.501	114,30	4.500	30.53	24.65	19.75	6.13	5	7	1/2 - 13	**56-1025**	**56-2125**

NOTE: CSMS = Morse taper size.

Straight Flute Holders • Extra Long

	D1		D1 max										
extra long	mm	in	mm	in	L	L1	L4 max	LS	CSMS system size	seat size	CS	insert screw	Torx wrench
7S0TE	12,93	.509	17,65	.695	12.93	10.00	7.65	3.13	2	0	8 - 32	**56-1014**	**56-2017**
7S0.5TE	15,47	.609	17,65	.695	12.93	9.80	7.60	3.13	2	—	8 - 32	**56-1014**	**56-2017**
7S2TE	24,41	.961	35,05	1.380	17.26	13.57	11.07	3.88	3	2	1/4 - 20	**56-1018**	**56-2015**

NOTE: CSMS = Morse taper size.



On the Web

We are here to serve you.

Visit our homepage at widia.com to:

- Find a Local WIDIA™ Authorized Distributor near you.
- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
- Purchase WIDIA-branded merchandise.
- Get social with us on Facebook, Twitter, Instagram, YouTube, and more!



NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

HydroForce™ HT Chuck



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

HydroForce™ HT Chuck High Torque for High Metal Removal Rates (MRR) and Superior Surface Finish

- HydroForce gives you an unmatched combination of accuracy and clamping forces.
- Compact and stable design.
- Advanced hydraulic clamping with lowest runout and superior vibration dampening.
- Balanced quality to lower vibration, especially at high speeds.
- Focused and flexible product offering.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com.**

WIDIA™



Holemaking • Indexable Drills

Introduction.....V2–V3

Top Cut 4.....V4–V40



		standard ● first choice ○ alternate choice						hole tolerance	standard range			customised solution range			
									diameter range		drilling depth L/D1	diameter range		drilling depth
									D1 mm	D1 in		D1 mm	D1 inch	
		P	M	K	N	S	H		min–max	min–max		min–max	min–max	
	**Top Cut 4**™ *Indexable Drill Body* *Short Hole Drilling*	●	●	●				IT9–11	12–68	.473–2.5	2 x D 3 x D 4 x D 5 x D	12–110	.473–4.33	2–5 x D [2]

In regard to insert and drill coatings, anything is possible. If a specific insert or drill is not suitable for your workpiece material, please contact our Engineered Solutions Department for an offer about special coatings and edge preparations.
**Except for L/D 5 x D.*
1) Other shank styles available as customised solution.
2) Dependent on the application, up to 6 x D is possible.

	● standard capabilities [1]			● standard ○ customised solution capabilities										page(s)
	Coolant													
		•	•	•	•	•	•	•	•*	•	•	•	•	V8–V23

WIDIA™ Top Cut 4™ •

New Generation Indexable Drilling System

Top Cut 4



The new WIDIA Top Cut 4 (TC4) portfolio is a broad offering for customers looking for a versatile indexable drilling platform.

The newly developed TC4 features improved centring capabilities and inserts with four cutting edges for both pocket seats (central and periphery). This, in combination with the renowned WIDIA grade technology, leads to outstanding flexibility and efficiency.

The TC4 platform offers three easy-to-select grades and two geometries applicable for steel, cast iron, and stainless steel materials. It covers the diameter range from 12–68mm within the standard offering in L/D ratios of 2–5 x D.

One Comprehensive Platform

- Standard diameter range covering 12–68mm in 2 x D, 3 x D, 4 x D, and 5 x D.
- Four real cutting edges each for entire platform.
- Eight insert sizes to cover complete diameter range.

Easy to Apply

- No risk of mixing up inner and outer insert due to clear visual differences.
- Easy-to-change inserts, laser marked with geometries and grades.
- Easy-to-use nomenclature guide enabling the tool body and the related insert selection to avoid order failures.

Highly Versatile

- Breadth of application capabilities include through and cross holes, inclined entry and exit opportunity, 45º corner, half cylindrical, concave, or chain drilling.
- Various geometries and grades available.

Highest Performance

- 2x four true cutting edges.
- Cutting edge profile of central and periphery insert work together, leading to high stabilisation of the drill, preventing drifting of the tool even on irregular surfaces.
- X-offset design to adjust diameter size on turning machines and optimise tolerances on machining centres.
- Apply where speed and economy are prime considerations.
- Three grades to achieve higher tool life at accelerated speeds:
  - WU25CH grade for highest metal removal rate in general applications.
  - WU40PH grade for high toughness demands.
  - WPK10CH grade for high-speed applications.



The guide below provides an example of how to select the
Top Cut 4 tool body and accompanying inserts for a stable steel drilling application.

Metric Body

TCF	250	R	3	SL	32	M	D
Tool Family Top Cut 4	Diameter Metric = 3 digits (e.g. 250 = 25mm) Inch = 4 digits (e.g. 2500 = 2.5")	Right-Hand Cutting	Length Diameter Ratio L/D = 3 x D	Shank Style SL = Side Lock Adaptor	Shank Size	Metric	Insert Size

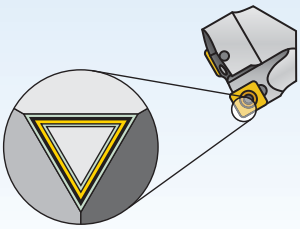
Periphery Insert

TCF	08	03	08	D	P	V34	WU25CH
Tool Family Top Cut 4	Size In-Circle D1	Insert Thickness	Insert Corner Radius	Insert Size	Insert Positioning C = Central P = Periphery	Insert Geometry	Grade

Insert Geometry – V34 for steel or cast iron or V36 for stainless steel and long chipping steel.

Insert Guide for Grades

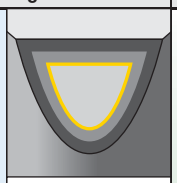
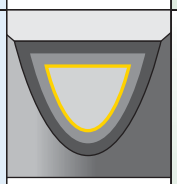
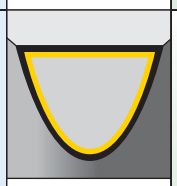
W	U	25	C	H
W	U	40	P	H
W	PK	10	C	H
WIDIA™	Material Range U = Universal P = Steel K = Cast Iron	Toughness Range Choose high numbers for toughness in stable conditions, low numbers for high wear resistance at continuous cuts.	Coating P = PVD C = CVD	Application H = Holemaking

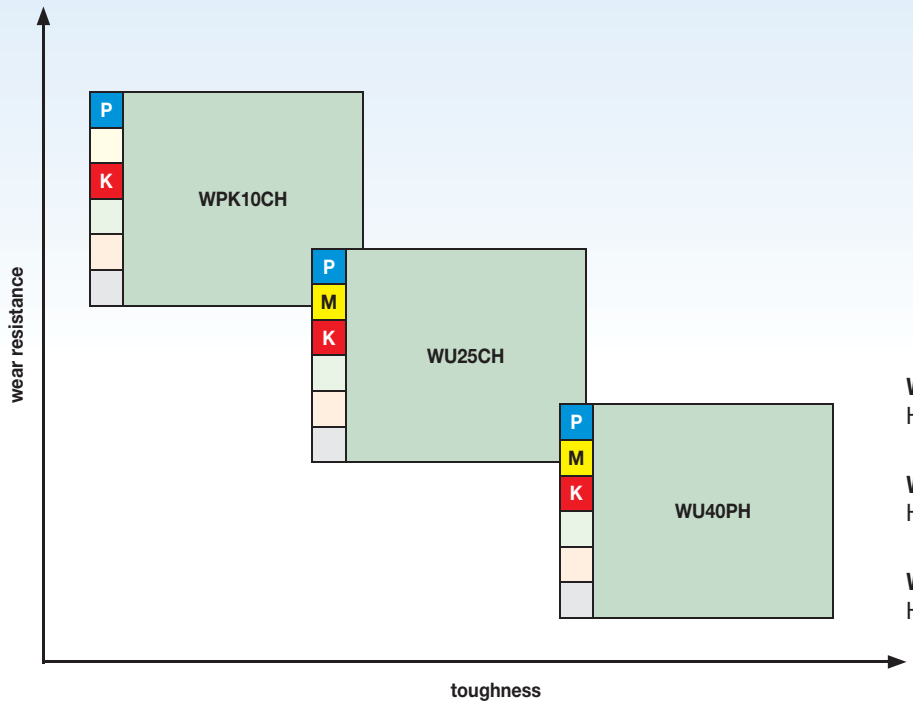


Coatings provide high-speed capability and are engineered for finishing to light roughing.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

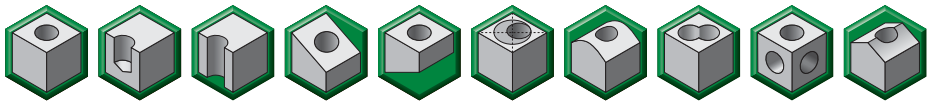
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WPK10CH	 TiCN-Al_2O_3	**Composition:** With an advanced CVD TiCN-Al_2O_3 coating combined with a cobalt-enriched carbide substrate, this grade offers a balanced combination of deformation-resistance and edge toughness. **Application:** Offers outstanding abrasion and crater wear resistance for high-speed machining of steels and cast irons. Use for very high cutting speeds with low to medium feed rates.	P									
			K									
WU25CH	 TiCN-Al_2O_3	**Composition:** Advanced CVD TiCN-Al_2O_3 coating together with a newly engineered tough carbide substrate. Ensures adequate deformation resistance and excellent edge strength and offers very good wear resistance over a wide range of machining conditions. **Application:** A high productivity grade with high speeds and feeds. First choice for high productivity with very good reliability in steels, stainless steels, and cast iron rates.	P									
			M									
			K									
WU40PH	 TiCN-Al_2O_3	**Composition:** With a multilayered PVD TiN-TiAlN coating and a tough substrate, this grade withstands interruptions and provides high wear resistance for long tool life. **Application:** First choice for high reliability in most materials. This grade should be used at medium speeds and high feeds due to sharper edges and as a grade for high-toughness applications. It covers steel, stainless steel, cast iron, and high-temp alloys under certain conditions.	P									
			M									
			K									

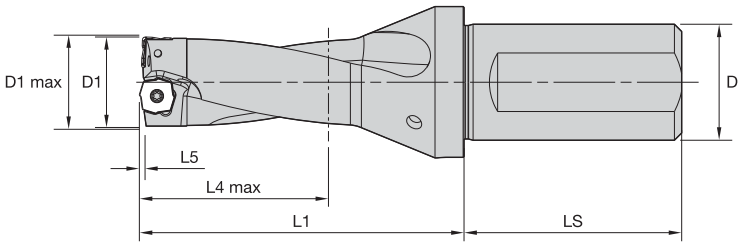


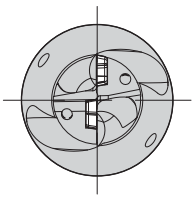
WPK10CH:
High-Speed Grade

WU25CH:
High Metal Removal Rate Grade

WU40PH:
High Toughness Grade











For information on LS, see the table on page V10.

■ Top Cut 4 Drill • Metric • 2 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537778	TCF120R2SL20MA	12,00	12,50	20	54,6	24,0	0,41	A	TCF040204AP	TCF040203AC
5537779	TCF125R2SL20MA	12,50	13,00	20	55,8	25,0	0,48	A	TCF040204AP	TCF040203AC
5537860	TCF127R2SL20MA	12,70	13,20	20	56,2	26,0	0,51	A	TCF040204AP	TCF040203AC
5537861	TCF130R2SL20MA	13,00	13,50	20	56,9	26,0	0,56	A	TCF040204AP	TCF040203AC
5537862	TCF135R2SL20MA	13,50	14,00	20	58,1	27,0	0,64	A	TCF040204AP	TCF040203AC
5577828	TCF140R2SL25MB	14,00	14,50	25	59,8	28,0	0,42	B	TCF050204BP	TCF060203BC
5577829	TCF145R2SL25MB	14,50	15,00	25	60,9	29,0	0,45	B	TCF050204BP	TCF060203BC
5577920	TCF150R2SL25MB	15,00	15,50	25	62,1	30,0	0,49	B	TCF050204BP	TCF060203BC
5577921	TCF155R2SL25MB	15,50	16,00	25	63,3	31,0	0,54	B	TCF050204BP	TCF060203BC
5577922	TCF160R2SL25MB	16,00	16,50	25	64,4	32,0	0,60	B	TCF050204BP	TCF060203BC
5577923	TCF165R2SL25MB	16,50	17,00	25	65,6	33,0	0,68	B	TCF050204BP	TCF060203BC
5577924	TCF170R2SL25MB	17,00	17,50	25	68,4	34,0	0,74	B	TCF050204BP	TCF060203BC
5577925	TCF175R2SL25MB	17,50	18,00	25	69,6	35,0	0,79	B	TCF050204BP	TCF060203BC
5577926	TCF180R2SL25MB	18,00	18,50	25	70,8	36,0	0,86	B	TCF050204BP	TCF060203BC
5577927	TCF185R2SL25MB	18,50	19,00	25	71,9	37,0	0,83	B	TCF050204BP	TCF060203BC
5578820	TCF190R2SL25MC	19,00	19,50	25	72,1	38,0	0,60	C	TCF070306CP	TCF070304CC
5578821	TCF195R2SL25MC	19,50	20,00	25	73,2	39,0	0,70	C	TCF070306CP	TCF070304CC
5578822	TCF200R2SL25MC	20,00	20,50	25	74,4	40,0	0,70	C	TCF070306CP	TCF070304CC
5578823	TCF205R2SL25MC	20,50	21,00	25	75,6	41,0	0,70	C	TCF070306CP	TCF070304CC
5578824	TCF210R2SL25MC	21,00	21,50	25	76,7	42,0	0,80	C	TCF070306CP	TCF070304CC
5578825	TCF220R2SL25MC	22,00	22,50	25	79,0	44,0	1,00	C	TCF070306CP	TCF070304CC
5578826	TCF225R2SL25MC	22,50	23,00	25	80,2	45,0	1,10	C	TCF070306CP	TCF070304CC
5578827	TCF230R2SL25MC	23,00	23,50	25	81,4	46,0	1,10	C	TCF070306CP	TCF070304CC
5537167	TCF240R2SL25MD	24,00	25,00	25	87,2	48,0	0,78	D	TCF080308DP	TCF090305DC
5537168	TCF250R2SL32MD	25,00	26,00	32	89,6	50,0	0,86	D	TCF080308DP	TCF090305DC
5537169	TCF260R2SL32MD	26,00	27,00	32	91,9	52,0	0,97	D	TCF080308DP	TCF090305DC
5537820	TCF265R2SL32MD	26,50	27,50	32	93,0	53,0	1,05	D	TCF080308DP	TCF090305DC
5537821	TCF270R2SL32MD	27,00	28,00	32	94,2	54,0	1,15	D	TCF080308DP	TCF090305DC
5537822	TCF280R2SL32MD	28,00	29,00	32	96,5	56,0	1,30	D	TCF080308DP	TCF090305DC
5537823	TCF290R2SL32MD	29,00	30,00	32	98,8	58,0	1,45	D	TCF080308DP	TCF090305DC
5537937	TCF300R2SL32ME	30,00	31,00	32	100,2	60,0	0,63	E	TCF100408EP	TCF120405EC
5537938	TCF310R2SL32ME	31,00	32,00	32	102,5	62,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

(Top Cut 4 Drill • Metric • 2 x D • SL Shanks — continued)

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537939	TCF320R2SL32ME	32,00	33,00	32	104,8	64,0	0,82	E	TCF100408EP	TCF120405EC
5537940	TCF330R2SL40ME	33,00	34,00	40	107,1	66,0	0,95	E	TCF100408EP	TCF120405EC
5537941	TCF340R2SL40ME	34,00	35,00	40	109,4	68,0	1,14	E	TCF100408EP	TCF120405EC
5537942	TCF350R2SL40ME	35,00	36,00	40	111,8	70,0	1,30	E	TCF100408EP	TCF120405EC
5537943	TCF360R2SL40ME	36,00	37,00	40	114,1	72,0	1,45	E	TCF100408EP	TCF120405EC
5578539	TCF370R2SL40MF	37,00	38,00	40	118,1	74,0	1,19	F	TCF120412FP	TCF150406FC
5578600	TCF375R2SL40MF	37,50	38,50	40	119,3	75,0	1,23	F	TCF120412FP	TCF150406FC
5578601	TCF380R2SL40MF	38,00	39,00	40	120,5	76,0	1,27	F	TCF120412FP	TCF150406FC
5578602	TCF390R2SL40MF	39,00	40,00	40	122,8	78,0	1,36	F	TCF120412FP	TCF150406FC
5578603	TCF400R2SL40MF	40,00	41,00	40	125,1	80,0	1,47	F	TCF120412FP	TCF150406FC
5578604	TCF410R2SL40MF	41,00	42,00	40	127,4	82,0	1,60	F	TCF120412FP	TCF150406FC
5578605	TCF420R2SL40MF	42,00	43,00	40	129,7	84,0	1,77	F	TCF120412FP	TCF150406FC
5578606	TCF430R2SL40MF	43,00	44,00	40	132,1	86,0	1,99	F	TCF120412FP	TCF150406FC
5578607	TCF440R2SL40MF	44,00	45,00	40	134,4	88,0	2,10	F	TCF120412FP	TCF150406FC
5578608	TCF450R2SL50MF	45,00	46,00	50	136,7	90,0	2,21	F	TCF120412FP	TCF150406FC
5578694	TCF460R2SL50MG	46,00	47,00	50	139,0	92,0	1,45	G	TCF150512GP	TCF180508GC
5578695	TCF470R2SL50MG	47,00	48,00	50	141,3	94,0	1,53	G	TCF150512GP	TCF180508GC
5578696	TCF480R2SL50MG	48,00	49,00	50	143,7	96,0	1,63	G	TCF150512GP	TCF180508GC
5578697	TCF490R2SL50MG	49,00	50,00	50	146,0	98,0	1,74	G	TCF150512GP	TCF180508GC
5578698	TCF500R2SL50MG	50,00	51,00	50	149,8	100,0	1,87	G	TCF150512GP	TCF180508GC
5578699	TCF505R2SL50MG	50,50	51,50	50	151,0	101,0	1,94	G	TCF150512GP	TCF180508GC
5578710	TCF510R2SL50MG	51,00	52,00	50	152,1	102,0	2,02	G	TCF150512GP	TCF180508GC
5578711	TCF520R2SL50MG	52,00	53,00	50	154,4	104,0	2,22	G	TCF150512GP	TCF180508GC
5578712	TCF530R2SL50MG	53,00	54,00	50	156,8	106,0	2,46	G	TCF150512GP	TCF180508GC
5578713	TCF540R2SL50MG	54,00	55,00	50	159,1	108,0	2,53	G	TCF150512GP	TCF180508GC
5578714	TCF550R2SL50MG	55,00	56,00	50	161,4	110,0	2,73	G	TCF150512GP	TCF180508GC
5578715	TCF560R2SL50MG	56,00	57,00	50	163,7	112,0	2,37	G	TCF150512GP	TCF180508GC
5538613	TCF570R2SL50MH	57,00	58,00	50	165,5	114,0	1,76	H	TCF180614HP	TCF210608HC
5538614	TCF580R2SL50MH	58,00	59,00	50	167,9	116,0	1,85	H	TCF180614HP	TCF210608HC
5538615	TCF590R2SL50MH	59,00	60,00	50	170,2	118,0	1,96	H	TCF180614HP	TCF210608HC
5538616	TCF600R2SL50MH	60,00	61,00	50	172,5	120,0	1,42	H	TCF180614HP	TCF210608HC
5538617	TCF610R2SL50MH	61,00	62,00	50	174,8	122,0	2,23	H	TCF180614HP	TCF210608HC
5538618	TCF620R2SL50MH	62,00	63,00	50	177,1	124,0	2,41	H	TCF180614HP	TCF210608HC
5538619	TCF630R2SL50MH	63,00	64,00	50	179,5	126,0	2,64	H	TCF180614HP	TCF210608HC
5538630	TCF640R2SL50MH	64,00	65,00	50	181,8	128,0	2,94	H	TCF180614HP	TCF210608HC
5538631	TCF650R2SL50MH	65,00	66,00	50	184,1	130,0	3,06	H	TCF180614HP	TCF210608HC
5538632	TCF660R2SL50MH	66,00	67,00	50	186,4	132,0	3,18	H	TCF180614HP	TCF210608HC
5538633	TCF670R2SL50MH	67,00	68,00	50	188,7	134,0	3,30	H	TCF180614HP	TCF210608HC
5538634	TCF680R2SL50MH	68,00	69,00	50	191,1	136,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 2 x D • SL Shanks — continued)

Spare Parts





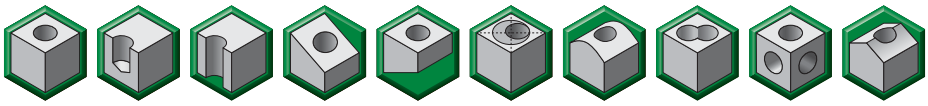
insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

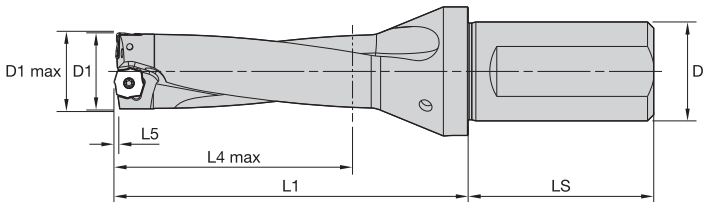
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.



WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





For information on LS, see the table on page V13.



Top Cut 4 Drill • Metric • 3 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537863	TCF120R3SL20MA	12,00	12,50	20	66,6	36,0	0,41	A	TCF040204AP	TCF040203AC
5537864	TCF125R3SL20MA	12,50	13,00	20	68,3	37,5	0,48	A	TCF040204AP	TCF040203AC
5537866	TCF127R3SL20MA	12,70	13,20	20	68,9	38,1	0,51	A	TCF040204AP	TCF040203AC
5537867	TCF130R3SL20MA	13,00	13,50	20	69,9	39,0	0,56	A	TCF040204AP	TCF040203AC
5537868	TCF135R3SL20MA	13,50	14,00	20	71,6	41,0	0,64	A	TCF040204AP	TCF040203AC
5577928	TCF140R3SL25MB	14,00	14,50	25	73,8	42,0	0,42	B	TCF050204BP	TCF060203BC
5577929	TCF145R3SL25MB	14,50	15,00	25	75,4	43,5	0,45	B	TCF050204BP	TCF060203BC
5577930	TCF150R3SL25MB	15,00	15,50	25	77,1	45,0	0,49	B	TCF050204BP	TCF060203BC
5577931	TCF155R3SL25MB	15,50	16,00	25	78,8	46,5	0,54	B	TCF050204BP	TCF060203BC
5577932	TCF160R3SL25MB	16,00	16,50	25	80,4	48,0	0,60	B	TCF050204BP	TCF060203BC
5577933	TCF165R3SL25MB	16,50	17,00	25	82,1	49,5	0,68	B	TCF050204BP	TCF060203BC
5577934	TCF170R3SL25MB	17,00	17,50	25	85,4	51,0	0,74	B	TCF050204BP	TCF060203BC
5577935	TCF175R3SL25MB	17,50	18,00	25	87,1	52,5	0,79	B	TCF050204BP	TCF060203BC
5577936	TCF180R3SL25MB	18,00	18,50	25	88,8	54,0	0,86	B	TCF050204BP	TCF060203BC
5577937	TCF185R3SL25MB	18,50	19,00	25	90,4	55,5	0,83	B	TCF050204BP	TCF060203BC
5578828	TCF190R3SL25MC	19,00	19,50	25	91,1	57,0	0,60	C	TCF070306CP	TCF070304CC
5578829	TCF195R3SL25MC	19,50	20,00	25	92,7	58,5	0,70	C	TCF070306CP	TCF070304CC
5578830	TCF200R3SL25MC	20,00	20,50	25	94,4	60,0	0,70	C	TCF070306CP	TCF070304CC
5578831	TCF205R3SL25MC	20,50	21,00	25	96,1	61,5	0,70	C	TCF070306CP	TCF070304CC
5578832	TCF210R3SL25MC	21,00	21,50	25	97,7	63,0	0,80	C	TCF070306CP	TCF070304CC
5578833	TCF220R3SL25MC	22,00	22,50	25	101,0	66,0	1,00	C	TCF070306CP	TCF070304CC
5578834	TCF225R3SL25MC	22,50	23,00	25	102,7	67,5	1,10	C	TCF070306CP	TCF070304CC
5578835	TCF230R3SL25MC	23,00	23,50	25	104,4	69,0	1,10	C	TCF070306CP	TCF070304CC
5537824	TCF240R3SL25MD	24,00	25,00	25	111,2	72,0	0,78	D	TCF080308DP	TCF090305DC
5537825	TCF250R3SL32MD	25,00	26,00	32	114,6	75,0	0,86	D	TCF080308DP	TCF090305DC
5537826	TCF260R3SL32MD	26,00	27,00	32	117,9	78,0	0,97	D	TCF080308DP	TCF090305DC
5537827	TCF265R3SL32MD	26,50	27,50	32	119,5	79,5	1,05	D	TCF080308DP	TCF090305DC
5537828	TCF270R3SL32MD	27,00	28,00	32	121,2	81,0	1,15	D	TCF080308DP	TCF090305DC
5537829	TCF280R3SL32MD	28,00	29,00	32	124,5	84,0	1,30	D	TCF080308DP	TCF090305DC
5537830	TCF290R3SL32MD	29,00	30,00	32	127,8	87,0	1,45	D	TCF080308DP	TCF090305DC
5537944	TCF300R3SL32ME	30,00	31,00	32	130,2	90,0	0,63	E	TCF100408EP	TCF120405EC
5537945	TCF310R3SL32ME	31,00	32,00	32	133,5	93,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

(Top Cut 4 Drill • Metric • 3 x D • SL Shanks — continued)

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537946	TCF320R3SL32ME	32,00	33,00	32	136,8	96,0	0,82	E	TCF100408EP	TCF120405EC
5537947	TCF330R3SL40ME	33,00	34,00	40	140,1	99,0	0,95	E	TCF100408EP	TCF120405EC
5537948	TCF340R3SL40ME	34,00	35,00	40	143,4	102,0	1,14	E	TCF100408EP	TCF120405EC
5537949	TCF350R3SL40ME	35,00	36,00	40	146,8	105,0	1,30	E	TCF100408EP	TCF120405EC
5537950	TCF360R3SL40ME	36,00	37,00	40	150,1	108,0	1,45	E	TCF100408EP	TCF120405EC
5578609	TCF370R3SL40MF	37,00	38,00	40	155,1	111,0	1,19	F	TCF120412FP	TCF150406FC
5578610	TCF375R3SL40MF	37,50	38,50	40	156,8	113,0	1,23	F	TCF120412FP	TCF150406FC
5578611	TCF380R3SL40MF	38,00	39,00	40	158,5	114,0	1,27	F	TCF120412FP	TCF150406FC
5578612	TCF390R3SL40MF	39,00	40,00	40	161,8	117,0	1,36	F	TCF120412FP	TCF150406FC
5578613	TCF400R3SL40MF	40,00	41,00	40	165,1	120,0	1,47	F	TCF120412FP	TCF150406FC
5578614	TCF410R3SL40MF	41,00	42,00	40	168,4	123,0	1,60	F	TCF120412FP	TCF150406FC
5578615	TCF420R3SL40MF	42,00	43,00	40	171,7	126,0	1,77	F	TCF120412FP	TCF150406FC
5578616	TCF430R3SL40MF	43,00	44,00	40	175,1	129,0	1,99	F	TCF120412FP	TCF150406FC
5578617	TCF440R3SL40MF	44,00	45,00	40	178,4	132,0	2,10	F	TCF120412FP	TCF150406FC
5578618	TCF450R3SL50MF	45,00	46,00	50	181,7	135,0	2,21	F	TCF120412FP	TCF150406FC
5578716	TCF460R3SL50MG	46,00	47,00	50	185,0	138,0	1,45	G	TCF150512GP	TCF180508GC
5578717	TCF470R3SL50MG	47,00	48,00	50	188,3	141,0	1,53	G	TCF150512GP	TCF180508GC
5578718	TCF480R3SL50MG	48,00	49,00	50	191,7	144,0	1,63	G	TCF150512GP	TCF180508GC
5578719	TCF490R3SL50MG	49,00	50,00	50	195,0	147,0	1,74	G	TCF150512GP	TCF180508GC
5578720	TCF500R3SL50MG	50,00	51,00	50	199,8	150,0	1,87	G	TCF150512GP	TCF180508GC
5578721	TCF505R3SL50MG	50,50	51,50	50	201,5	152,0	1,94	G	TCF150512GP	TCF180508GC
5578722	TCF510R3SL50MG	51,00	52,00	50	203,1	153,0	2,02	G	TCF150512GP	TCF180508GC
5578723	TCF520R3SL50MG	52,00	53,00	50	206,4	156,0	2,22	G	TCF150512GP	TCF180508GC
5578724	TCF530R3SL50MG	53,00	54,00	50	209,8	159,0	2,46	G	TCF150512GP	TCF180508GC
5578726	TCF540R3SL50MG	54,00	55,00	50	213,1	162,0	2,53	G	TCF150512GP	TCF180508GC
5578727	TCF550R3SL50MG	55,00	56,00	50	216,4	165,0	2,73	G	TCF150512GP	TCF180508GC
5578728	TCF560R3SL50MG	56,00	57,00	50	219,7	168,0	2,37	G	TCF150512GP	TCF180508GC
5538635	TCF570R3SL50MH	57,00	58,00	50	222,5	171,0	1,76	H	TCF180614HP	TCF210608HC
5538636	TCF580R3SL50MH	58,00	59,00	50	225,9	174,0	1,85	H	TCF180614HP	TCF210608HC
5538637	TCF590R3SL50MH	59,00	60,00	50	229,2	177,0	1,96	H	TCF180614HP	TCF210608HC
5538638	TCF600R3SL50MH	60,00	61,00	50	232,5	180,0	1,42	H	TCF180614HP	TCF210608HC
5538639	TCF610R3SL50MH	61,00	62,00	50	235,8	183,0	2,23	H	TCF180614HP	TCF210608HC
5538640	TCF620R3SL50MH	62,00	63,00	50	239,1	186,0	2,41	H	TCF180614HP	TCF210608HC
5538641	TCF630R3SL50MH	63,00	64,00	50	242,5	189,0	2,64	H	TCF180614HP	TCF210608HC
5538642	TCF640R3SL50MH	64,00	65,00	50	245,8	192,0	2,94	H	TCF180614HP	TCF210608HC
5538643	TCF650R3SL50MH	65,00	66,00	50	249,1	195,0	3,06	H	TCF180614HP	TCF210608HC
5538644	TCF660R3SL50MH	66,00	67,00	50	252,4	198,0	3,18	H	TCF180614HP	TCF210608HC
5538645	TCF670R3SL50MH	67,00	68,00	50	255,7	201,0	3,30	H	TCF180614HP	TCF210608HC
5538646	TCF680R3SL50MH	68,00	69,00	50	259,1	204,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 3 x D • SL Shanks — continued)

Spare Parts



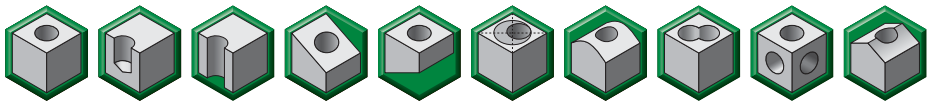

insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

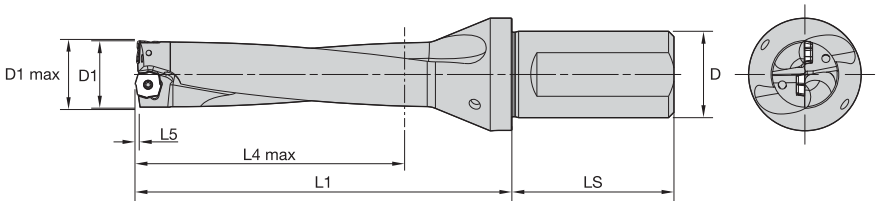
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.



WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





For information on LS, see the table on page V16.



Top Cut 4 Drill • Metric • 4 x D • SL Shanks

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537869	TCF120R4SL20MA	12,00	12,50	20	78,6	48,0	0,41	A	TCF040204AP	TCF040203AC
5537870	TCF125R4SL20MA	12,50	13,00	20	80,8	50,0	0,48	A	TCF040204AP	TCF040203AC
5537871	TCF127R4SL20MA	12,70	13,20	20	81,6	50,8	0,51	A	TCF040204AP	TCF040203AC
5537872	TCF130R4SL20MA	13,00	13,50	20	82,9	52,0	0,56	A	TCF040204AP	TCF040203AC
5537873	TCF135R4SL20MA	13,50	14,00	20	85,1	54,0	0,64	A	TCF040204AP	TCF040203AC
5577938	TCF140R4SL25MB	14,00	14,50	25	87,8	56,0	0,42	B	TCF050204BP	TCF060203BC
5577939	TCF145R4SL25MB	14,50	15,00	25	89,9	58,0	0,45	B	TCF050204BP	TCF060203BC
5577940	TCF150R4SL25MB	15,00	15,50	25	92,1	60,0	0,49	B	TCF050204BP	TCF060203BC
5577941	TCF155R4SL25MB	15,50	16,00	25	94,3	62,0	0,54	B	TCF050204BP	TCF060203BC
5577942	TCF160R4SL25MB	16,00	16,50	25	96,4	64,0	0,60	B	TCF050204BP	TCF060203BC
5577943	TCF165R4SL25MB	16,50	17,00	25	98,6	66,0	0,68	B	TCF050204BP	TCF060203BC
5577944	TCF170R4SL25MB	17,00	17,50	25	102,4	68,0	0,74	B	TCF050204BP	TCF060203BC
5577945	TCF175R4SL25MB	17,50	18,00	25	104,6	70,0	0,79	B	TCF050204BP	TCF060203BC
5577946	TCF180R4SL25MB	18,00	18,50	25	106,8	72,0	0,86	B	TCF050204BP	TCF060203BC
5577947	TCF185R4SL25MB	18,50	19,00	25	108,9	74,0	0,83	B	TCF050204BP	TCF060203BC
5578836	TCF190R4SL25MC	19,00	19,50	25	110,1	76,0	0,60	C	TCF070306CP	TCF070304CC
5578837	TCF195R4SL25MC	19,50	20,00	25	112,2	78,0	0,70	C	TCF070306CP	TCF070304CC
5578838	TCF200R4SL25MC	20,00	20,50	25	114,4	80,0	0,70	C	TCF070306CP	TCF070304CC
5578839	TCF205R4SL25MC	20,50	21,00	25	116,6	82,0	0,70	C	TCF070306CP	TCF070304CC
5578840	TCF210R4SL25MC	21,00	21,50	25	118,7	84,0	0,80	C	TCF070306CP	TCF070304CC
5578841	TCF220R4SL25MC	22,00	22,50	25	123,0	88,0	1,00	C	TCF070306CP	TCF070304CC
5578842	TCF225R4SL25MC	22,50	23,00	25	125,2	90,0	1,10	C	TCF070306CP	TCF070304CC
5578843	TCF230R4SL25MC	23,00	23,50	25	127,4	92,0	1,10	C	TCF070306CP	TCF070304CC
5537831	TCF240R4SL25MD	24,00	25,00	25	135,2	96,0	0,78	D	TCF080308DP	TCF090305DC
5537832	TCF250R4SL32MD	25,00	26,00	32	139,6	100,0	0,86	D	TCF080308DP	TCF090305DC
5537833	TCF260R4SL32MD	26,00	27,00	32	143,9	104,0	0,97	D	TCF080308DP	TCF090305DC
5537834	TCF265R4SL32MD	26,50	27,50	32	146,0	106,0	1,05	D	TCF080308DP	TCF090305DC
5537835	TCF270R4SL32MD	27,00	28,00	32	148,2	108,0	1,15	D	TCF080308DP	TCF090305DC
5537836	TCF280R4SL32MD	28,00	29,00	32	152,5	112,0	1,30	D	TCF080308DP	TCF090305DC
5537837	TCF290R4SL32MD	29,00	30,00	32	156,8	116,0	1,45	D	TCF080308DP	TCF090305DC
5537951	TCF300R4SL32ME	30,00	31,00	32	160,2	120,0	0,63	E	TCF100408EP	TCF120405EC
5537952	TCF310R4SL32ME	31,00	32,00	32	164,5	124,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

(Top Cut 4 Drill • Metric • 4 x D • SL Shanks — continued)

order number	catalogue number	D1	D1 max	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537953	TCF320R4SL32ME	32,00	33,00	32	168,8	128,0	0,82	E	TCF100408EP	TCF120405EC
5537954	TCF330R4SL40ME	33,00	34,00	40	173,1	132,0	0,95	E	TCF100408EP	TCF120405EC
5537955	TCF340R4SL40ME	34,00	35,00	40	177,4	136,0	1,14	E	TCF100408EP	TCF120405EC
5537956	TCF350R4SL40ME	35,00	36,00	40	181,8	140,0	1,30	E	TCF100408EP	TCF120405EC
5537957	TCF360R4SL40ME	36,00	37,00	40	186,1	144,0	1,45	E	TCF100408EP	TCF120405EC
5578619	TCF370R4SL40MF	37,00	38,00	40	192,1	148,0	1,19	F	TCF120412FP	TCF150406FC
5578620	TCF375R4SL40MF	37,50	38,50	40	194,3	150,0	1,23	F	TCF120412FP	TCF150406FC
5578621	TCF380R4SL40MF	38,00	39,00	40	196,5	152,0	1,27	F	TCF120412FP	TCF150406FC
5578622	TCF390R4SL40MF	39,00	40,00	40	200,8	156,0	1,36	F	TCF120412FP	TCF150406FC
5578623	TCF400R4SL40MF	40,00	41,00	40	205,1	160,0	1,47	F	TCF120412FP	TCF150406FC
5578624	TCF410R4SL40MF	41,00	42,00	40	209,4	164,0	1,60	F	TCF120412FP	TCF150406FC
5578625	TCF420R4SL40MF	42,00	43,00	40	213,7	168,0	1,77	F	TCF120412FP	TCF150406FC
5578626	TCF430R4SL40MF	43,00	44,00	40	218,1	172,0	1,99	F	TCF120412FP	TCF150406FC
5578627	TCF440R4SL40MF	44,00	45,00	40	222,4	176,0	2,10	F	TCF120412FP	TCF150406FC
5578628	TCF450R4SL50MF	45,00	46,00	50	226,7	180,0	2,21	F	TCF120412FP	TCF150406FC
5578729	TCF460R4SL50MG	46,00	47,00	50	231,0	184,0	1,45	G	TCF150512GP	TCF180508GC
5578730	TCF470R4SL50MG	47,00	48,00	50	235,3	188,0	1,53	G	TCF150512GP	TCF180508GC
5578731	TCF480R4SL50MG	48,00	49,00	50	239,7	192,0	1,63	G	TCF150512GP	TCF180508GC
5578732	TCF490R4SL50MG	49,00	50,00	50	244,0	196,0	1,74	G	TCF150512GP	TCF180508GC
5578733	TCF500R4SL50MG	50,00	51,00	50	249,8	200,0	1,87	G	TCF150512GP	TCF180508GC
5578734	TCF505R4SL50MG	50,50	51,50	50	252,0	202,0	1,94	G	TCF150512GP	TCF180508GC
5578735	TCF510R4SL50MG	51,00	52,00	50	254,1	204,0	2,02	G	TCF150512GP	TCF180508GC
5578736	TCF520R4SL50MG	52,00	53,00	50	258,4	208,0	2,22	G	TCF150512GP	TCF180508GC
5578737	TCF530R4SL50MG	53,00	54,00	50	262,8	212,0	2,46	G	TCF150512GP	TCF180508GC
5578738	TCF540R4SL50MG	54,00	55,00	50	267,1	216,0	2,53	G	TCF150512GP	TCF180508GC
5578739	TCF550R4SL50MG	55,00	56,00	50	271,4	220,0	2,73	G	TCF150512GP	TCF180508GC
5578750	TCF560R4SL50MG	56,00	57,00	50	275,7	224,0	2,37	G	TCF150512GP	TCF180508GC
5538647	TCF570R4SL50MH	57,00	58,00	50	279,5	228,0	1,76	H	TCF180614HP	TCF210608HC
5538648	TCF580R4SL50MH	58,00	59,00	50	283,9	232,0	1,85	H	TCF180614HP	TCF210608HC
5538649	TCF590R4SL50MH	59,00	60,00	50	288,2	236,0	1,96	H	TCF180614HP	TCF210608HC
5538650	TCF600R4SL50MH	60,00	61,00	50	292,5	240,0	1,42	H	TCF180614HP	TCF210608HC
5538651	TCF610R4SL50MH	61,00	62,00	50	296,8	244,0	2,23	H	TCF180614HP	TCF210608HC
5538652	TCF620R4SL50MH	62,00	63,00	50	301,1	248,0	2,41	H	TCF180614HP	TCF210608HC
5538653	TCF630R4SL50MH	63,00	64,00	50	305,5	252,0	2,64	H	TCF180614HP	TCF210608HC
5538654	TCF640R4SL50MH	64,00	65,00	50	309,8	256,0	2,94	H	TCF180614HP	TCF210608HC
5538655	TCF650R4SL50MH	65,00	66,00	50	314,1	260,0	3,06	H	TCF180614HP	TCF210608HC
5538656	TCF660R4SL50MH	66,00	67,00	50	318,4	264,0	3,18	H	TCF180614HP	TCF210608HC
5538657	TCF670R4SL50MH	67,00	68,00	50	322,7	268,0	3,30	H	TCF180614HP	TCF210608HC
5538658	TCF680R4SL50MH	68,00	69,00	50	327,1	272,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 4 x D • SL Shanks — continued)

Spare Parts



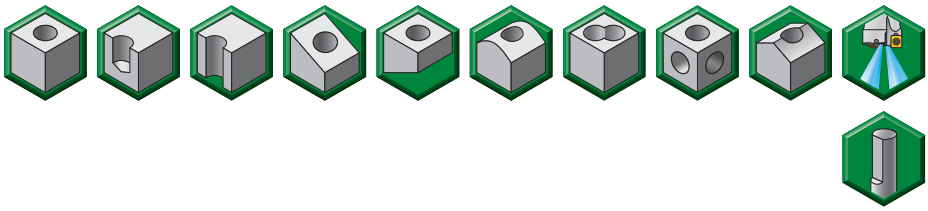

insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

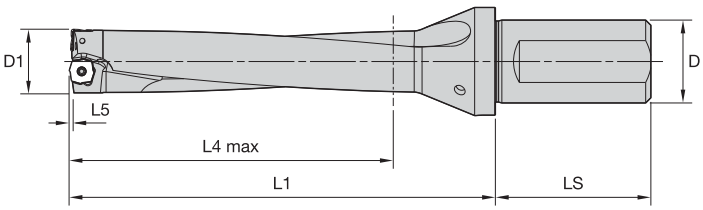
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drilling in stacked plates possible in certain applications. Ask for technical support.
Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock
D1 max is an achievable diameter using x-offset.



WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.







For information on LS, see the table on page V19.

Top Cut 4 Drill • Metric • 5 x D • SL Shanks

order number	catalogue number	D1	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537874	TCF120R5SL20MA	12,00	20	86,0	60,0	0,41	A	TCF040204AP	TCF040203AC
5537875	TCF125R5SL20MA	12,50	20	89,0	63,0	0,48	A	TCF040204AP	TCF040203AC
5537876	TCF127R5SL20MA	12,70	20	90,0	63,5	0,51	A	TCF040204AP	TCF040203AC
5537877	TCF130R5SL20MA	13,00	20	90,0	65,0	0,56	A	TCF040204AP	TCF040203AC
5537878	TCF135R5SL20MA	13,50	20	94,0	68,0	0,64	A	TCF040204AP	TCF040203AC
5577948	TCF140R5SL25MB	14,00	25	99,0	70,0	0,42	B	TCF050204BP	TCF060203BC
5577949	TCF145R5SL25MB	14,50	25	100,0	72,5	0,45	B	TCF050204BP	TCF060203BC
5577950	TCF150R5SL25MB	15,00	25	103,0	75,0	0,49	B	TCF050204BP	TCF060203BC
5577951	TCF155R5SL25MB	15,50	25	104,8	77,5	0,54	B	TCF050204BP	TCF060203BC
5577952	TCF160R5SL25MB	16,00	25	108,4	80,0	0,60	B	TCF050204BP	TCF060203BC
5577953	TCF165R5SL25MB	16,50	25	111,1	82,5	0,68	B	TCF050204BP	TCF060203BC
5577954	TCF170R5SL25MB	17,00	25	115,4	85,0	0,74	B	TCF050204BP	TCF060203BC
5577955	TCF175R5SL25MB	17,50	25	118,1	87,5	0,79	B	TCF050204BP	TCF060203BC
5577956	TCF180R5SL25MB	18,00	25	120,8	90,0	0,86	B	TCF050204BP	TCF060203BC
5577957	TCF185R5SL25MB	18,50	25	122,4	92,5	0,83	B	TCF050204BP	TCF060203BC
5578844	TCF190R5SL25MC	19,00	25	129,1	95,0	0,60	C	TCF070306CP	TCF070304CC
5578845	TCF195R5SL25MC	19,50	25	131,7	97,5	0,70	C	TCF070306CP	TCF070304CC
5578846	TCF200R5SL25MC	20,00	25	132,0	100,0	0,70	C	TCF070306CP	TCF070304CC
5578847	TCF205R5SL25MC	20,50	25	134,1	102,5	0,70	C	TCF070306CP	TCF070304CC
5578848	TCF210R5SL25MC	21,00	25	137,0	105,0	0,80	C	TCF070306CP	TCF070304CC
5578849	TCF220R5SL25MC	22,00	25	142,0	110,0	1,00	C	TCF070306CP	TCF070304CC
5578850	TCF225R5SL25MC	22,50	25	144,7	112,5	1,10	C	TCF070306CP	TCF070304CC
5578851	TCF230R5SL25MC	23,00	25	147,0	115,0	1,10	C	TCF070306CP	TCF070304CC
5537838	TCF240R5SL25MD	24,00	25	152,0	120,0	0,78	D	TCF080308DP	TCF090305DC
5537839	TCF250R5SL32MD	25,00	32	158,0	125,0	0,86	D	TCF080308DP	TCF090305DC
5537840	TCF260R5SL32MD	26,00	32	164,0	130,0	0,97	D	TCF080308DP	TCF090305DC
5537841	TCF265R5SL32MD	26,50	32	166,5	132,5	1,05	D	TCF080308DP	TCF090305DC
5537842	TCF270R5SL32MD	27,00	32	170,0	135,0	1,15	D	TCF080308DP	TCF090305DC
5537843	TCF280R5SL32MD	28,00	32	176,5	140,0	1,30	D	TCF080308DP	TCF090305DC
5537844	TCF290R5SL32MD	29,00	32	181,0	145,0	1,45	D	TCF080308DP	TCF090305DC
5537958	TCF300R5SL32ME	30,00	32	186,0	150,0	0,63	E	TCF100408EP	TCF120405EC
5537959	TCF310R5SL32ME	31,00	32	193,0	155,0	0,72	E	TCF100408EP	TCF120405EC

(continued)

(Top Cut 4 Drill • Metric • 5 x D • SL Shanks — continued)

order number	catalogue number	D1	D	L1	L4 max	L5	insert size	periphery insert	centre insert
5537960	TCF320R5SL32ME	32,00	32	199,0	160,0	0,82	E	TCF100408EP	TCF120405EC
5537961	TCF330R5SL40ME	33,00	40	204,0	165,0	0,95	E	TCF100408EP	TCF120405EC
5537962	TCF340R5SL40ME	34,00	40	210,0	170,0	1,14	E	TCF100408EP	TCF120405EC
5537963	TCF350R5SL40ME	35,00	40	216,8	175,0	1,30	E	TCF100408EP	TCF120405EC
5537964	TCF360R5SL40ME	36,00	40	222,0	180,0	1,45	E	TCF100408EP	TCF120405EC
5578629	TCF370R5SL40MF	37,00	40	228,0	185,0	1,19	F	TCF120412FP	TCF150406FC
5578640	TCF375R5SL40MF	37,50	40	231,8	188,0	1,23	F	TCF120412FP	TCF150406FC
5578641	TCF380R5SL40MF	38,00	40	234,5	190,0	1,27	F	TCF120412FP	TCF150406FC
5578642	TCF390R5SL40MF	39,00	40	239,8	195,0	1,36	F	TCF120412FP	TCF150406FC
5578643	TCF400R5SL40MF	40,00	40	245,1	200,0	1,47	F	TCF120412FP	TCF150406FC
5578644	TCF410R5SL40MF	41,00	40	250,4	205,0	1,60	F	TCF120412FP	TCF150406FC
5578645	TCF420R5SL40MF	42,00	40	255,7	210,0	1,77	F	TCF120412FP	TCF150406FC
5578646	TCF430R5SL40MF	43,00	40	261,1	215,0	1,99	F	TCF120412FP	TCF150406FC
5578647	TCF440R5SL40MF	44,00	40	266,4	220,0	2,10	F	TCF120412FP	TCF150406FC
5578648	TCF450R5SL50MF	45,00	50	271,7	225,0	2,21	F	TCF120412FP	TCF150406FC
5578751	TCF460R5SL50MG	46,00	50	277,0	230,0	1,45	G	TCF150512GP	TCF180508GC
5578752	TCF470R5SL50MG	47,00	50	282,3	235,0	1,53	G	TCF150512GP	TCF180508GC
5578753	TCF480R5SL50MG	48,00	50	287,7	240,0	1,63	G	TCF150512GP	TCF180508GC
5578754	TCF490R5SL50MG	49,00	50	293,0	245,0	1,74	G	TCF150512GP	TCF180508GC
5578755	TCF500R5SL50MG	50,00	50	299,8	250,0	1,87	G	TCF150512GP	TCF180508GC
5578756	TCF505R5SL50MG	50,50	50	302,5	253,0	1,94	G	TCF150512GP	TCF180508GC
5578757	TCF510R5SL50MG	51,00	50	305,1	255,0	2,02	G	TCF150512GP	TCF180508GC
5578758	TCF520R5SL50MG	52,00	50	310,4	260,0	2,22	G	TCF150512GP	TCF180508GC
5578759	TCF530R5SL50MG	53,00	50	315,8	265,0	2,46	G	TCF150512GP	TCF180508GC
5578760	TCF540R5SL50MG	54,00	50	321,1	270,0	2,53	G	TCF150512GP	TCF180508GC
5578761	TCF550R5SL50MG	55,00	50	326,4	275,0	2,73	G	TCF150512GP	TCF180508GC
5578762	TCF560R5SL50MG	56,00	50	331,7	280,0	2,37	G	TCF150512GP	TCF180508GC
5538659	TCF570R5SL50MH	57,00	50	330,0	285,0	1,76	H	TCF180614HP	TCF210608HC
5538680	TCF580R5SL50MH	58,00	50	336,0	290,0	1,85	H	TCF180614HP	TCF210608HC
5538681	TCF590R5SL50MH	59,00	50	339,2	295,0	1,96	H	TCF180614HP	TCF210608HC
5538682	TCF600R5SL50MH	60,00	50	345,5	300,0	1,42	H	TCF180614HP	TCF210608HC
5538683	TCF610R5SL50MH	61,00	50	347,8	305,0	2,23	H	TCF180614HP	TCF210608HC
5538684	TCF620R5SL50MH	62,00	50	358,0	310,0	2,41	H	TCF180614HP	TCF210608HC
5538685	TCF630R5SL50MH	63,00	50	365,0	315,0	2,64	H	TCF180614HP	TCF210608HC
5538686	TCF640R5SL50MH	64,00	50	363,8	320,0	2,94	H	TCF180614HP	TCF210608HC
5538687	TCF650R5SL50MH	65,00	50	375,0	325,0	3,06	H	TCF180614HP	TCF210608HC
5538688	TCF660R5SL50MH	66,00	50	376,4	330,0	3,18	H	TCF180614HP	TCF210608HC
5538689	TCF670R5SL50MH	67,00	50	385,0	335,0	3,30	H	TCF180614HP	TCF210608HC
5538700	TCF680R5SL50MH	68,00	50	390,0	340,0	2,93	H	TCF180614HP	TCF210608HC

(continued)

(Top Cut 4 Drill • Metric • 5 x D • SL Shanks — continued)

Spare Parts



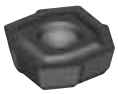

insert size	periphery insert	centre insert	insert screw order number	Torx size	Torx driver order number	tightening torque Nm
A	TCF040204AP	TCF040203AC	**2025073**	T5	**2029221**	0,40
B	TCF050204BP	TCF060203BC	**1175225**	T6	**1138455**	0,53
C	TCF070306CP	TCF070304CC	**1021337**	T7	**2029266**	0,90
D	TCF080308DP	TCF090305DC	**1134385**	T8	**2029598**	1,10
E	TCF100408EP	TCF120405EC	**2018194**	T9	**1138430**	2,00
F	TCF120412FP	TCF150406FC	**1756815**	T15	**2029596**	4,00
G	TCF150512GP	TCF180508GC	**1099645**	T20	**2029488**	6,30
H	TCF180614HP	TCF210608HC	**1823871**	T25	**1022519**	8,80

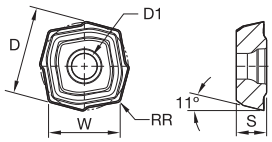
D	LS
20,00	50
25,00	56
32,00	60
40,00	70
50,00	80

NOTE: Drill shipped with insert screws and Torx wrench.
See pages V20–V23 for inserts.
SL = Side Lock



WARNING
During through-hole operations, a slug or disc is produced as the tool breaks through the workpiece. When the drill is stationary and the workpiece is rotating, this slug may be hurled from the chuck by centrifugal force. Provide adequate shielding to protect bystanders.





● first choice
○ alternate choice

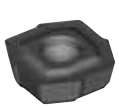
P		○	○	●
M			○	○
K		○	○	●
N				
S				
H				

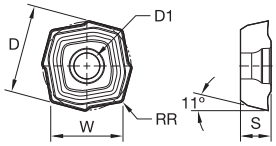
Top Cut 4 Drill • Centre Inserts • V34

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040203ACV34	4,47	2,10	3,65	2,00	0,300	A	▪	5541817	5541818
TCF060203BCV34	6,00	2,40	4,90	2,40	0,300	B	▪	5542602	5542604
TCF070304CCV34	7,59	2,60	6,20	2,80	0,400	C	▪	5542642	5542643
TCF090305DCV34	9,55	2,80	7,80	3,00	0,500	D	▪	5538554	5538555
TCF120405ECV34	12,00	3,40	9,80	3,60	0,500	E	▪	5538603	5538604
TCF150406FCV34	14,94	4,80	12,20	4,20	0,600	F	▪	5542623	5542624
TCF180508GCV34	17,88	6,00	14,60	5,40	0,800	G	▪	5542475	5542476
TCF210608HCV34	21,68	7,50	17,70	6,50	0,800	H	▪	5542002	5542003

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.





● first choice
○ alternate choice

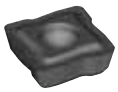
		WPK10CH	WU25CH	WU40PH
P		○	○	●
M			○	●
K		○	○	●
N				
S				
H				

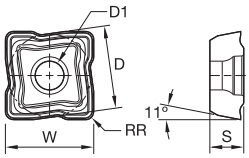
Top Cut 4 Drill • Centre Inserts • V36

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040203ACV36	4,47	2,10	3,65	2,00	0,300	A	●	5541819	5541840
TCF060203BCV36	6,00	2,40	4,90	2,40	0,300	B	●	5542606	5542607
TCF070304CCV36	7,59	2,60	6,20	2,80	0,400	C	●	5542644	5542645
TCF090305DCV36	9,55	2,80	7,80	3,00	0,500	D	●	5538556	5538557
TCF120405ECV36	12,00	3,40	9,80	3,60	0,500	E	●	5538606	5538607
TCF150406FCV36	14,94	4,80	12,20	4,20	0,600	F	●	5542625	5542626
TCF180508GCV36	17,88	6,00	14,60	5,40	0,800	G	●	5542477	5542478
TCF210608HCV36	21,68	7,50	17,70	6,50	0,800	H	●	5542004	5542005

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.





● first choice
○ alternate choice

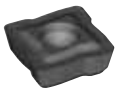
P		○	●	○
M			○	○
K		○	●	○
N				
S				
H				

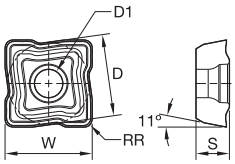
■ Top Cut 4 Drill • Periphery Inserts • V34

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040204APV34	4,14	2,10	4,40	2,00	0,400	A	5541843	5541841	5541842
TCF050204BPV34	5,07	2,40	5,40	2,40	0,400	B	5542620	5542608	5542609
TCF070306CPV34	6,67	2,60	7,10	2,80	0,600	C	5542648	5542646	5542647
TCF080308DPV34	8,08	2,80	8,60	3,00	0,800	D	5538600	5538558	5538559
TCF100408EPV34	9,96	3,40	10,60	3,60	0,800	E	5538610	5538608	5538609
TCF120412FPV34	12,59	4,80	13,40	4,20	1,200	F	5542629	5542627	5542628
TCF150512GPV34	15,13	6,00	16,10	5,40	1,200	G	5542601	5542479	5542600
TCF180614HPV34	18,04	7,50	19,20	6,50	1,400	H	5542008	5542006	5542007

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.





● first choice
○ alternate choice

		WPK10CH	WU25CH	WU40PH
P		○	○	●
M			○	●
K		○	○	●
N				
S				
H				

Top Cut 4 Drill • Periphery Inserts • V36

catalogue number	D	D1	W	S	RR	insert size	WPK10CH	WU25CH	WU40PH
TCF040204APV36	4,14	2,10	4,40	2,00	0,400	A	●	5541844	5541845
TCF050204BPV36	5,07	2,40	5,40	2,40	0,400	B	●	5542621	5542622
TCF070306CPV36	6,67	2,60	7,10	2,80	0,600	C	●	5542649	5542650
TCF080308DPV36	8,08	2,80	8,60	3,00	0,800	D	●	5538601	5538602
TCF100408EPV36	9,96	3,40	10,60	3,60	0,800	E	●	5538611	5538612
TCF120412FPV36	12,59	4,80	13,40	4,20	1,200	F	●	5542640	5542641
TCF150512GPV36	15,13	6,00	16,10	5,40	1,200	G	●	5542603	5542605
TCF180614HPV36	18,04	7,50	19,20	6,50	1,400	H	●	5542009	5542020

NOTE: For application-specific insert selection, please refer to the application data on pages V24–V35.

Geometry	Application
V34	First choice for machining steel, cast iron, and short chipping materials. Suitable for severe cutting conditions.
V36	First choice for stainless steel. Suitable for long chipping steel and where low power consumption is required.

■ Top Cut 4 • Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4					Recommended Feed Rate by Diameter (mm/r)											
					Insert Size A			Insert Size B			Insert Size C			Insert Size D		
					TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	120	**140**	160	140	**160**	240	150	**180**	260	160	**180**	260
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**150**	220	130	**170**	250	140	**170**	250
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	130	**150**	210	130	**170**	240	140	**170**	240
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	120	**140**	160	140	**170**	260	150	**190**	280	160	**190**	280
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	**120**	140	130	**170**	240	140	**180**	260	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	90	**100**	120	130	**170**	230	130	**170**	240	140	**170**	240
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	120	**140**	180	140	**170**	270	150	**200**	290	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	**120**	160	130	**160**	260	140	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	250	130	**180**	260	140	**180**	260
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	120	**140**	180	140	**170**	270	150	**200**	290	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	110	**120**	160	130	**160**	260	140	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	250	130	**180**	260	140	**180**	260
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	120	**140**	160	140	**170**	240	150	**180**	250	160	**180**	250
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**160**	230	140	**170**	240	150	**170**	240
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	130	**160**	230	130	**160**	220	140	**160**	220
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	120	**140**	160	140	**170**	200	140	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	120	**150**	190	130	**160**	200	140	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	110	**130**	180	120	**140**	190	120	**140**	190
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	0,13	**0,14**	0,18	0,15	**0,17**	0,20	0,16	**0,23**	0,27	0,17	**0,24**	0,29
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,13	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,06	**0,08**	0,10	0,08	**0,12**	0,15	0,10	**0,13**	0,16	0,11	**0,14**	0,17
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	0,08	**0,11**	0,15	0,10	**0,12**	0,16	0,11	**0,14**	0,18	0,12	**0,15**	0,20
			C	V34	WU40PH												
		U	P	V34	WU25CH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,11**	0,14	0,10	**0,12**	0,15	0,11	**0,14**	0,16	0,12	**0,15**	0,18
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,10	0,08	**0,10**	0,14	0,10	**0,12**	0,15	0,11	**0,13**	0,16
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	S	P	V36	WU25CH	160	**180**	260	160	**180**	260	160	**180**	260	160	**180**	260
			C	V36	WU40PH												
		U	P	V36	WU40PH	140	**170**	250	140	**170**	250	140	**170**	250	140	**170**	250
			C	V36	WU40PH												
		I	P	V36	WU40PH	140	**170**	240	140	**170**	240	140	**170**	240	140	**170**	240
			C	V36	WU40PH												
	2	S	P	V34	WPK10CH	160	**190**	280	160	**190**	280	160	**190**	280	160	**190**	280
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**170**	240	140	**170**	240	140	**170**	240	140	**170**	240
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	160	**200**	310	160	**200**	310	160	**200**	310	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**200**	280	150	**200**	280	150	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**180**	260	140	**180**	260	140	**180**	260	140	**180**	260
			C	V34	WU40PH												
	4	S	P	V34	WPK10CH	160	**200**	310	160	**200**	310	160	**200**	310	160	**200**	310
			C	V34	WU40PH												
		U	P	V34	WU25CH	150	**200**	280	150	**200**	280	150	**200**	280	150	**200**	280
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**180**	260	140	**180**	260	140	**180**	260	140	**180**	260
			C	V34	WU40PH												
	5	S	P	V36	WU25CH	160	**180**	250	160	**180**	250	160	**180**	250	160	**180**	250
			C	V36	WU40PH												
		U	P	V36	WU40PH	150	**170**	240	150	**170**	240	150	**170**	240	150	**170**	240
			C	V36	WU40PH												
		I	P	V36	WU40PH	140	**160**	220	140	**160**	220	140	**160**	220	140	**160**	220
			C	V36	WU40PH												
	6	S	P	V36	WU25CH	150	**170**	210	150	**170**	210	150	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	140	**160**	200	140	**160**	200	140	**160**	200	140	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	120	**140**	190	120	**140**	190	120	**140**	190	120	**140**	190
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Stainless Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,13	0,08	**0,10**	0,15	0,10	**0,12**	0,16
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,06	**0,08**	0,12	0,07	**0,10**	0,12	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,06	**0,08**	0,11	0,07	**0,10**	0,11	0,08	**0,10**	0,14	0,10	**0,12**	0,15
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Stainless Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	120	**140**	160	140	**160**	230	150	**170**	240	150	**170**	240
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**150**	210	130	**160**	210	130	**160**	210
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	130	**150**	200	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	120	**140**	160	140	**160**	200	150	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	110	**120**	140	130	**150**	180	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	90	**100**	120	120	**140**	170	130	**150**	180	130	**150**	180
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	110	**120**	140	130	**150**	180	140	**160**	200	140	**160**	200
			C	V36	WU40PH												
		U	P	V36	WU40PH	90	**110**	120	120	**130**	160	130	**140**	180	130	**140**	180
			C	V36	WU40PH												
		I	P	V36	WU40PH	80	**100**	110	100	**120**	150	110	**130**	160	110	**130**	160
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Stainless Steel • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	0,12	**0,14**	0,20	0,14	**0,16**	0,25	0,16	**0,18**	0,28	0,16	**0,20**	0,30
			C	V36	WU40PH												
		U	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												
		I	P	V36	WU40PH	0,11	**0,13**	0,18	0,12	**0,14**	0,22	0,14	**0,16**	0,25	0,14	**0,18**	0,26
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Stainless Steel • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
M	1	S	P	V36	WU40PH	150	**170**	240	150	**170**	240	150	**170**	240	150	**170**	240
			C	V36	WU40PH												
		U	P	V36	WU40PH	130	**160**	210	130	**160**	210	130	**160**	210	130	**160**	210
			C	V36	WU40PH												
		I	P	V36	WU40PH	130	**160**	200	130	**160**	200	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
	2	S	P	V36	WU40PH	150	**170**	210	150	**170**	210	150	**170**	210	150	**170**	210
			C	V36	WU40PH												
		U	P	V36	WU40PH	130	**160**	200	130	**160**	200	130	**160**	200	130	**160**	200
			C	V36	WU40PH												
		I	P	V36	WU40PH	130	**150**	180	130	**150**	180	130	**150**	180	130	**150**	180
			C	V36	WU40PH												
	3	S	P	V36	WU40PH	140	**160**	200	140	**160**	200	140	**160**	200	140	**160**	200
			C	V36	WU40PH												
		U	P	V36	WU40PH	130	**140**	180	130	**140**	180	130	**140**	180	130	**140**	180
			C	V36	WU40PH												
		I	P	V36	WU40PH	110	**130**	160	110	**130**	160	110	**130**	160	110	**130**	160
			C	V36	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Cast Iron • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,08	**0,10**	0,14	0,08	**0,10**	0,16	0,10	**0,13**	0,18	0,12	**0,16**	0,24
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

Top Cut 4 • Cast Iron • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size A			Insert Size B			Insert Size C			Insert Size D		
						TCF040203AC TCF040204AP 12,00–13,99mm			TCF060203BC TCF050204BP 14,00–18,99mm			TCF070304CC TCF070306CP 19,00–23,99mm			TCF090305DC TCF080308DP 24,00–29,99mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	120	**140**	180	140	**170**	250	150	**180**	260	160	**200**	280
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	160	130	**160**	240	140	**170**	250	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	230	130	**160**	240	140	**170**	260
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	120	**140**	180	130	**160**	240	140	**180**	250	150	**180**	260
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	160	120	**150**	230	130	**160**	240	140	**160**	250
			C	V34	WU40PH												
		I	P	V34	WU40PH	100	**110**	140	120	**150**	220	130	**160**	240	140	**160**	250
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	120	**140**	160	130	**160**	240	140	**170**	240	150	**170**	250
			C	V34	WU25CH												
		U	P	V34	WU25CH	110	**120**	140	120	**150**	230	130	**160**	230	140	**160**	240
			C	V34	WU40PH												
		I	P	V34	WU40PH	90	**100**	120	120	**150**	230	130	**160**	230	140	**160**	220
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Cast Iron • 2 x D/3 x D • Feed Chart • Metric

Top Cut 4						Recommended Feed Rate by Diameter (mm/r)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU25CH												
		U	P	V34	WU25CH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												
		I	P	V34	WU40PH	0,14	**0,16**	0,26	0,16	**0,20**	0,3	0,18	**0,22**	0,32	0,20	**0,24**	0,36
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

■ Top Cut 4 • Cast Iron • 2 x D/3 x D • Speed Chart • Metric

Top Cut 4						Recommended Cutting Speed by Diameter (m/min)											
						Insert Size E			Insert Size F			Insert Size G			Insert Size H		
						TCF120405EC TCF100408EP 30,00–36,99mm			TCF150406FC TCF120412FP 37,00–45,99mm			TCF180508GC TCF150512GP 46,00–56,99mm			TCF210608HC TCF180614HP 57,00–68,00mm		
Material Group		Condition	Pocket Seat	Geometry	Grade	min	Start	max	min	Start	max	min	Start	max	min	Start	max
K	1	S	P	V34	WPK10CH	160	**200**	280	160	**200**	280	160	**200**	280	160	**200**	280
			C	V34	WU25CH												
		U	P	V34	WU25CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**170**	260	140	**170**	260	140	**170**	260	140	**170**	260
			C	V34	WU40PH												
	2	S	P	V34	WPK10CH	150	**180**	260	150	**180**	260	150	**180**	260	150	**180**	260
			C	V34	WU25CH												
		U	P	V34	WU25CH	140	**160**	250	140	**160**	250	140	**160**	250	140	**160**	250
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**160**	250	140	**160**	250	140	**160**	250	140	**160**	250
			C	V34	WU40PH												
	3	S	P	V34	WPK10CH	150	**170**	250	150	**170**	250	150	**170**	250	150	**170**	250
			C	V34	WU25CH												
		U	P	V34	WU25CH	140	**160**	240	140	**160**	240	140	**160**	240	140	**160**	240
			C	V34	WU40PH												
		I	P	V34	WU40PH	140	**160**	220	140	**160**	220	140	**160**	220	140	**160**	220
			C	V34	WU40PH												

NOTE: For 4 x D, it is highly recommended to start with feed and speed values reduced by 10% less than above recommendations.
For 5 x D, diameter range 12–23,99mm (insert sizes A to C), it is highly recommended to start with feed and speed values reduced by 20% less than above recommendations.
For 5 x D, diameter range 24–68mm (insert sizes D to H), it is highly recommended to start with feed and speed values reduced by 15% less than above recommendations.
For 4 x D and 5 x D, it is recommended to reduce the feed rate during entry and exit by 30–50%.

Condition: S = stable conditions,
U = unstable cutting conditions,
I = interrupted cutting conditions
Pocket Seat: P = periphery insert,
C = centre insert

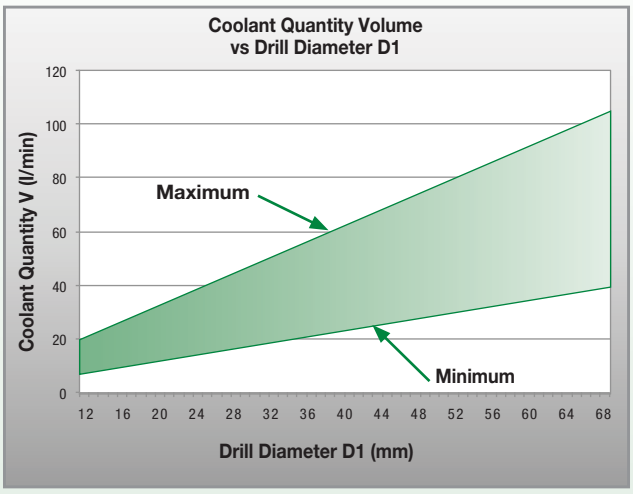
Top Cut 4 • Drill Depth • 2 x D/3 x D • Hole Tolerance Table

Insert size	Diameter Range (mm)	Hole Tolerance (mm)
A	12,00–13,99	+/- 0,20
B	14,00–18,99	+/- 0,20
C	19,00–23,99	+/- 0,20
D	24,00–29,99	+/- 0,20
E	30,00–36,99	+/- 0,20
F	37,00–45,99	+/- 0,25
G	46,00–56,99	+/- 0,25
H	57,00–68,00	+/- 0,28

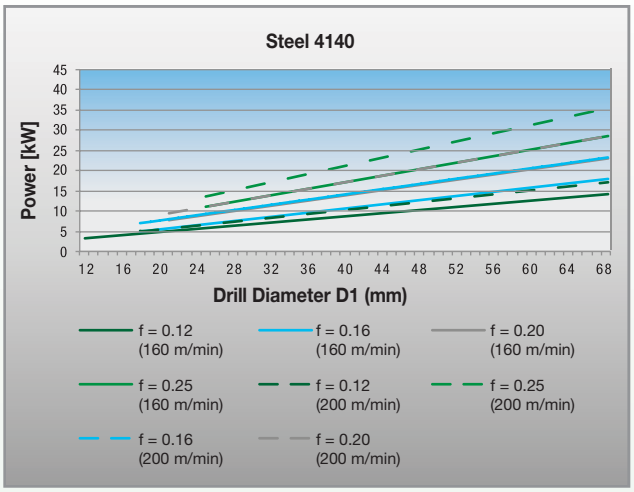
Top Cut 4 • Drill Depth • 4 x D/5 x D • Hole Tolerance Table

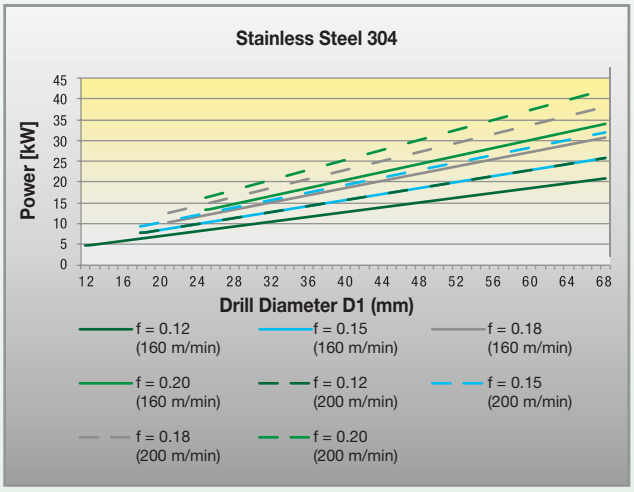
Insert size	Diameter Range (mm)	Hole Tolerance (mm)
A	12,00–13,99	+/- 0,35
B	14,00–18,99	+/- 0,35
C	19,00–23,99	+/- 0,35
D	24,00–29,99	+/- 0,35
E	30,00–36,99	+/- 0,35
F	37,00–45,99	+/- 0,38
G	46,00–56,99	+/- 0,38
H	57,00–68,00	+/- 0,42

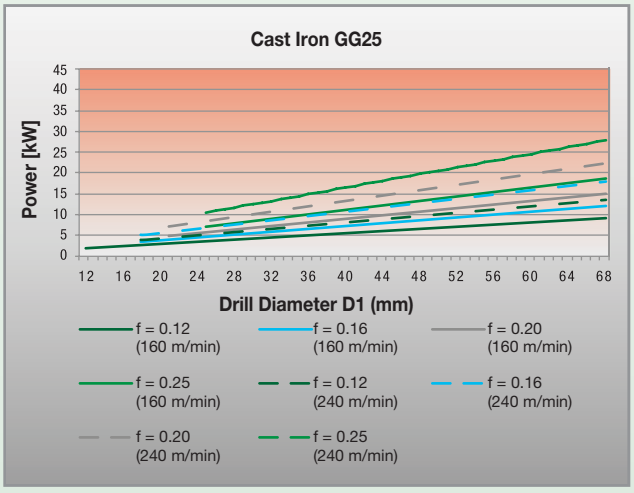
Coolant Requirement/Recommendation



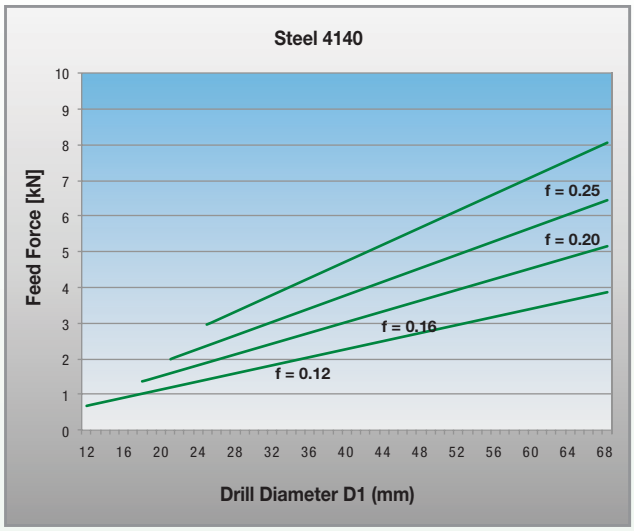
Power Requirement

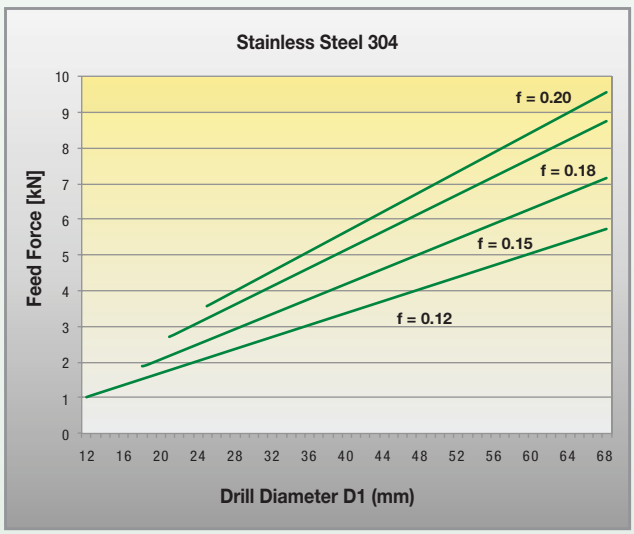


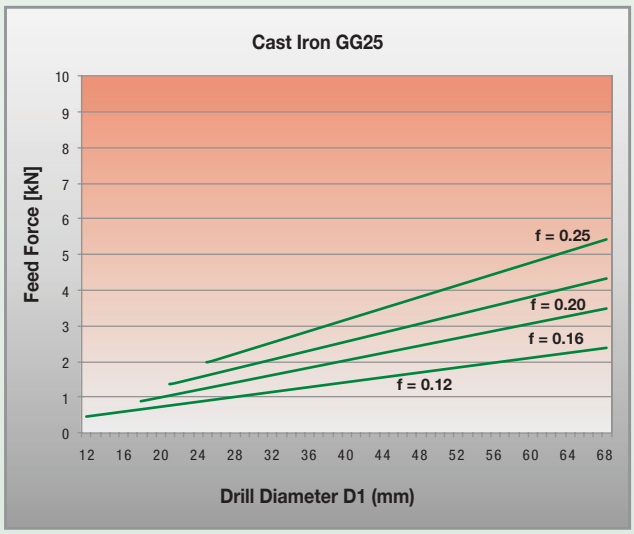




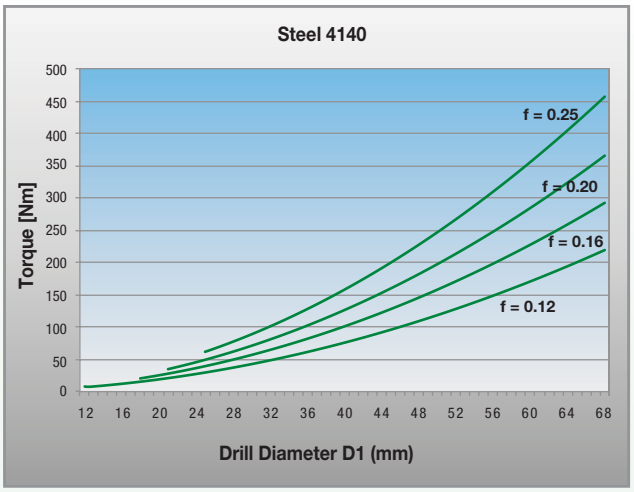
Feed Force Requirement

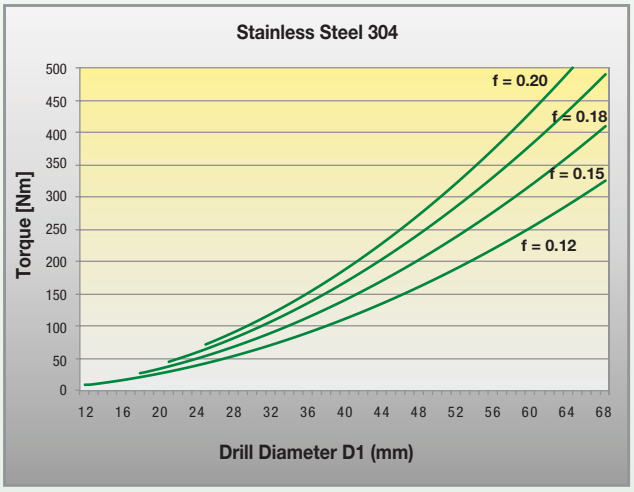


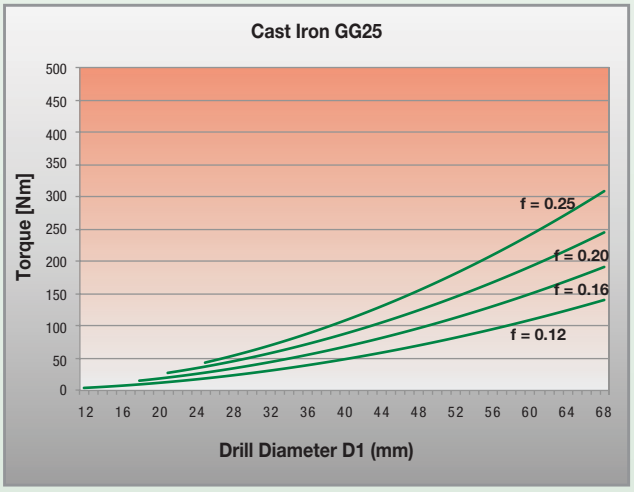




Torque Requirement







X-Offset Capabilities • Metric

Insert size	Diameter Range (mm)	2 x D and 3 x D		4 x D		5 x D	
		X-offset value max. in mm	D1 max value	X-offset value max. in mm	D1 max value	X-offset value max.	D1 max value
A	12,00–13,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
B	14,00–18,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
C	19,00–23,99	0,5	D1 + 1mm	0,5	D1 + 1mm	—	—
D	24,00–29,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
E	30,00–36,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
F	37,00–45,99	0,8	D1 + 1,6mm	0,8	D1 + 1mm	—	—
G	46,00–56,99	1	D1 + 2mm	0,8	D1 + 1mm	—	—
H	57,00–68,00	1	D1 + 2mm	0,8	D1 + 1mm	—	—

Unmatched Versatility Meets Powerful Performance



EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

Top Cut 4™

Specifically designed for versatility — Top Cut 4 offers outstanding flexibility, increased productivity, and is the one tool to apply to a variety of drilling applications and different workpiece materials.

- High tool life at accelerated speeds.
- Efficient chip evacuation.
- Increased coolant supply.
- Up to 5 x D.

To learn more about the benefits of **WIDIA™ Top Cut 4**, contact your local distributor.

WIDIA™



Reconditioning Services

WIDIA™ Reconditioning Services Optimise the Total Value of Metalcutting Tools Throughout Their Entire Life

WIDIA Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

- Local support you can trust.
- Rapid turnaround to minimise inventory.
- Like-new performance continues delivering productivity.
- Application support throughout the tool lifecycle.
- WIDIA proprietary geometry specifications after each regrind.
- WIDIA certified coatings.
- Easy logistics through the reconditioning process.

Simple Logistics

Our unique reconditioning program simplifies sending and receiving reconditioned tools to reduce shipping time and increase on-hand inventory.

To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.





Global Reconditioning Network



To locate a Reconditioning Center near you, visit **widia.com/services.**

WIDIA™


5
10
15
20
25

Holemaking • Hole Finishing

Introduction.....W2–W5
HSR Reaming Tools.....W6–W29
WIDIA TRM.....W30–W33
ROTAFLEX.....W34–W71
Custom Solutions.....W72–W81



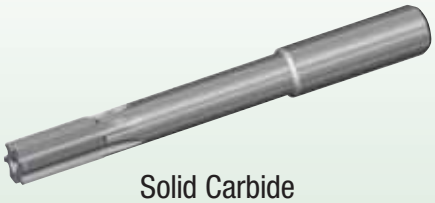
Hole Finishing with WIDIA™



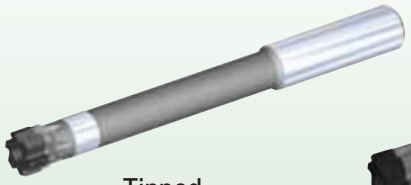
Hole Finishing with WIDIA

WIDIA is one of the only sources in the metalworking industry that offers all types of hole finishing tooling — from reaming and fine boring to motion tooling. By owning the entire process chain — from raw materials to reconditioning — WIDIA offers customised solutions to meet any imaging challenge, regardless of portfolio or capacity.

REAMING



Solid Carbide



Tipped



Modular

BORING



Roughing



Finishing

COUNTERSINKING



Countersinkers



Porting
Fluid Power

PCD ROUND TOOLS



Steel-based



Carbide-based

● first choice
○ alternate choice

			P	M	K	N	S	H	standard diameter range	standard diameter accuracy	engineered solution diameter range	engineered solution diameter accuracy	Position	Cylindricity
reaming tools		**HSR™ — Solid Carbide** High-Speed Reamer Carbide	●	●	●	●	○		.196–.551" 5–14mm	IT7	.056–1.00" 1,4–25,4mm	IT6 >.39" >10mm	.0004" 10 µm	.0003" 7 µm
		**HSR — Carbide Tipped** High-Speed Reamer Carbide/Cermet	●	●	●	●	○		.551–1.26" 14–32mm	IT7	.551–2.55" 14–65mm	IT6	.0004" 10 µm	.0003" 7 µm
boring/fine-boring tools		**ROTAFLEX™ FBHBB** Fine-Boring Carbide/Cermet/PCD/CBN	●	●	●	●	●	○	.236–.866" 6–22mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
		**ROTAFLEX FBH** Fine-Boring Carbide/Cermet/PCD/CBN	●	●	●	●	●	○	.866–4.25" 22–115mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
		**ROTAFLEX TCHS** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		.886–4.52" 22,5–115mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**ROTAFLEX Small Bridge Tools** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		3.425–7.87" 87–200mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**ROTAFLEX Large Bridge Tools** Roughing Carbide/Cermet/PCD/CBN	●	●	●	●	●		7.87–20.47" 200–520mm	IT7	–	–	.0004" 10 µm	>.0008" >20 µm
		**Fine-Boring Cartridges** Fine-Boring Carbide/Cermet/PCD/CBN	●	○	●	●	○		3.425–20.47" 87–520mm	IT7	–	–	.0002" 5 µm	.0002– .0004" 5–10 µm
countersinking		**Countersinking** Round Tools Steel Base				●			–	–	–	IT7	.0004" 10 µm	.0004" 10 µm
		**Port Cutters** Carbide/Cermet Steel Base				●			for standard ports SAE, BSPP, ISO	–	–	IT7	.0004" 10 µm	.0004" 10 µm
PCD		**PCD** Round Tools Steel Base CBN				●			–	–	.394–4.00" 10–100mm	IT6	.0004" 10 µm	.0004" 10 µm
		**PCD** Round Tools Carbide Base				●			–	–	.197–1.00" 5–25mm	IT6	.0002" 5 µm	.0003" 7 µm

Cylindricity
NOTE: Process- and application-dependent.
Highly dependent on the pre-machine hole accuracy.
Use of high-performance drilling/pre-machining tools mandatory to reach values.

Position
NOTE: Process- and application-dependent.
Highly dependent on the pre-machine hole accuracy.
Use of high-performance drilling/pre-machining tools mandatory to reach values.

achievable surface quality Ra						capability				cost/part	cycle time	required operator experience	page(s)
P	M	K	N	S	H								
20–40 µ-in 0,5–1,0 µm	20–40 µ-in 0,5–1,0 µm	20–60 µ-in 0,5–1,5 µm	–	20–40 µ-in 0,5–1,0 µm	–	●	●	●	●	moderate	low	low	W8–W10, W13–W14
20–40 µ-in 0,5–1,0 µm	20–40 µ-in 0,5–1,0 µm	20–60 µ-in 0,5–1,5 µm	–	20–40 µ-in 0,5–1,0 µm	–	●	●	● carbide only	● carbide only	moderate	low	low	W11–W12, W15–W16
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	<48 µ-in <1,2 µm	●	●	●	●	low	moderate	low–moderate	W49–W51
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	<48 µ-in <1,2 µm	●	●	●	●	low	moderate	low–moderate	W52–W53
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	moderate	low–moderate	W36–W37
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	low	low–moderate	W38–W39
40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–200 µ-in 1,0–5,0 µm	40–80 µ-in 1,0–2,0 µm	40–200 µ-in 1,0–5,0 µm	–	●	●	●	●	low	moderate	low–moderate	W40–W45
32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	32–80 µ-in 0,8–2,0 µm	–	●	●	○	○	low	moderate	low–moderate	W46–W48
32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80 µ-in 0,8–2,0 µm	–	–	●	●	●	●	very low	very low	moderate	W76–W77
32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80µ-in -2,0 µm	32–80 µ-in 0,8–2,0 µm	–	–	●	●	●	●	very low	very low	moderate	W74–W75
–	–	–	4–32 µ-in 0,1–0,8 µm	–	–	●	●	●	●	low	very low	moderate	W80–W81
–	–	–	4–32 µ-in 0,1–0,8 µm	–	–	●	●	●	●	low	very low	moderate	W80–W81

Ra *Surface roughness*
NOTE: Surface roughness values are guidelines and depend on the application, coolant situation, machine, and cutting data applied.

HSR™ Reaming Tools combine high-performance micrograin substrates, specific coatings, and extremely unequal flutes for outstanding machining results. Increase your productivity with the HSR leads and lapped grinding surface of rake, clearance, and relief angle.



HSR Reaming Tools

HSR Solid Carbide Reaming Tools

- Diameters starting at 1,40mm (.055") with internal coolant supply available as standard.
- Ground to H7 tolerance class for use in most applications.
- Specific coatings and lead configurations available for high-speed machining of steel, stainless steel, and cast iron.
- Uncoated micrograin substrates for machining stainless steel and non-ferrous materials at accelerated speeds.

Features and Benefits

- Lapped ground leads for high-speed cutting.
- Long tool life with increased hole and surface quality.
- High Metal Removal Rates (MRR) at increased speeds and feeds.
- Radial coolant supply for through hole applications and axial coolant supply for blind holes to achieve higher feed rates.
- Decreased runout and improved straightness due to unequal flutes.

Customisation

- Diameters starting at 1,40mm (.055") up to 14,15mm (.557") available with and without internal coolant in 0,001mm steps.
- Solid cermet reaming tools and tooling for heat-resistant materials are available on request.

HSR™ Carbide- and Cermet-Tipped Reaming Tools

- Achieve solid carbide and solid cermet metal removal rates from 14–32mm (.551–1.26") with no customisation required.
- Ground to H7 tolerance class to accomodate most applications.
- Specific coatings and lead configuration for high-speed machining of steel, stainless steel, cast iron, and non-ferrous materials at accelerated speeds.
- Coated and uncoated micrograin substrate carbide and coated cermet specifically engineered for reaming.

Features and Benefits

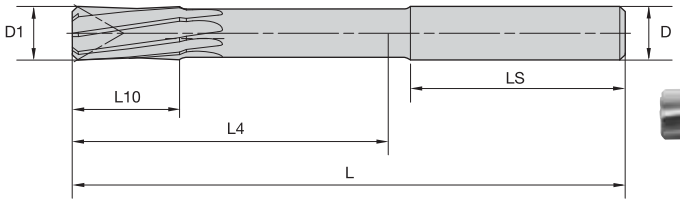
- Lapped ground leads for high-speed cutting.
- Long tool life with increased hole and surface quality.
- High metal removal rates at higher speeds and feeds.
- Decreased runout and improved straightness due to unequal flutes.
- Adjustment screw at straight-fluted HSR reamers to change internal coolant supply from axial to radial.
- Optimised coolant options for blind holes and blind hole applications with interrupted cut.



Customisation

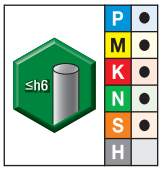
- Diameters up to 50mm (1.968") available with and without internal coolant in 0,001mm steps.
- HSR tooling for machining heat-resistant materials is available on request.







HSR Reamers with Helical Flutes for Through Holes • K10™ • 1,4–10mm

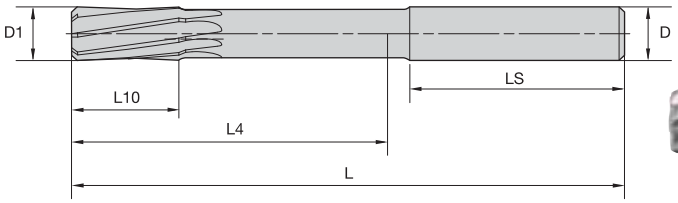


● first choice
○ alternate choice

grade K10 uncoated								
order #	catalogue #	D1	D	L	L4	L10	LS	Z
2293636	050221-000014	1,40	1,40	40	18	8	22	3
2293637	050221-000015	1,50	1,50	40	18	8	22	3
2293638	050221-000016	1,60	1,60	43	20	9	23	3
2283423	050221-000020	2,00	2,00	49	24	11	25	4
2283424	050221-000022	2,20	2,20	53	26	12	27	4
2283426	050221-000025	2,50	2,50	57	28	14	29	4
2283427	050221-000028	2,80	2,80	61	32	15	29	4
2283428	050221-000030	3,00	3,00	61	32	15	29	6
2283429	050221-000032	3,20	3,20	65	35	16	30	6
2283430	050221-000035	3,50	3,50	70	40	18	30	6
2283431	050221-000040	4,00	4,00	75	41	19	32	6
2293640	050221-000045	4,50	4,50	80	44	21	33	6
2283445	050221-000050	5,00	5,00	86	51	23	34	6
2293641	050221-000055	5,50	5,60	93	57	26	36	6
2293642	050221-000060	6,00	5,60	93	53	26	36	6
2293643	050221-000065	6,50	6,30	101	63	28	38	6
2293644	050221-000070	7,00	7,10	109	69	31	40	6
2283450	050221-000075	7,50	7,10	109	69	31	40	6
2283451	050221-000080	8,00	8,00	117	75	33	42	6
2283463	050221-000085	8,50	8,00	117	75	33	42	6
2283464	050221-000090	9,00	9,00	125	81	36	44	6
2283465	050221-000095	9,50	9,00	125	81	36	44	6
2283466	050221-000100	10,00	10,00	133	87	38	46	6

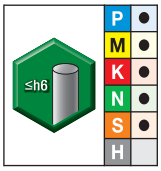
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 hole tolerance capability starting at diameter 10mm is available as a Custom Solution. Additional diameters and lengths made to order.

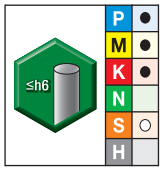






HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 2–144mm

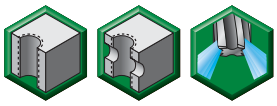


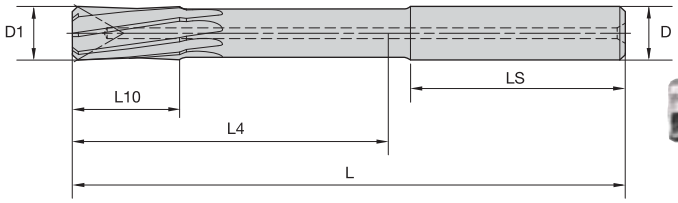


● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2436494	050227-000200	2441162	450227-000200	2,00	3,00	48	15	6	28	4
2436871	050227-000300	2441253	450227-000300	3,00	3,00	48	15	6	28	4
2436872	050227-000400	2441254	450227-000400	4,00	4,00	54	21	8	28	4
2436913	050227-000500	2441256	450227-000500	5,00	6,00	74	32	12	36	4
2436914	050227-000600	2441257	450227-000600	6,00	6,00	74	33	12	36	4
2436916	050227-000800	2441260	450227-000800	8,00	8,00	91	50	16	36	6
2436919	050227-001000	2441261	450227-001000	10,00	10,00	103	58	20	40	6
2436922	050227-001200	2441284	450227-001200	12,00	12,00	118	68	24	45	6
2436946	050227-001400	2441285	450227-001400	14,00	14,00	132	81	28	45	6

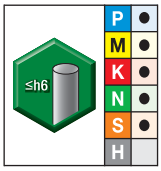
- Standard reamers listed are ground to achieve an H7 tolerance hole.
  IT6 capability is available. Additional diameters and lengths made to order.

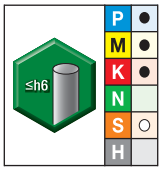






HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 5–14mm



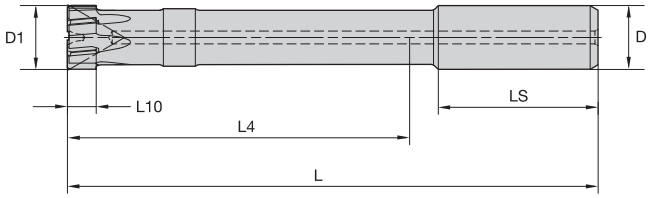


● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2437425	050271-000500	2441380	450271-000500	5,00	6,00	74	32	12	36	4
2437426	050271-000600	2441381	450271-000600	6,00	6,00	74	33	12	36	4
2437428	050271-000800	2441453	450271-000800	8,00	8,00	91	50	16	36	6
2437430	050271-001000	2441455	450271-001000	10,00	10,00	103	58	20	40	6
2437432	050271-001200	2441457	450271-001200	12,00	12,00	118	68	24	45	6
2437468	050271-001400	2441494	450271-001400	14,00	14,00	132	81	28	45	6

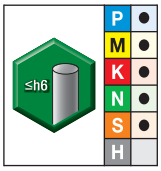
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.

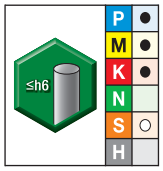






HSR Reamers with Helical Flutes for Through Holes • K10F™/K10F-DCFD™ • 14–32mm



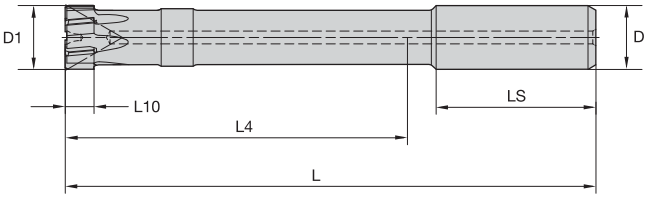


● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
3084978	050281-001400	3084312	450281-001400	14,00	16,00	145	90	9	48	6
3084983	050281-001600	3084317	450281-001600	16,00	20,00	157	100	9	50	6
3084992	050281-001800	3084321	450281-001800	18,00	20,00	171	114	9	50	6
3085083	050281-002000	3084319	450281-002000	20,00	20,00	200	143	9	50	6
3085084	050281-002200	3084322	450281-002200	22,00	20,00	210	153	11	50	6
3085087	050281-002400	3084323	450281-002400	24,00	20,00	210	153	11	50	6
3085089	050281-002500	3084324	450281-002500	25,00	20,00	210	153	11	50	6
3085090	050281-002600	3084325	450281-002600	26,00	25,00	240	177	11	56	8
3085092	050281-002800	3084327	450281-002800	28,00	25,00	240	177	11	56	8
3085104	050281-003000	3084320	450281-003000	30,00	25,00	270	207	11	56	8
	–	3084328	450281-003200	32,00	25,00	270	207	11	56	8

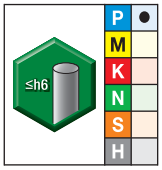
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.







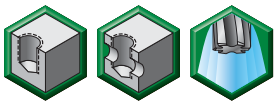
HSR Reamers with Helical Flutes for Through Holes • CERMET-DCFD™ • 14–20mm

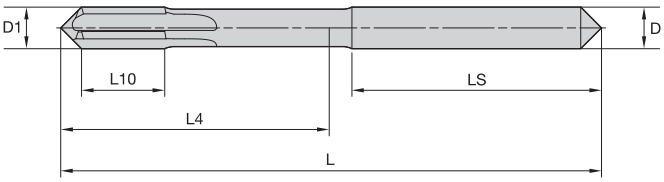


● first choice
○ alternate choice

grade CERMET-DCFD TiAlN								
order #	catalogue #	D1	D	L	L4	L10	LS	Z
3888130	456681-001400	14,00	16,00	145	76	8	49	6
3888131	456681-001500	15,00	16,00	145	76	8	49	6
3888132	456681-001600	16,00	20,00	157	86	8	51	6
3888403	456681-001700	17,00	20,00	157	86	10	51	6
3888404	456681-001800	18,00	20,00	171	100	10	51	6
3888405	456681-001900	19,00	20,00	171	100	10	51	6
3888406	456681-002000	20,00	20,00	200	129	10	51	6

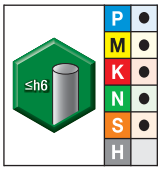
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.

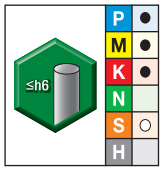






HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 2–4mm

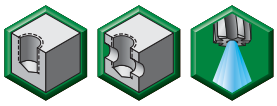


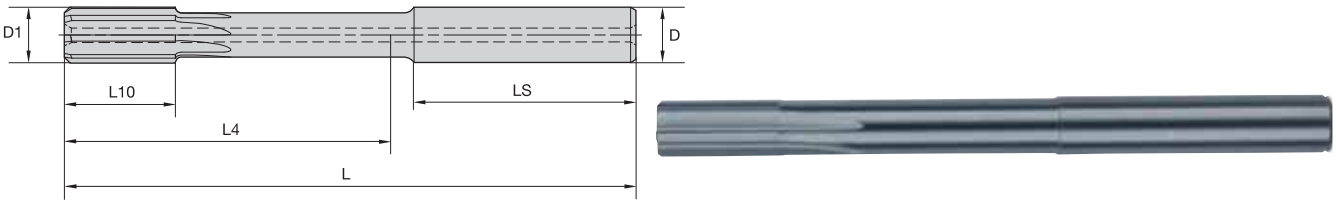


● first choice
○ alternate choice

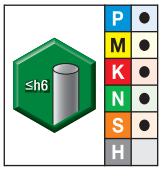
grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2446025	050222-000200	2446371	450222-000200	2,00	3,00	48	15	6	28	4
2446029	050222-000300	2446372	450222-000300	3,00	3,00	48	15	8	28	4
2446031	050222-000400	2446415	450222-000400	4,00	4,00	54	21	8	28	4

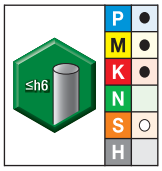
- Standard reamers listed are ground to achieve an H7 tolerance hole.
  IT6 capability is available. Additional diameters and lengths made to order.





HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 5–14mm

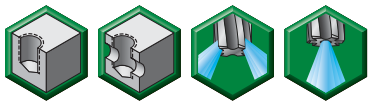


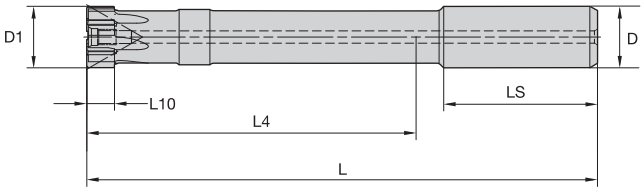


● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
2437472	050270-000500	2441337	450270-000500	5,00	6,00	74	32	12	36	4
2437523	050270-000600	2441339	450270-000600	6,00	6,00	74	33	12	36	4
2437525	050270-000800	2441341	450270-000800	8,00	8,00	91	50	16	36	6
2437526	050270-001000	2441342	450270-001000	10,00	10,00	103	58	20	40	6
2437527	050270-001200	2441353	450270-001200	12,00	12,00	118	68	24	45	6
2437529	050270-001400	2441354	450270-001400	14,00	14,00	132	81	28	45	6

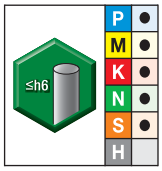
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.

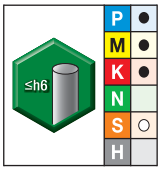






HSR Reamers with Straight Flutes for Blind Holes • K10F™/K10F-DCFD™ • 14–32mm



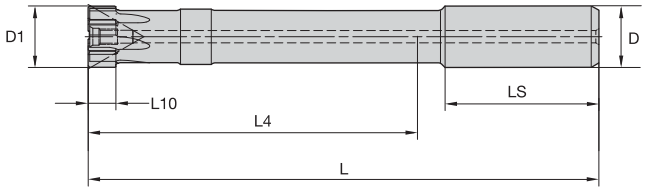


● first choice
○ alternate choice

grade K10F uncoated		grade K10F-DCFD TiAlN								
order #	catalogue #	order #	catalogue #	D1	D	L	L4	L10	LS	Z
3055655	050280-001400	3084512	450280-001400	14,00	16,00	145	90	9	48	6
3055656	050280-001600	3084526	450280-001600	16,00	20,00	157	100	9	50	6
3055657	050280-001800	3084528	450280-001800	18,00	20,00	171	114	9	50	6
3056095	050280-002000	3077292	450280-002000	20,00	20,00	200	143	9	50	6
3056096	050280-002200	3084529	450280-002200	22,00	20,00	210	153	11	50	6
3056097	050280-002400	3084530	450280-002400	24,00	20,00	210	153	11	50	6
3056098	050280-002500	3084531	450280-002500	25,00	20,00	210	153	11	50	6
3056099	050280-002600	3084532	450280-002600	26,00	25,00	240	177	11	56	8
3056100	050280-002800	3084593	450280-002800	28,00	25,00	240	177	11	56	8
3056102	050280-003000	3084594	450280-003000	30,00	25,00	270	207	11	56	8
3056273	050280-003200	3084595	450280-003200	32,00	25,00	270	207	11	56	8

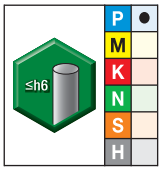
- Standard reamers listed are ground to achieve an H7 tolerance hole. IT6 capability is available. Additional diameters and lengths made to order.







HSR Reamers with Straight Flutes for Blind Holes • CERMET-DCFD™ • 14–20mm



● first choice
○ alternate choice

grade CERMET-DCFD TiAlN								
order #	catalogue #	D1	D	L	L4	L10	LS	Z
3888407	456680-001400	14,00	16,00	145	76	8	49	6
3888408	456680-001500	15,00	16,00	145	76	8	49	6
3888409	456680-001600	16,00	20,00	157	86	8	51	6
3888410	456680-001700	17,00	20,00	157	86	10	51	6
3888411	456680-001800	18,00	20,00	171	100	10	51	6
3888412	456680-001900	19,00	20,00	171	100	10	51	6
3888413	456680-002000	20,00	20,00	200	129	10	51	6

■ Series 050221 • Solid Carbide • Helical Flute • Grade K10™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70
P	1	20	–	30	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	20	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	4	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	5	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	6	10	–	10	mm/r	0,06–0,10	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23
M	1	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
K	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	3	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
N	1	30	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	2	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	3	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	4	30	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	5	20	–	30	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
	6	30	–	40	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45
S	1	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	2	10	–	10	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	3	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25
	4	10	–	20	mm/r	0,07–0,13	0,08–0,16	0,10–0,20	0,13–0,23	0,15–0,25

■ Series 050227 • Solid Carbide • Helical Flute • Grade K10F™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev						
		min		max	Tool Diameter	1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	3	30	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	4	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	5	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	10	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	20	–	30	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	70	–	90	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	80	–	100	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	70	–	90	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	60	–	80	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	90	–	110	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	10	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

■ Series 450227 • Solid Carbide • Helical Flute • Grade K10F-DCFD™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev						
		min		max	Tool Diameter	1,40–3,15	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	60	–	80	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	2	60	–	80	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	3	60	–	70	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	4	40	–	60	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,40–0,70	0,40–0,80	0,50–0,90
	6	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	50	–	70	mm/r	0,25–0,45	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

■ Series 050271 • Solid Carbide • Helical Flute • Grade K10F™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	50	–	70	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	120	–	140	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	150	–	170	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

■ Series 450271 • Solid Carbide • Helical Flute • Grade K10F-DCFD™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	100	–	120	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	60	–	80	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	30	–	50	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	70	–	90	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	30	–	40	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

■ Series 050281 • Uncoated • Carbide-Tipped • Helical Flute • Grade K10F™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev			
		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	50	–	70	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	30	–	40	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	20	–	30	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	30	–	40	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
N	1	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	4	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	5	120	–	140	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	6	150	–	170	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	3	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90

■ Series 450281 • Coated • Carbide-Tipped • Helical Flute • Grade K10F-DCFD™ • Metric

Material Group		 Cutting Speed — vc Range — m/min			 Recommended Feed Rate per Rev			
		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	20	–	30	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	70	–	90	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	30	–	40	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	20	–	30	mm/r	0,30–0,50	0,30–0,60	0,35–0,65

■ Series 456681 • Cermet-Tipped • Helical Flute • Grade CERMET-DCFD™ • Metric

Material Group		  Cutting Speed — vc Range — m/min			 Recommended Feed Rate per Rev		
		min		max	Tool Diameter	12,70–15,00	15,00–20,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80

■ Series 050222 • Solid Carbide • Straight Flute • Grade K10F™ • Metric

Material Group		   Cutting Speed — vc Range — m/min			 Recommended Feed Rate per Rev		
		min		max	Tool Diameter	1,40–3,15	3,16–4,80
P	1	30	–	40	mm/r	0,20–0,30	0,20–0,40
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40
	3	30	–	30	mm/r	0,20–0,30	0,20–0,40
	4	20	–	30	mm/r	0,20–0,30	0,20–0,40
	5	10	–	20	mm/r	0,20–0,30	0,20–0,40
	6	10	–	20	mm/r	0,15-0,30	0,20-0,30
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30
	3	10	–	10	mm/r	0,15–0,30	0,20–0,30
K	1	20	–	30	mm/r	0,25–0,45	0,35–0,65
	2	20	–	30	mm/r	0,25–0,45	0,35–0,65
	3	20	–	30	mm/r	0,25–0,45	0,35–0,65
N	1	70	–	90	mm/r	0,25–0,45	0,35–0,65
	2	80	–	100	mm/r	0,25–0,45	0,35–0,65
	3	80	–	100	mm/r	0,25–0,45	0,35–0,65
	4	70	–	90	mm/r	0,25–0,45	0,35–0,65
	5	60	–	80	mm/r	0,25–0,45	0,35–0,65
	6	90	–	110	mm/r	0,25-0,45	0,35-0,65
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30
	2	10	–	10	mm/r	0,10–0,20	0,15–0,30
	3	20	–	30	mm/r	0,15–0,30	0,20–0,30
	4	20	–	30	mm/r	0,15-0,30	0,20-0,30

■ Series 450222 • Solid Carbide • Straight Flute • Grade K10F-DCFD™ • Metric

Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev		
		min		max	Tool Diameter	1,40–3,15	3,16–4,80
P	1	60	–	80	mm/r	0,20–0,30	0,20–0,40
	2	60	–	80	mm/r	0,20–0,30	0,20–0,40
	3	50	–	70	mm/r	0,20–0,30	0,20–0,40
	4	40	–	60	mm/r	0,20–0,30	0,20–0,40
	5	20	–	30	mm/r	0,20–0,30	0,20–0,40
	6	20	–	30	mm/r	0,15–0,30	0,20–0,30
M	1	10	–	20	mm/r	0,15–0,30	0,20–0,30
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30
	3	10	–	20	mm/r	0,15–0,30	0,20–0,30
K	1	50	–	70	mm/r	0,25–0,45	0,35–0,65
	2	50	–	70	mm/r	0,25–0,45	0,35–0,65
	3	50	–	70	mm/r	0,25–0,45	0,35–0,65
S	1	10	–	20	mm/r	0,10–0,20	0,15–0,30
	2	10	–	20	mm/r	0,10–0,20	0,15–0,30

■ Series 050270 • Solid Carbide • Straight Flute • Grade K10F™ • Metric




Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	50	–	70	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	40	–	60	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	20	–	30	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	10	–	20	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	30	–	50	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
N	1	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	140	–	160	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	4	130	–	150	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	5	120	–	140	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	6	150	–	170	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	10	–	20	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	3	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	4	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65

■ Series 450270 • Solid Carbide • Straight Flute • Grade K10F-DCFD™ • Metric




Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev					
		min		max	Tool Diameter	3,16–4,80	4,81–7,15	7,16–9,59	9,60–12,70	12,70–15,00
P	1	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	2	110	–	130	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	3	100	–	120	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	4	60	–	80	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	5	30	–	50	mm/r	0,20–0,40	0,30–0,50	0,35–0,65	0,40–0,80	0,50–0,90
	6	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
M	1	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	2	30	–	40	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
	3	20	–	30	mm/r	0,20–0,30	0,20–0,40	0,30–0,50	0,30–0,60	0,35–0,65
K	1	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	2	80	–	100	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
	3	70	–	90	mm/r	0,35–0,65	0,40–0,80	0,50–0,90	0,60–1,05	0,60–1,20
S	1	30	–	40	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50
	2	20	–	30	mm/r	0,15–0,30	0,20–0,30	0,20–0,40	0,25–0,45	0,30–0,50

■ Series 050280 • Uncoated • Carbide-Tipped • Straight Flute • Grade K10F™ • Metric





Material Group		Cutting Speed — vc Range — m/min			Recommended Feed Rate per Rev			
		min		max	Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	50	–	70	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	2	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	3	40	–	60	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	4	30	–	40	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	5	20	–	30	mm/r	0,50–0,90	0,60–1,05	0,60–1,20
	6	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
M	1	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	10	–	20	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	30	–	50	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	30	–	40	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
N	1	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	140	–	160	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	4	130	–	150	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	5	120	–	140	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	6	150	–	170	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	10	–	20	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	3	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	4	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90

■ Series 450280 • Coated • Carbide-Tipped • Straight Flute • Grade K10F-DCFD™ • Metric



Material Group		Cutting Speed — vc Range — m/min min		max	Recommended Feed Rate per Rev Tool Diameter	12,70–15,00	15,00–20,00	20,00–32,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05	0,60–1,10
	6	30	–	40	mm/r	0,35-0,65	0,40-0,80	0,50-0,90
M	1	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	2	30	–	40	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
	3	20	–	30	mm/r	0,35–0,65	0,40–0,80	0,50–0,90
K	1	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	2	80	–	100	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
	3	70	–	90	mm/r	0,60–1,20	0,70–1,30	0,80–1,40
S	1	30	–	40	mm/r	0,30–0,50	0,30–0,60	0,35–0,65
	2	20	–	30	mm/r	0,30-0,50	0,30-0,60	0,35-0,65

■ Series 456680 • Cermet-Tipped • Straight Flute • Grade CERMET-DCFD™ • Metric



Material Group		Cutting Speed — vc Range — m/min min		max	Recommended Feed Rate per Rev Tool Diameter	12,70–15,00	15,00–20,00
P	1	110	–	130	mm/r	0,50–0,90	0,60–1,05
	2	110	–	130	mm/r	0,50–0,90	0,60–1,05
	3	100	–	120	mm/r	0,50–0,90	0,60–1,05
	4	60	–	80	mm/r	0,50–0,90	0,60–1,05
	5	30	–	50	mm/r	0,50–0,90	0,60–1,05
	6	30	–	40	mm/r	0,35–0,65	0,40–0,80

WIDIA™ TRM •
Top Ream Modular (Available as Semi-Standards)

WIDIA TRM



Primary Application

- Achieve solid carbide metal removal rates.
- Five sizes of standard straight shank bodies available to couple reaming heads from 20–42mm (.787–1.653").

Features and Benefits

- High-speed and high-performance ready.
- Unique proprietary coupling system enables same runout accuracy as monoblock systems (<3 microns).
- Comfortable radial clamping for quick exchanging even in narrow situations in the machine.
- No fixture for clamping or dismounting necessary.

Customisation

- Heads fully customisable as simple specials with different lead geometries, grades, coatings, and edge hones.
- Semi-finished heads on stock for shorter lead times.

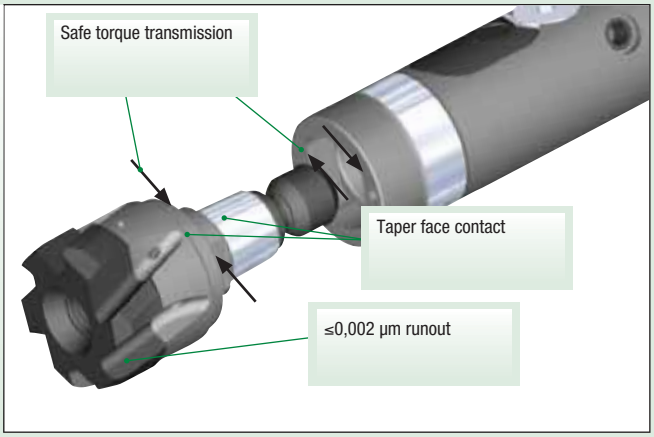
Ordering Process

- Please contact your local Authorised Distributor for a quote.

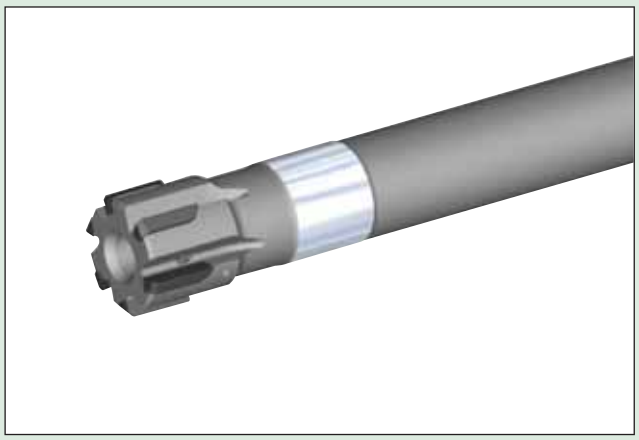


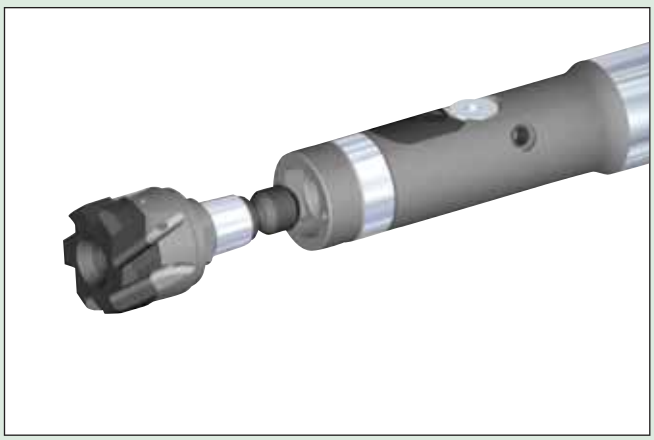
WST™ — WIDIA™ Short Taper

- Easy to handle.
- Fewer vibrations due to safe torque transmission.
- No head-to-body orientation adjustment necessary.
- Higher hole quality due to minimal runout and taper face contact.
- Easy to disassemble due to push out effect of head.



Special Design — Top Ream Tipped Tools





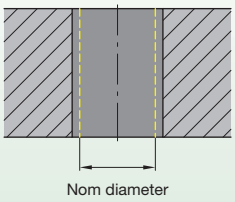
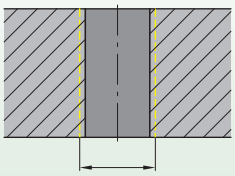
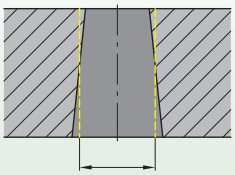
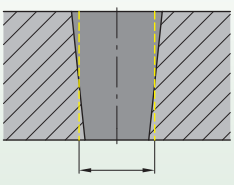
Regular Tipped

- 4–8 brazing joints depending on diameter (number of teeth).
- Less stiffness.
- More vibrations.
- Higher runout after thermal influence (e.g., coating, reconditioning, etc.).

WIDIA Top Ream

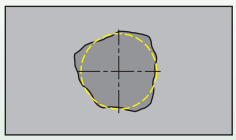
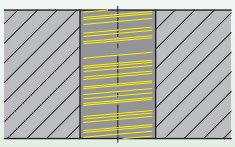
- Min 4x reconditionable.
- New reaming grade WU05PR™ holds bore surface finish more than 2x longer.
- Stronger brazing joint than conventional tipped reamers.
- Less influence of coating process on runout.

Reamer Troubleshooting

Problem	Cause	Possible Remedy
Hole diameter too large 	1. Reaming tool running out of centre. 2. Concentricity of pilot hole and ream machining unsatisfactory. 3. Built-up edge. 4. Unsuitable cooling lubricant. 5. Reaming tool diameter too large.	• Use equalising adaptor. • Re-align, use floating head. • Change cooling lubricant. • Change cutting speed. • Measure reamers and send for repairs.
Hole diameter too small 	1. Reamer worn. 2. Unsuitable cooling lubricant. 3. Reaming allowance too small.	• Replace and refit tool. • Change cooling lubricant. • Increase reaming allowance.
Conical hole profile wider towards drill runout 	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Positioning accuracy of pilot hole to reaming.	• Re-align, use equalising adaptor. • Correct positioning accuracy.
Conical hole profile wider at drill entry point 	1. Concentricity of pilot hole and reaming unsatisfactory. 2. Reaming tool skim cutting with ledger.	• Re-align, use floating head. • Securely clamp reaming tool axially.

(continued)

Reamer Troubleshooting *(continued)*

Problem	Cause	Possible Remedy
Conical hole profile wider at drill entry point 	1. Reaming tool running out of centre. 2. Slanted cutting surface/asymmetrical cutting. 3. Workpiece twisted.	• Use equalising adaptor. • Spot face as drilling preparation. • Take the direction of impact into account when clamping the workpiece.
Surface quality does not meet specification 	1. Tool cutters worn. 2. Reaming tool running out of centre. 3. Incorrect technology data (cutting parameters). 4. Inadequate chip evacuation.	• Use equalising adaptor. • Re-align, use floating head. • Change cooling lubricant. • Change cutting speed. • Measure reamers and send for repairs.
Feed grooves 	1. Built-up edge.	• Change cooling lubricant. • Change cutting speed.



ROTAFLEX

The WIDIA™ line of Precision Hole Finishing ensures decreased vibration, increased productivity, and reduced calls for scheduled maintenance. You can count on consistent hole diameters, high speed and feed rates, and good surface quality at a great price.

- Easy adjustments and low initial investment.
- Roughing and precision finishing heads available.
- For roughing and fine finishing operations over a broad diameter range.

The newly developed RFX coupling eases assembly and disassembly and enhances stabililty

- Increased machine tool productivity and less vibration.
- Standard micro-adjustable cartridges for fine finishing operations.
- Internal coolant and spacious chip flutes.



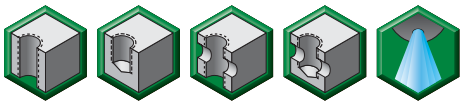
EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

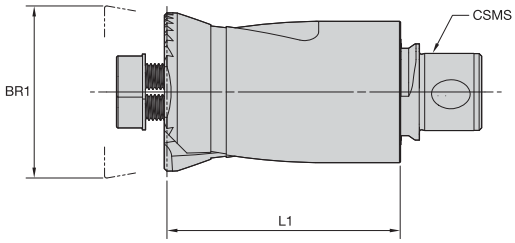
Advanced system uses the progressive RFX coupling and the latest technology WIDIA™ Victory™ ISO turning inserts

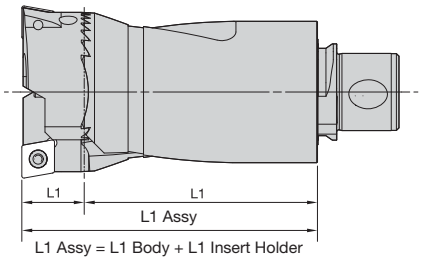
- High feed rates due to the proprietary front serration of the TCHS twin cutters.
- Internal coolant and spacious chip flutes ensure secure chip evacuation.
- High-precision adjustment of FBH and FBHBB Fine-Boring Heads with the axial and radial pre-loaded eccentric bushing instead of a threaded spindle.
- Higher rigidity with the new RFX bayonet-type coupling.
- Achieve unmatched tool life with WIDIA Victory grades.

WIDIA™

- Basic body shipped without insert holders.
- Order insert holder, slides, or micro-adjustable cartridges separately.









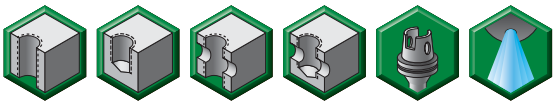
TCHS • RFX Shank Series

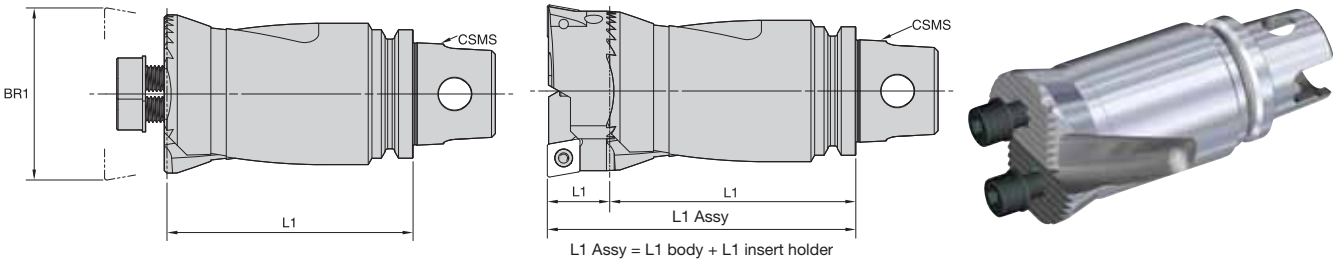
order number	catalogue number	BR1 bore range	L1	CSMS system size	kg
3861179	**RFX185TCHS022030**	22,500-30,000	27,7	RFX185	0,20
3861180	**RFX245TCHS030039**	30,000-39,000	37,7	RFX245	0,20
3861181	**RFX320TCHS039050**	39,000-50,000	48,7	RFX320	0,50
3861182	**RFX420TCHS050067**	50,000-67,000	68,2	RFX420	1,00
3861183	**RFX550TCHS067088**	67,000-88,000	90,7	RFX550	2,00
3861184	**RFX720TCHS088115**	88,000-115,000	113,7	RFX720	4,00

Spare Parts

catalogue number	 fixing screw	 disc washer
RFX185TCHS022030	**12147602700**	**12147600100**
RFX245TCHS030039	**12147602300**	**12147603900**
RFX320TCHS039050	**12147602400**	**12147600200**
RFX420TCHS050067	**12147602500**	**12147604000**
RFX550TCHS067088	**12147602600**	**12147600300**
RFX720TCHS088115	**12147602800**	**12147600400**

- Basic body shipped without insert holders.
- Order insert holder, slides, or micro-adjustable cartridges separately.





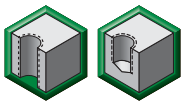
TCHS • KM™ Shank Series

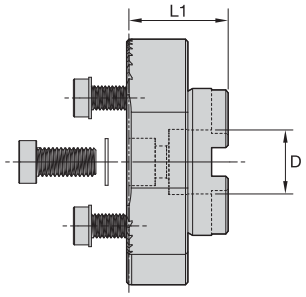
order number	catalogue number	BR1 bore range	L1	CSMS system size	kg
3861149	KM32TSTCHS022030	22,000-30,000	52,7	KM32TS	0,30
3861150	KM32TSTCHS030039	30,000-39,000	67,7	KM32TS	0,50
3861152	KM40TSTCHS030039	30,000-39,000	87,7	KM40TS	0,60
3861151	KM32TSTCHS039050	39,000-50,000	63,7	KM32TS	0,70
3861173	KM40TSTCHS039050	39,000-50,000	83,7	KM40TS	1,00
3861174	KM40TSTCHS050067	50,000-67,000	78,2	KM40TS	1,10
3861175	KM50TSTCHS050067	50,000-67,000	88,2	KM50TS	1,20
3861176	KM50TSTCHS067088	67,000-88,000	95,7	KM50TS	1,40
3861177	KM63TSTCHS067088	67,000-88,000	95,7	KM63TS	1,80
3861178	KM63TSTCHS088115	88,000-115,000	93,7	KM63TS	2,40

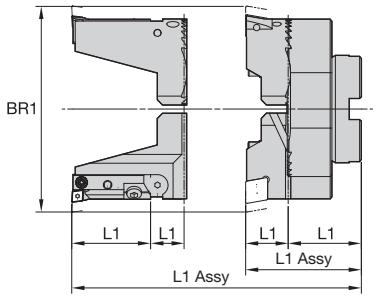
Spare Parts

catalogue number	 fixing screw	 disc washer
KM32TSTCHS022030	12147602700	12147600100
KM32TSTCHS030039	12147602300	12147603900
KM32TSTCHS039050	12147602400	12147600200
KM40TSTCHS030039	12147602300	12147603900
KM40TSTCHS039050	12147602400	12147600200
KM40TSTCHS050067	12147602500	12147604000
KM50TSTCHS050067	12147602500	12147604000
KM50TSTCHS067088	12147602600	12147600300
KM63TSTCHS067088	12147602600	12147600300
KM63TSTCHS088115	12147602800	12147600400

- For use with shell mill adaptors; please order separately.
- Bridge body shipped without insert holder, slides, or micro-adjustable cartridges.
- Order insert holder separately for rough boring and slides for fine boring.
- Order micro-adjustable cartridges separately for fine boring.







L1 Assy = L1 bridge + L1 insert holder
L1 Assy = L1 bridge + L1 slide + L1 cartridge



Bridge Tool • Small

order number	catalogue number	BR1 bore range	D	L1	kg
2006019	**12600208800**	87.000-110.000	27	40,3	1,70
2005500	**12600210900**	109.000-133.000	27	40,3	1,90
2005553	**12600213200**	132.000-156.000	27	40,3	2,10
2005556	**12600215500**	155.000-179.000	27	40,3	2,30
2005560	**12600217800**	178.000-202.000	27	40,3	2,50

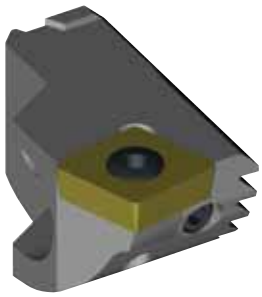
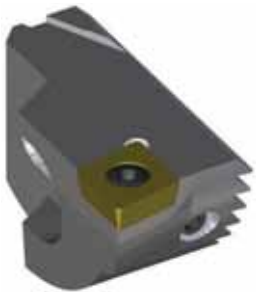
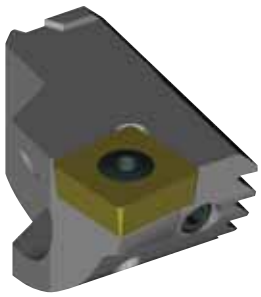
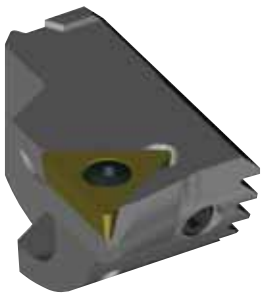
NOTE: Use of ISO cartridges SCLCL12CA12, STGCL12CA16, or SSRCL12CA12 is recommended.

Spare Parts

catalogue number	 fixing screw	 fixing screw	 fixing screw	 disc washer	 disc washer
12600208800	–	**12346233000**	**12147519100**	**12147600300**	–
12600210900	**12147613500**	–	**12147519100**	**12147600300**	**12147740200**
12600213200	**12147613500**	–	**12147519100**	**12147600300**	**12147740200**
12600215500	**12147613500**	–	**12147519100**	**12147600300**	**12147740200**
12600217800	**12147613500**	–	**12147519100**	**12147600300**	**12147740200**

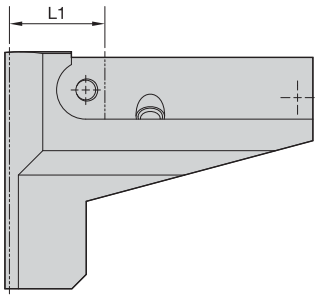
(continued)

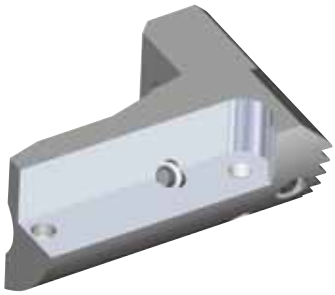
(continued)

Insert Holder Reference Chart

C-Style 70°	C-Style 90°	S-Style 80°	T-Style 90°
12625906700	12625706700	12626006700	12625806800

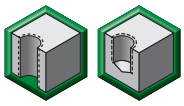


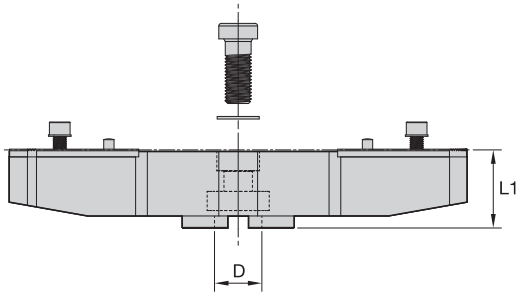


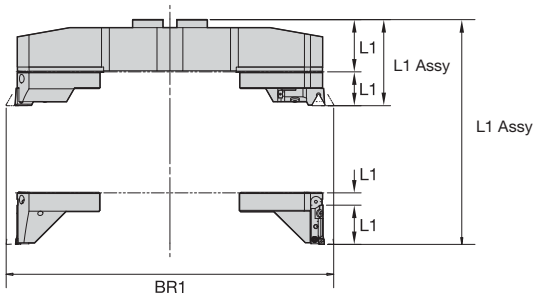
Slide for Micro-Adjustable Cartridges

order number	catalogue number	L1	adjusting screw	fixing screw	hex wrench
3864647	SMAC087	19,2	12147665000	12147519100	12148041100

- For use with shell mill adaptors; please order separately.
- Bridge body shipped without ISO cartridges, slides, or micro-adjustable cartridges.
- Order ISO cartridges separately for rough boring.
- Order micro-adjustable cartridges separately for fine boring.







L1 Assy = L1 Bridge + L1 Insert Holder
L1 Assy = L1 Bridge + L1 Slide + L1 Cartridge

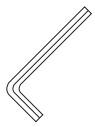


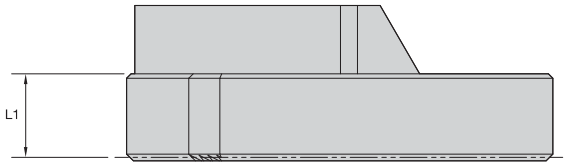
Bridge Tool • Large

order number	catalogue number	BR1 bore range	D	L1	kg
2005574	**12600020000**	200.000-280.000	40	50,6	2,00
2005602	**12600027800**	278.000-360.000	40	50,6	2,80
2005656	**12600035800**	358.000-440.000	40	61,6	2,50
2005722	**12600043800**	438.000-520.000	40	61,6	3,50

NOTE: Use of ISO cartridges SCLCL12CA12, STGCL12CA16, or SSRCL12CA12 is recommended.

Spare Parts

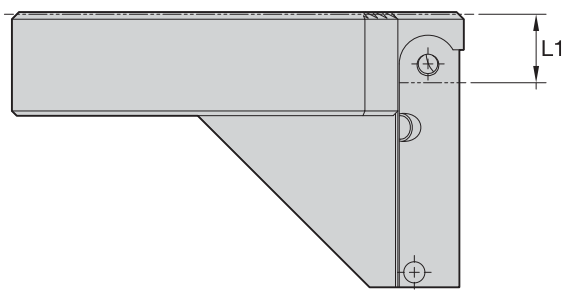
catalogue number	 fixing screw	 fixing screw	 disc washer	 hex wrench
12600020000	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600027800	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600035800	**12147739900**	**12147625400**	**12147600300**	**12147666700**
12600043800	**12147739900**	**12147625400**	**12147600300**	**12147666700**





Slide for ISO Cartridges

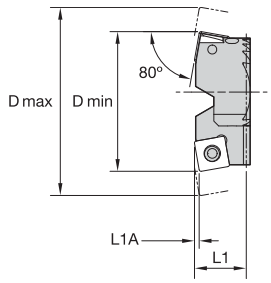
order number	catalogue number	L1	fixing screw	adjusting screw	hex wrench	hex wrench
2005576	12614020100	19,4	12147625200	12147739800	12148041300	12148041200

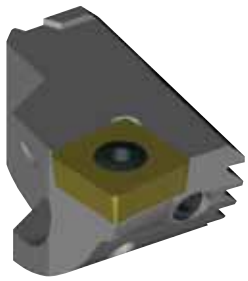




Slide for Micro-Adjustable Cartridges

order number	catalogue number	L1	fixing screw	adjusting screw	hex wrench
3860905	SMAC200	13,9	12147519100	12147739800	12148041200



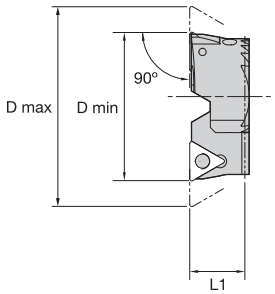


80° Lead Insert Holder • S-Style

order number	catalogue number	D min	D max	L1	L1A	gage insert
2005620	**12626003000**	30,00	39,00	12,35	1,30	SP..0703..
2005676	**12626004000**	39,00	50,00	16,30	1,50	SC../SP..09T3..
2005814	**12626005000**	50,00	67,00	21,80	2,10	SC../SP..1204..
2005941	**12626006700**	67,00	88,00	24,30	2,10	SC../SP..1204..

Spare Parts

catalogue number	clamping screw	adjusting screw	adjusting screw	Nm	Torx wrench	hex wrench
12626003000	**12148067200**	**12148069600**	**–**	1,0	**12148086600**	**12148040900**
12626004000	**12148038800**	**12148069600**	**–**	3,0	**12148082400**	**12148040900**
12626005000	**12148007200**	**12147602200**	**–**	3,5	**12148099400**	**12148041000**
12626006700	**12148007200**	**–**	**12147665000**	3,5	**12148099400**	**12148041100**



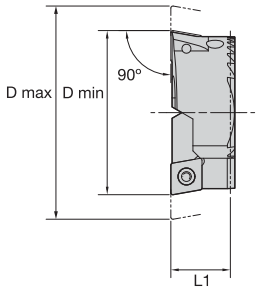


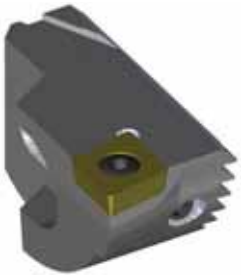
90° Lead Insert Holder • T-Style

order number	catalogue number	D min	D max	L1	gage insert
2005674	**12625804000**	39,00	50,00	16,30	TC../TP..1102..
2005802	**12625805100**	50,00	67,00	21,80	TC../TP..16T3..
2005939	**12625806800**	67,00	88,00	24,30	TC../TP..16T3..

Spare Parts

catalogue number	clamping screw	adjusting screw	adjusting screw	Nm	Torx wrench	hex wrench
12625804000	**12148068700**	**12148069600**	**–**	1,0	**12148086600**	**12148040900**
12625805100	**12148038800**	**12147602200**	**–**	3,0	**12148099400**	**12148041000**
12625806800	**12148038800**	**–**	**12147665000**	3,5	**12148099400**	**12148041100**

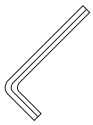


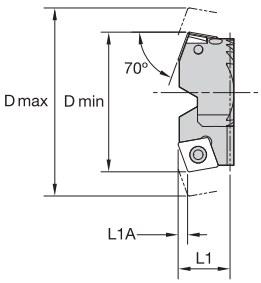


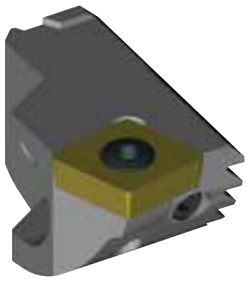
90° Lead Insert Holder • C-Style

order number	catalogue number	D min	D max	L1	gage insert
2005580	**12625702200**	22,50	30,00	12,05	CC../CP..0602..
2005618	**12625703000**	30,00	39,00	12,35	CC../CP..0602..
2005673	**12625704000**	39,00	50,00	16,30	CC../CP..09T3..
2005801	**12625705000**	50,00	67,00	21,80	CC../CP..1204..
2005938	**12625706700**	67,00	88,00	24,30	CC../CP..1204..
2006041	**12625708986**	88,00	115,00	36,30	CC../CP..1204..

Spare Parts

catalogue number	 clamping screw	 adjusting screw	 adjusting screw	Nm	 Torx wrench	 hex wrench
12625702200	**12148086600**	**12147579300**	**–**	1,0	**12148086600**	**12148046000**
12625703000	**12148086600**	**12148069600**	**–**	1,0	**12148086600**	**12148040900**
12625704000	**12148082400**	**12148069600**	**–**	3,0	**12148082400**	**12148040900**
12625705000	**12148099400**	**12147602200**	**–**	3,5	**12148099400**	**12148041000**
12625706700	**12148099400**	**–**	**12147665000**	3,5	**12148099400**	**12148041100**
12625708900	**12148099400**	**12148541600**	**–**	3,5	**12148099400**	**12148041100**

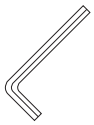




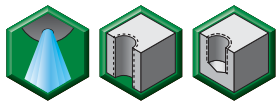
70° Lead Insert Holder • C-Style

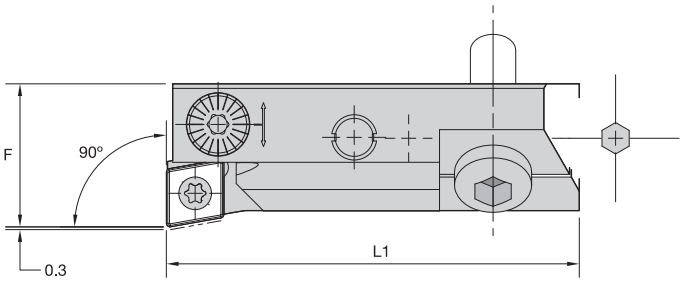
order number	catalogue number	D min	D max	L1	L1A	gage insert
2005581	**12625902200**	22,50	30,00	12,35	1,60	CC../CP..0602..
2005619	**12625903000**	30,00	39,00	12,35	1,60	CC../CP..0602..
2005675	**12625904000**	39,00	50,00	16,30	2,30	CC../CP..09T3..
2005813	**12625905000**	50,00	67,00	21,80	3,10	CC../CP..1204..
2005940	**12625906700**	67,00	88,00	24,30	3,10	CC../CP..1204..
2006054	**12625908986**	88,00	115,00	36,30	3,10	CC../CP..1204..

Spare Parts

catalogue number	 clamping screw	 adjusting screw	 adjusting screw	Nm	 Torx wrench	 hex wrench
12625902200	**12148068700**	**12147579300**	–	1,0	**12148086600**	**12148046000**
12625903000	**12148068700**	**12148069600**	–	1,0	**12148086600**	**12148040900**
12625904000	–	**12148069600**	–	3,0	**12148082400**	**12148040900**
12625905000	**12148007200**	**12147602200**	–	3,5	**12148099400**	**12148041000**
12625906700	**12148007200**	–	**12147665000**	3,5	**12148099400**	**12148041100**
12625908900	–	**12147602200**	–	3,5	**12148099400**	**12148041100**

- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.



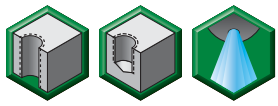


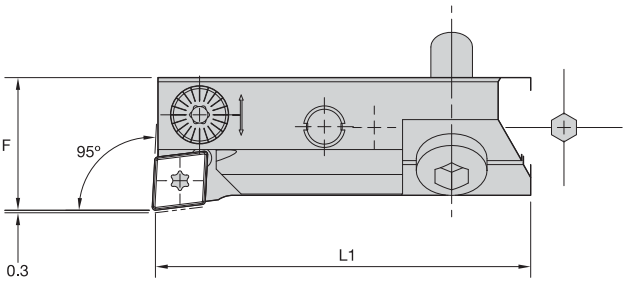


90° Lead Micro-Adjustable Cartridge • C-Style

order number	catalogue number	F	L1	gage insert	 insert clamping screw	 Torx wrench	Nm
3860908	**MASCFCR09CA06F**	16,00	45,50	CC..0602..	**12148068700**	**12148086600**	1,0

- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.



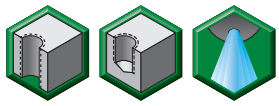


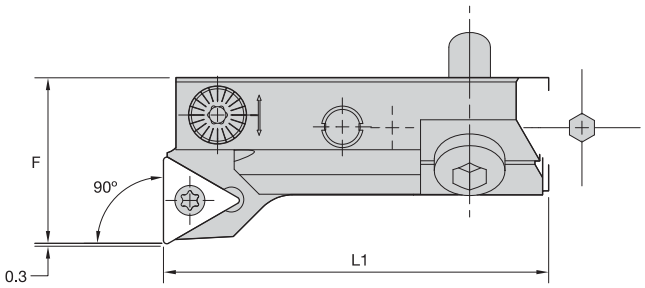


95° Lead Micro-Adjustable Cartridge • C-Style

order number	catalogue number	F	L1	gage insert	insert clamping screw	Torx wrench	Nm
3860909	**MASCLCR09CA06F**	16,00	45,50	CC..0602..	**12148068700**	**12148086600**	1,0

- All cartridges have internal coolant supply directed to the cutting edge.
- 0,01mm diameter adjustment within a range of 0,3mm.
- Radial adjustment without influence on axial position.
- Axial adjustment range of 1mm.



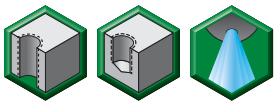


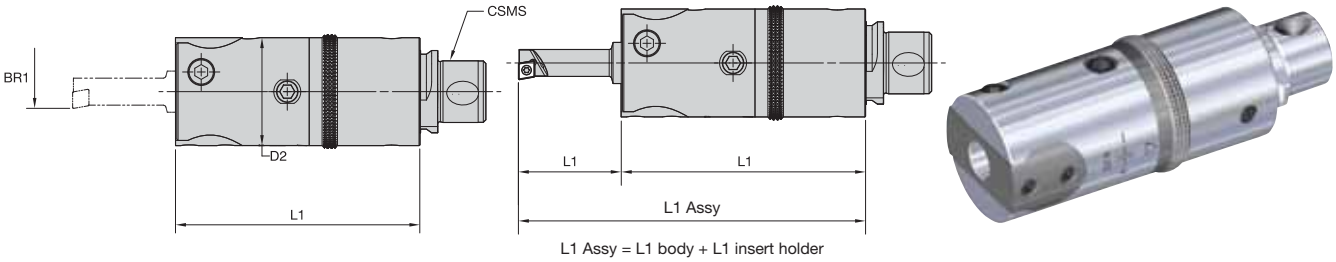


90° Lead Micro-Adjustable Cartridge • T-Style

order number	catalogue number	F	L1	gage insert	insert clamping screw	Torx wrench	Nm
3860910	**MASTFCR09CA11F**	20,00	45,50	TC..1102..	**12148068700**	**12148086600**	1,0

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.





L1 Assy = L1 body + L1 insert holder

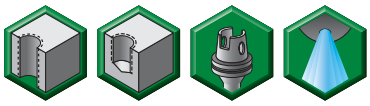
FBHBB • RFX Series Shank

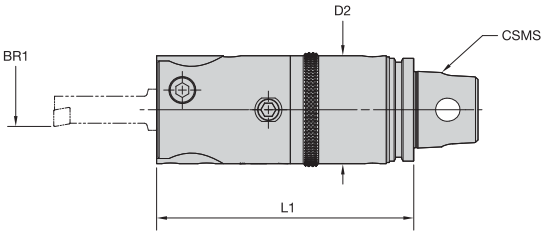
order number	catalogue number	BR1 bore range	D2	L1	CSMS system size	kg
3860906	**RFX420FBHBB006022**	6,000-22,000	42,00	95,00	RFX420	1,10

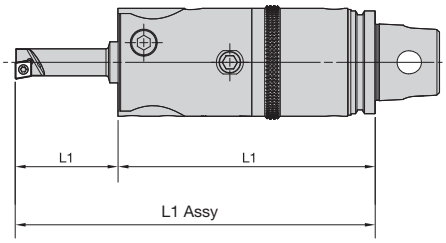
Spare Parts

catalogue number	front clamping screw 1	front clamping screw 2	adjustment locking screw	hex wrench	hex wrench
RFX420FBHBB006022	**12148068700**	**12148042400**	**12147680500**	**12148041100**	**12148041300**

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.







L1 Assy = L1 body + L1 insert holder



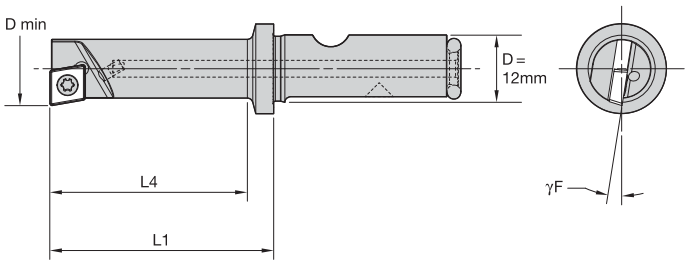
FBHBB KM-TS™ Series Shank

order number	catalogue number	BR1 bore range	D2	L1	CSMS system size	kg
3860907	**KM40TSFBHBB006022**	6,000-22,000	42,00	105,00	KM40TS	1,10

Spare Parts

catalogue number	front clamping screw 1	front clamping screw 2	adjustment locking screw	hex wrench	hex wrench
KM40TSFBHBB006022	**12147617400**	**12148042400**	**12147680500**	**12148041100**	**12148041300**

- All boring bars have internal coolant supply directed to the cutting edge.





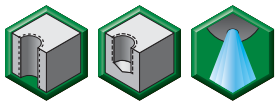
Boring Bars for Precision Fine Boring Heads (FBHBB)

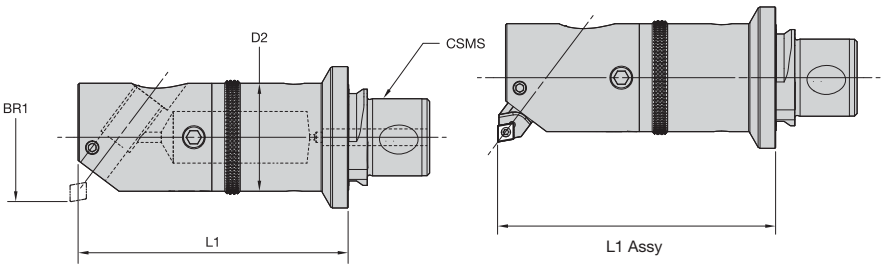
order number	catalogue number	D min	D max	L1	L4	γF°	kg
2005954	**12627006200**	6,00	8,00	30,00	24,00	-5.00	0,10
2006015	**12627008200**	8,00	10,00	30,00	25,00	-3.00	0,10
2005499	**12627010200**	10,00	13,00	35,00	30,00	-11.00	0,10
2005542	**12627013200**	13,00	16,00	40,00	35,00	-9.00	0,10
2005558	**12627016200**	16,00	19,00	45,00	40,00	-6.00	0,10
2005573	**12627019300**	19,00	22,00	55,00	55,00	-6.00	0,20

Spare Parts

catalogue number	gage insert	 clamping screw	 Torx wrench	Nm
12627006200	**CP..04T1..**	**12148005800**	**12148005900**	0,3
12627008200	**CP..04T1..**	**12148005800**	**12148005900**	0,3
12627010200	**CC../CP..0602..**	**12148068700**	**12148086600**	1,0
12627013200	**CC../CP..0602..**	**12148068700**	**12148086600**	1,0
12627016200	**CC../CP..0602..**	**12148068700**	**12148086600**	1,0
12627019300	**CC../CP..0602..**	**12148068700**	**12148086600**	1,0

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.



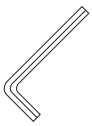
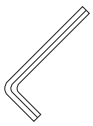




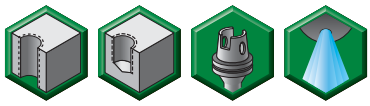
FBH • RFX Series Shank

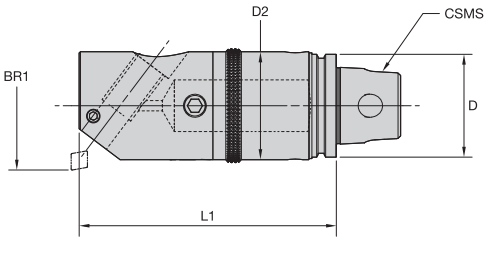
order number	catalogue number	BR1 bore range	D2	L1	L1 assy	CSMS system size	kg
3861143	**RFX185FBH022029**	22,000-29,000	18,50	55,00	56,00	RFX185	0,20
3861144	**RFX245FBH029038**	29,000-38,000	24,50	60,00	62,00	RFX245	0,20
3861145	**RFX320FBH038050**	38,000-50,000	32,00	75,00	77,00	RFX320	0,50
3861146	**RFX420FBH050065**	50,000-65,000	42,00	95,00	98,00	RFX420	1,10
3861147	**RFX550FBH065088**	65,000-88,000	55,00	115,00	120,00	RFX550	2,10
3861148	**RFX720FBH088115**	88,000-115,000	72,00	155,00	160,00	RFX720	4,90

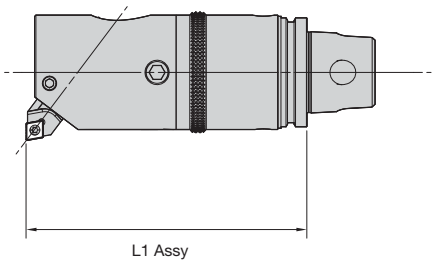
Spare Parts

catalogue number	 adjusting screw	adjustment locking screw	 fixing screw	wedge	 hex wrench	 hex wrench
RFX185FBH022029	**12147620000**	**12147680200**	**12346292100**	**12147621100**	**12148041100**	**12148040900**
RFX245FBH029038	**12147620000**	**12147680300**	**12346292200**	**12147621200**	**12148041100**	**12148040900**
RFX320FBH038050	**12147620300**	**12147680400**	**12147622300**	**12147621300**	**12148041200**	**12148041000**
RFX420FBH050065	**12147620400**	**12147680500**	**12148575900**	**12147621400**	**12148041300**	**12148041100**
RFX550FBH065088	**12147620500**	**12147680600**	**12148087100**	**12147621500**	**12148041400**	**12148041100**
RFX720FBH088115	**12147620600**	**12147680700**	**12148087100**	**12147621600**	**12148079000**	**–**

- 0,01mm diameter adjustment.
- Basic body shipped without boring bars.





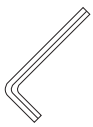
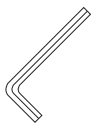


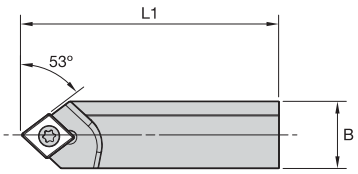


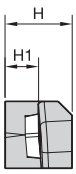
FBH • KM™ Series Shank

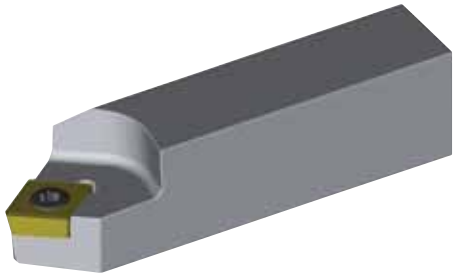
order number	catalogue number	BR1 bore range	D2	L1	L1 assy	CSMS system size	kg
3861123	KM32TSFBH022029	22,000-29,000	18,50	60,00	62,00	KM32TS	0,20
3861124	KM32TSFBH029038	29,000-38,000	24,50	70,00	72,00	KM32TS	0,20
3861125	KM32TSFBH038050	38,000-50,000	32,00	80,00	82,00	KM32TS	0,50
3861126	KM40TSFBH029038	29,000-38,000	24,50	90,00	92,00	KM40TS	0,50
3861127	KM40TSFBH038050	38,000-50,000	32,00	100,00	103,00	KM40TS	0,90
3861128	KM40TSFBH050065	50,000-65,000	42,00	105,00	108,00	KM40TS	1,10
3861129	KM50TSFBH050065	50,000-65,000	42,00	110,00	115,00	KM50TS	1,20
3861130	KM50TSFBH065088	65,000-88,000	55,00	125,00	130,00	KM50TS	1,70
3861131	KM63TSFBH065088	65,000-88,000	55,00	130,00	135,00	KM63TS	2,50
3861132	KM63TSFBH088115	88,000-115,000	63,00	130,00	135,00	KM63TS	2,00

Spare Parts

catalogue number	 adjusting screw	adjustment locking screw	 fixing screw	wedge	 hex wrench	 hex wrench
KM32TSFBH022029	12147620000	12147680200	12346292100	12147621100	12148041100	12148040900
KM32TSFBH029038	12147620000	12147680300	12346292200	12147621200	12148041100	12148040900
KM32TSFBH038050	12147620300	12147680400	12147622300	12147621300	12148041200	12148041000
KM40TSFBH029038	12147620000	12147680300	12346292200	12147621200	12148041100	12148040900
KM40TSFBH038050	12147620300	12147680400	12147622300	12147621300	12148041200	12148041000
KM40TSFBH050065	12147620400	12147680500	12148575900	12147621400	12148041100	12148041300
KM50TSFBH050065	12147620400	12147680500	12148575900	12147621400	12148041100	12148041300
KM50TSFBH065088	12147620500	12147680600	12148087100	12147621500	12148041200	12148041400
KM63TSFBH065088	12147620500	12147680600	12148087100	12147621500	12148041200	12148041400
KM63TSFBH088115	12147620600	12147680700	12148087100	12147621600	12148041200	12148079000

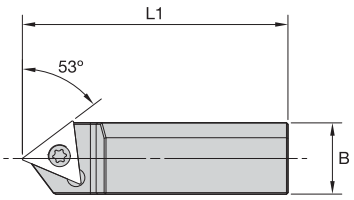


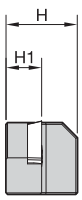


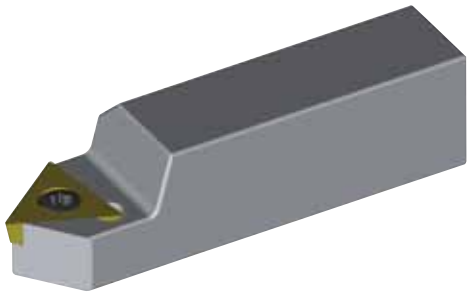


Precision Head Insert Holder • C-Style

order number	catalogue number	D min	D max	L1	H	H1	B	gage insert	clamping screw	Torx wrench	Nm
2004781	**12627270300**	22,00	29,00	19,00	8,00	4,50	8,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004782	**12627275300**	29,00	38,00	27,00	8,00	4,50	8,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004133	**12627270700**	38,00	50,00	35,00	10,00	5,50	10,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004140	**12627276500**	50,00	65,00	46,00	12,00	6,50	12,00	CC../CP..0602..	**12148068700**	**12148086600**	1,0
2004161	**12627277700**	65,00	88,00	60,00	16,00	8,00	16,00	CC../CP..09T3..	**12148038800**	**12148082400**	3,0
2004177	**12627278700**	88,00	115,00	84,00	16,00	8,00	16,00	CC../CP..09T3..	**12148038800**	**12148082400**	3,0



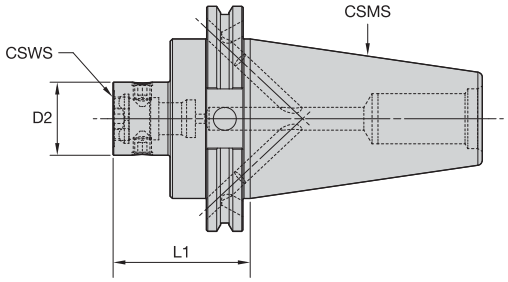




Precision Head Insert Holder • T-Style

order number	catalogue number	D min	D max	L1	H	H1	B	gage insert	clamping screw	Torx wrench	Nm
2004134	**12627270800**	38,00	50,00	35,00	10,00	5,50	10,00	TC../TP..1102..	**12148068700**	**12148086600**	1,0
2004141	**12627276800**	50,00	65,00	46,00	12,00	6,50	12,00	TC../TP..1102..	**12148068700**	**12148086600**	1,0
2004162	**12627277800**	65,00	88,00	60,00	16,00	8,00	16,00	TC../TP..1102..	**12148038800**	**12148082400**	3,0
2004178	**12627278800**	86,00	115,00	84,00	16,00	8,00	16,00	TC../TP..1102..	**12148038800**	**12148082400**	3,0





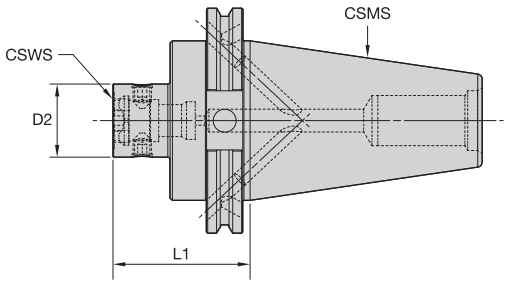


■ RFX • CV40 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860896	**CV40BRFX185236**	CV40	RFX185	18,5	60,0	1,1	**RFX185LS**	**12148041100**	6,0
3860897	**CV40BRFX245236**	CV40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860898	**CV40BRFX320236**	CV40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	14,0
3860899	**CV40BRFX420236**	CV40	RFX420	42,0	60,0	1,1	**RFX420LS**	**12148041300**	16,0
3860900	**CV40BRFX550256**	CV40	RFX550	55,0	65,0	1,2	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.

Form AD	✓				
Form B			40	(2x) MS2221S	2,5mm
			50	(2x) MS1296S	3mm



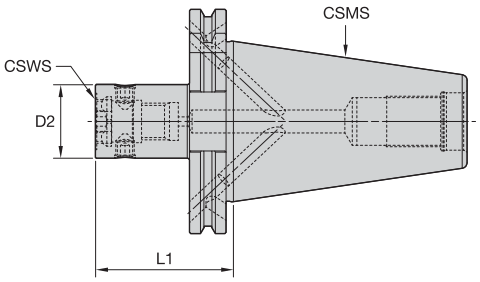


RFX • CV50 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860901	**CV50BRFX320236**	CV50	RFX320	32,0	60,0	3,1	**RFX320LS**	**12148041200**	12,0
3860902	**CV50BRFX420236**	CV50	RFX420	42,0	60,0	3,2	**RFX420LS**	**12148041300**	20,0
3860903	**CV50BRFX550236**	CV50	RFX550	55,0	60,0	3,4	**RFX550LS**	**12148041400**	25,0
3860904	**CV50BRFX720276**	CV50	RFX720	72,0	70,0	3,6	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.

Form AD	✓				
Form B			40	(2x) MS2221S	2,5mm
			50	(2x) MS1296S	3mm

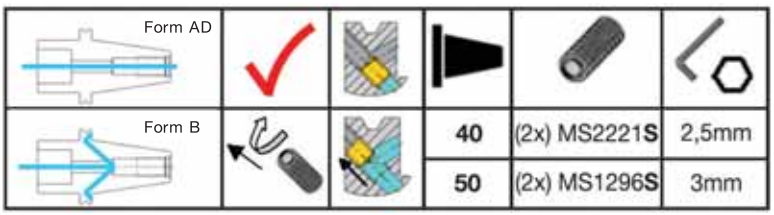


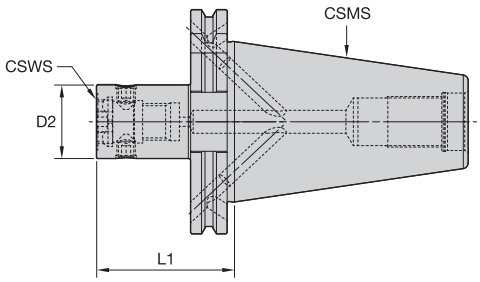


■ RFX • DV40 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860696	**DV40BRFX185060M**	DV40	RFX185	18,5	60,0	1,1	**RFX185LS**	**12148041100**	6,0
3860697	**DV40BRFX245060M**	DV40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860698	**DV40BRFX320060M**	DV40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	14,0
3860699	**DV40BRFX420060M**	DV40	RFX420	42,0	60,0	1,1	**RFX420LS**	**12148041300**	16,0
3860700	**DV40BRFX550065M**	DV40	RFX550	55,0	65,0	1,2	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.



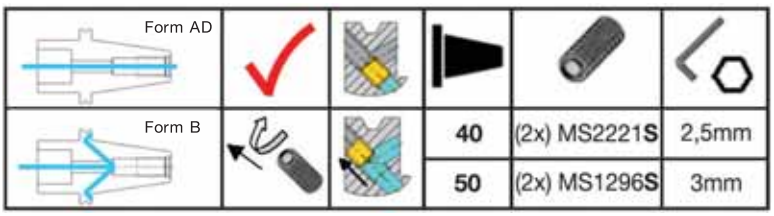


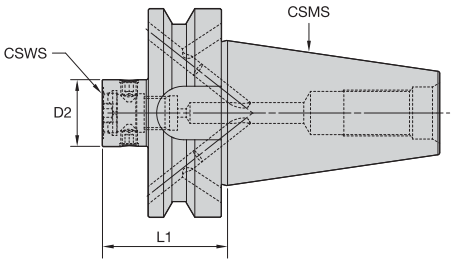


RFX • DV50 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860701	**DV50BRFX320060M**	DV50	RFX320	32,0	60,0	3,1	**RFX320LS**	**12148041200**	14,0
3860702	**DV50BRFX420060M**	DV50	RFX420	42,0	60,0	3,2	**RFX420LS**	**12148041300**	16,0
3860853	**DV50BRFX550060M**	DV50	RFX550	55,0	60,0	3,4	**RFX550LS**	**12148041400**	20,0
3860854	**DV50BRFX720065M**	DV50	RFX720	72,0	65,0	3,6	**RFX720LS**	**12148041400**	20,0

NOTE: Lock screws included. Order retention knobs separately.





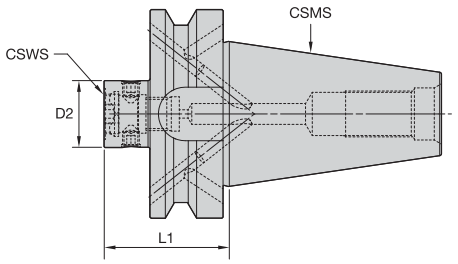


■ RFX • BT40 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860676	**BT40BRFX185060M**	BT40	RFX185	18,5	60,0	1,0	**RFX185LS**	**12148041100**	8,0
3860677	**BT40BRFX245060M**	BT40	RFX245	24,5	60,0	1,1	**RFX245LS**	**12148041100**	8,0
3860678	**BT40BRFX320060M**	BT40	RFX320	32,0	60,0	1,1	**RFX320LS**	**12148041200**	12,0
3860679	**BT40BRFX420060M**	BT40	RFX420	42,0	60,0	1,2	**RFX420LS**	**12148041300**	20,0
3860680	**BT40BRFX550065M**	BT40	RFX550	55,0	65,0	1,3	**RFX550LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.

Form AD	✓				
Form B			40	(2x) MS2221S	2,5mm
			50	(2x) MS1296S	3mm

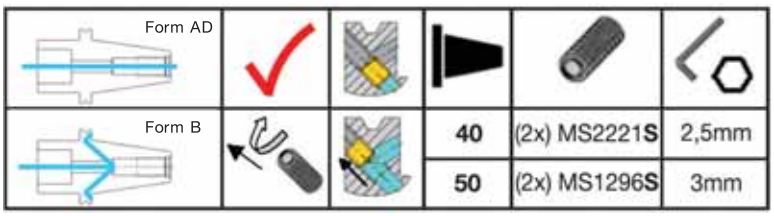


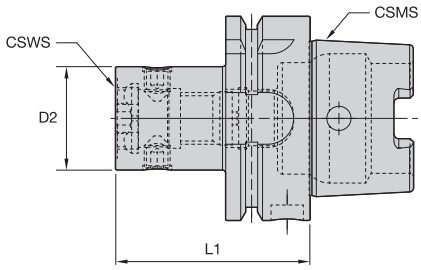


RFX • BT50 Taper Shank Form B/AD

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860681	**BT50BRFX320060M**	BT50	RFX320	32,0	60,0	3,5	**RFX320LS**	**12148041200**	14,0
3860682	**BT50BRFX420060M**	BT50	RFX420	42,0	60,0	3,9	**RFX420LS**	**12148041300**	16,0
3860693	**BT50BRFX550065M**	BT50	RFX550	55,0	65,0	4,2	**RFX550LS**	**12148041400**	25,0
3860694	**BT50BRFX720070M**	BT50	RFX720	72,0	70,0	4,5	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included. Order retention knobs separately.



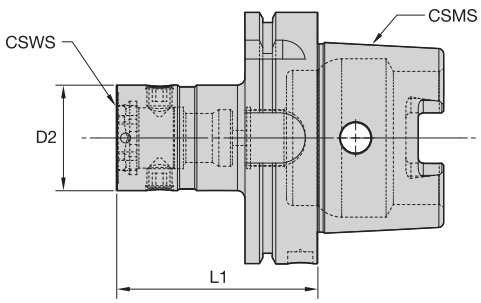




■ RFX • HSK63 Form A

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860549	**HSK63ARFX185060M**	HSK63A	RFX185	18,5	60,0	0,7	**RFX185LS**	**12148041100**	6,0
3860550	**HSK63ARFX245060M**	HSK63A	RFX245	24,5	60,0	0,7	**RFX245LS**	**12148041100**	8,0
3860551	**HSK63ARFX320060M**	HSK63A	RFX320	32,0	60,0	0,8	**RFX320LS**	**12148041200**	14,0
3860552	**HSK63ARFX420070M**	HSK63A	RFX420	42,0	70,0	1,0	**RFX420LS**	**12148041300**	16,0
3860623	**HSK63ARFX550080M**	HSK63A	RFX550	55,0	80,0	1,4	**RFX550LS**	**12148041400**	20,0
3860624	**HSK63ARFX720095M**	HSK63A	RFX720	72,0	95,0	2,0	**RFX720LS**	**12148041400**	20,0

NOTE: Lock screws included. HSK coolant unit and wrench are available but must be ordered separately.

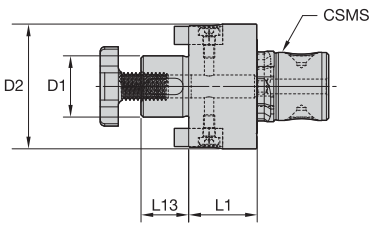




RFX • HSK100 Form A

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3881208	**HSK100ARFX420080M**	HSK100A	RFX420	42,0	80,0	1,0	**RFX420LS**	**12148041300**	20,0
3881209	**HSK100ARFX550090M**	HSK100A	RFX550	55,0	90,0	2,2	**RFX550LS**	**12148041400**	25,0
3881210	**HSK100ARFX720105M**	HSK100A	RFX720	72,0	105,0	2,5	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included. HSK coolant unit and wrench are available but must be ordered separately.



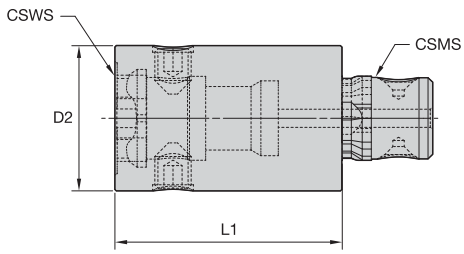


CS-RFX Adaptor • Lock Screw Design

order number	catalogue number	CSMS system size	D1	D2	L1	L13	kg
3860547	**RFX550CS27030M**	RFX550	27,0	55,0	30,0	21,0	0,9
3860548	**RFX720CS40035M**	RFX720	40,0	72,0	35,0	27,0	1,8

Spare Parts

catalogue number	 lock screw
RFX550CS27030M	**12147522400**
RFX720CS40035M	**KLS40M**

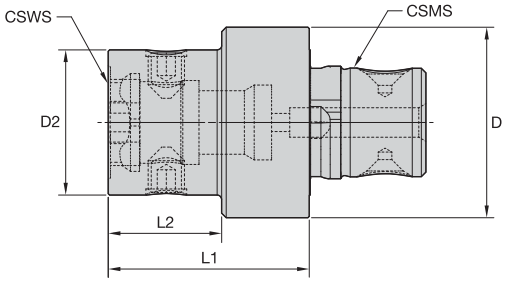




RFX Extensions

order number	catalogue number	CSMS system size	CSWS system size	D2	L1	kg	lock screw	hex wrench	Nm
3860450	**RFX185RFX185030M**	RFX185	RFX185	18,5	30,0	0,1	**RFX185LS**	**12148041100**	6,0
3860451	**RFX245RFX245035M**	RFX245	RFX245	24,5	35,0	0,2	**RFX245LS**	**12148041100**	8,0
3860452	**RFX320RFX320050M**	RFX320	RFX320	32,0	50,0	0,3	**RFX320LS**	**12148041200**	14,0
3860473	**RFX420RFX420060M**	RFX420	RFX420	42,0	60,0	0,8	**RFX420LS**	**12148041300**	16,0
3860474	**RFX550RFX550090M**	RFX550	RFX550	55,0	90,0	1,6	**RFX550LS**	**12148041400**	20,0
3860475	**RFX720RFX720100M**	RFX720	RFX720	72,0	100,0	3,1	**RFX720LS**	**12148041400**	25,0

NOTE: Lock screws included.





RFX Reducers

order number	catalogue number	CSMS system size	CSWS system size	D	D2	L1	L2	kg	lock screw	hex wrench	Nm
3860419	**RFX320RFX185030M**	RFX320	RFX185	32,0	18,5	30,0	15,0	0,2	**RFX185LS**	**12148041100**	6,0
3860420	**RFX320RFX245040M**	RFX320	RFX245	32,0	24,5	40,0	25,0	0,2	**RFX245LS**	**12148041100**	8,0
3860421	**RFX420RFX185035M**	RFX420	RFX185	42,0	18,5	35,0	15,0	0,4	**RFX185LS**	**12148041100**	6,0
3860422	**RFX420RFX245045M**	RFX420	RFX245	42,0	24,5	45,0	25,0	0,4	**RFX245LS**	**12148041100**	8,0
3860443	**RFX420RFX320045M**	RFX420	RFX320	42,0	32,0	45,0	25,0	0,6	**RFX320LS**	**12148041200**	14,0
3860444	**RFX550RFX185040M**	RFX550	RFX185	55,0	18,5	40,0	15,0	0,7	**RFX185LS**	**12148041100**	6,0
3860445	**RFX550RFX245050M**	RFX550	RFX245	55,0	24,5	50,0	25,0	0,8	**RFX245LS**	**12148041100**	8,0
3860446	**RFX550RFX320050M**	RFX550	RFX320	55,0	32,0	50,0	25,0	0,8	**RFX320LS**	**12148041200**	14,0
3860447	**RFX550RFX420055M**	RFX550	RFX420	55,0	42,0	55,0	30,0	0,9	**RFX420LS**	**12148041300**	16,0
3860448	**RFX720RFX420060M**	RFX720	RFX420	72,0	42,0	60,0	30,0	1,6	**RFX420LS**	**12148041300**	16,0
3860449	**RFX720RFX550060M**	RFX720	RFX550	72,0	55,0	60,0	30,0	1,8	**RFX550LS**	**12148041400**	20,0

NOTE: Lock screws included.

Easy Access to Proven Metalworking Expertise!

WIDIA™ Customer Application Engineers assist customers and engineering groups throughout the world with expert tool selection and application recommendations for the entire range of WIDIA tooling.

Customer Application Support (CAS)

EXTREME **CHALLENGES.**
EXTREME **RESULTS.**

ORIGINATING COUNTRY	LANGUAGE	TEL	FAX	EMAIL
Australia	English	+61 001 724 539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Austria	German	0800 291630	0049 911 9735 429*	eu.techsupport@widia.com
Belgium	English / French	0800 80410	0049 911 9735 429*	eu.techsupport@widia.com
China	Chinese	+86 400 889 2237	+86 21 58999985 *	w-cn.techsupport@widia.com
Denmark	English	+45 808 89295	001 724 539 6830 *	na.techsupport@widia.com
Finland	English	0800 919413	001 724 539 6830 *	na.techsupport@widia.com
France	Frensh	+33 080 5540 379	0049 911 9735 429*	eu.techsupport@widia.com
Germany	German	0800 1015774	0911 9735 429*	eu.techsupport@widia.com
India	English	+91 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Israel	English	+972 1809 449907	001 724 539 6830 *	na.techsupport@widia.com
Italy	Italian	800 916568	02 89512146 *	eu.techsupport@widia.com
Japan	English	+81 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Korea (South)	English	+82 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Malaysia	English	+60 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Netherlands	English	0800 0201131	001 724 539 6830 *	na.techsupport@widia.com
New Zealand	English	+64 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Norway	English	800 10081	001 724 539 6830 *	na.techsupport@widia.com
Poland	Polish	00800 4411943	06166 56504*	eu.techsupport@widia.com
Russia (landline)	Russian	+7 8800 5556395	0048 6166 56504*	eu.techsupport@widia.com
Russia (cell phone)	Russian	+7 8005556395	0048 6166 56504*	eu.techsupport@widia.com
Singapore	English	+65 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
South Africa	English	+27 0800 981644	001 724 539 6830 *	na.techsupport@widia.com
Sweden	English	+46 020798794	001 724 539 6830 *	na.techsupport@widia.com
Taiwan	English	+886 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
Thailand	English	+66 001 724539 6921 *	001 724 539 6830 *	ap.techsupport@widia.com
United Kingdom	English	+44 0800 028 2996	001 724 539 6830 *	na.techsupport@widia.com
Ukraine	Russian	+380 0800502665	0048 6166 56504*	eu.techsupport@widia.com
USA	English	888 539 5145	001 724 539 6830 *	na.techsupport@widia.com

Phone and fax numbers marked with * are not toll free.

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services.**

WIDIA™

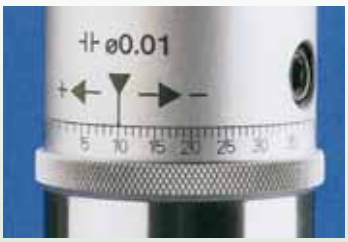
Design Principle



Basic adaptor | Eccentric bushing | Boring bar adaptor

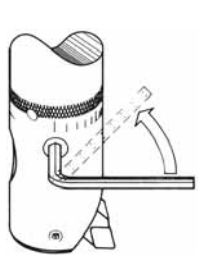
Eccentric bushing for fine adjustment

Regular fine boring heads have a threaded spindle as an adjustment mechanism. In this situation, spindle inaccuracy can cause backlash and require extra effort during setup. The ROTAFLEX eccentric bushing is easy to use, and machining forces are transmitted via a larger surface, ensuring a consistent diameter during machining.

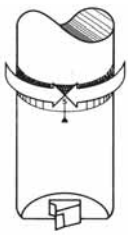


After rough adjustment of the insert holder, the easy-to-read scale enables fine adjustment to reach precisely the diameter needed. Here, no parallax errors occur when reading the scale.

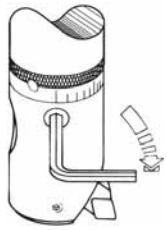
Adjustment



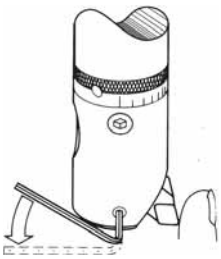
Unlock fine adjustment ring



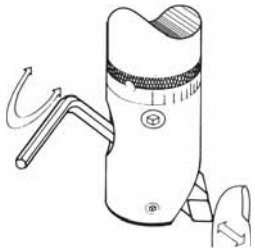
Set fine adjustment to zero



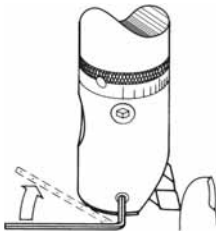
Lock fine adjustment ring



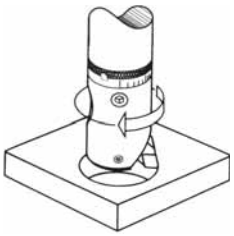
Unlock insert holder



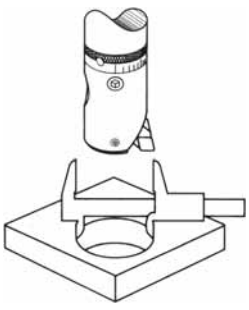
Coarse adjustment on pre-set equipment



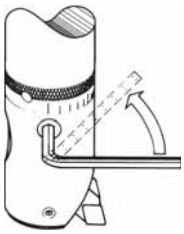
Lock insert holder



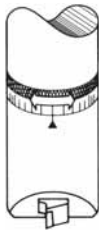
Control cut



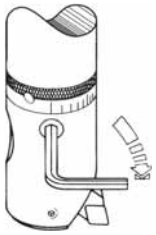
Measure



Unlock fine adjustment ring

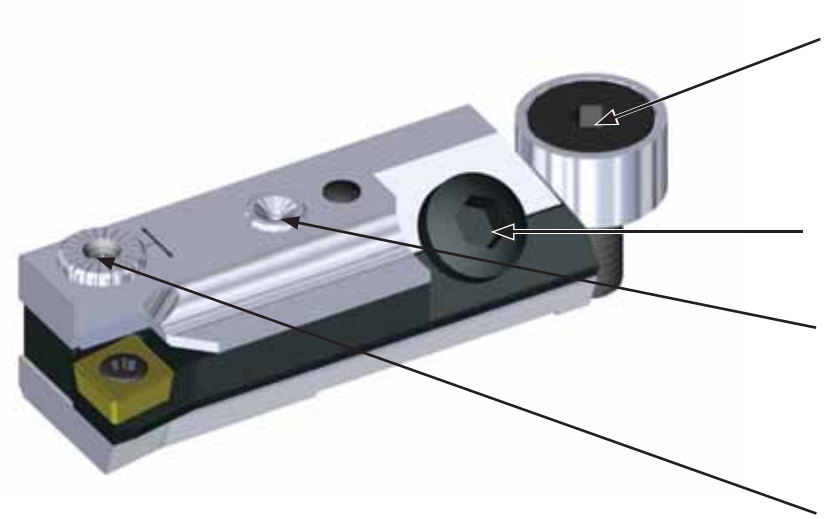


Readjust



Lock fine adjustment ring

Application Hints • Micro-Adjustable Cartridges



Axial adjustment wedge
1mm adjustment range

Fastening screw

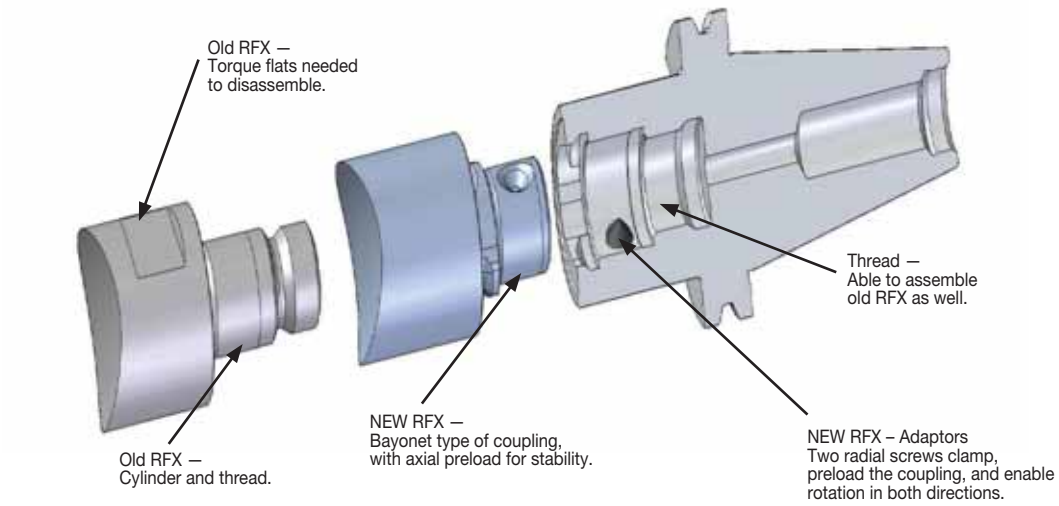
Lubrication nipple
Lithium saponified hydroxide is the recommended grease. The maintenance interval depends on the operating conditions. In permanent operations, a regreasing is recommended every four weeks.

Micro adjustment
0,01mm diameter adjustment.
Radial adjustment range of 0,6mm.

Rotation speed max 10,000 RPM

Application Hints • RFX Coupling

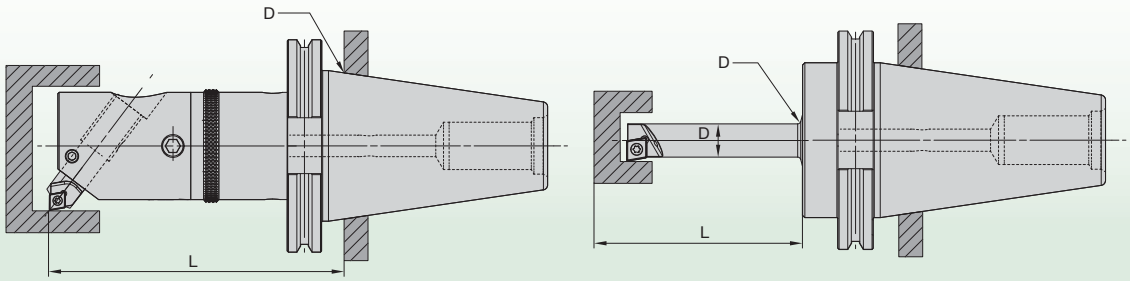
Old RFX screw-type coupling can be mounted into new RFX bayonet-type adaptors as well.



General Application Hints

- Identify your critical diameter (D).
- Identify the maximum distance cutting edge (L) to critical diameter.

Here are some examples:



Refer to this table for first investigation of application:

Type of Tooling	Stable	Unstable	Tests Necessary
Twin Cutter Solid Tools	<3,5 x D	3,5–6,5 x D	>6,5 x D
Twin Cutter Bridge Tools	<3,5 x D	3,5–6,5 x D	>6,5 x D
Fine-Boring Heads with Boring Bar (FBHBB)	<3,5 x D	3,5–5,0 x D	>5,0 x D
Fine-Boring Heads (FBH)	<3,5 x D	3,5–5,0 x D	>5,0 x D
Fine-Boring Bridge Tools	<3,5 x D	3,5–5,0 x D	>5,0 x D
	Function of the tool is expected without issues within recommended cutting data.	**Application may require reduced feeds and/or speeds compared to stable conditions.**	**Machining test may be required to identify cutting data.**

Causes of and remedies for rough and fine boring problems

It is generally assumed that the tools have been properly mounted as per the technical recommendations in this catalogue.

Problem	Cause	Possible Remedy
Vibration tendency	1. Overhang 2. Choice of insert 3. Cutting data	• Adjust L/D ratio • Select 90° lead angle on rough boring tools • Select inserts with positive geometry • Select inserts with smaller corner radius • Reduce depth of cut • Increase feed
Slight chatter marks on surface	1. Choice of insert 2. Cutting data 3. Machining environment	• Select 90° lead angle • Select ground inserts with small edge preparation • Select inserts with smaller corner radius • Increase feed • Increase coolant
Conical bores	1. Choice of insert 2. Cutting data 3. Machining environment	• Select a more wear-resistant insert grade • Increase cutting speed • Check whether all screws have been tightened to recommended torque

Inserts Overview

Geometry	Application	ANSI catalogue number	ISO catalogue number	P			M		K		S	
				WP15CT	WP25CT	WP35CT	WM15CT	WM25CT	WK05CT	WK20CT	WS10PT	WS25PT
	CCMT-FP • Fine Finishing	CCMT2151FP	CCMT060204FP	●	●		●	●		●	●	●
		CCMT3251FP	CCMT09T304FP	●	●		●	●		●	●	●
	CCMT-MU • Medium to Finishing	CCMT2152MU	CCMT060208MU					●		●		
		CCMT3251MU	CCMT09T304MU	●	●			●	●	●	●	●
		CCMT3252MU	CCMT09T308MU	●	●	●		●		●	●	●
		CCMT432MU	CCMT120408MU	●	●			●		●		●
	CCMT-MP • Roughing to Medium	CCMT2151MP	CCMT060204MP	●	●		●	●		●	●	
		CCMT3251MP	CCMT09T304MP	●	●		●	●		●	●	
		CCMT3252MP	CCMT09T308MP	●	●		●	●		●	●	
		CCMT432MP	CCMT120408MP	●	●		●	●		●	●	
		CCMT433MP	CCMT120412MP		●		●	●		●		

Hole Finishing Capabilities and Custom Solutions



With our state-of-the-art CNC equipment and engineering processes, we can design complex geometries for reaming and countersinking. Special countersinks for pre-working and finishing operations minimise machine time and rationalise production. Our custom solution reamers deliver proven performance in applications that demand high surface qualities, narrow fit, alignment tolerances, and long tool life.

Hole Finishing Custom Solution Tool Styles:

- Reaming
- Boring
- Countersinking
- PCD Round Tools

Hole Finishing Capabilities and Custom Solution Services

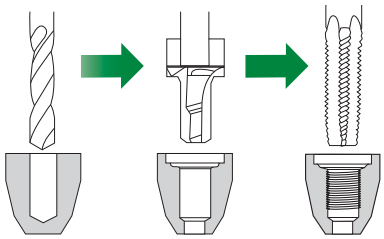
- Development, design, and production of different types of cutting tools for reaming, boring, and countersinking.
- Services provided by one engineering department fully integrated with all WIDIA™ focused factories.
- Capabilities with all common cutting materials such as high-speed steel (HSS-E), powdered metal, solid carbide, carbide-tipped, cermet, and PCD, with or without internal coolant.
- Complete tool competence from one source, from construction, application engineering, development, and production through tool reconditioning services.





Port Contour Cutters

- Each component has entry and exit points for the fluid involved called ports.
- Port shapes and forms are standardised.
- WIDIA™ offers porting tools to finish these ports in one-shot operations.



Standard Port	Available Cutters
JDS-G173.1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
AS5202	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
ISO-6149-1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
SAE J2241/1	169-0XXX WITH GROOVE & 169-1XXX WITHOUT GROOVE & 269-0XXX WITH GROOVE & 269-1XXX WITHOUT GROOVE
NPTF/NPT	186, 187 & 287
MS 16142	163, 253, 263, 267, 367 & 467
CAT.IE2554	163, 253, 263, 267, 367 & 467
SAE J1926-1	163, 253, 263, 267, 367 & 467
BSPP/BSPF	265
AS1300	RCT SERIES/CUSTOM SOLUTION
MS33659	164, 264 & 268
AND10050	164, 264 & 268
ISO-1179-1	255 STD. LGHT. & 265 EXT. LGTH. REAMER
DIN-3852-2	225 SMALL, 235 LARGE & 245 EXT. LGTH. REAMER

Port Contour Cutters

CHALLENGE

- Dura-bar 65-45-12.
- Component: General cavity.
- Ream SAE#8.
- Surface finish below Ra 32 (inch).

SOLUTION

- Cermet-tipped port cutting tool.

CUTTING DATA

- 2100 RPM–20 IPM.
- Flood coolant.
- Machining centre.

RESULT

- Surface finish of 7–15 RA (inch).

BENEFIT

- Increase productivity by one-shot finishing of port.





Reamer Custom Solutions

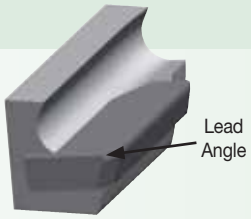
With our state-of-the-art equipment and engineering processes, we can design complex geometries for reaming and countersinking. Special countersinks for pre-working and finishing operations minimise machining time and rationalise production. Our custom solution reamers deliver proven performance in applications that demand high surface qualities, narrow fit, alignment tolerances, and long tool life.



Diameter

- 1,4–50mm (.055–1.968").
- Up to tolerance IT6 depending on application.
- Diameter steps.

Leads

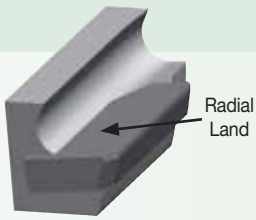


- 25–90° leads for smoother cutting or better positioning.
- Double leads for better surface quality.
- Radius leads for optimal CI machining.

Grades

- Various grades available tailored to your specific application.

Radial Land

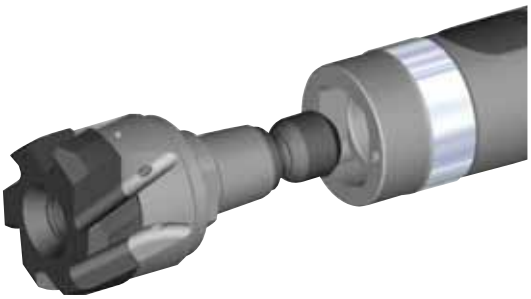


- Cylindrical for better guiding and form.
- Upsharp (no land) for best surface finishes and less passive forces.
- Narrow land to reduce forces.

TRM – TOP REAM MODULAR

CHALLENGE

- Tube holes Ø 25,25mm (.994").
- Tolerance range 100 µm.
- Alloy steel, long-chipping.
- Machining center with internal coolant.



SOLUTION

- Six cutting edges.
- Coated cermet.
- Standard 5 x D body clamped into hydraulic chuck.



CUTTING DATA

- vc = 90 m/min (295 SFM).
- f = 0,48 mm/rev (.019 IPR).

RESULT

- After more than 30 minutes only minor wear visible.

BENEFIT

- Reduction of machining time in total to less than 60 minutes per plate with 180 holes.
- Predictable tool life as only 2 µm diameter deviation after 30 minutes tool life.

PCD STEP REAMER

CHALLENGE

- Bearing bore Ø 130mm.
- Tolerance range 25 µm S6.
- Aluminium AlSi8Cu3.
- Varying depth of cut ca. 0,5–5mm.
- Machining centre with internal coolant.

SOLUTION

- PCD tipped, steel-based tool with HSK interface and internal coolant.
- Six effective cutting and chamfering teeth in positive cutting position.

CUTTING DATA

- vc = 350 m/min (1.148 SFM).
- f = 0,60 mm/rev (.024 IPR).

RESULT

- Tool life increase versus previous solution.
- Surface finish Ra 0.2 µm.

BENEFIT

- Secure process.
- Most productive solution at large diameter.
- Very long tool life.
- Reconditionable.

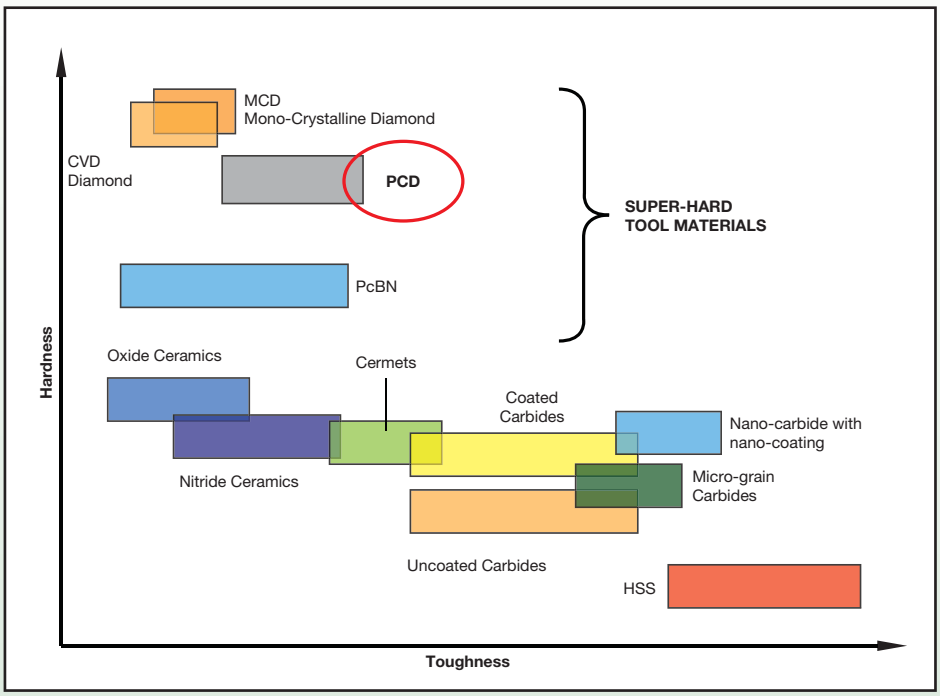




Highly uneven flute design reduces vibrations.

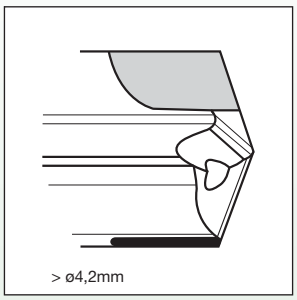
PCD • Round Tools for Holemaking

Cutting Materials • Hardness vs. Toughness



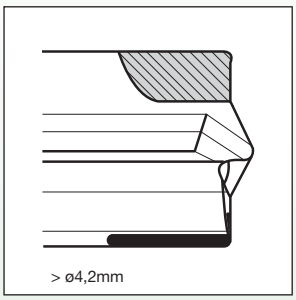
WIDIA™ PCD Drill-Pointed Geometries

Type: **CT**
Corner tipped



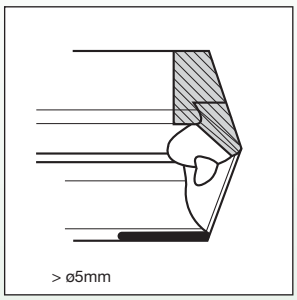
For general applications.

Type: **CTE**
Corner tipped with centre point



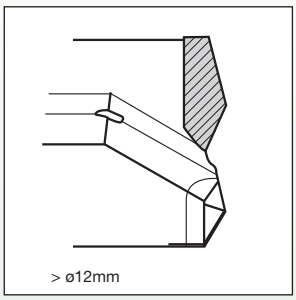
For precasted bores.

Type: **SW**
Sandwich



For highly abrasive materials.

Type: **MT**
For body = steel

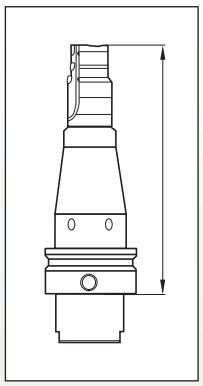


For breaking through the casting skin.

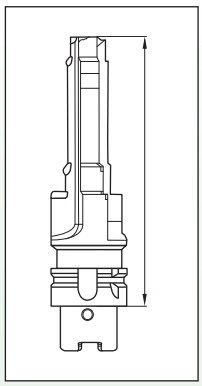
Non-Ferrous Materials

N2	Low-Silicon Aluminium Alloys (Hypoeutectic <12.2% Si) and Magnesium Alloys
N3	High-Silicon Aluminium Alloys (Hypereutectic >12.2% Si) and Magnesium Alloys
N4	Copper, Brass, Zinc-Based Materials
N5	Nylon, Plastics, Rubber, Phenolics, Resins, Fibreglass, Glass
N6	Carbon and Graphite Composites: Brush Alloys, Kevlar, Graphite
N7	MMCs — Aluminium Based Metal Matrix Composites

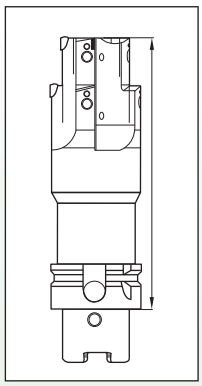
WIDIA™ PCD Styles for Reamers/CS



PKD ST —
Steel Shank



PKD STM —
Monoblock



PKD STMJ —
Adjustable Cutting Edges

PKD SC —
Solid Carbide Shank

Material	Coolant Style Grade	Coolant Style Grade	Coolant Style Grade
Al <7%	MQL, Emulsion	PCD SC PCD STM PCD STMU	WBK45U
Al <12%	MQL, Emulsion		WBK45U
Al <12%	Emulsion	PCD SC	WBK45U
Mg Alloys	Emulsion	PCD SC	WBK45U
CFK	Dry	PCD SC	WBK45U



Tapping

Tapping Introduction.....X2–X9

Spiral-Point/Left-Hand Spiral-Flute Taps.....Y2–Y17

Spiral-Flute Taps.....Y18–Y42

Straight-Flute Taps.....Y44–Y56

Forming Taps.....Y58–Y63

Thread Mills.....Y64–Y83

High-Performance Taps Application Data.....Y84–Y86

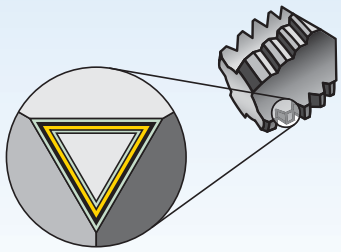
Technical Information.....Y88–Y115

★ Good ★★ Better ★★★ Best	hole		thread		coolant		size range		material				chamfer				
series	through	blind	cutting	forming	flood	through	min–max	grade/ coating	carbide	HSS-E-PM	HSS-E	HSS	type	form	helix angle	dimension	
Spiral-Point and Left-Hand Spiral-Flute Taps																	
GT20 	X		X		X		M3–M42	GP6520, GM6515		X			plug	D	L15°	DIN 371, 374, 376	
GT20 	X		X		X		M24–M42	GP6520		X			plug	D	L15°	DIN 376, XL	
GT21 	X		X			X	M5–M14	GP6520, GM6515		X			plug	D	L15°	DIN 371, 376	
GT10 	X		X		X		M3–M20	WS32MG		X			plug	D	L8°	DIN 371, 376	
GT14 	X		X		X		M3–M12	WN35MG		X			plug	B	0°	DIN 371, 376	
GT70 	X		X		X		M3–M16	WN48EG		X			plug	B	0°	DIN 371, 376	
GT00 	X		X		X		M3–M20	WP31MG		X			plug	B	0°	DIN 371, 374, 376	
VTSP060 	X		X		X		#4–1"	WP49EG, WU41EG			X		plug	B	0°	DIN 371, 376	
VTSP065 	X		X		X		M2–M36	WP42EG, WU41EG, WP49EG, WU40EG			X		plug	B	0°	DIN 371, 374, 376	
VTSP075 	X		X		X		M3–M20	WU41EG, WU40EG			X		plug	B	0°	JIS	
Spiral-Flute Taps																	
GT30 		X	X		X		M24–M42	GP6520		X			semi-bottom	C	45°	DIN 376, XL	
GT30 		X	X		X		M3–M42	GP6520, GM6515, GP6505		X			semi-bottom	C	45°	DIN 371, 374, 376	
GT31 		X	X			X	M5–M42	GP6520, GM6515		X			semi-bottom	C	45°	DIN371, 376	
GT31 		X	X			X	M24–M42	GP6520		X			semi-bottom	C	45°	DIN 376, XL	
GT32 		X	X		X		M5–M16	GP6520		X			bottoming	E	45°	DIN 371, 374, 376	
GT33 		X	X			X	M5–M16	GP6520		X			bottoming	E	45°	DIN 371, 374, 376	
GT50 		X	X		X		M24–M42	GP6520		X			semi-bottom	C	15°	DIN 376, XL	
GT51 		X	X			X	M24–M42	GP6520		X			semi-bottom	C	15°	DIN 376, XL	
GT12 		X	X		X		M3–M20	WS32MG		X			semi-bottom	C	10°	DIN 371, 376	
GT16 		X	X		X		M3–M12	WN35MG		X			semi-bottom	C	30°	DIN 371	
GT80 		X	X		X		M3–M20	WN48EG		X			semi-bottom	C	45°	DIN 371, 376	

P				M	K		N			S				H			
1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16	17, 18, 19, 20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1,40.2, 41.1	39.1, 41.2	page(s)	recommended cutting parameters
Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC		
Spiral-Point and Left-Hand Spiral-Flute Taps *(continued)*																	
★★★		★★★		★★★		★★	★	★		★★						Y4	Y85
★★★		★★★		★★★		★★	★	★		★★						Y5	Y85
★★★		★★★		★★★		★★	★	★		★★						Y6	Y85
											★★★	★★★				Y7	Y85
													★★★			Y8	Y85
							★★★	★	★							Y9	Y85
	★★★		★★★	★	★	★					★					Y10	Y85
★★	★	★		★★	★	★★	★	★★	★★	★						Y11	Y86
★★	★	★		★★	★	★★	★	★★	★★	★						Y14	Y86
★★	★	★		★★	★	★★	★	★★	★★	★						Y17	Y86
Spiral-Flute Taps *(continued)*																	
★★★		★★★		★★★		★★	★	★			★★					Y21	Y85
★★★		★★★		★★★		★★	★	★			★★					Y20	Y85
★★★		★★★		★★★		★★	★	★			★★					Y22	Y85
★★★		★★★		★★★		★★	★	★			★★					Y23	Y85
★★★		★★★		★★★		★★	★	★			★★					Y24	Y85
★★★		★★★		★★★		★★	★	★			★★					Y25	Y85
★★★		★★★				★★										Y26	Y85
★★★		★★★				★★										Y28	Y85
											★★★	★★★				Y30	Y85
													★★★			Y31	Y85
							★★★									Y32	Y85

★ Good ★★ Better ★★★ Best	hole		thread		coolant		size range		material				chamfer				
series	through	blind	cutting	forming	flood	through	min–max	grade/ coating	carbide	HSS-E-PM	HSS-E	HSS	type	form	helix angle	dimension	
Spiral-Flute Taps *(continued)*																	
GT02		X	X		X		M3–M20	WP31MG		X			semi-bottom	C	25°	DIN 371, 374, 376	
GT04		X	X		X		M3–M20	WH36MG		X			semi-bottom	C	42°	DIN 371, 374, 376	
VTSFT60		X	X		X		#4–1"	WP49EG, WU41EG			X		semi-bottom	C	45°	DIN 371, 376	
VTSFT65		X	X		X		M2–M36	WP42EG, WU41EG, WP49EG, WU40EG			X		semi-bottom	C	45°	DIN 371, 374, 376	
VTSFT65		X	X		X		M3–M20	WP49EG, WP42EG			X		bottoming	E	45°	DIN 371, 374, 376	
VTSFT75		X	X		X		M3–M20	WU41EG, WU40EG			X		semi-bottom	C	45°	JIS	
Straight-Flute Taps																	
GX10	X	X	X		X		M3–M16	WH16PG	X				semi-bottom	C	0°	DIN 371, 374, 376	
GX35		X	X			X	M6–M16	WK12PG	X				bottom	E	0°	HA6535	
GX35		X	X			X	M6–M14	WK12PG	X				bottom	E	0°	DIN 371, 374, 376	
GX47		X	X			X	M6–M10	WN14PG	X				bottoming	E	0°	DIN 371	
GX47		X	X			X	M6–M16	WN14PG	X				bottom	E	0°	HA6535	
GX50		X	X			X	M4–M14	WK12PG	X				semi-bottom	C	0°	DIN 371, DIN 376	
GT40	X	X	X		X		M4–M22	GP6520		X			semi-bottom	C	0°	DIN 371, 374, 376	
GT41	X	X	X			X	M4–M20	GP6520		X			semi-bottom	C	0°	DIN 371, 374, 376	
GT42		X	X		X		M5–M20	GP6520		X			bottoming	E	0°	DIN 371, 374, 376	
GT43		X	X			X	M5–M20	GP6520		X			bottoming	E	0°	DIN 371, 374, 376	
GT06	X	X	X		X		M6–M16	WS32MG		X			semi-bottom	C	0°	DIN 371, 374, 376	
Form Taps																	
GX49		X		X		X	M6–M10	WN14PG	X				bottoming	E	—	DIN 374	
GX49		X		X		X	M6–M12	WN14PG	X				bottoming	E	—	HA6535	
GT22	X	X		X	X		M3–M16	WP31MG, WN38MG		X			semi-bottom	C	—	DIN 2174	
GT23	X	X		X		X	M5–M16	WP31MG, WN38MG		X			semi-bottom	C	—	DIN 2174	

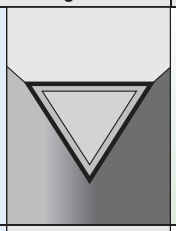
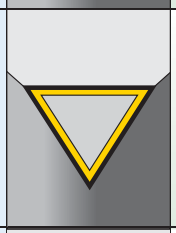
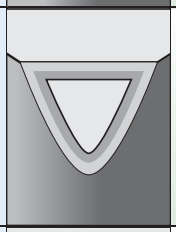
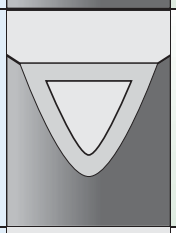
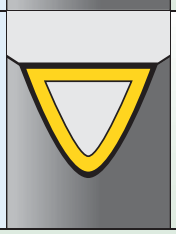
	P				M	K		N			S				H			
	1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16	17, 18, 19, 20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1,40.2, 41.1	39.1, 41.2		
	Steel <35 HRC	Steel >36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Grey Cast Iron	Ductile Cast Iron	Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC	page(s)	recommended cutting parameters
Spiral-Flute Taps *(continued)*																		
		★★★		★★★	★	★	★					★					Y33	Y85
		★★★		★★★													Y34	Y85
	★★	★	★		★★	★	★★	★	★★	★★	★						Y35	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y38	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y41	Y86
	★★	★	★		★★	★	★★	★	★★	★★	★						Y42	Y86
Straight-Flute Taps *(continued)*																		
																★★★	Y46	Y84
						★★★	★★★										Y47	Y84
						★★★	★★★										Y48	Y84
									★★★								Y49	Y84
									★★★								Y50	Y84
						★★★	★★★										Y51	Y84
						★★★	★★★		★★★	★★							Y52	Y85
						★★★	★★★		★★★	★★							Y53	Y85
						★★★	★★★		★★★	★★							Y54	Y85
						★★★	★★★		★★★	★★							Y55	Y85
																★★★	Y56	Y85
Form Taps *(continued)*																		
								★★★	★★								Y60	Y84
								★★★	★★								Y61	Y84
	★★★							★★★	★★								Y62	Y85
	★★★							★★★	★★								Y63	Y85

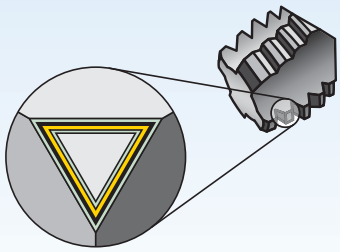


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

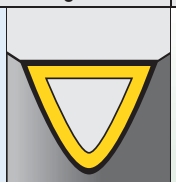
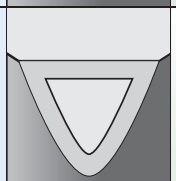
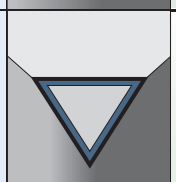
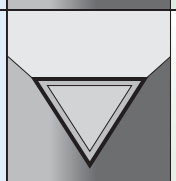
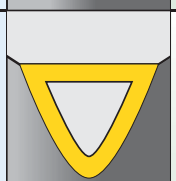
Grade	Coating	Grade Description	05	10	15	20	25	30	35	40	45
WK12PG		PVD coated TiCN and fine grain carbide. Extraordinary wear resistance when tapping cast iron. High-temperature hardness allows long life at up to 4x faster speed than HSS-E-PM taps.	K	K	K						
WN14PG		Coated carbide, PVD two-layer coating over fine-grain carbide. Coating consists of low friction CrC/C over wear-resistant TiN. CrC/C resists galling of non-ferrous materials to the tap. Provides superior performance for tapping cast aluminium and other non-ferrous materials.	N	N	N						
WH16PG		Coated carbide, PVD two-layer coating with heat-resistant TiAlN base layer and low-friction MoS_2 top layer over carbide substrate. Use in hardened steel 55–63 HRC.				H	H	H			
GP6520		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate coated with wear-resistant TiCN base layer. Use in steel, cast iron, and cast aluminium with silicon.	P	P	P	P	P	P			
			K	K	K		K	K	K		
GM6515		HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate. Coating consists of low-friction CrC/C over wear-resistant TiN base layer. Use for tapping stainless steel and non-ferrous materials.	M	M	M	M	M	M			
			N	N	N		N	N	N		

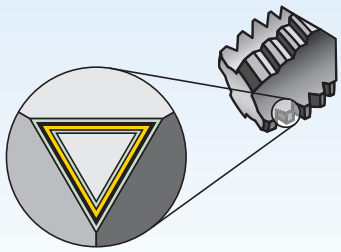


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ◄——► toughness

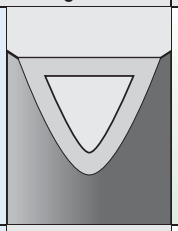
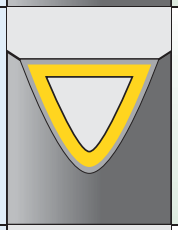
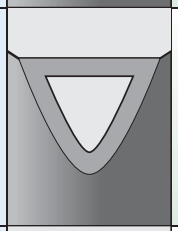
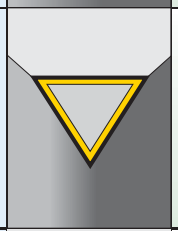
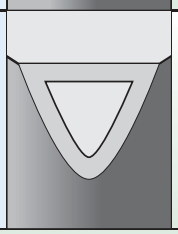
Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WS34MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium, high-cobalt powder metal HSS-E-PM substrate. Coating consists of low-friction CrC/C over wear-resistant TiN base layer. Use for tapping titanium and titanium alloys.	S					■	■	■		
WS30MG		Surface-treated HSS-E-PM: powder metal HSS-E-PM substrate with nitride surface treatment that provides wear resistance in non-ferrous materials including titanium. Limited use. Use for tapping titanium and titanium alloys.	S								■	■
WU32MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate coated with wear-resistant TiCN base layer.	S				■	■	■			
WS39MG		Surface-treated HSS-E-PM powder metal HSS-E substrate with oxide/nitride surface treatment that provides wear resistance in nickel alloys.	S							■	■	■
WP31MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with TiN coating. Use for tapping steel 32–44 HRC and for forming threads in steel up to 32 HRC.	P						■	■	■	

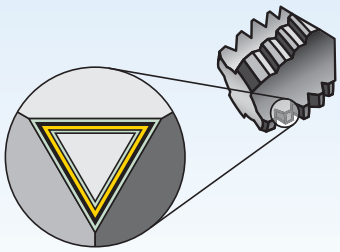


Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ← → toughness

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
WS32MG		Coated HSS-E-PM, PVD heat- and wear-resistant high-vanadium cobalt powder metal HSS substrate with high-hardness TiCN coating. Use when tapping heat-treated steel 44–55 HRC and cobalt- or nickel-based heat-resistant alloys.	S		■	■	■					
			H		■	■	■					
WN35MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with two-layer coating. TiN base layer and DLC top layer that resists galling of non-ferrous materials to the tap. Use for tapping titanium. Not recommended for steel.	S				■	■	■			
WN38MG		Coated HSS-E-PM, PVD powder metal HSS-E substrate with DLC coating. Use for form tapping aluminium. Not recommended for steel.	N					■	■	■		
WN44EG		High-vanadium HSS-E substrate with a coating consists of low friction CrC/C over wear-resistant TiN base layer. Use for tapping stainless steel and non-ferrous materials.	N							■	■	■
WP42EG		Coated HSS-E substrate with TiCN PVD layer. Use in multiple applications, including steel, stainless steel, ductile cast iron, and cast aluminium. WP42EG is more abrasion-resistant than WU41EG.	P							■	■	■
			M							■	■	■
			K							■	■	■
			N							■	■	■



Coatings are designed for optimised tapping performance in specific materials.

P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

Grade

Coating	Grade Description		wear resistance ← 05	10	15	20	25	30	35	40	45 → toughness
WU41EG	Coated HSS-E substrate with TiN PVD layer. Use in multiple applications, including steel, stainless steel, ductile cast iron, and cast aluminium.	P							■	■	■
		M							■	■	■
		K								■	■
		N								■	■
WP49EG	HSS-E substrate with black oxide surface treatment. Use in a variety of materials, including steel, stainless steel, and ductile iron. Not recommended for non-ferrous materials.	P								■	■
		M								■	■
		K									■
WU40EG	Uncoated HSS-E grade with bright surface. Use in easy-to-machine, general-purpose applications.	P								■	■
		M								■	■
		K									■
		N									■
WN48EG	Coated HSS-E, PVD lower vanadium HSS-E substrate with DLC coating. Use for tapping non-ferrous materials with low cutting temperatures like wrought aluminium. Not recommended for steel.										
		N						■	■	■	



Tapping Portfolio

Spiral-Point and Left-Hand Spiral-Flute Taps Y2–Y17

High-Performance Victory HSS-E-PM Taps Y4–Y10

Multipurpose VariTap Y11–Y17

Spiral-Flute Taps Y18–Y42

High-Performance Victory HSS-E-PM Taps Y20–Y34

Multipurpose VariTap Y35–Y42

Straight-Flute Taps Y44–Y56

High-Performance Victory Solid Carbide Taps Y46–Y51

High-Performance Victory HSS-E-PM Taps Y52–Y56

Forming Taps Y58–Y63

High-Performance Victory Solid Carbide Taps Y60–Y61

High-Performance Victory HSS-E-PM Taps Y62–Y63

Thread Mills Y64–Y83

High-Performance Taps Application Data Y84–Y86

Technical Information Y88–Y115



Spiral-Point and Left-Hand Spiral-Flute

WIDIA-GTD™ offers a wide range of options for tapping through holes in:

- Steel and steel alloys.
- Stainless steel.
- Cast iron.
- Wrought and cast aluminium.
- Nickel-based alloys.
- Titanium alloys.

High-Performance Victory™ HSS-E-PM Taps

- Left-hand spiral flutes to push chips ahead in through holes.
- Manufactured from powdered metal high-speed steel coated for thread cutting in various applications.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.
- PVD coatings offer outstanding thermal stability, hot hardness, oxidation resistance, and low coefficient of friction.
- Low runout of thread and chamfer.
- Excellent chip control.
- Reliable performance.
- Exceptional thread quality.

Multipurpose VariTap™

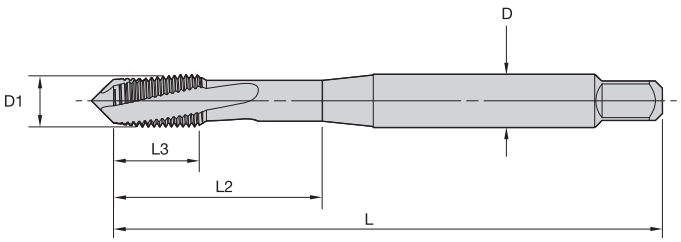


- Unique spiral-point geometry provides low tapping torque while pushing chips ahead of the tap in through holes.
- Manufactured from high-vanadium HSS-E to provide long and consistent life.
- Ideal for customers who have a variety of materials to machine.
- Geometry designed to allow tapping of a wide variety of ductile materials: carbon and alloy steels, stainless steels, ductile iron, and cast aluminium.
- Wide range of inch and metric standard sizes, pitch diameter limits, classes of fit, chamfer styles, and coatings.

WIDIA VICTORY

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.





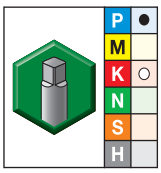


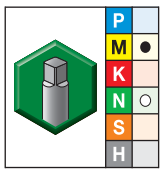
Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

GT20 • Form D Plug Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel



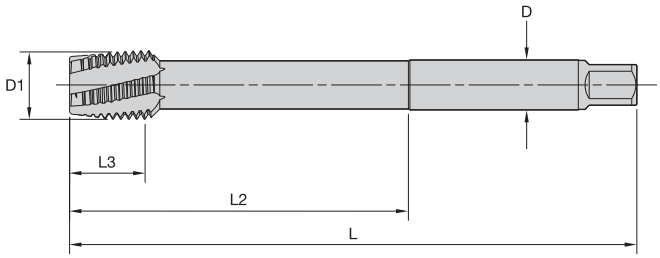


● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
3955084	GT205094	3955047	GT205077	M3 X 0,5	56	8	18	3,5	2	DIN 371	6HX
3955085	GT205095	3955048	GT205078	M4 X 0,7	63	10	21	4,5	2	DIN 371	6HX
3955086	GT205096	3955049	GT205079	M5 X 0,8	70	10	25	6,0	2	DIN 371	6HX
3955087	GT205097	3955050	GT205080	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955124	GT205104	3955077	GT205087	M8 X 1	90	13	35	6,0	3	DIN 374	6HX
3955088	GT205098	3955051	GT205081	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955125	GT205105	3955078	GT205088	M10 X 1	90	10	35	7,0	3	DIN 374	6HX
3955126	GT205106	3955079	GT205089	M10 X 1,25	100	15	39	7,0	3	DIN 374	6HX
3955089	GT205099	3955052	GT205082	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955127	GT205107	3955080	GT205090	M12 X 1,5	100	15	39	9,0	3	DIN 374	6HX
3955090	GT205100	3955073	GT205083	M12 X 1,75	110	18	44	9,0	3	DIN 376	6HX
3955128	GT205108	3955081	GT205091	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
3955091	GT205101	3955074	GT205084	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
3955129	GT205109	3955082	GT205092	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
3955092	GT205102	3955075	GT205085	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
3955130	GT205110	3955083	GT205093	M18 X 1,5	110	15	50	14,0	4	DIN 374	6HX
3955123	GT205103	3955076	GT205086	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033723	GT205111	–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033725	GT205113	–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033726	GT205114	–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033728	GT205116	–		M36 X 4	200	40	110	28,0	6	DIN 376	6HX
4033730	GT205118	–		M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.





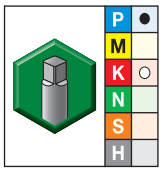


Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT20 • Form D Plug Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

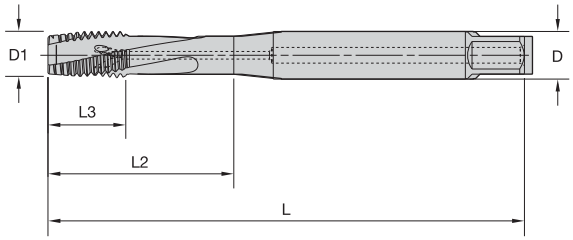


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4033765	GT205122	M24 X 3	200	30	120	18,0	5	6HX
4033767	GT205124	M30 X 3,5	250	35	150	22,0	5	6HX
4033768	GT205125	M33 X 3,5	250	35	150	25,0	5	6HX
4033770	GT205127	M36 X 4	250	40	150	28,0	6	6HX
4033772	GT205129	M42 X 4,5	300	45	180	32,0	6	6HX

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.





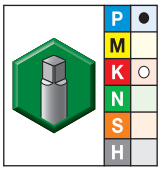


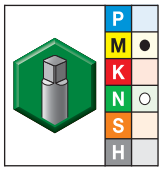
Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT21 • Form D Plug Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel



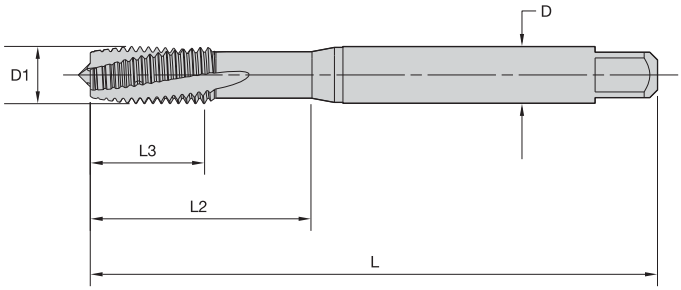


● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
3955054	GT215007	3955038	GT215001	M5 X 0,8	70	10	25	6,0	2	DIN 371	6HX
3955055	GT215008	3955039	GT215002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955056	GT215009	3955040	GT215003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955057	GT215010	3955041	GT215004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955058	GT215011	3955042	GT215005	M12 X 1,75	110	18	44	9,0	3	DIN 376	6HX
3955059	GT215012	3955053	GT215006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX

- WS32MG TiCN for nickel and nickel alloys.



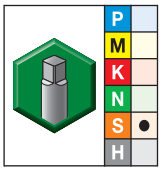




Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT10 • Form D Plug Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys

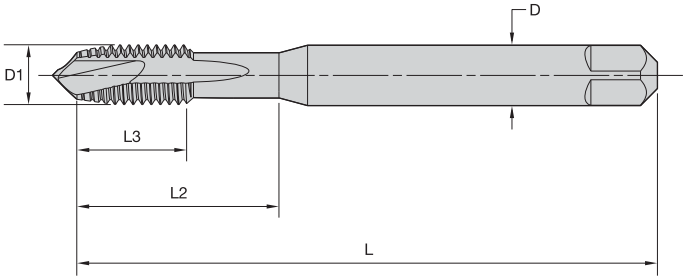


● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160100	GT105001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4160101	GT105002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4160102	GT105003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4160103	GT105004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4160104	GT105005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4160105	GT105006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4160106	GT105007	M12 X 1,75	110	24	–	9,0	3	DIN 376	6HX
4160107	GT105008	M14 X 2	110	26	–	11,0	3	DIN 376	6HX
4160108	GT105009	M16 X 2	110	27	–	12,0	3	DIN 376	6HX
4160109	GT105010	M20 X 2,5	140	32	–	16,0	3	DIN 376	6HX

- WN35MG TiN/DLC for titanium and titanium alloys.





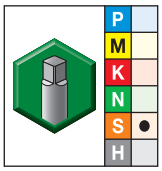


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT14 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Titanium and Titanium Alloys

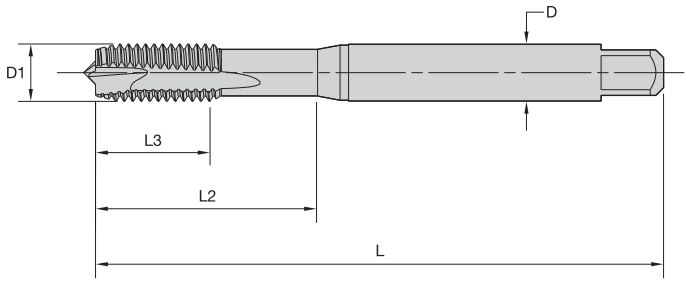


● first choice
○ alternate choice

grade WN35MG TiN/DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160093	GT145001	M3 X 0,5	56	11	18	3,5	3	DIN 371	6HX
4160094	GT145002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4160095	GT145003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4160096	GT145004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4160097	GT145005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4160098	GT145006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4160099	GT145007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX

- WN48EG DLC for aluminium.





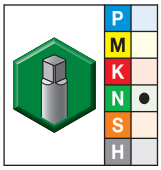


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

■ GT70 • Form B Plug Chamfer • Metric DIN 371 and 376 • For Aluminium

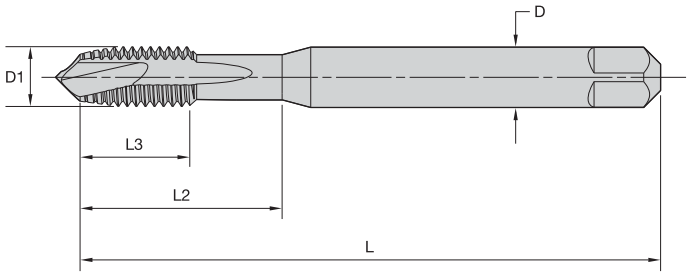


● first choice
○ alternate choice

grade WN48EG DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160036	GT705001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6H
4160037	GT705002	M4 X 0,7	63	13	21	4,5	2	DIN 371	6H
4160038	GT705003	M5 X 0,8	70	15	25	6,0	2	DIN 371	6H
4160039	GT705004	M6 X 1	80	17	30	6,0	2	DIN 371	6H
4160040	GT705005	M8 X 1,25	90	20	35	8,0	2	DIN 371	6H
4160041	GT705006	M10 X 1,5	100	22	39	10,0	2	DIN 371	6H
4160042	GT705007	M12 X 1,75	110	24	–	9,0	3	DIN 376	6H
4160063	GT705008	M16 X 2	110	27	–	12,0	3	DIN 376	6H

- WP31MG TiN for steel 32–44 HRC.





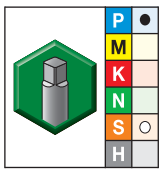


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT00 • Form B Plug Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

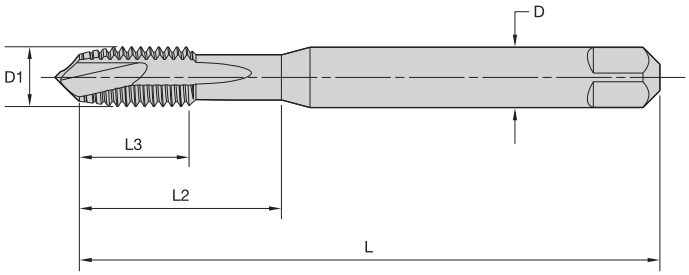


● first choice
○ alternate choice

grade WP31MG TiN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4153679	GT005001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4153680	GT005002	M4 X 0,7	63	13	21	4,5	2	DIN 371	6HX
4153681	GT005003	M5 X 0,8	70	15	25	6,0	2	DIN 371	6HX
4153682	GT005004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4153760	GT005012	M8 X 1	90	17	–	6,0	3	DIN 374	6HX
4153753	GT005005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4153761	GT005013	M10 X 1	90	18	–	7,0	3	DIN 374	6HX
4153762	GT005014	M10 X 1,25	100	22	–	7,0	3	DIN 374	6HX
4153754	GT005006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4153763	GT005015	M12 X 1,25	100	22	–	9,0	3	DIN 374	6HX
4153764	GT005016	M12 X 1,5	100	22	–	9,0	3	DIN 374	6HX
4153755	GT005007	M12 X 1,75	110	24	–	9,0	3	DIN 376	6HX
4153765	GT005017	M14 X 1,5	100	22	–	11,0	3	DIN 374	6HX
4153756	GT005008	M14 X 2	110	26	–	11,0	3	DIN 376	6HX
4153766	GT005018	M16 X 1,5	100	22	–	12,0	4	DIN 374	6HX
4153757	GT005009	M16 X 2	110	27	–	12,0	4	DIN 376	6HX
4153758	GT005010	M18 X 2	125	30	–	14,0	4	DIN 376	6HX
4153759	GT005011	M20 X 2,5	140	32	–	16,0	4	DIN 376	6HX

- WU41EG TiN
- WP49EG oxide



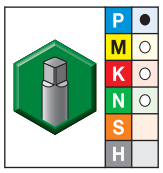


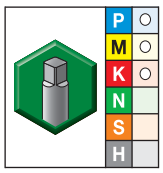


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376



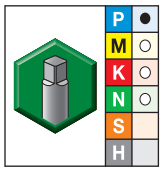


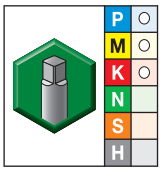
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472633	VTSPO6005	5387704	VTSPO6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472635	VTSPO6007	5387707	VTSPO6007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472636	VTSPO6008	5387708	VTSPO6008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472638	VTSPO6010	5387760	VTSPO6010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472639	VTSPO6011	5387761	VTSPO6011	8 - 32	63	11	21	4,5	2	DIN 371	2B
5472641	VTSPO6013	5387763	VTSPO6013	10 - 24	70	12	25	6,0	2	DIN 371	2B
5472644	VTSPO6014	5387764	VTSPO6014	10 - 32	70	12	25	6,0	2	DIN 371	2B
5472646	VTSPO6016	5387766	VTSPO6016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472647	VTSPO6017	5387767	VTSPO6017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472649	VTSPO6019	5387769	VTSPO6019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472650	VTSPO6020	5387770	VTSPO6020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472652	VTSPO6022	5387772	VTSPO6022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472653	VTSPO6023	5387773	VTSPO6023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472655	VTSPO6025	5387776	VTSPO6025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472656	VTSPO6026	5387777	VTSPO6026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472658	VTSPO6028	5387779	VTSPO6028	1/2 - 13	110	23	47	9,0	3	DIN 376	2B
5472659	VTSPO6029	5387780	VTSPO6029	1/2 - 20	110	23	47	9,0	3	DIN 376	2B
5472661	VTSPO6031	5387782	VTSPO6031	9/16 - 12	110	25	53	11,0	3	DIN 376	2B
5472662	VTSPO6032	5387783	VTSPO6032	9/16 - 18	110	25	53	11,0	3	DIN 376	2B
5472663	VTSPO6033	5387784	VTSPO6033	5/8 - 11	110	24	51	12,0	3	DIN 376	2B

(continued)

(VT-SPO • Form B Plug Chamfer • Machine Screw and Fractional • DIN 371 and 376 — continued)



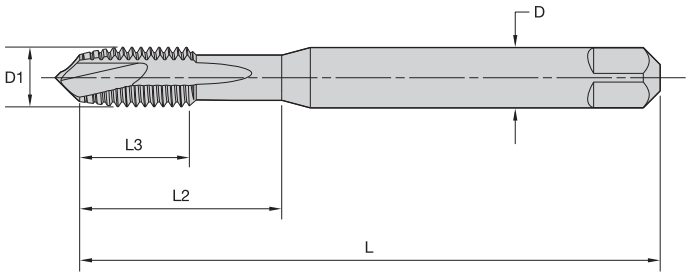


● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472664	**VTSPO6034**	**5387785**	**VTSPO6034**	5/8 - 18	110	24	51	12,0	3	DIN 376	2B
5472665	**VTSPO6035**	**5387786**	**VTSPO6035**	3/4 - 10	140	30	64	16,0	3	DIN 376	2B
5472666	**VTSPO6036**	**5387787**	**VTSPO6036**	3/4 - 16	140	30	64	16,0	3	DIN 376	2B
5472667	**VTSPO6037**	**5387788**	**VTSPO6037**	7/8 - 9	140	34	71	18,0	3	DIN 376	2B
5472668	**VTSPO6038**	**5387789**	**VTSPO6038**	7/8 - 14	140	34	71	18,0	3	DIN 376	2B
5472669	**VTSPO6039**	**5387790**	**VTSPO6039**	1 - 8	160	38	81	18,0	3	DIN 376	2B
5472670	**VTSPO6040**	**5387791**	**VTSPO6040**	1 - 12	160	38	81	18,0	3	DIN 376	2B

- WU41EG TiN
- WP49EG oxide



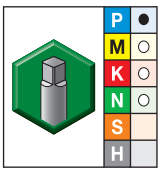


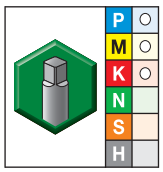


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SPO • Form B Plug Chamfer • UNJC/UNJF • Inch DIN 371 and 376

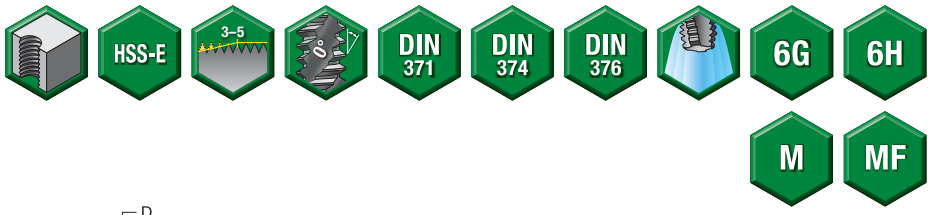


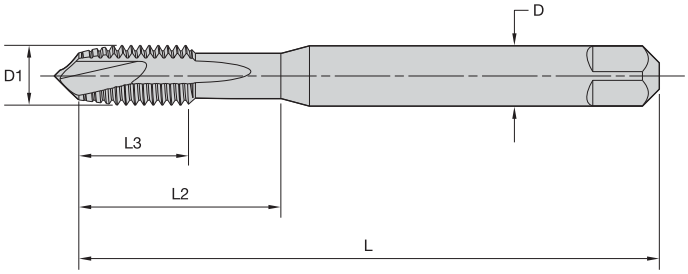


● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472634	VTSPO6006	5387705	VTSPO6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5472637	VTSPO6009	5387709	VTSPO6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5472640	VTSPO6012	5387762	VTSPO6012	8 - 32	63	11	21	4,5	2	DIN 371	3B
5472645	VTSPO6015	5387765	VTSPO6015	10 - 32	70	12	25	6,0	2	DIN 371	3B
5472648	VTSPO6018	5387768	VTSPO6018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5472651	VTSPO6021	5387771	VTSPO6021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5472654	VTSPO6024	5387774	VTSPO6024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5472657	VTSPO6027	5387778	VTSPO6027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5472660	VTSPO6030	5387781	VTSPO6030	1/2 - 20	110	23	47	9,0	3	DIN 376	3B

- WU40EG bright
- WU41EG TiN
- WP42EG TiCN
- WP49EG oxide



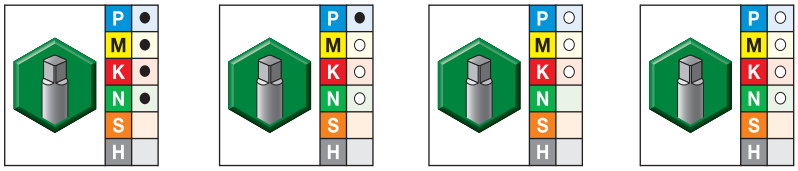




Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

■ VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376

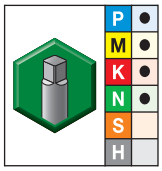


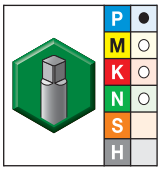
● first choice
○ alternate choice

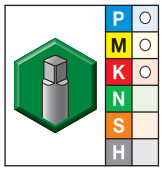
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5366647	VTSPO6505	5366646	VTSPO6505	5366648	VTSPO6505	5366649	VTSPO6505	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
	–		–	5366660	VTSPO6506		–	M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
	–		–	5366661	VTSPO6507		–	M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
	–	5366662	VTSPO6508	5366663	VTSPO6508	5366664	VTSPO6508	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
	–		–	5366665	VTSPO6509		–	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
	–		–	5368602	VTSPO6545	5368603	VTSPO6545	M3 X 0,35	56	8	—	2,2	2	DIN 374	6H
	–	5368514	VTSPO6525	5368515	VTSPO6525	5368516	VTSPO6525	M3 X 0,5	56	8	—	2,2	2	DIN 376	6H
	–		–	5366670	VTSPO6511		–	M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
5366667	VTSPO6510	5366666	VTSPO6510	5366668	VTSPO6510	5366669	VTSPO6510	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
	–	5366671	VTSPO6512	5366673	VTSPO6512	5366674	VTSPO6512	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
	–		–	5368604	VTSPO6546	5368605	VTSPO6546	M4 X 0,5	63	10	21	2,8	2	DIN 374	6H
	–	5368517	VTSPO6526	5368518	VTSPO6526	5368519	VTSPO6526	M4 X 0,7	63	10	21	2,8	2	DIN 376	6H
	–		–	5366679	VTSPO6514		–	M4 X 0,7	63	11	21	4,5	2	DIN 371	6G
5366676	VTSPO6513	5366675	VTSPO6513	5366677	VTSPO6513	5366678	VTSPO6513	M4 X 0,7	63	11	21	4,5	2	DIN 371	6H
	–		–	5368606	VTSPO6547	5368607	VTSPO6547	M5 X 0,5	70	12	25	3,5	2	DIN 374	6H
	–	5368540	VTSPO6527	5368541	VTSPO6527	5368542	VTSPO6527	M5 X 0,8	70	12	25	3,5	2	DIN 376	6H
	–		–	5366685	VTSPO6516		–	M5 X 0,8	70	12	25	6,0	2	DIN 371	6G
5366681	VTSPO6515	5366680	VTSPO6515	5366682	VTSPO6515	5366684	VTSPO6515	M5 X 0,8	70	12	25	6,0	2	DIN 371	6H
	–		–	5368608	VTSPO6548	5368609	VTSPO6548	M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
	–		–	5368610	VTSPO6549	5368611	VTSPO6549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H
	–	5368543	VTSPO6528	5368544	VTSPO6528	5368545	VTSPO6528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
5366687	VTSPO6517	5366686	VTSPO6517	5366688	VTSPO6517	5366689	VTSPO6517	M6 X 1	80	12	30	6,0	3	DIN 371	6H
	–		–	5366690	VTSPO6518		–	M6 X 1	80	12	30	6,0	3	DIN 371	6G
	–		–	5368612	VTSPO6550	5368613	VTSPO6550	M7 X 0,75	80	12	30	5,5	3	DIN 374	6H

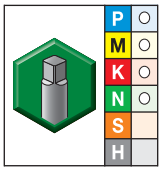
(continued)

(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 — continued)







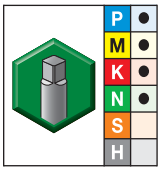


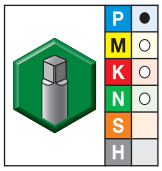
● first choice
○ alternate choice

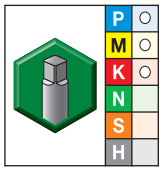
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5366693	VTSPO6519	5366692	VTSPO6519	5366695	VTSPO6519	5366696	VTSPO6519	M7 X 1	80	12	30	7,0	3	DIN 371	6H
	–		–	5366697	VTSPO6520		–	M7 X 1	80	12	30	7,0	3	DIN 371	6G
	–		–	5368614	VTSPO6551	5368615	VTSPO6551	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
	–		–	5368616	VTSPO6552	5368617	VTSPO6552	M8 X 1	90	15	35	6,0	3	DIN 374	6H
	–	5368546	VTSPO6529	5368547	VTSPO6529	5368548	VTSPO6529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5366700	VTSPO6521	5366698	VTSPO6521	5366701	VTSPO6521	5366703	VTSPO6521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
	–		–	5366704	VTSPO6522		–	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
	–		–	5368618	VTSPO6553	5368619	VTSPO6553	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
	–		–	5368620	VTSPO6554	5368621	VTSPO6554	M10 X 1	90	15	35	7,0	3	DIN 374	6H
	–		–	5368622	VTSPO6555	5368623	VTSPO6555	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
	–		–	5366709	VTSPO6524		–	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
5366706	VTSPO6523	5366705	VTSPO6523	5366707	VTSPO6523	5366708	VTSPO6523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
	–	5368549	VTSPO6530	5368550	VTSPO6530	5368551	VTSPO6530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
	–		–	5368624	VTSPO6556	5368625	VTSPO6556	M11 X 1	90	15	36	8,0	3	DIN 374	6H
	–		–	5368626	VTSPO6557	5368627	VTSPO6557	M12 X 1	100	21	39	9,0	3	DIN 374	6H
	–		–	5368628	VTSPO6558	5368629	VTSPO6558	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
	–		–	5368630	VTSPO6559	5368631	VTSPO6559	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
	–		–	5368556	VTSPO6532		–	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5368553	VTSPO6531	5368552	VTSPO6531	5368554	VTSPO6531	5368555	VTSPO6531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
	–		–	5368632	VTSPO6560	5368633	VTSPO6560	M14 X 1	100	21	47	11,0	3	DIN 374	6H
	–		–	5368634	VTSPO6561	5368635	VTSPO6561	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
	–		–	5368636	VTSPO6562	5368637	VTSPO6562	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5368558	VTSPO6533	5368557	VTSPO6533	5368559	VTSPO6533	5368560	VTSPO6533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
	–		–	5368561	VTSPO6534		–	M14 X 2	110	24	52	11,0	3	DIN 376	6G
	–		–	5368638	VTSPO6563	5368639	VTSPO6563	M16 X 1	100	21	46	12,0	3	DIN 374	6H
	–		–	5368640	VTSPO6564	5368641	VTSPO6564	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
5368563	VTSPO6535	5368562	VTSPO6535	5368565	VTSPO6535	5368566	VTSPO6535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
	–		–	5368567	VTSPO6536		–	M16 X 2	110	24	51	12,0	3	DIN 376	6G
	–		–	5368642	VTSPO6565	5368643	VTSPO6565	M18 X 1	110	21	50	14,0	3	DIN 374	6H
	–		–	5368683	VTSPO6566	5368684	VTSPO6566	M18 X 1,5	110	21	50	14,0	3	DIN 374	6H
	–		–	5368685	VTSPO6567	5368686	VTSPO6567	M18 X 2	125	30	58	14,0	3	DIN 374	6H
5368569	VTSPO6537	5368568	VTSPO6537	5368570	VTSPO6537	5368571	VTSPO6537	M18 X 2,5	125	30	58	14,0	3	DIN 376	6H
	–		–	5368687	VTSPO6568	5368688	VTSPO6568	M20 X 1	125	24	56	16,0	3	DIN 374	6H
	–		–	5368689	VTSPO6569	5368690	VTSPO6569	M20 X 1,5	125	24	56	16,0	3	DIN 374	6H
	–		–	5368691	VTSPO6570	5368692	VTSPO6570	M20 X 2	140	30	64	16,0	3	DIN 374	6H
5368573	VTSPO6538	5368572	VTSPO6538	5368574	VTSPO6538	5368575	VTSPO6538	M20 X 2,5	140	30	64	16,0	3	DIN 376	6H

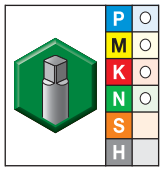
(continued)

(VT-SPO • Form B Plug Chamfer • Metric DIN 371, 374, and 376 — continued)







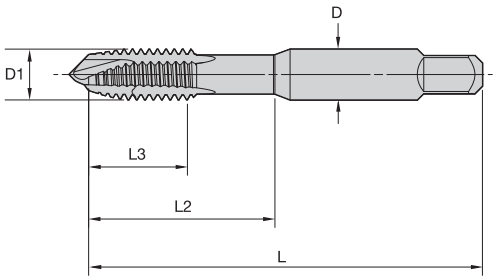


● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
	–		–	5368693	VTSPO6571	5368694	VTSPO6571	M22 X 1,5	125	24	62	18,0	3	DIN 374	6H
	–		–		–	5368695	VTSPO6572	M22 X 2	140	30	70	18,0	3	DIN 374	6H
5368577	VTSPO6539	5368576	VTSPO6539	5368578	VTSPO6539	5368579	VTSPO6539	M22 X 2,5	140	30	70	18,0	3	DIN 376	6H
	–		–	5368696	VTSPO6573	5368697	VTSPO6573	M24 X 1,5	140	28	67	18,0	3	DIN 374	6H
	–		–		–	5368698	VTSPO6574	M24 X 2	140	30	67	18,0	3	DIN 374	6H
5368581	VTSPO6540	5368580	VTSPO6540	5368582	VTSPO6540	5368583	VTSPO6540	M24 X 3	160	36	77	18,0	3	DIN 376	6H
	–	5368584	VTSPO6541	5368585	VTSPO6541	5368586	VTSPO6541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
	–		–		–	5368699	VTSPO6575	M30 X 2	150	28	80	22,0	4	DIN 374	6H
	–	5368587	VTSPO6542	5368588	VTSPO6542	5368589	VTSPO6542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
	–		–	5368600	VTSPO6543		–	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
	–		–	5368601	VTSPO6544		–	M36 X 4	200	48	110	28,0	4	DIN 376	6H

- WU40EG bright
- WU41EG TiN



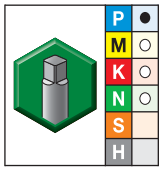


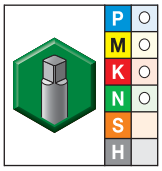


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SPO • Form B Plug Chamfer • Metric • JIS





● first choice
○ alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	tap class
5387861	VTSPO7505	5387859	VTSPO7505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5387865	VTSPO7506	5387863	VTSPO7506	M4 X 0,7	52	13	21	5,0	2	JIS	ISO 2
5387869	VTSPO7507	5387867	VTSPO7507	M5 X 0,8	60	16	24	5,5	2	JIS	ISO 2
5387873	VTSPO7508	5387871	VTSPO7508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5387877	VTSPO7509	5387875	VTSPO7509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5387881	VTSPO7510	5387879	VTSPO7510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
–		5387883	VTSPO7511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
–		5387887	VTSPO7513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
–		5387885	VTSPO7512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
–		5387891	VTSPO7515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
–		5387889	VTSPO7514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
–		5387895	VTSPO7517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
–		5387893	VTSPO7516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
–		5387898	VTSPO7518	M18 X 2,5	100	37	55	14,0	3	JIS	ISO 2
–		5387900	VTSPO7519	M20 X 2,5	105	37	60	15,0	3	JIS	ISO 2



Spiral Flute

WIDIA-GTD™ offers a wide range of options for tapping blind holes in:

- Steel and steel alloys.
- Stainless steel.
- Cast iron.
- Wrought and cast aluminium.
- Nickel-based alloys.
- Titanium alloys.

High-Performance Victory™ HSS-E-PM Taps

- Optimised spiral-flute designs enable deep blind holes to be threaded.
- Manufactured from powdered metal high-speed steel coated for thread cutting in various applications.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.
- PVD coatings offer outstanding thermal stability, hot hardness, oxidation resistance, and low coefficient of friction.
- Low runout of thread and chamfer.
- Excellent chip control.
- Reliable performance.
- Exceptional thread quality.

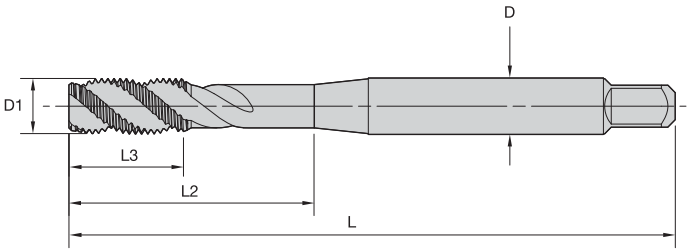
Multipurpose VariTap™

- Spiral-flute geometry optimised to provide efficient chip ejection in blind holes.
- Manufactured from high-vanadium HSS-E to provide long and consistent life.
- Ideal for customers who have a variety of materials to machine.
- Geometry designed to allow tapping of a wide variety of ductile materials: carbon and alloy steels, stainless steels, ductile iron, and cast aluminium.
- Wide range of inch and metric standard sizes, pitch diameter limits, classes of fit, chamfer styles, and coatings.



- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.
- GP6505 oxide for steel.



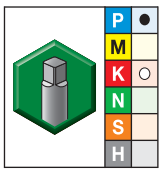


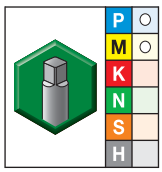


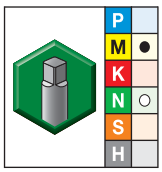
Shank Tolerance	
D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT30 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel and Stainless Steel





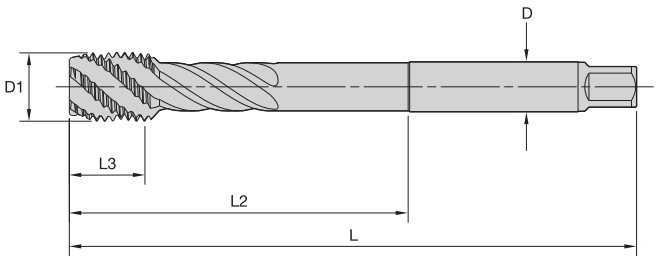


● first choice
○ alternate choice

grade GP6520 TiCN		grade GP6505 Oxide		grade GM6515 TiN+CrC/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
3954929	GT305097	4035066	GT305116	3955098	GT305148	M3 X 0,5	56	8	18	3,5	3	DIN 371	6HX
3954930	GT305098	4035067	GT305117	3955099	GT305079	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
3954931	GT305099	4035068	GT305118	3955100	GT305080	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
3954932	GT305100	4035069	GT305119	3955101	GT305081	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955031	GT305109	–		3955110	GT305090	M8 X 1	90	13	35	6,0	3	DIN 374	6HX
3955023	GT305101	4035070	GT305120	3955102	GT305082	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955032	GT305110	–		3955111	GT305091	M10 X 1	90	10	35	7,0	3	DIN 374	6HX
3955033	GT305111	–		3955112	GT305092	M10 X 1,25	100	15	39	7,0	3	DIN 374	6HX
3955024	GT305102	4035071	GT305121	3955103	GT305083	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955034	GT305112	–		3955113	GT305093	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
3955025	GT305103	4035072	GT305122	3955104	GT305084	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
3955035	GT305113	–		3955114	GT305094	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
3955026	GT305104	4035073	GT305123	3955105	GT305085	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
3955036	GT305114	–		3955115	GT305095	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
3955027	GT305105	4035074	GT305124	3955106	GT305086	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
3955037	GT305115	–		3955116	GT305096	M18 X 1,5	110	15	50	14,0	4	DIN 374	6HX
3955028	GT305106	–		3955107	GT305087	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
3955029	GT305107	–		3955108	GT305088	M22 X 2,5	140	25	70	18,0	4	DIN 376	6HX
3955030	GT305108	–		3955109	GT305089	M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033733	GT305161	–		–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033735	GT305163	–		–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033736	GT305164	–		–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033738	GT305166	–		–		M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4033740	GT305168	–		–		M42 X 4,5	200	45	120	32,0	5	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.



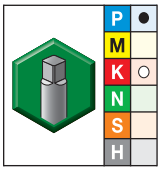




Shank Tolerance	
D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT30 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

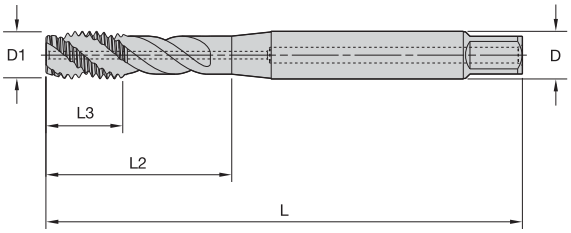


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4033776	GT305151	M24 X 3	200	30	120	18,0	5	6HX
4033778	GT305153	M30 X 3,5	250	35	150	22,0	5	6HX
4033779	GT305154	M33 X 3,5	250	35	150	25,0	5	6HX
4033781	GT305156	M36 X 4	250	40	150	28,0	5	6HX
4033783	GT305158	M42 X 4,5	300	45	180	32,0	5	6HX

- GM6515 TiN + CrC/C for stainless steel.
- GP6520 TiCN for steel.



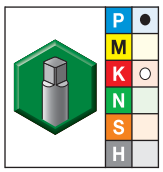


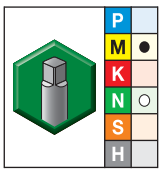


Shank Tolerance	
D mm	**tolerance h6**
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT31 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371 and 376 • For Steel and Stainless Steel



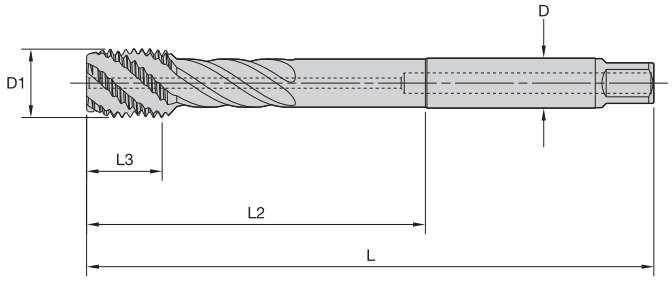


● first choice
○ alternate choice

grade GP6520 TiCN		grade GM6515 TiN+CrC/C		metric dimensions					number of flutes	dimension standard	class of fit
order #	**catalogue #**	**order #**	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**D**			
3955349	**GT315007**	**3955343**	**GT315001**	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
3955350	**GT315008**	**3955344**	**GT315002**	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
3955351	**GT315009**	**3955345**	**GT315003**	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
3955352	**GT315010**	**3955346**	**GT315004**	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
3955373	**GT315011**	**3955347**	**GT315005**	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
3955374	**GT315012**	**3955348**	**GT315006**	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5143530	**GT315033**	–		M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5143531	**GT315034**	–		M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5143532	**GT315035**	–		M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033744	**GT315025**	–		M24 X 3	160	30	77	18,0	5	DIN 376	6HX
4033746	**GT315027**	–		M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4033747	**GT315028**	–		M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4033749	**GT315030**	–		M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4033751	**GT315032**	–		M42 X 4,5	200	45	120	32,0	5	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.





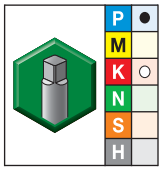


Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT31 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

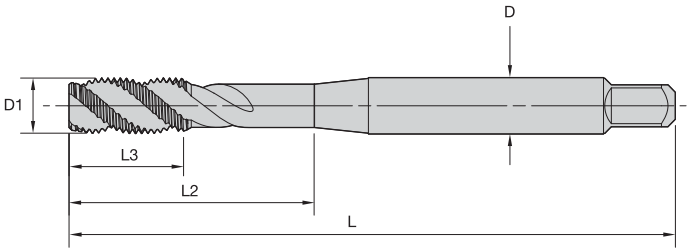


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4033787	GT315014	M24 X 3	200	30	120	18,0	5	6HX
4033789	GT315016	M30 X 3,5	250	35	150	22,0	5	6HX
4033790	GT315017	M33 X 3,5	250	35	150	25,0	5	6HX
4033792	GT315019	M36 X 4	250	40	150	28,0	5	6HX
4033794	GT315021	M42 X 4,5	300	45	180	32,0	5	6HX

- GP6520 TiCN for steel.





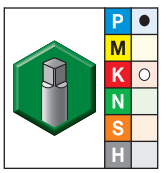


Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT32 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Steel

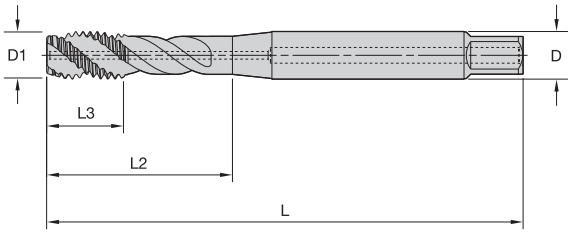


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4153906	GT325001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4153907	GT325002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4153908	GT325003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
4153909	GT325004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
4153912	GT325007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4153910	GT325005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4153953	GT325008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4153911	GT325006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4153954	GT325009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX

- GP6520 TiCN for steel.





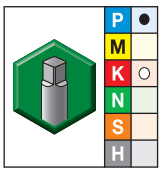


Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT33 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Steel

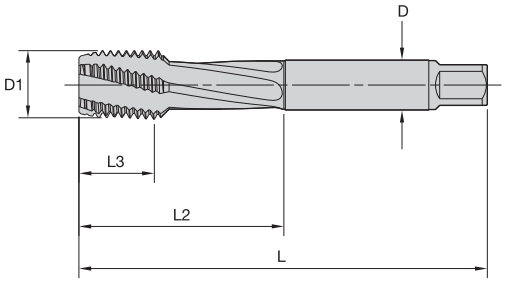


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4153955	GT335001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4153956	GT335002	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4153957	GT335003	M8 X 1,25	90	13	35	8,0	3	DIN 371	6HX
4153958	GT335004	M10 X 1,5	100	15	39	10,0	3	DIN 371	6HX
4153961	GT335007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4153959	GT335005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4153962	GT335008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4153960	GT335006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4153963	GT335009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX

- GP6520 TiCN for steel and cast iron.





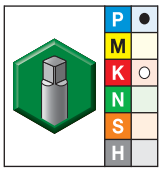


Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron

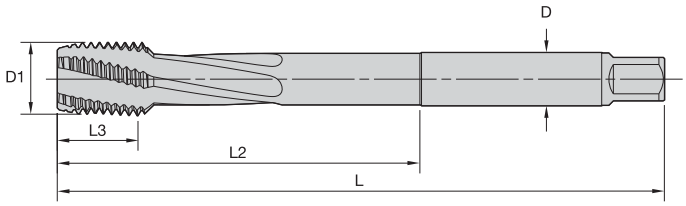


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154254	**GT505001**	M24 X 3	160	30	77	18,0	4	DIN 376	6HX
4154255	**GT505002**	M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4154256	**GT505003**	M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4154257	**GT505004**	M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4154258	**GT505005**	M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for steel and cast iron.



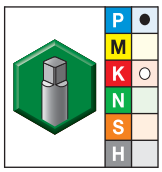




Shank Tolerance	
D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

■ GT50 • Form C Semi-Bottoming Chamfer • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

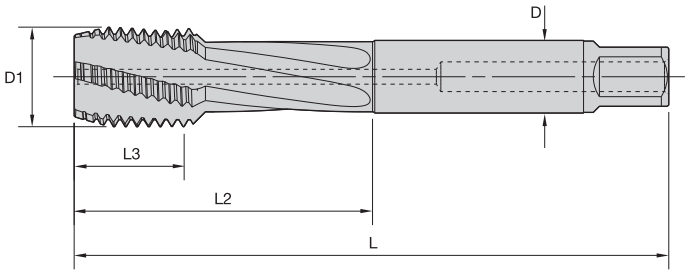


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4154259	GT505006	M24 X 3	200	30	120	18,0	4	6HX
4154260	GT505007	M30 X 3,5	250	35	150	22,0	5	6HX
4154261	GT505008	M33 X 3,5	250	35	150	25,0	5	6HX
4154262	GT505009	M36 X 4	250	40	150	28,0	5	6HX
4154263	GT505010	M42 X 4,5	300	45	180	32,0	6	6HX

- GP6520 TiCN for steel and cast iron.





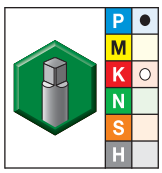


Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric DIN 376 • For Steel and Cast Iron

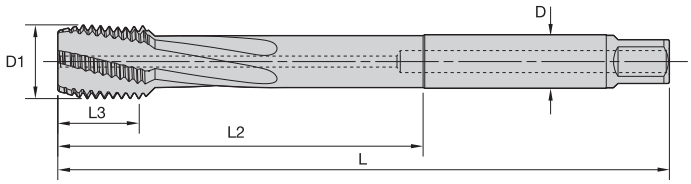


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154264	GT515001	M24 X 3	160	30	77	18,0	4	DIN 376	6HX
4154265	GT515002	M30 X 3,5	180	35	91	22,0	5	DIN 376	6HX
4154266	GT515003	M33 X 3,5	180	35	100	25,0	5	DIN 376	6HX
4154267	GT515004	M36 X 4	200	40	110	28,0	5	DIN 376	6HX
4154268	GT515005	M42 X 4,5	200	45	120	32,0	6	DIN 376	6HX

- GP6520 TiCN for tapping steel and cast iron.





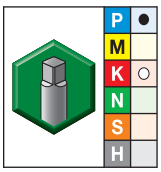


Shank Tolerance

D mm	tolerance h6
12–18	+0, -0,011
20–30	+0, -0,013
32–36	+0, -0,016

WIDIA VICTORY

GT51 • Form C Semi-Bottoming Chamfer • Through Coolant • Larger Sizes • Metric Extra Long • For Steel and Cast Iron

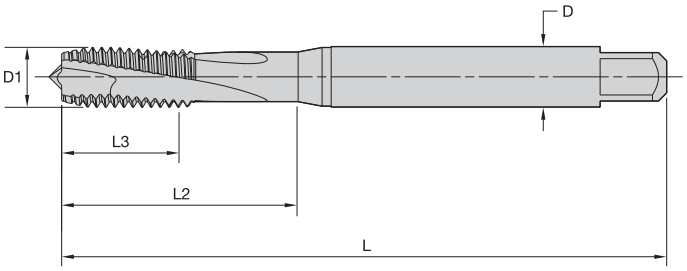


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
4154269	GT515006	M24 X 3	200	30	120	18,0	4	6HX
4154270	GT515007	M30 X 3,5	250	35	150	22,0	5	6HX
4154271	GT515008	M33 X 3,5	250	35	150	25,0	5	6HX
4154272	GT515009	M36 X 4	250	40	150	28,0	5	6HX
4154273	GT515010	M42 X 4,5	300	45	180	32,0	6	6HX

- WS32MG TiCN for nickel and nickel alloys.





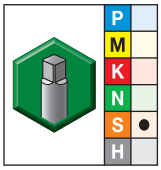


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT12 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Nickel and Nickel Alloys

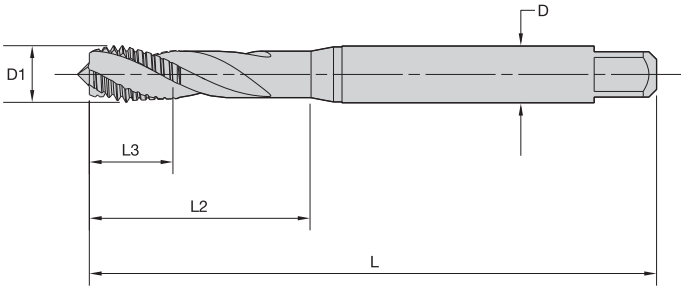


● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4159636	GT125001	M3 X 0,5	56	11	18	3,5	2	DIN 371	6HX
4159637	GT125002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6HX
4159638	GT125003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6HX
4159639	GT125004	M6 X 1	80	17	30	6,0	3	DIN 371	6HX
4159640	GT125005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6HX
4159641	GT125006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6HX
4159642	GT125007	M12 X 1,75	110	24	—	9,0	3	DIN 376	6HX
4159663	GT125008	M14 X 2	110	26	—	11,0	3	DIN 376	6HX
4159664	GT125009	M16 X 2	110	27	—	12,0	3	DIN 376	6HX
4159665	GT125010	M20 X 2,5	140	32	—	16,0	3	DIN 376	6HX

- WN35MG TiN/DLC for titanium and titanium alloys.





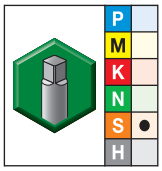


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT16 • Form C Semi-Bottoming Chamfer • Metric DIN 371 • For Titanium and Titanium Alloys

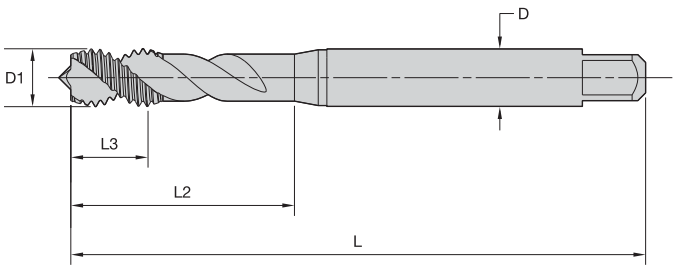


● first choice
○ alternate choice

grade WN35MG TiN/DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160437	**GT165001**	M3 X 0,5	56	6	18	3,5	3	DIN 371	6HX
4160438	**GT165002**	M4 X 0,7	63	7	21	4,5	3	DIN 371	6HX
4160439	**GT165003**	M5 X 0,8	70	8	25	6,0	3	DIN 371	6HX
4160440	**GT165004**	M6 X 1	80	10	30	6,0	3	DIN 371	6HX
4160441	**GT165005**	M8 X 1,25	90	14	35	8,0	3	DIN 371	6HX
4160442	**GT165006**	M10 X 1,5	100	16	39	10,0	3	DIN 371	6HX
4160523	**GT165007**	M12 X 1,75	110	18	44	12,0	3	DIN 371	6HX

- WN48EG DLC for aluminium.





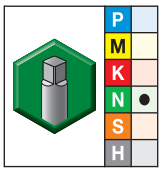


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

■ GT80 • Form C Semi-Bottoming Chamfer • Metric DIN 371 and 376 • For Aluminium

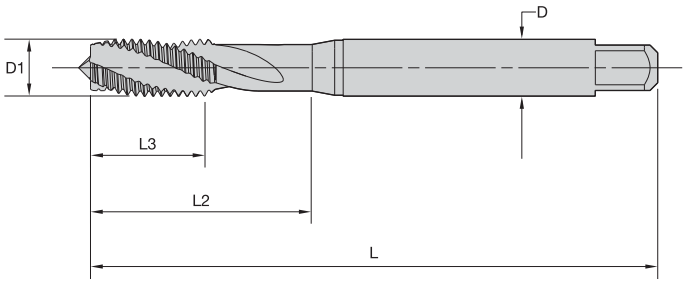


● first choice
○ alternate choice

grade WN48EG DLC		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4160054	GT805001	M3 X 0,5	56	6	18	3,5	2	DIN 371	6H
4160055	GT805002	M4 X 0,7	63	7	21	4,5	2	DIN 371	6H
4160056	GT805003	M5 X 0,8	70	8	25	6,0	2	DIN 371	6H
4160057	GT805004	M6 X 1	80	10	30	6,0	2	DIN 371	6H
4160058	GT805005	M8 X 1,25	90	14	35	8,0	2	DIN 371	6H
4160059	GT805006	M10 X 1,5	100	16	39	10,0	2	DIN 371	6H
4160060	GT805007	M12 X 1,75	110	18	–	9,0	3	DIN 376	6H
4160061	GT805008	M16 X 2	110	22	–	12,0	3	DIN 376	6H
4160062	GT805009	M20 X 2,5	140	25	–	16,0	3	DIN 376	6H

- WP31MG TiN
  for steel 32–44 HRC.





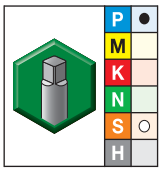


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT02 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

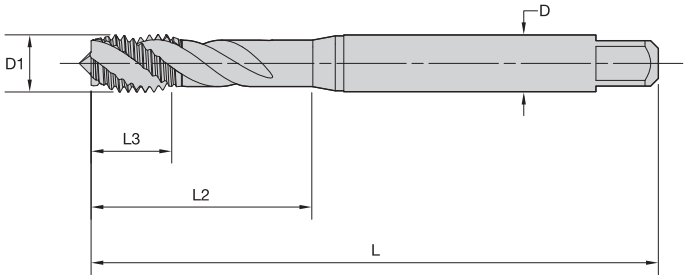


● first choice
○ alternate choice

grade WP31MG TiN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4152638	GT025001	M3 X 0,5	56	11	18	3,5	3	DIN 371	6H
4152639	GT025002	M4 X 0,7	63	13	21	4,5	3	DIN 371	6H
4152640	GT025003	M5 X 0,8	70	15	25	6,0	3	DIN 371	6H
4152641	GT025004	M6 X 1	80	17	30	6,0	3	DIN 371	6H
4152709	GT025012	M8 X 1	90	17	–	6,0	3	DIN 374	6H
4152642	GT025005	M8 X 1,25	90	20	35	8,0	3	DIN 371	6H
4152710	GT025013	M10 X 1	90	18	–	7,0	3	DIN 374	6H
4152711	GT025014	M10 X 1,25	100	22	–	7,0	3	DIN 374	6H
4152703	GT025006	M10 X 1,5	100	22	39	10,0	3	DIN 371	6H
4152712	GT025015	M12 X 1,25	100	22	–	9,0	3	DIN 374	6H
4152713	GT025016	M12 X 1,5	100	22	–	9,0	3	DIN 374	6H
4152704	GT025007	M12 X 1,75	110	24	44	12,0	3	DIN 376	6H
4152714	GT025017	M14 X 1,5	100	22	–	11,0	3	DIN 374	6H
4152705	GT025008	M14 X 2	110	26	52	11,0	3	DIN 376	6H
4152715	GT025018	M16 X 1,5	100	22	–	12,0	3	DIN 374	6H
4152706	GT025009	M16 X 2	110	27	–	12,0	3	DIN 376	6H
4152707	GT025010	M18 X 2	125	30	–	14,0	4	DIN 376	6H
4152708	GT025011	M20 X 2,5	140	32	–	16,0	4	DIN 376	6H

- WH36MG TiAlN/MoS_2 for steel 32–44 HRC (3 x D).



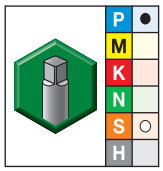




Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT04 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

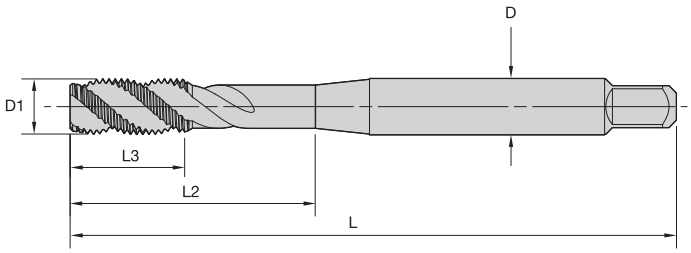


● first choice
○ alternate choice

grade WH36MG TiN+MoS_2		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4158471	GT045001	M3 X 0,5	56	6	18	3,5	3	DIN 371	6H
4158472	GT045002	M4 X 0,7	63	7	21	4,5	3	DIN 371	6H
4158763	GT045003	M5 X 0,8	70	8	25	6,0	3	DIN 371	6H
4158764	GT045004	M6 X 1	80	10	30	6,0	3	DIN 371	6H
4158772	GT045012	M8 X 1	90	10	–	6,0	3	DIN 374	6H
4158765	GT045005	M8 X 1,25	90	14	35	8,0	3	DIN 371	6H
4158773	GT045013	M10 X 1	90	10	–	7,0	3	DIN 374	6H
4158774	GT045014	M10 X 1,25	100	16	–	7,0	3	DIN 374	6H
4158766	GT045006	M10 X 1,5	100	16	39	10,0	3	DIN 371	6H
4158775	GT045015	M12 X 1,25	100	15	–	9,0	4	DIN 374	6H
4158776	GT045016	M12 X 1,5	100	15	–	9,0	4	DIN 374	6H
4158767	GT045007	M12 X 1,75	110	18	–	9,0	4	DIN 376	6H
4158777	GT045017	M14 X 1,5	100	15	–	11,0	4	DIN 374	6H
4158768	GT045008	M14 X 2	110	20	–	11,0	4	DIN 376	6H
4158778	GT045018	M16 X 1,5	100	15	–	12,0	4	DIN 374	6H
4158769	GT045009	M16 X 2	110	22	–	12,0	4	DIN 376	6H
4158770	GT045010	M18 X 2,5	125	25	–	14,0	4	DIN 376	6H
4158771	GT045011	M20 X 2,5	140	25	–	16,0	4	DIN 376	6H

- WU41EG TiN.
- WP49EG oxide.



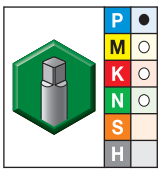


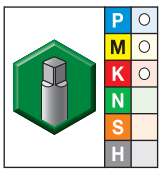


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376



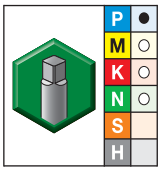


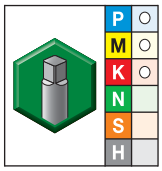
● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472587	VTSFT6005	5387487	VTSFT6005	4 - 40	56	8	18	3,5	2	DIN 371	2B
5472589	VTSFT6007	5387489	VTSFT6007	5 - 40	56	9	20	4,0	2	DIN 371	2B
5472600	VTSFT6008	5387640	VTSFT6008	6 - 32	56	9	20	4,0	2	DIN 371	2B
5472602	VTSFT6010	5387642	VTSFT6010	6 - 40	56	9	20	4,0	2	DIN 371	2B
5472603	VTSFT6011	5387643	VTSFT6011	8 - 32	63	11	21	4,5	3	DIN 371	2B
5472605	VTSFT6013	5387645	VTSFT6013	10 - 24	70	12	25	6,0	3	DIN 371	2B
5472606	VTSFT6014	5387646	VTSFT6014	10 - 32	70	12	25	6,0	3	DIN 371	2B
5472608	VTSFT6016	5387648	VTSFT6016	1/4 - 20	80	15	30	7,0	3	DIN 371	2B
5472609	VTSFT6017	5387649	VTSFT6017	1/4 - 28	80	15	30	7,0	3	DIN 371	2B
5472611	VTSFT6019	5387651	VTSFT6019	5/16 - 18	90	15	35	8,0	3	DIN 371	2B
5472612	VTSFT6020	5387652	VTSFT6020	5/16 - 24	90	15	35	8,0	3	DIN 371	2B
5472614	VTSFT6022	5387654	VTSFT6022	3/8 - 16	100	19	39	10,0	3	DIN 371	2B
5472615	VTSFT6023	5387655	VTSFT6023	3/8 - 24	100	19	39	10,0	3	DIN 371	2B
5472617	VTSFT6025	5387657	VTSFT6025	7/16 - 14	100	18	41	8,0	3	DIN 376	2B
5472618	VTSFT6026	5387658	VTSFT6026	7/16 - 20	100	18	41	8,0	3	DIN 376	2B
5472620	VTSFT6028	5387670	VTSFT6028	1/2 - 13	110	23	40	9,0	3	DIN 376	2B
5472621	VTSFT6029	5387671	VTSFT6029	1/2 - 20	110	23	40	9,0	3	DIN 376	2B
5472623	VTSFT6031	5387673	VTSFT6031	9/16 - 12	110	25	32	11,0	3	DIN 376	2B
5472624	VTSFT6032	5387674	VTSFT6032	9/16 - 18	110	25	32	11,0	3	DIN 376	2B
5472625	VTSFT6033	5387675	VTSFT6033	5/8 - 11	110	24	35	12,0	3	DIN 376	2B

(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Machine Screw and Fractional • DIN 371 and 376 — continued)



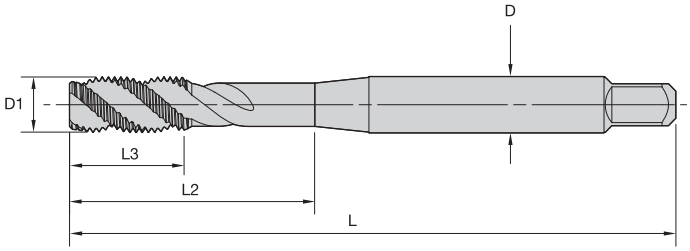


● first choice
○ alternate choice

grade WU41EG TiN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5472626	**VTSFT6034**	**5387676**	**VTSFT6034**	5/8 - 18	110	24	35	12,0	3	DIN 376	2B
5472627	**VTSFT6035**	**5387677**	**VTSFT6035**	3/4 - 10	140	30	46	16,0	4	DIN 376	2B
5472628	**VTSFT6036**	**5387678**	**VTSFT6036**	3/4 - 16	140	30	46	16,0	4	DIN 376	2B
5472629	**VTSFT6037**	**5387679**	**VTSFT6037**	7/8 - 9	140	34	35	18,0	4	DIN 376	2B
5472630	**VTSFT6038**	**5387700**	**VTSFT6038**	7/8 - 14	140	34	35	18,0	4	DIN 376	2B
5472631	**VTSFT6039**	**5387701**	**VTSFT6039**	1 - 8	160	38	41	18,0	4	DIN 376	2B
5472632	**VTSFT6040**	**5387702**	**VTSFT6040**	1 - 12	160	38	41	18,0	4	DIN 376	2B

• WP49EG oxide



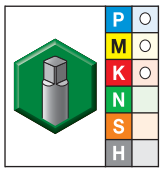




Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

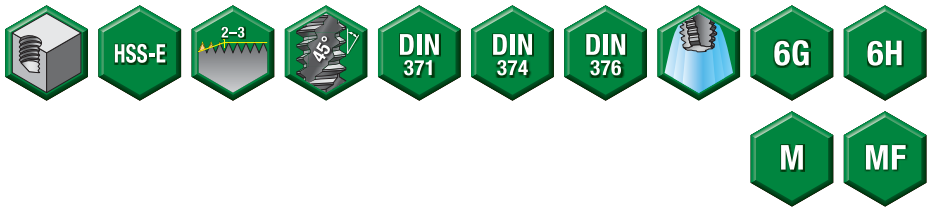
VT-SFT • Form C Semi-Bottoming Chamfer • UNJC/UNJF • Inch DIN 371 and 376

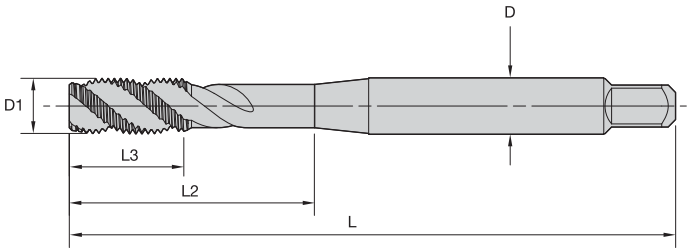


● first choice
○ alternate choice

grade WP49EG Oxide		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5387488	VTSFT6006	4 - 40	56	8	18	3,5	2	DIN 371	3B
5387641	VTSFT6009	6 - 32	56	9	20	4,0	2	DIN 371	3B
5387644	VTSFT6012	8 - 32	63	11	21	4,5	3	DIN 371	3B
5387647	VTSFT6015	10 - 32	70	12	25	6,0	3	DIN 371	3B
5387650	VTSFT6018	1/4 - 28	80	15	30	7,0	3	DIN 371	3B
5387653	VTSFT6021	5/16 - 24	90	15	35	8,0	3	DIN 371	3B
5387656	VTSFT6024	3/8 - 24	100	19	39	10,0	3	DIN 371	3B
5387659	VTSFT6027	7/16 - 20	100	18	41	8,0	3	DIN 376	3B
5387672	VTSFT6030	1/2 - 20	110	23	40	9,0	3	DIN 376	3B

- WP42EG TiCN
- WU41EG TiN
- WP49EG oxide
- WU40EG bright



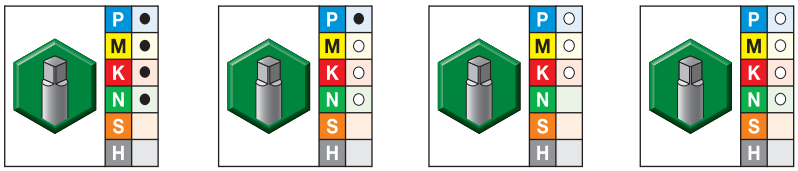




Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376

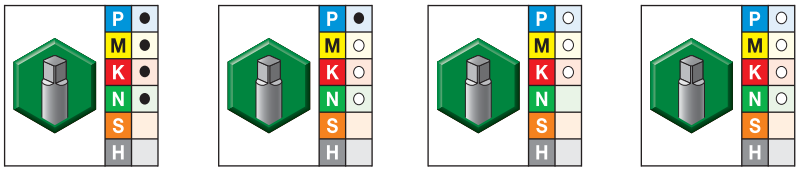


● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
5368703	VTSFT6506	5368702	VTSFT6506	5368704	VTSFT6506	5368705	VTSFT6506	M2 X 0,4	45	7	13	2,8	2	DIN 371	6H
–		–		5368706	VTSFT6507	–		M2 X 0,4	45	7	13	2,8	2	DIN 371	6G
–		–		5368707	VTSFT6508	–		M2,2 X 0,45	45	7	13	2,8	2	DIN 371	6H
–		5368708	VTSFT6509	5368709	VTSFT6509	5368720	VTSFT6509	M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6H
–		–		5368721	VTSFT6510	–		M2,5 X 0,45	50	7	15	2,8	2	DIN 371	6G
–		–		5402138	VTSFT6545	–		M3 X 0,35	56	8	—	2,2	2	DIN 374	6H
–		–		5368726	VTSFT6512	–		M3 X 0,5	56	8	18	3,5	2	DIN 371	6G
–		–		5402227	VTSFT6525	5402228	VTSFT6525	M3 X 0,5	56	8	—	2,2	2	DIN 376	6H
5368723	VTSFT6511	5368722	VTSFT6511	5368724	VTSFT6511	5368725	VTSFT6511	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
–		5368727	VTSFT6513	5368728	VTSFT6513	5368729	VTSFT6513	M3,5 X 0,6	56	9	20	4,0	2	DIN 371	6H
–		–		5402139	VTSFT6546	5402180	VTSFT6546	M4 X 0,5	63	10	21	2,8	3	DIN 374	6H
–		–		5368734	VTSFT6515	–		M4 X 0,7	63	11	21	4,5	3	DIN 371	6G
–		–		5402229	VTSFT6526	5402250	VTSFT6526	M4 X 0,7	63	10	21	2,8	3	DIN 376	6H
5368731	VTSFT6514	5368730	VTSFT6514	5368732	VTSFT6514	5368733	VTSFT6514	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
–		–		5402181	VTSFT6547	5402182	VTSFT6547	M5 X 0,5	70	12	25	3,5	3	DIN 374	6H
–		–		5368739	VTSFT6517	–		M5 X 0,8	70	12	25	6,0	3	DIN 371	6G
–		–		5402251	VTSFT6527	5402252	VTSFT6527	M5 X 0,8	70	12	25	3,5	3	DIN 376	6H
5368736	VTSFT6516	5368735	VTSFT6516	5368737	VTSFT6516	5368738	VTSFT6516	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
–		–		5402183	VTSFT6548	–		M6 X 0,5	80	12	30	4,5	3	DIN 374	6H
–		–		5402185	VTSFT6549	5402184	VTSFT6549	M6 X 0,75	80	12	30	4,5	3	DIN 374	6H

(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 — continued)

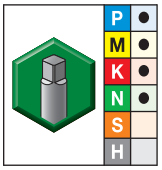


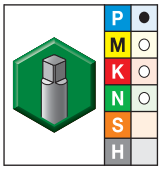
● first choice
○ alternate choice

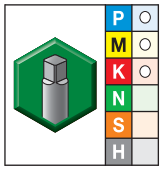
grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions						
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5368741	VTSFT6518	5368740	VTSFT6518	5368742	VTSFT6518	5368743	VTSFT6518	M6 X 1	80	12	30	6,0	3	DIN 371	6H
	–		–	5402253	VTSFT6528	5402254	VTSFT6528	M6 X 1	80	12	30	4,5	3	DIN 376	6H
	–		–	5368744	VTSFT6519		–	M6 X 1	80	12	30	6,0	3	DIN 371	6G
	–		–	5368745	VTSFT6520	5368746	VTSFT6520	M7 X 1	80	12	30	7,0	3	DIN 371	6H
	–		–	5402186	VTSFT6550	5402187	VTSFT6550	M8 X 0,75	80	12	30	6,0	3	DIN 374	6H
5402188	VTSFT6551		–	5402189	VTSFT6551	5402190	VTSFT6551	M8 X 1	90	15	35	6,0	3	DIN 374	6H
	–		–	5368752	VTSFT6522		–	M8 X 1,25	90	15	35	8,0	3	DIN 371	6G
	–		–	5402255	VTSFT6529	5402256	VTSFT6529	M8 X 1,25	90	15	35	6,0	3	DIN 376	6H
5368749	VTSFT6521	5368748	VTSFT6521	5368750	VTSFT6521	5368751	VTSFT6521	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
	–		–		–	5402191	VTSFT6552	M10 X 0,75	90	15	35	7,0	3	DIN 374	6H
	–		–	5402192	VTSFT6553	5402193	VTSFT6553	M10 X 1	90	15	35	7,0	3	DIN 374	6H
5402194	VTSFT6554		–	5402195	VTSFT6554	5402196	VTSFT6554	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5368754	VTSFT6523	5368753	VTSFT6523	5368755	VTSFT6523	5368756	VTSFT6523	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
	–		–	5368757	VTSFT6524		–	M10 X 1,5	100	18	39	10,0	3	DIN 371	6G
	–		–	5402257	VTSFT6530	5402258	VTSFT6530	M10 X 1,5	100	18	39	7,0	3	DIN 376	6H
	–		–	5402197	VTSFT6555	5402198	VTSFT6555	M12 X 1	100	21	39	9,0	3	DIN 374	6H
	–		–	5402199	VTSFT6556	5402200	VTSFT6556	M12 X 1,25	100	21	39	9,0	3	DIN 374	6H
5402201	VTSFT6557		–	5402202	VTSFT6557	5402203	VTSFT6557	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
	–		–	5402263	VTSFT6532		–	M12 X 1,75	110	21	44	9,0	3	DIN 376	6G
5402260	VTSFT6531	5402259	VTSFT6531	5402261	VTSFT6531	5402262	VTSFT6531	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
	–		–		–	5402204	VTSFT6558	M14 X 1	100	21	47	11,0	3	DIN 374	6H
	–		–		–	5402205	VTSFT6559	M14 X 1,25	100	21	47	11,0	3	DIN 374	6H
5402206	VTSFT6560		–	5402207	VTSFT6560	5402208	VTSFT6560	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
	–		–	5402268	VTSFT6534		–	M14 X 2	110	24	52	11,0	3	DIN 376	6G
5402265	VTSFT6533	5402264	VTSFT6533	5402266	VTSFT6533	5402267	VTSFT6533	M14 X 2	110	24	52	11,0	3	DIN 376	6H
	–		–		–	5402209	VTSFT6561	M16 X 1	100	21	46	12,0	3	DIN 374	6H
	–		–	5402210	VTSFT6562	5402211	VTSFT6562	M16 X 1,5	100	21	46	12,0	3	DIN 374	6H
	–		–	5402272	VTSFT6536		–	M16 X 2	110	24	51	12,0	3	DIN 376	6G
	–	5402269	VTSFT6535	5402270	VTSFT6535	5402271	VTSFT6535	M16 X 2	110	24	51	12,0	3	DIN 376	6H
	–		–		–	5402212	VTSFT6563	M18 X 1	110	21	50	14,0	4	DIN 374	6H
	–		–	5402214	VTSFT6564	5402213	VTSFT6564	M18 X 1,5	110	21	50	14,0	4	DIN 374	6H
	–		–		–	5402215	VTSFT6565	M18 X 2	125	30	58	14,0	4	DIN 374	6H
	–	5402273	VTSFT6537	5402274	VTSFT6537	5402275	VTSFT6537	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
	–		–		–	5402216	VTSFT6566	M20 X 1	125	24	56	16,0	4	DIN 374	6H
	–		–	5402217	VTSFT6567	5402218	VTSFT6567	M20 X 1,5	125	24	56	16,0	4	DIN 374	6H
	–		–		–	5402219	VTSFT6568	M20 X 2	140	30	64	16,0	4	DIN 374	6H
	–	5402276	VTSFT6538	5402277	VTSFT6538	5402278	VTSFT6538	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H
	–		–	5402220	VTSFT6569	5402221	VTSFT6569	M22 X 1,5	125	24	62	18,0	4	DIN 374	6H
	–		–		–	5402222	VTSFT6570	M22 X 2	140	30	70	18,0	4	DIN 374	6H
	–	5402279	VTSFT6539	5402280	VTSFT6539	5402281	VTSFT6539	M22 X 2,5	140	30	70	18,0	4	DIN 376	6H

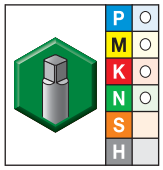
(continued)

(VT-SFT • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 — continued)





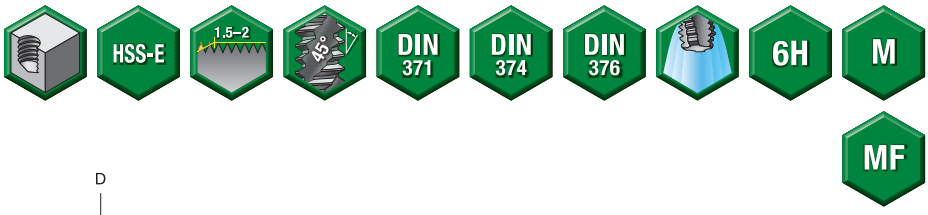


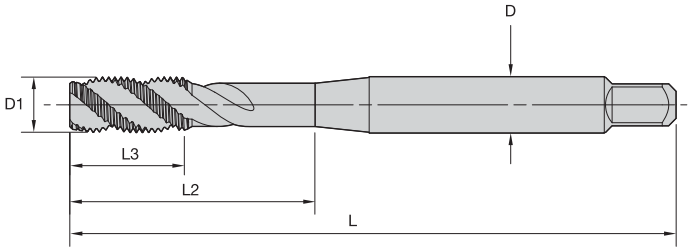


● first choice
○ alternate choice

grade WP42EG TiCN		grade WU41EG TiN		grade WP49EG Oxide		grade WU40EG Bright		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	order #	catalogue #	order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D			
–		–		5402223	VTSFT6571	5402224	VTSFT6571	M24 X 1,5	140	28	67	18,0	4	DIN 374	6H
–		–		–		5402225	VTSFT6572	M24 X 2	140	28	67	18,0	4	DIN 374	6H
–		5402282	VTSFT6540	5402283	VTSFT6540	5402284	VTSFT6540	M24 X 3	160	36	77	18,0	4	DIN 376	6H
–		5402285	VTSFT6541	5402286	VTSFT6541	5402287	VTSFT6541	M27 X 3	160	36	82	20,0	4	DIN 376	6H
–		–		–		5402226	VTSFT6573	M30 X 2	150	28	80	22,0	2	DIN 374	6H
–		5402288	VTSFT6542	5402289	VTSFT6542	5402290	VTSFT6542	M30 X 3,5	180	42	91	22,0	4	DIN 376	6H
–		–		5402291	VTSFT6543	5402292	VTSFT6543	M33 X 3,5	180	42	100	25,0	4	DIN 376	6H
–		–		5402293	VTSFT6544	5402294	VTSFT6544	M36 X 4	200	48	110	28,0	5	DIN 376	6H

- WP42EG TiCN
- WP49EG oxide

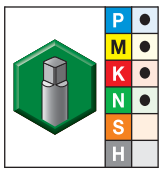


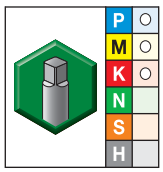




Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376



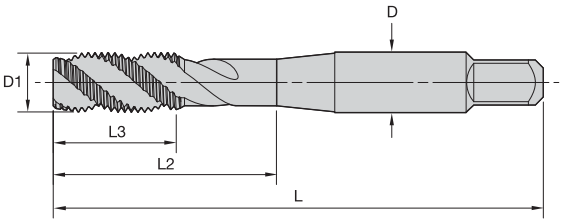


● first choice
○ alternate choice

grade WP42EG TiCN		grade WP49EG Oxide		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
5387434	VTSFT6574	5387435	VTSFT6574	M3 X 0,5	56	8	18	3,5	2	DIN 371	6H
5387436	VTSFT6575	5387437	VTSFT6575	M4 X 0,7	63	11	21	4,5	3	DIN 371	6H
5387438	VTSFT6576	5387439	VTSFT6576	M5 X 0,8	70	12	25	6,0	3	DIN 371	6H
5387460	VTSFT6577	5387461	VTSFT6577	M6 X 1	80	12	30	6,0	3	DIN 371	6H
5387475	VTSFT6585	5387476	VTSFT6585	M8 X 1	90	15	35	6,0	3	DIN 374	6H
5387462	VTSFT6578	5387463	VTSFT6578	M8 X 1,25	90	15	35	8,0	3	DIN 371	6H
5387477	VTSFT6586	5387478	VTSFT6586	M10 X 1,25	100	18	39	7,0	3	DIN 374	6H
5387464	VTSFT6579	5387465	VTSFT6579	M10 X 1,5	100	18	39	10,0	3	DIN 371	6H
5387479	VTSFT6587	5387481	VTSFT6587	M12 X 1,5	100	21	39	9,0	3	DIN 374	6H
5387466	VTSFT6580	5387467	VTSFT6580	M12 X 1,75	110	21	44	9,0	3	DIN 376	6H
5387482	VTSFT6588	5387483	VTSFT6588	M14 X 1,5	100	21	47	11,0	3	DIN 374	6H
5387468	VTSFT6581	5387469	VTSFT6581	M14 X 2	110	24	52	11,0	3	DIN 376	6H
–		5387470	VTSFT6582	M16 X 2	110	24	51	12,0	3	DIN 376	6H
5387471	VTSFT6583	5387472	VTSFT6583	M18 X 2,5	125	30	58	14,0	4	DIN 376	6H
5387473	VTSFT6584	5387474	VTSFT6584	M20 X 2,5	140	30	64	16,0	4	DIN 376	6H

- WU41EG TiN
- WU40EG bright



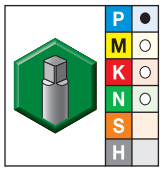


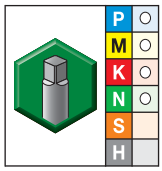


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

VT-SFT • Form C Semi-Bottoming Chamfer • Metric • JIS





● first choice
○ alternate choice

grade WU41EG TiN		grade WU40EG Bright		metric dimensions							
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	tap class
5398709	VTSFT7505	5398708	VTSFT7505	M3 X 0,5	46	11	19	4,0	2	JIS	ISO 2
5398791	VTSFT7506	5398790	VTSFT7506	M4 X 0,7	52	13	21	5,0	3	JIS	ISO 2
5398793	VTSFT7507	5398792	VTSFT7507	M5 X 0,8	60	16	24	5,5	3	JIS	ISO 2
5398795	VTSFT7508	5398794	VTSFT7508	M6 X 1	62	19	29	6,0	3	JIS	ISO 2
5398797	VTSFT7509	5398796	VTSFT7509	M8 X 1,25	70	22	37	6,2	3	JIS	ISO 2
5398799	VTSFT7510	5398798	VTSFT7510	M10 X 1,5	75	24	41	7,0	3	JIS	ISO 2
–		5398800	VTSFT7511	M12 X 1,25	82	29	48	8,5	3	JIS	ISO 2
–		5398802	VTSFT7513	M12 X 1,5	82	29	48	8,5	3	JIS	ISO 2
–		5398801	VTSFT7512	M12 X 1,75	82	29	48	8,5	3	JIS	ISO 2
–		5398804	VTSFT7515	M14 X 1,5	88	30	48	10,5	3	JIS	ISO 2
–		5398803	VTSFT7514	M14 X 2	88	30	48	10,5	3	JIS	ISO 2
–		5398806	VTSFT7517	M16 X 1,5	95	32	52	12,5	3	JIS	ISO 2
–		5398805	VTSFT7516	M16 X 2	95	32	52	12,5	3	JIS	ISO 2
–		5398807	VTSFT7518	M18 X 2,5	100	37	55	14,0	4	JIS	ISO 2
–		5398808	VTSFT7519	M20 X 2,5	105	37	60	15,0	4	JIS	ISO 2

Tap into the power of the original.



WIDIA™ VariTap™

A heritage of hard work, innovation, and excellence. That's what makes an original.

Built on a 140-year legacy of providing the industry with the highest quality performance in taps, dies, and gages. Our history propels us to keep delivering the most advanced solutions.

The WIDIA VariTap is the next application of our commitment to innovation.

- Extensive range of sizes, fits, styles, and coatings, equipped with optimised geometry, offering the largest portfolio solution of multipurpose taps available.
- Capable of working with a wide variety of materials.
- Long and consistent tool life leading to lower inventory costs.
- Unique spiral-point geometry provides low tapping torque, while pushing chips ahead of the tap in through holes.
- Superior thread finish.

To learn more about the unmatched benefits of WIDIA VariTap, call 800.979.4342, contact your local Authorised Distributor, or visit **widia.com/varitap.**

WIDIA™



Straight Flute

WIDIA-GTD™ offers a wide range of straight-flute options for tapping through and blind holes in:

- Cast iron.
- Aluminium.

High-Performance Victory™ Solid Carbide Taps

- Straight flute designed for outstanding tool life in cast iron, aluminium, and hardened materials.
- Manufactured with fine-grain micrograin carbide for exceptional wear life.
- Ideal for long production runs where fewer tool changes mean greater productivity.
- Runs up to 4x faster and lasts up to 4x longer than conventional high-speed steel taps.
- Excellent thread quality and tap performance.

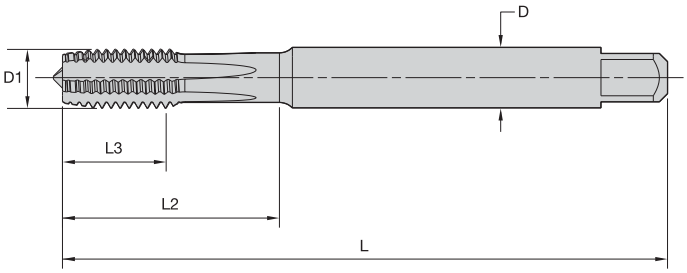
High-Performance Victory™ HSS-E-PM Taps

- Straight-flute taps store chips in hole or are flushed out with internal coolant.
- Manufactured from powdered metal high-speed steel coated for thread cutting in cast iron and aluminium.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.



- WH16PG TiAlN/MoS_2 for steel 55–63 HRC.



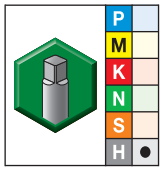




Shank Tolerance	
D mm	tolerance h6
1–3	+0, -0,025
3,5–6	+0, -0,030
7–10	+0, -0,036
11–18	+0, -0,043

WIDIA VICTORY

■ GX10 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel

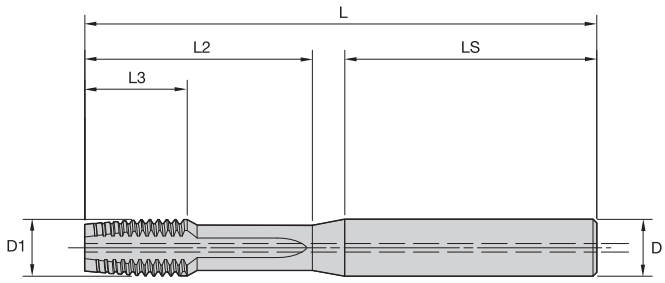


● first choice
○ alternate choice

grade WH16PG TiAlN+MoS_2		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4158323	GX105001	M3 X 0,5	63	6	18	4,5	4	DIN 371	6HX
4158324	GX105002	M4 X 0,7	63	8	20	4,5	4	DIN 371	6HX
4158325	GX105003	M5 X 0,8	70	10	26	6,0	4	DIN 371	6HX
4158326	GX105004	M6 X 1	80	12	28	6,0	4	DIN 371	6HX
4158331	GX105009	M8 X 1	90	15	35	8,0	5	DIN 374	6HX
4158327	GX105005	M8 X 1,25	90	15	35	8,0	5	DIN 371	6HX
4158332	GX105010	M10 X 1	100	18	38	10,0	5	DIN 374	6HX
4158328	GX105006	M10 X 1,5	100	18	38	10,0	5	DIN 371	6HX
4158333	GX105011	M12 X 1,5	110	21	41	12,0	5	DIN 374	6HX
4158329	GX105007	M12 X 1,75	110	21	41	12,0	5	DIN 376	6HX
4158334	GX105012	M14 X 1,5	110	24	44	14,0	5	DIN 374	6HX
4158330	GX105008	M14 X 2	110	24	44	14,0	6	DIN 376	6HX
4158335	GX105013	M16 X 1,5	110	24	44	16,0	5	DIN 374	6HX

• WK12PG TiCN for cast iron.



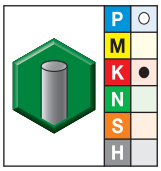




Shank Tolerance	
D	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX35 • Form E Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron

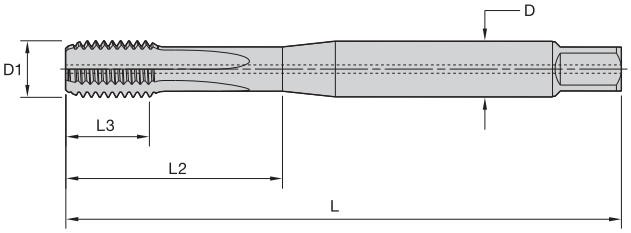


● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	LS	D	number of flutes	class of fit
5551152	GX352733	M6 X 1	70	12	24	42	6,0	4	6HX
5551153	GX352734	M8 X 1,25	80	15	32	43	8,0	4	6HX
5551154	GX352735	M10 X 1,5	90	18	40	44	10,0	4	6HX
5551156	GX352738	M12 X 1,5	100	21	48	46	12,0	4	6HX
5551155	GX352737	M12 X 1,75	100	21	48	46	12,0	4	6HX
5551159	GX352740	M14 X 1,5	110	24	56	52	12,0	4	6HX
5551157	GX352739	M14 X 2	110	24	56	52	12,0	4	6HX
5551160	GX352741	M16 X 2	110	24	64	44	14,0	4	6HX

- WK12PG TiCN for cast iron.



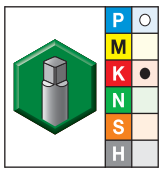




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX35 • Form E Bottoming Chamfer • Through Coolant • Metric • For Cast Iron

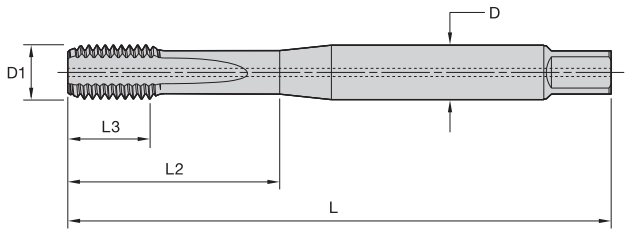


● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
5520825	GX355006	M6 X 1	80	10	30	6,0	4	6HX
5520826	GX355007	M7 X 1	80	10	30	7,0	4	6HX
5520827	GX355008	M8 X 1,25	90	13	35	8,0	4	6HX
5520828	GX355009	M9 X 1,25	90	13	35	9,0	4	6HX
5520830	GX355101	M10 X 1	90	10	35	7,0	4	6HX
5520831	GX355102	M10 X 1,25	100	15	39	7,0	4	6HX
5520829	GX355010	M10 X 1,5	100	15	39	10,0	4	6HX
5520834	GX355121	M12 X 1,25	100	15	39	9,0	4	6HX
5520835	GX355122	M12 X 1,50	100	15	39	9,0	4	6HX
5520833	GX355012	M12 X 1,75	110	18	44	9,0	4	6HX
5520837	GX355141	M14 X 1,25	100	15	47	11,0	4	6HX
5520838	GX355142	M14 X 1,5	100	15	47	11,0	4	6HX
5520836	GX355014	M14 X 2	110	20	52	11,0	4	6HX

• WN14PG TiN + CrC/C for aluminium.



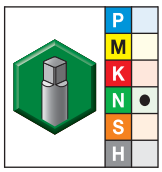




Shank Tolerance	
D	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium

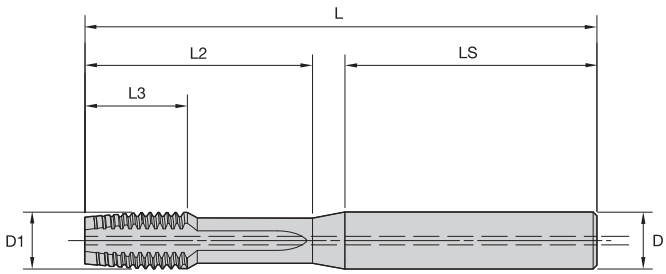


● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
5520839	GX475006	M6 X 1	80	10	30	6,0	3	6HX
5520840	GX475008	M8 X 1,25	90	10	35	8,0	3	6HX
5520841	GX475010	M10 X 1,5	100	15	39	10,0	3	6HX

• WN14PG TiN + CrC/C
for aluminium.



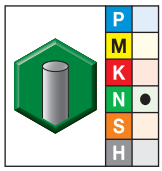




Shank Tolerance	
D mm	**tolerance h6**
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX47 • Form E Bottoming Chamfer • Through Coolant • Metric • For Aluminium

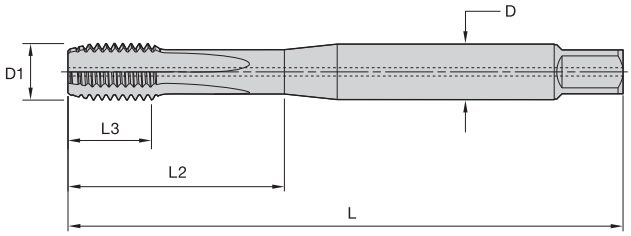


● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions							
order #	**catalogue #**	**D1 size**	**L**	**L3**	**L2**	**LS**	**D**	**number of flutes**	**class of fit**
5551161	**GX472866**	M6 X 1	70	12	24	42	6,0	3	6HX
5551162	**GX472867**	M8 X 1,25	80	15	32	43	8,0	3	6HX
5551163	**GX472868**	M10 X 1,5	90	18	40	44	10,0	3	6HX
5551164	**GX472872**	M12 X 1,5	100	21	48	46	12,0	3	6HX
5551165	**GX472870**	M12 X 1,75	100	21	48	46	12,0	3	6HX
5551166	**GX472874**	M14 X 1,5	110	24	56	52	12,0	4	6HX
5551167	**GX472873**	M14 X 2	110	24	56	52	12,0	4	6HX
5551168	**GX472875**	M16 X 2	110	24	64	44	14,0	4	6HX

• WK12PG TiCN for cast iron.





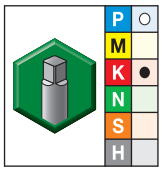


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX50 • Form C Semi-Bottoming Chamfer • Through Coolant M6 and Larger • Metric • For Cast Iron

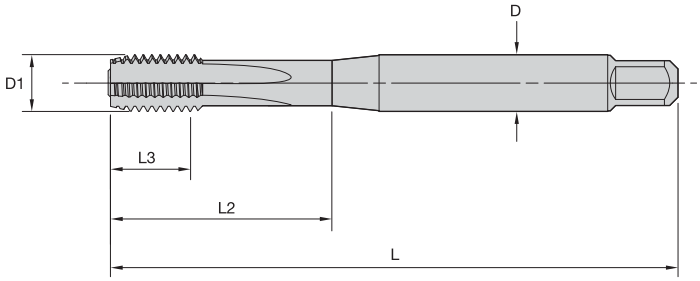


● first choice
○ alternate choice

grade WK12PG TiCN		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	class of fit
5520817	GX505004	M4 X 0,7	63	10	21	4,5	3	6HX
5520818	GX505005	M5 X 0,8	70	10	25	6,0	3	6HX
5520819	GX505006	M6 X 1	80	10	30	6,0	4	6HX
5520820	GX505008	M8 X 1,25	90	13	35	8,0	4	6HX
5520822	GX505010	M10 X 1,5	100	15	39	10,0	4	6HX
5520823	GX505012	M12 X 1,75	110	18	44	9,0	4	6HX
5520824	GX505014	M14 X 2	110	20	52	11,0	4	6HX

- GP6520 TiCN for cast iron and cast aluminium.





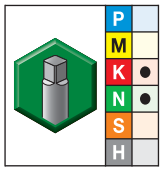


Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT40 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

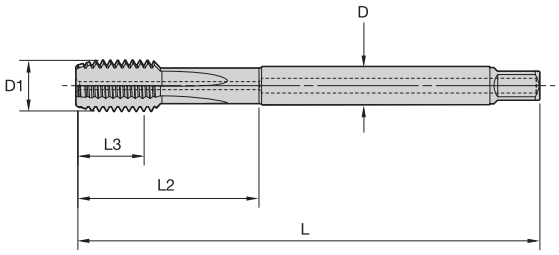


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4033699	GT405001	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
4033700	GT405002	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4033701	GT405003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4033702	GT405004	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4033753	GT405005	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
5408066	GT405057	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4033754	GT405006	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
5408067	GT405058	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4033755	GT405007	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5408068	GT405059	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
4033756	GT405008	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
4033757	GT405009	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
4033758	GT405010	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX
4033759	GT405011	M22 X 2,5	140	25	70	18,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.





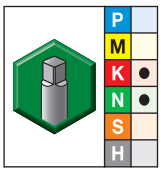


Shank Tolerance

D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT41 • Form C Semi-Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

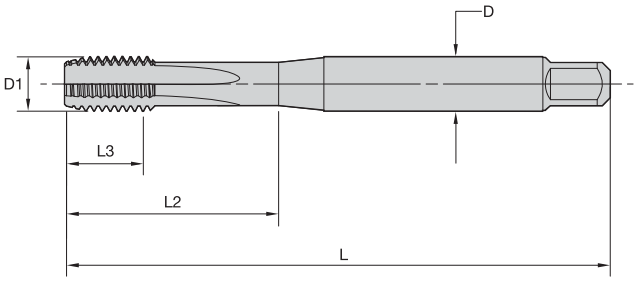


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4033659	GT415001	M4 X 0,7	63	10	21	4,5	3	DIN 371	6HX
4033660	GT415002	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4033661	GT415003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4033662	GT415004	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4033813	GT415005	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
5408069	GT415021	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4033814	GT415006	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
5408400	GT415022	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4033815	GT415007	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
5408401	GT415023	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
4033816	GT415008	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
4033817	GT415009	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
4033818	GT415010	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.



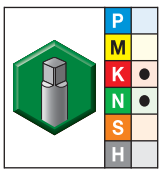




Shank Tolerance	
D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT42 • Form E Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

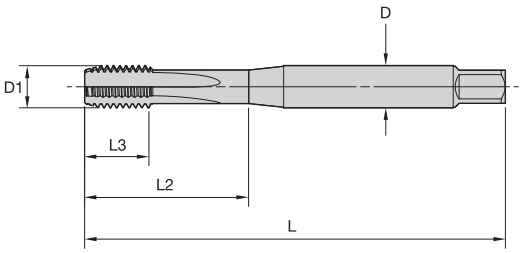


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4154274	GT425001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4154275	GT425002	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4154276	GT425003	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4154277	GT425004	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
4154280	GT425007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4154278	GT425005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4154281	GT425008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4154279	GT425006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4154282	GT425009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
5408402	GT425010	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5408403	GT425011	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5408404	GT425012	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- GP6520 TiCN for cast iron and cast aluminium.



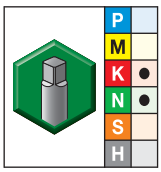




Shank Tolerance	
D mm	tolerance h6
>3–6	+0, -0,008
>6–10	+0, -0,009
>10–18	+0, -0,011
>18–30	+0, -0,013
>30–50	+0, -0,016

WIDIA VICTORY

■ GT43 • Form E Bottoming Chamfer • Through Coolant • Metric DIN 371, 374, and 376 • For Cast Iron and Cast Aluminium

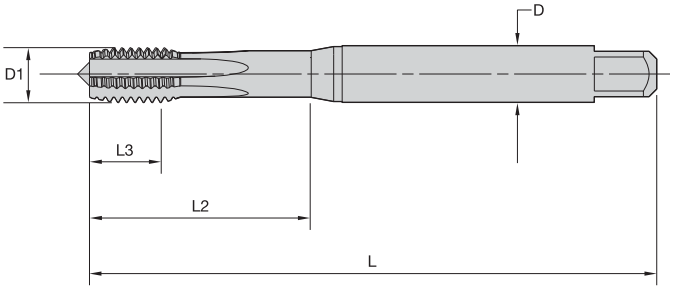


● first choice
○ alternate choice

grade GP6520 TiCN		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	D	number of flutes	dimension standard	class of fit
4154283	GT435001	M5 X 0,8	70	10	25	6,0	3	DIN 371	6HX
4154284	GT435002	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4154285	GT435003	M8 X 1,25	90	13	35	8,0	4	DIN 371	6HX
4154286	GT435004	M10 X 1,5	100	15	39	10,0	4	DIN 371	6HX
4154289	GT435007	M12 X 1,5	100	15	39	9,0	4	DIN 374	6HX
4154287	GT435005	M12 X 1,75	110	18	44	9,0	4	DIN 376	6HX
4154290	GT435008	M14 X 1,5	100	15	47	11,0	4	DIN 374	6HX
4154288	GT435006	M14 X 2	110	20	52	11,0	4	DIN 376	6HX
4154291	GT435009	M16 X 1,5	100	15	46	12,0	4	DIN 374	6HX
5408405	GT435010	M16 X 2	110	20	51	12,0	4	DIN 376	6HX
5408406	GT435011	M18 X 2,5	125	25	58	14,0	4	DIN 376	6HX
5408407	GT435012	M20 X 2,5	140	25	64	16,0	4	DIN 376	6HX

- WS32MG TiCN for steel 44–55 HRC.





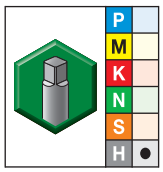


Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

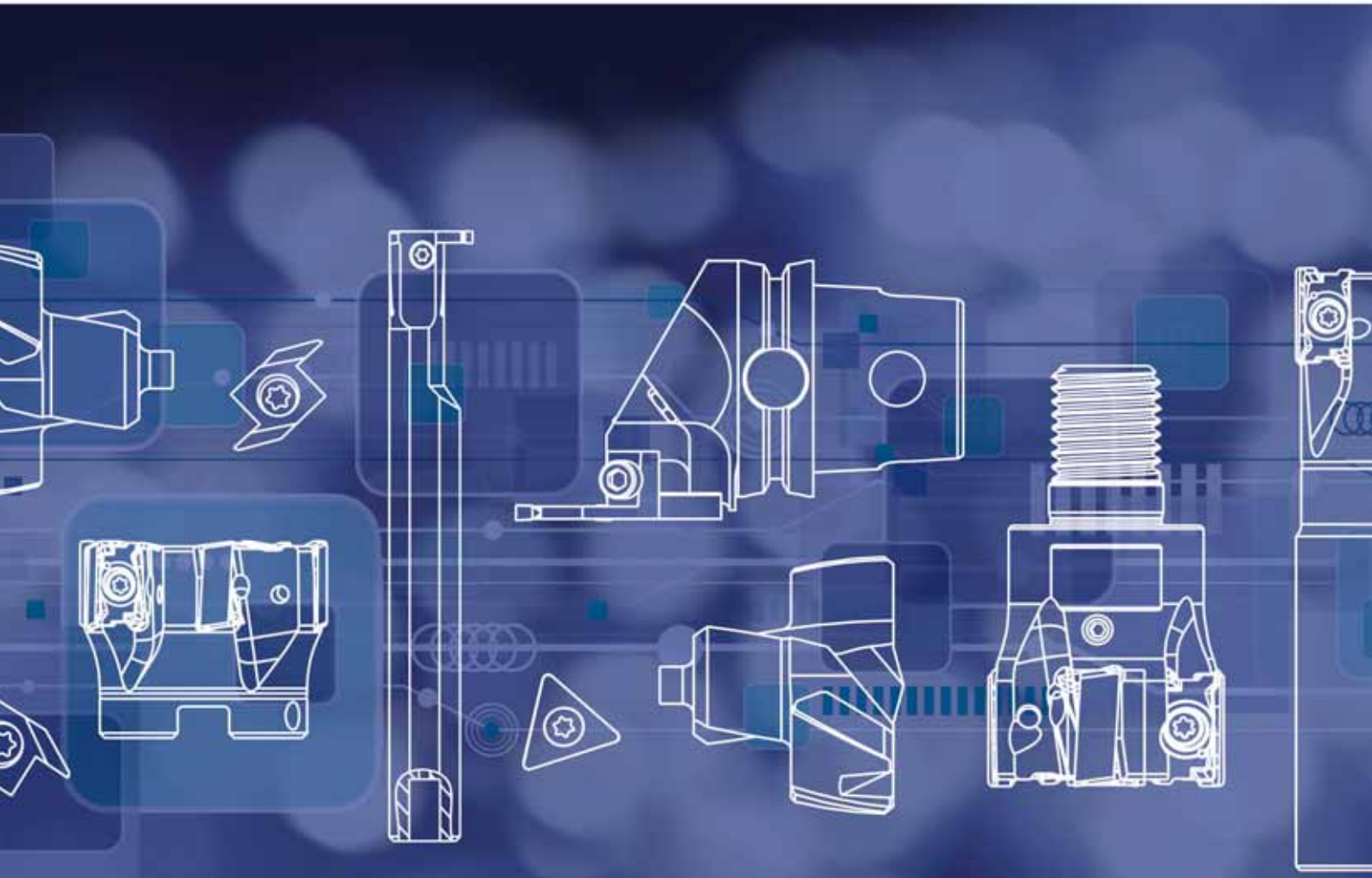
■ GT06 • Form C Semi-Bottoming Chamfer • Metric DIN 371, 374, and 376 • For Hard Steel



● first choice
○ alternate choice

grade WS32MG TiCN		metric dimensions					number of flutes	dimension standard	class of fit
order #	catalogue #	D1 size	L	L3	L2	D			
4159915	GT065003	M6 X 1	80	10	30	6,0	4	DIN 371	6HX
4159918	GT065006	M8 X 1	90	10	35	8,0	5	DIN 374	6HX
4159913	GT065001	M8 X 1,25	90	14	35	8,0	5	DIN 371	6HX
4159919	GT065007	M10 X 1	90	10	35	10,0	5	DIN 374	6HX
4159914	GT065002	M10 X 1,5	100	16	39	10,0	5	DIN 371	6HX
4159920	GT065008	M12 X 1,5	100	15	–	9,0	5	DIN 374	6HX
4159916	GT065004	M12 X 1,75	110	18	–	9,0	5	DIN 376	6HX
4159921	GT065009	M14 X 1,5	100	15	–	11,0	6	DIN 374	6HX
4159922	GT065010	M16 X 1,5	100	15	–	12,0	6	DIN 374	6HX
4159917	GT065005	M16 X 2	110	22	–	12,0	6	DIN 376	6HX

WIDIA™



NOVO KNOWS ART TO PART TO PROFIT

Being as productive and profitable as possible is your fundamental goal. With the addition of NOVO™ to your team, your goal can be achieved. NOVO possesses powerful digital tools that link together process planning, inventory availability and purchase, cost-per-part management, and productivity improvements.

NOVO can ensure you have the right tools on your machines, in the right sequence. Resulting in flawless execution that accelerates every job, and maximises every shift. **widia.com/novo**

01	THE DIGITAL SOURCE FOR DELIVERING SMART MACHINING SOLUTIONS widia.com/novo	NOVO™



Forming Taps

WIDIA-GTD™ offers a wide range of forming tap options for tapping through and blind holes in:

- Steel and steel alloys.
- Stainless steel.
- Aluminium.

High-Performance Victory™ Solid Carbide Taps

- Advanced forming geometries designed for superior tap performance in aluminium.
- Manufactured with fine-grain micrograin carbide for exceptional wear life.
- Ideal for long production runs where fewer tool changes mean greater productivity.
- Runs up to 4x faster and lasts up to 4x longer than conventional high-speed steel taps.
- Excellent thread quality and tap performance.

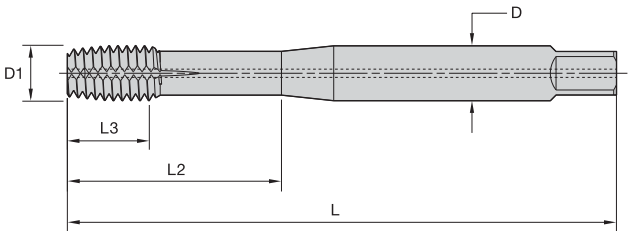
High-Performance Victory™ HSS-E-PM Taps

- Manufactured from powdered metal high-speed steel coated for thread forming in steel, stainless steel, and aluminium.
- High hardness provides superior wear resistance.
- Offer performance advantages over conventional high-speed steel taps.
- Long tap life at up to 50% higher tapping speed than HSS taps.



- WN14PG TiN + CrC/C for aluminium.



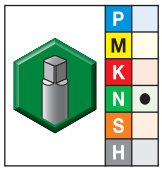




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium

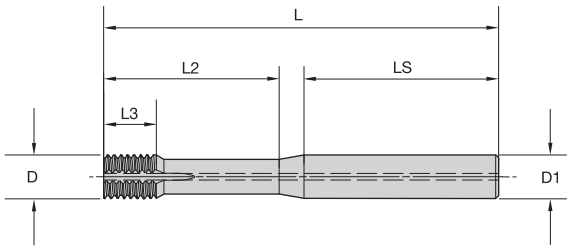


● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions						
order #	catalogue #	D1 size	L	L3	L2	D	number of lube grooves	class of fit
5520842	GX495006	M6 X 1	80	10	30	6,0	2	6HX
5520843	GX495008	M8 X 1,25	90	13	35	8,0	2	6HX
5520844	GX495010	M10 X 1,5	100	15	39	10,0	3	6HX

• WN14PG TiN + CrC/C for aluminium.



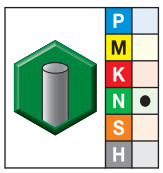




Shank Tolerance	
D	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–16	+0, -0,011

WIDIA VICTORY

■ GX49 • Form E Bottoming Entry Taper • Through Coolant • Metric • For Aluminium

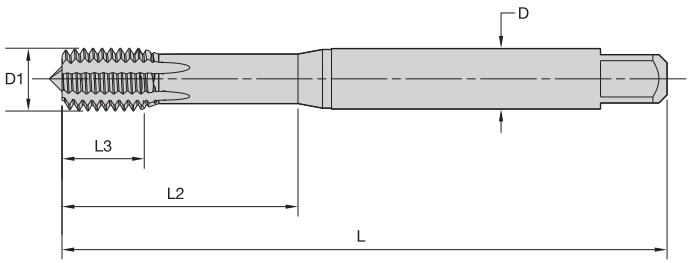


● first choice
○ alternate choice

grade WN14PG TiN+CrC/C		metric dimensions							
order #	catalogue #	D1 size	L	L3	L2	LS	D	number of lube grooves	class of fit
5551169	GX492908	M6 X 1	70	8	24	42	6,0	2	6HX
5551170	GX492909	M8 X 1,25	80	10	32	43	8,0	2	6HX
5551171	GX492911	M10 X 1,5	90	12	40	44	10,0	3	6HX
5551173	GX492915	M12 X 1,5	100	14	48	46	12,0	3	6HX
5551172	GX492914	M12 X 1,75	100	14	48	46	12,0	3	6HX

- WP31MG TiN for steel.
- WN38MG DLC for aluminium.





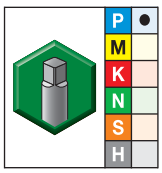


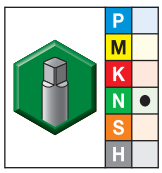
Shank Tolerance

D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

■ GT22 • Form C Semi-Bottoming Entry Taper • Metric DIN 2174 • For Steel and Aluminium



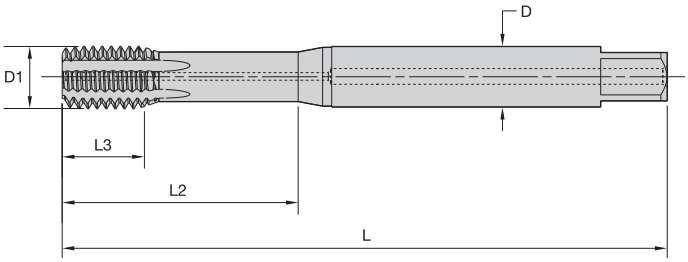


● first choice
○ alternate choice

grade WP31MG TiN		grade WN38MG DLC		metric dimensions						
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	dimension standard	class of fit
4158495	GT225016	4154671	GT225001	M3 X 0,5	56	6	18	3,5	DIN 2174	6HX
4158496	GT225017	4154672	GT225002	M4 X 0,7	63	7	21	4,5	DIN 2174	6HX
4158497	GT225018	4154673	GT225003	M5 X 0,8	70	8	25	6,0	DIN 2174	6HX
4158498	GT225019	4154674	GT225004	M6 X 1	80	10	30	6,0	DIN 2174	6HX
4158513	GT225024	4154679	GT225009	M8 X 1	90	10	35	8,0	DIN 2174	6HX
4158499	GT225020	4154675	GT225005	M8 X 1,25	90	14	35	8,0	DIN 2174	6HX
4158514	GT225025	4154680	GT225010	M10 X 1	90	10	35	10,0	DIN 2174	6HX
4158515	GT225026	4154681	GT225011	M10 X 1,25	100	16	39	10,0	DIN 2174	6HX
4158500	GT225021	4154676	GT225006	M10 X 1,5	100	16	39	10,0	DIN 2174	6HX
4158516	GT225027	4154682	GT225012	M12 X 1,25	100	15	–	9,0	DIN 2174	6HX
4158517	GT225028	4154683	GT225013	M12 X 1,5	100	15	–	9,0	DIN 2174	6HX
4158501	GT225022	4154677	GT225007	M12 X 1,75	110	18	–	9,0	DIN 2174	6HX
4158518	GT225029	4154684	GT225014	M14 X 1,5	100	15	–	11,0	DIN 2174	6HX
4158519	GT225030	4154685	GT225015	M16 X 1,5	100	15	–	12,0	DIN 2174	6HX
4158502	GT225023	4154678	GT225008	M16 X 2	110	22	–	12,0	DIN 2174	6HX

- WP31MG TiN for steel.
- WN38MG DLC for aluminium.



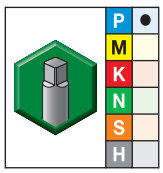


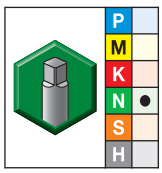


Shank Tolerance	
D mm	tolerance h9
1–3	+0, -0,025
>3–6	+0, -0,030
>6–10	+0, -0,036
>10–18	+0, -0,043
>18–30	+0, -0,052

WIDIA VICTORY

GT23 • Form C Semi-Bottoming Entry Taper • Through Coolant • Metric DIN 2174 • For Steel and Aluminium





● first choice
○ alternate choice

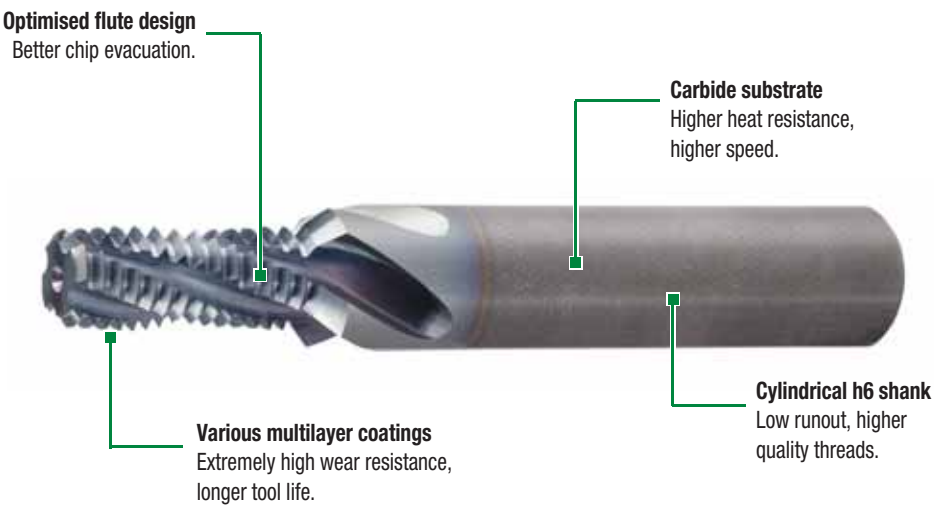
grade WP31MG TiN		grade WN38MG DLC		metric dimensions						
order #	catalogue #	order #	catalogue #	D1 size	L	L3	L2	D	dimension standard	class of fit
4159965	GT235012	4159522	GT235001	M5 X 0,8	70	8	25	6,0	DIN 2174	6HX
4159966	GT235013	4159644	GT235002	M6 X 1	80	10	30	6,0	DIN 2174	6HX
4159971	GT235018	4159649	GT235007	M8 X 1	90	10	35	8,0	DIN 2174	6HX
4159967	GT235014	4159645	GT235003	M8 X 1,25	90	14	35	8,0	DIN 2174	6HX
4159972	GT235019	4159650	GT235008	M10 X 1	90	10	35	10,0	DIN 2174	6HX
4159968	GT235015	4159646	GT235004	M10 X 1,5	100	16	39	10,0	DIN 2174	6HX
4159993	GT235020	4159651	GT235009	M12 X 1,5	100	15	–	9,0	DIN 2174	6HX
4159969	GT235016	4159647	GT235005	M12 X 1,75	110	18	–	9,0	DIN 2174	6HX
4159994	GT235021	4159652	GT235010	M14 X 1,5	100	15	–	11,0	DIN 2174	6HX
4159995	GT235022	4159653	GT235011	M16 X 1,5	100	15	–	12,0	DIN 2174	6HX
4159970	GT235017	4159648	GT235006	M16 X 2	110	22	–	12,0	DIN 2174	6HX



Thread Mills

Our solid thread mills are designed to be the highest quality thread milling solution.

- Cut up to 63 HRC.
- Improved overall thread quality.



Unmatched Capabilities

- Capable of easily cutting most difficult materials.
- Carbide grades make threading easier and reduce machining times.
- High-quality internal and external threading on 3-axis CNC machines.
- Thread mills make interrupted cuts and short chips.
- Design offers a range of benefits to improve overall thread quality.
- Short, easily evacuated chips generate less heat and friction, so there is a lower risk of damage to threading.

Choose WIDIA-GTD™ Thread Mills

- Greater versatility than competitive products.
- Optimum surface quality for an excellent end product.
- Designed to eliminate chipping issues.
- No need to reverse the spindle.
- Fewer machining problems means more production safety.



Victory™ GTM Series HP Solid Carbide Thread Mills • Metric

★ Good
★★ Better
★★★ Best

GTM Series Solid Thread Milling • Metric	series	size range (inch and metric) size min–max	hole	operation	coolant	grade	shank
	**GTM11**	M3–M20	★★★	★★★	★★★	WU13PV	6535 HA
	**GTM21**	M5–M16	★★★	★★	★★★	WU12PV	6535 HA
	**GTM31**	M4–M16	★★★	★★★	★★★	WU12PV	6535 HA
	**GTM41**	M6–M24	★★★	★★★	★★★	WU16PV	6535 HA
	**GTM41LH**	M6–M12	★★★	★★★	★★★	WU16PV	6535 HA

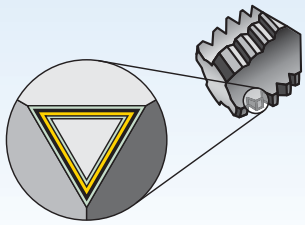
Victory GTM Series HP Solid Carbide Thread Mills • Inch

★ Good
★★ Better
★★★ Best

GTM Series Solid Thread Milling • Inch	series	size range (inch and metric) size min–max	hole	operation	coolant	grade	shank
	**GTM21**	#10–5/8"	★★★	★★	★★★	WU12PV	6535 HA
	**GTM31**	1/4–5/8"	★★★	★★★	★★★	WU12PV	6535 HA
	**GTM41**	1/4–3/4"	★★★	★★★	★★★	WU16PV	6535 HA

P				M	K		N			S				H			
1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16, 17, 18, 19	20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2	page(s)	recommended cutting parameters
Steel <35 HRC	Steel 36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron		Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC		
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★	★	★	★			Y69	Y77
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★			Y71	Y77
					★★★	★★★	★★★	★★★	★★★							Y73	Y77
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★					★★★	★★★	Y75	Y78
										★★★	★★★	★★★	★★★	★★★	★★★	Y76	Y78

P				M	K		N			S				H			
1, 2, 3, 4, 6, 7	5, 9, 10, 11	12, 13.1	13.2	14.1, 14.2, 14.3, 14.4	15, 16, 17, 18, 19	20	21	22, 23, 24, 25	26, 27, 28	31, 32	33, 34, 35	36	37	38.1, 38.2, 40.1, 40.2, 41.1	39.1, 41.2	page(s)	recommended cutting parameters
Steel <35 HRC	Steel 36–48 HRC	PH and Ferritic Stainless Steel <35 HRC	PH and Ferritic Stainless Steel >35 HRC	Stainless Steel	Cast Iron		Wrought Aluminium	Cast Aluminium	Copper, Copper Alloys	Iron Based	Cobalt Based	Nickel Based	Titanium Alloys	Hardened Steels 49–55 HRC	Hardened Steels 56–68 HRC		
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★			Y70	Y77
					★★★	★★★	★★★	★★★	★★★							Y72	Y77
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★					★★★	★★★	Y74	Y78



Coatings are designed for optimised tapping performance in specific materials.

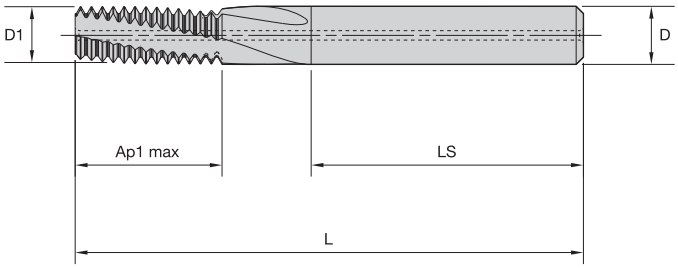
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous
S	High-Temp Alloys
H	Hardened Materials

wear resistance ⟷ toughness

Grade

Coating	Grade Description		05	10	15	20	25	30	35	40	45
WU12PV	Coated carbide. PVD fine-grain carbide substrate with high-hardness TiCN coating. Universal grade for thread milling most materials.	P									
		M									
		K									
		N									
		S									
WU13PV	Coated carbide. PVD carbide substrate with heat-resistant TiAlN coating. Universal grade for thread milling most materials.	P									
		M									
		K									
		N									
		S									
WU16PV	Coated carbide. PVD two-layer coating with heat-resistant TiAlN base layer and low-friction MoS_2 top layer over carbide substrate. Use for thread milling most materials, including high-hardness materials.	P									
		M									
		K									
		N									
		S									
		H									



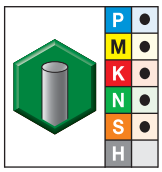




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

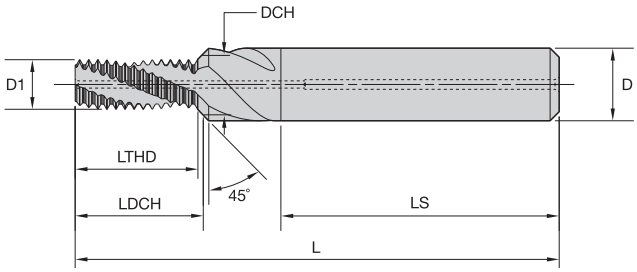
■ GTM11 • Through Coolant • Metric and Metric Fine



● first choice
○ alternate choice

grade WU13PV TiAlN		metric dimensions						
order #	catalogue #	D1 size	D1	Ap1 max	L	LS	D	cutting edges
4138391	GTM115001	M3X0.5	2,4	6	42	28	4,0	3
4138502	GTM115012	M4X0.5	3,4	8	55	36	6,0	3
4138392	GTM115002	M4X0.7	3,2	9	55	36	6,0	3
4138503	GTM115013	M5X0.5	4,3	10	55	36	6,0	3
4138493	GTM115003	M5X0.8	4,0	11	55	36	6,0	3
4138504	GTM115014	M6X0.75	5,0	12	55	36	6,0	3
4138494	GTM115004	M6X1	4,8	12	55	36	6,0	3
4138505	GTM115015	M8X0.75	5,9	17	63	36	6,0	3
4138506	GTM115016	M8X1	5,9	16	63	36	6,0	3
4138495	GTM115005	M8X1.25	5,9	17	63	36	6,0	3
4138507	GTM115017	M10X1	7,9	20	70	36	8,0	3
4138496	GTM115006	M10X1.5	7,9	20	70	36	8,0	3
4138508	GTM115018	M12X1	9,9	24	80	40	10,0	4
4138509	GTM115019	M12X1.5	9,9	25	80	40	10,0	4
4138497	GTM115007	M12X1.75	9,9	25	80	40	10,0	4
4138510	GTM115020	M14X1.5	9,9	29	80	40	10,0	4
4138498	GTM115008	M14X2	11,6	29	90	45	12,0	4
4138511	GTM115021	M16X1.5	11,9	32	90	45	12,0	4
4138499	GTM115009	M16X2	11,9	33	90	45	12,0	4
4138512	GTM115022	M18X1.5	13,9	37	90	45	14,0	4
4138500	GTM115010	M18X2.5	13,9	39	90	45	14,0	4
4138513	GTM115023	M20X1.5	13,9	41	90	45	14,0	4
4138501	GTM115011	M20X2.5	13,9	41	90	45	14,0	4



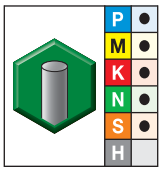




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

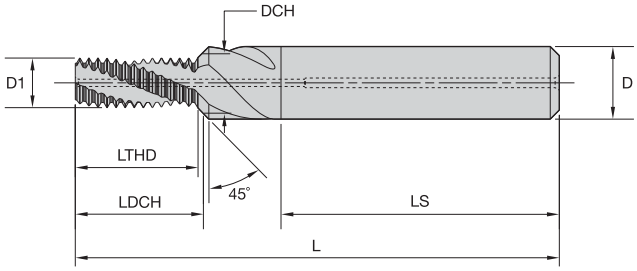
■ GTM21 • Through Coolant • Inch UNC and UNF



● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions								
order #	catalogue #	D1 TPI	D1	DCH	LTHD	LDCH	L	LS	D	cutting edges
4138537	GTM215024	#10-32	3,8	5,13	9,95	10,53	55	36	6,0	3
4138530	GTM215017	1/4-20	4,7	6,65	13,36	14,23	62	36	8,0	3
4138538	GTM215025	1/4-28	5,2	6,65	13,19	13,84	62	36	8,0	3
4138531	GTM215018	5/16-18	6,2	8,25	16,26	17,19	74	40	10,0	3
4138539	GTM215026	5/16-24	6,6	8,25	16,44	17,15	74	40	10,0	3
4138532	GTM215019	3/8-16	7,7	9,83	19,89	20,85	80	45	12,0	3
4138540	GTM215027	3/8-24	8,2	9,83	19,62	20,31	80	45	12,0	3
4138533	GTM215020	7/16-14	9,0	11,43	22,72	23,79	80	45	12,0	3
4138541	GTM215028	7/16-20	9,6	11,43	22,28	23,08	80	45	12,0	3
4138534	GTM215021	1/2-13	10,4	13,00	26,43	27,60	90	45	14,0	4
4138542	GTM215029	1/2-20	11,1	13,00	26,10	26,89	90	45	14,0	4
4138535	GTM215022	9/16-12	11,8	14,61	30,75	31,99	100	48	16,0	4
4138543	GTM215030	9/16-18	12,5	14,61	28,99	29,88	100	48	16,0	4
4138536	GTM215023	5/8-11	13,1	16,18	33,54	34,89	102	48	18,0	4
4138544	GTM215031	5/8-18	14,1	16,18	33,24	34,09	102	48	18,0	4





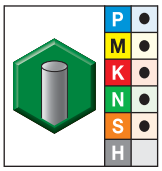


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

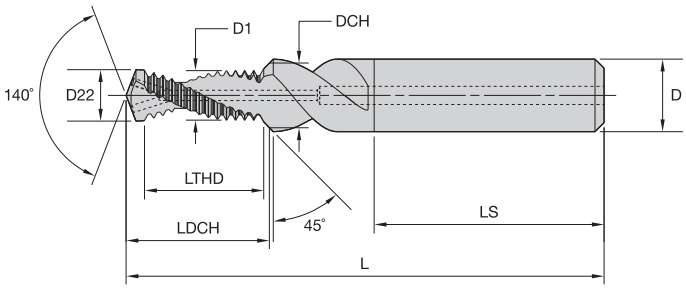
■ GTM21 • Through Coolant • Metric and Metric Fine



● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions								
order #	catalogue #	D1 size	D1	DCH	LTHD	LDCH	L	LS	D	cutting edges
4138514	GTM215001	M5X0.8	4,0	5,30	10,82	11,40	55	36	6,0	3
4138521	GTM215008	M6X0.75	5,0	6,30	12,40	12,97	62	36	8,0	3
4138515	GTM215002	M6X1	4,8	6,30	12,52	13,19	62	36	8,0	3
4138522	GTM215009	M8X1	6,7	8,30	16,53	17,23	74	40	10,0	3
4138516	GTM215003	M8X1.25	6,5	8,30	16,91	17,71	74	40	10,0	3
4138523	GTM215010	M10X1	8,7	10,30	20,55	21,23	80	45	12,0	3
4138524	GTM215011	M10X1.25	8,4	10,30	20,67	21,50	80	45	12,0	3
4138517	GTM215004	M10X1.5	8,2	10,30	20,29	21,22	80	45	12,0	3
4138525	GTM215012	M12X1	10,6	12,30	24,56	25,27	90	45	14,0	4
4138526	GTM215013	M12X1.25	10,4	12,30	24,43	25,24	90	45	14,0	4
4138527	GTM215014	M12X1.5	10,1	12,30	24,80	25,76	90	45	14,0	4
4138518	GTM215005	M12X1.75	9,9	12,30	25,42	26,48	90	45	14,0	4
4138528	GTM215015	M14X1.5	12,1	14,30	29,31	30,25	100	48	16,0	4
4138519	GTM215006	M14X2	11,6	14,30	29,05	30,24	100	48	16,0	4
4138529	GTM215016	M16X1.5	14,0	16,30	32,31	33,30	102	48	18,0	4
4138520	GTM215007	M16X2	13,6	16,30	33,05	34,24	102	48	18,0	4



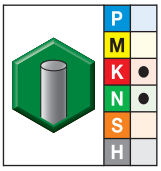




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

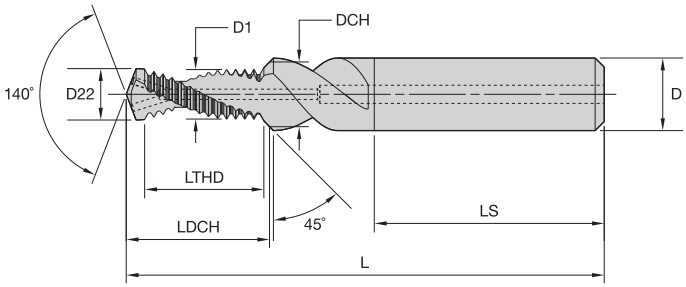
■ GTM31 • Through Coolant • Inch UNC and UNF



● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions									cutting edges
order #	catalogue #	D1 TPI	D1	D22	DCH	LTHD	LDCH	L	LS	D	
4138561	GTM315021	1/4-20	4,9	5,2	6,65	12,80	15,87	62	36	8,0	2
4138568	GTM315028	1/4-28	5,3	5,5	6,65	12,79	15,35	62	36	8,0	2
4138562	GTM315023	5/16-18	6,3	6,6	8,25	15,63	19,19	74	40	10,0	2
4138569	GTM315030	5/16-24	6,6	6,9	8,25	15,98	19,07	74	40	10,0	2
4138563	GTM315017w	3/8-16	7,7	8,0	9,83	19,16	23,25	79	45	12,0	2
4138570	GTM315024	3/8-24	8,2	8,5	9,83	19,16	22,54	79	45	12,0	2
4138564	GTM315018	7/16-14	9,0	9,4	11,43	21,89	26,58	79	45	12,0	2
4138571	GTM315025	7/16-20	9,6	9,9	11,43	21,72	25,69	79	45	12,0	2
4138565	GTM315019	1/2-13	10,4	10,8	13,00	25,52	30,71	89	45	14,0	2
4138572	GTM315026	1/2-20	11,1	11,5	13,00	25,55	29,82	89	45	14,0	2
4138566	GTM315020	9/16-12	11,8	12,3	14,61	27,66	33,37	102	48	16,0	2
4138573	GTM315027	9/16-18	12,5	12,9	14,61	28,37	33,15	102	48	16,0	2
4138567	GTM315022	5/8-11	13,1	13,5	16,18	30,14	36,40	102	48	18,0	2
4138574	GTM315029	5/8-18	14,1	14,5	16,18	31,21	36,25	102	48	18,0	2



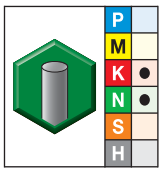




Shank Tolerance	
D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

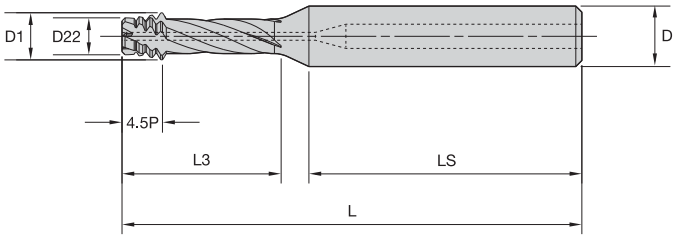
GTM31 • Through Coolant • Metric and Metric Fine



● first choice
○ alternate choice

grade WU12PV TiCN		metric dimensions									cutting edges
order #	catalogue #	D1 size	D1	D22	DCH	LTHD	LDCH	L	LS	D	
4138545	GTM315001	M4X0.7	3,2	3,3	4,30	7,74	9,59	49	36	6,0	2
4138546	GTM315002	M5X0.8	4,0	4,2	5,30	9,65	11,82	55	36	6,0	2
4138553	GTM315009	M6X0.75	5,1	5,3	6,30	12,07	14,37	62	36	8,0	2
4138547	GTM315003	M6X1	4,8	5,0	6,30	12,06	14,69	62	36	8,0	2
4138554	GTM315010	M8X1	6,8	7,0	8,30	16,09	19,10	74	40	10,0	2
4138548	GTM315004	M8X1.25	6,5	6,8	8,30	15,08	18,42	74	40	10,0	2
4138555	GTM315011	M10X1	8,7	9,0	10,30	20,11	23,52	79	45	12,0	2
4138556	GTM315012	M10X1.25	8,4	8,8	10,30	20,11	23,87	79	45	12,0	2
4138549	GTM315005	M10X1.5	8,2	8,5	10,30	19,59	23,65	79	45	12,0	2
4138557	GTM315013	M12X1.25	10,4	10,8	12,30	23,88	28,00	89	45	14,0	2
4138558	GTM315014	M12X1.5	10,2	10,5	12,30	24,12	28,57	89	45	14,0	2
4138550	GTM315006	M12X1.75	9,9	10,3	12,30	22,86	27,63	89	45	14,0	2
4138559	GTM315015	M14X1.5	12,1	12,5	14,30	27,14	31,98	102	48	16,0	2
4138551	GTM315007	M14X2	11,6	12,0	14,30	28,12	33,62	102	48	16,0	2
4138560	GTM315016	M16X1.5	14,1	14,5	16,30	31,65	36,87	102	48	18,0	2
4138552	GTM315008	M16X2	13,6	14,0	16,30	32,13	38,00	102	48	18,0	2



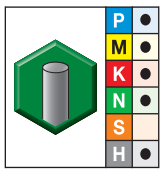




Shank Tolerance	
D mm	**tolerance h6**
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

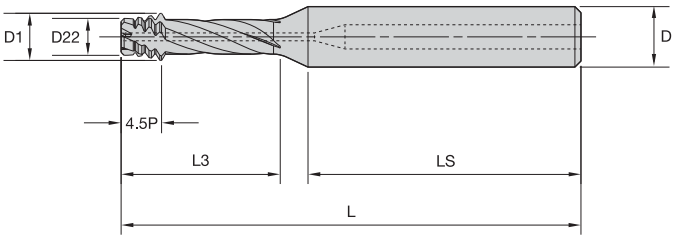
■ GTM41 • Through Coolant • Right Hand • Inch UNC and UNF



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS_2		metric dimensions							
order #	**catalogue #**	**D1 TPI**	**D1**	**D22**	**L3**	**L**	**LS**	**D**	**cutting edges**
4138610	**GTM415025**	1/4-20	4,64	3,34	17,00	60	36	8,0	3
4138617	**GTM415033**	1/4-28	4,66	3,62	17,00	60	36	8,0	3
4138611	**GTM415026**	5/16-18	5,64	4,12	21,90	76	40	10,0	4
4138618	**GTM415034**	5/16-24	5,64	4,48	21,90	76	40	10,0	4
4138612	**GTM415027**	3/8-16	7,16	5,42	26,30	76	40	10,0	4
4138619	**GTM415035**	3/8-24	7,14	6,00	26,30	76	40	10,0	4
4138613	**GTM415028**	7/16/14	8,47	6,49	31,00	86	45	12,0	4
4138620	**GTM415036**	7/16-20	8,45	7,06	33,00	86	45	12,0	4
4138606	**GTM415029**	1/2-13	10,08	7,95	33,40	86	45	12,0	4
4138615	**GTM415037**	1/2-20	8,45	7,06	33,00	86	45	12,0	4
4138614	**GTM415030**	9/16-12	11,28	8,98	41,00	98	48	16,0	4
4138621	**GTM415038**	9/16-18	11,27	9,72	41,00	98	48	16,0	4
4138607	**GTM415031**	5/8-11	12,89	10,40	42,00	98	48	16,0	4
4138616	**GTM415039**	5/8-18	12,38	10,83	42,00	98	48	16,0	4
4138608	**GTM415032**	3/4-10	15,50	12,77	51,30	111	50	20,0	5
4138609	**GTM415040**	3/4-16	15,38	13,65	51,30	111	50	20,0	5





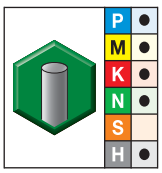


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

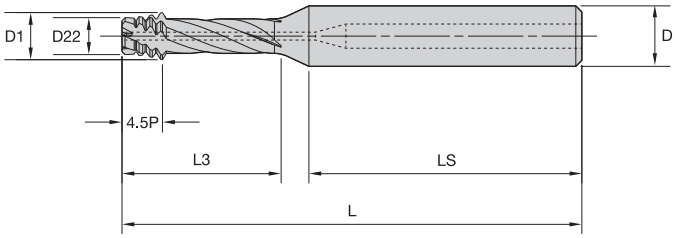
■ GTM41 • Through Coolant • Right Hand • Metric and Metric Fine



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS_2		metric dimensions							
order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	cutting edges
4138576	GTM415001	M6X1	4,51	3,41	16,5	60	36	8,0	3
4138578	GTM415002	M7X1	4,51	3,41	16,5	60	36	8,0	3
4138592	GTM415014	M8X1	6,23	5,13	21,9	71	40	10,0	4
4138580	GTM415003	M8X1.25	6,23	4,91	21,9	71	40	10,0	4
4138593	GTM415015	M9X1	6,23	5,13	21,9	71	40	10,0	4
4138582	GTM415004	M9X1.25	6,23	4,91	21,9	71	40	10,0	4
4138594	GTM415016	M10X1	6,23	5,13	21,9	71	40	10,0	4
4138595	GTM415013	M10X1.25	6,23	4,91	21,9	71	40	10,0	4
4138584	GTM415005	M10X1.5	7,75	6,11	26,3	76	40	10,0	4
4138586	GTM415006	M11X1.5	7,75	6,11	26,3	76	40	10,0	4
4138596	GTM415017	M12X1	9,15	8,06	30,0	86	45	12,0	4
4138598	GTM415007	M12X1.5	7,75	6,11	26,3	76	40	10,0	4
4138587	GTM415008	M12X1.75	9,16	7,21	32,4	86	45	12,0	4
4138599	GTM415018	M14X1	9,15	8,06	30,0	86	45	12,0	4
4138600	GTM415019	M14X1.5	10,83	9,15	37,4	98	48	16,0	4
4138588	GTM415009	M14X2	11,08	8,91	41,0	98	48	16,0	4
4138601	GTM415020	M16X1.5	10,83	9,15	37,4	98	48	16,0	4
4138589	GTM415010	M16X2	11,08	8,91	41,0	98	48	16,0	4
4138602	GTM415021	M18X1.5	14,83	13,15	47,0	98	48	16,0	4
4138590	GTM415011	M18X2.5	14,38	11,71	51,3	111	50	20,0	5
4138603	GTM415022	M20X1.5	14,83	13,15	47,0	98	48	16,0	4
4138591	GTM415012	M20X2.5	14,38	11,71	51,3	111	50	20,0	5
4138604	GTM415023	M22X1.5	18,23	16,55	56,0	111	50	20,0	5
4138605	GTM415024	M24X1.5	18,23	16,55	56,0	111	50	20,0	5





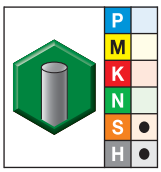


Shank Tolerance

D mm	tolerance h6
6	+0, -0,008
8–10	+0, -0,009
12–18	+0, -0,011
20–30	+0, -0,013

WIDIA VICTORY

■ GTM41 • Through Coolant • Left Hand • Metric and Metric Fine



● first choice
○ alternate choice

grade WU16PV TiAlN+MoS_2		metric dimensions							
order #	catalogue #	D1 size	D1	D22	L3	L	LS	D	cutting edges
4138575	**GTM415041**	M6X1	4,51	3,41	16,5	60	36	8,0	3
4138577	**GTM415042**	M7X1	4,51	3,41	16,5	60	36	8,0	3
4138579	**GTM415043**	M8X1.25	6,23	4,91	21,9	71	40	10,0	4
4138581	**GTM415044**	M9X1.25	6,23	4,91	21,9	71	40	10,0	4
4138583	**GTM415045**	M10X1.5	7,75	6,11	26,3	76	40	10,0	4
4138585	**GTM415046**	M11X1.5	7,75	6,11	26,3	76	40	10,0	4
4138597	**GTM415047**	M12X1.5	9,17	7,21	32,4	86	45	12,0	4

GTM11 and GTM21 • Metric



Thread Mill GTM11



Thread Mill • Chamfer GTM21

Material Group		Cutting Speed — vc Range — m/min			Feed/Tooth by Diameter			Cutting Speed — vc Range — m/min			Feed/Tooth by Diameter		
		min	Starting Value	max		<10mm	>10mm	min	Starting Value	max		<10mm	>10mm
P	1	90	**115**	150	mm	**0,05**	0,08	140	**185**	240	mm	**0,06**	0,10
	2	90	**115**	150	mm	**0,05**	0,08	140	**185**	240	mm	**0,06**	0,10
	3	40	**50**	70	mm	**0,02**	0,03	70	**90**	120	mm	**0,03**	0,04
	4	–	**–**	–	–	**–**	–	70	**90**	120	mm	**0,03**	0,04
	5	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	6	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
M	1	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	2	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	3	–	**–**	–	–	**–**	–	–	**–**	–	–	**–**	–
K	1	120	**150**	200	mm	**0,06**	0,10	130	**170**	220	mm	**0,06**	0,11
	2	120	**150**	200	mm	**0,06**	0,10	130	**170**	220	mm	**0,06**	0,11
	3	90	**115**	150	mm	**0,05**	0,07	110	**140**	180	mm	**0,05**	0,07
N	1	200	**225**	250	mm	**0,05**	0,06	270	**300**	330	mm	**0,08**	0,16
	2	170	**190**	210	mm	**0,04**	0,05	160	**175**	190	mm	**0,08**	0,16
	3	250	**275**	300	mm	**0,07**	0,09	270	**300**	330	mm	**0,08**	0,16
	4	250	**275**	300	mm	**0,07**	0,09	270	**300**	330	mm	**0,08**	0,16
	5	270	**300**	330	mm	**0,12**	0,13	250	**275**	300	mm	**0,11**	0,20
	6	170	**190**	210	mm	**0,05**	0,06	90	**100**	110	mm	**0,11**	0,20
S	1	60	**80**	100	mm	**0,04**	0,06	70	**90**	120	mm	**0,05**	0,08
	2	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05
	3	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05
	4	50	**65**	80	mm	**0,03**	0,04	50	**60**	80	mm	**0,03**	0,05

GTM31 • Metric



Drill • Chamfer • Thread Mill GTM31

Material Group		Cutting Speed — vc Range — m/min			Drilling				Milling			
					Recommended Feed by Diameter				Feed/Tooth by Diameter			
		min	Starting Value	max		<6mm	6–10mm	10–16mm		<6mm	6–10mm	10–16mm
K	1	130	**175**	230	mm/r	**0,10**	**0,16**	0,30	mm	**0,05**	**0,07**	0,10
N	1	270	**300**	330	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	2	140	**150**	170	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	4	270	**300**	330	mm/r	**0,15**	**0,25**	0,34	mm	**0,06**	**0,08**	0,12
	5	110	**120**	130	mm/r	**0,12**	**0,20**	0,32	mm	**0,06**	**0,08**	0,12

NOTE: For thread depths over 2 x D up to 3 x D, reduce speed and feed by 25%.

■ Universal Thread Mills • GTM41 • Metric



Mill • Chamfer • Thread Mill GTM41

Material Group		TM Style	Grade	Cutting Speed — vc Range — m/min min	Starting Value	max	Feed/Tooth by Diameter	< 10mm	>10mm
P	1	GTM41 R	WU16PV	170	**225**	290	mm	**0,05**	0,08
	2	GTM41 R	WU16PV	170	**225**	290	mm	**0,05**	0,08
	3	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,05
	4	GTM41 R	WU16PV	100	**125**	160	mm	**0,03**	0,05
	5	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	6	GTM41 R	WU16PV	60	**80**	100	mm	**0,03**	0,04
M	1	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	2	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
	3	GTM41 R	WU16PV	120	**150**	200	mm	**0,03**	0,04
K	1	GTM41 R	WU16PV	190	**250**	330	mm	**0,06**	0,10
	2	GTM41 R	WU16PV	190	**250**	330	mm	**0,06**	0,10
	3	GTM41 R	WU16PV	140	**185**	240	mm	**0,04**	0,07
N	1	–	–	–	**–**	–	–	**–**	–
	2	GTM41 R	WU16PV	180	**230**	300	mm	**0,06**	0,07
	3	–	–	–	**–**	–	–	**–**	–
	4	GTM41 R	WU16PV	210	**275**	360	mm	**0,06**	0,07
	5	–	–	–	**–**	–	–	**–**	–
	6	GTM41 R	WU16PV	210	**275**	360	mm	**0,06**	0,07
S	1	GTM41 L	WU16PV	120	**150**	200	mm	**0,025**	0,045
	2	GTM41 L	WU16PV	50	**60**	80	mm	**0,015**	0,025
	3	GTM41 L	WU16PV	50	**60**	80	mm	**0,015**	0,025
	4	GTM41 L	WU16PV	70	**90**	120	mm	**0,025**	0,035
H	1	GTM41	WU16PV	80	**100**	130	mm	**0,030**	0,050
	2	GTM41	WU16PV	80	**100**	130	mm	**0,030**	0,050
	3	GTM41	WU16PV	50	**65**	80	mm	**0,020**	0,030
	4	GTM41	WU16PV	50	**65**	80	mm	**0,020**	0,030

NOTE: For thread depths over 2 x D up to 3 x D, reduce speed and feed by 25%.

Thread Milling Methods

Climb Milling

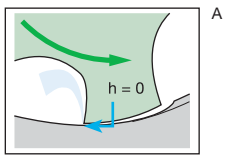
Properties:

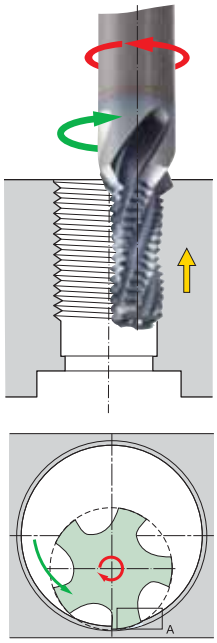
- Tool rotation direction clockwise
- Tool moves anti-clockwise
- Pitch upwards

↓

- Right-hand thread

Climb milling is always when the cutting edge goes out of the material with a chip thickness h = 0





Conventional Milling

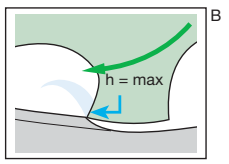
Properties:

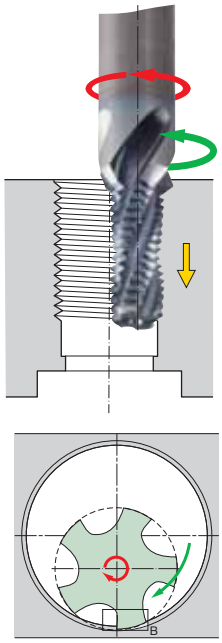
- Tool rotation direction clockwise
- Tool moves clockwise
- Pitch downwards

↓

- Right-hand thread

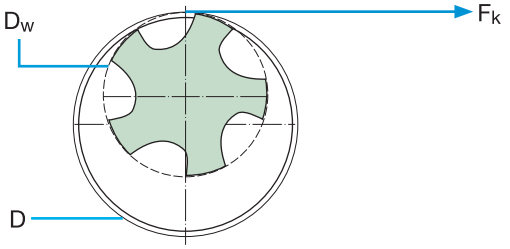
Conventional milling is always when the cutting edge goes out of the material with a chip thickness h = max





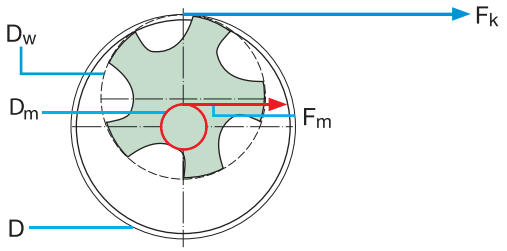
Counter Feed F_k

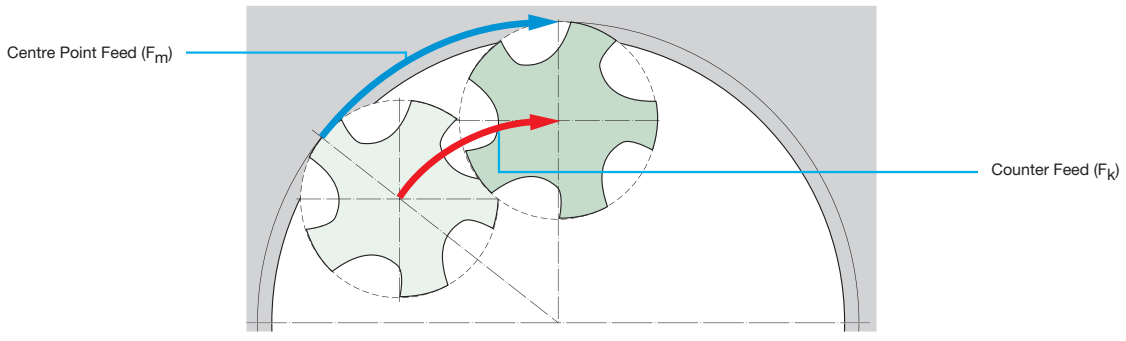
$$F_k = n \bullet f_z \bullet Z \text{ [mm/min]}$$



Centre Point Feed F_m

$$F_m = \frac{F_k \bullet (D\text{-}Dw)}{D} \text{ [mm/min]}$$



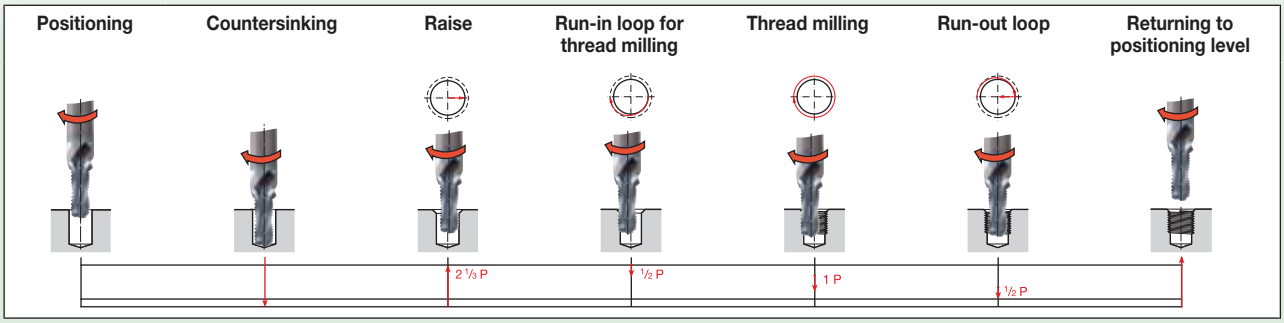


D_w = Tool diameter [mm]
n = RPM [min^{-1}]
f_z = Feed per tooth [mm]
Z = Number of teeth on tool (radial)
D = Nominal diameter of thread = Diameter of external contour [mm]
D_m = Diameter of the centre point ($D\text{-}D_w$) [mm]

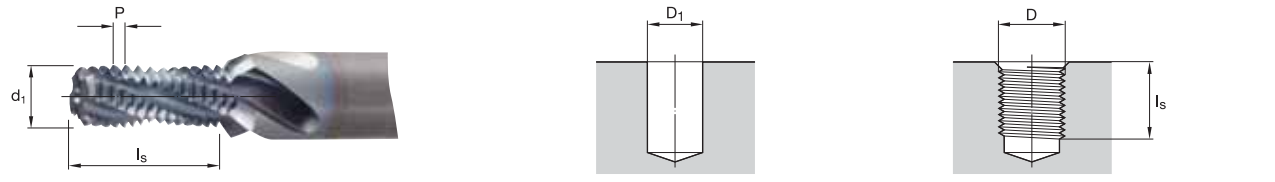
Thread Mill GTM21

Preparation	Drilling of thread hole
Process Principle	Countersinking, thread milling (conventional milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 ..... 8,5mm
Material — Cast aluminium
Grade — WU12PV

Tool — GTM21
Catalogue number GTM215004
Number of teeth Z 3
Tool diameter d_1 ..... 8,2mm*
Tool radius compensation k[1] 0,1mm**
Tool radius to be programmed[2] 4mm***
Countersink depth l_S 21,2mm
Cutting speed v_c ..... 250 m/min
Feed (countersinking) f_S ..... 0,3 mm/U
Feed (milling) f_Z ..... 0,09 mm/tooth

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ $S = 9709$

$v_S = f_S \bullet n$ $F = 2913$ (countersinking)

$v_f = f_Z \bullet Z \bullet n$ $F = 2622$ (contour)

$v_f = \frac{v_f \text{ contour} \bullet (D-d_1)}{D}$ $F = 472$ (centre point)

Program to DIN 66025 (conventional milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 2	S 9709	T01 [2]	M03
Advancing tool to full thread depth	N 20	G 91	Z-21.200							
Countersinking	N 30	G 01	Z-2	F 2913	(countersink)					
Raise	N 40	G 00	Z 3.450							
Moving sideways to the starting point	N 50	G 42	G01	X 4.250	F 1311	(milling, 1/2 contour)		[F 236] [3]	(milling,1/2 centre point)	
Run-in loop in arc	N 60	G 02	X-9.25	Y 0.000	Z-0.750	I-4.625	J 0			
Thread milling	N 70	G 02	X 0	Y 0	Z-1.500	I 5	J 0.000	F2622	[F 472] [3]	(centre point)
Run-out loop in arc	N 80	G 02	X 9.25	Y 0.000	Z-0.750	I 4.625	J 0			
Exit	N 90	G 40	G 01	X-4.25						
Retracting tool to positioning level	N 100	G 90	G 00	Z 2						

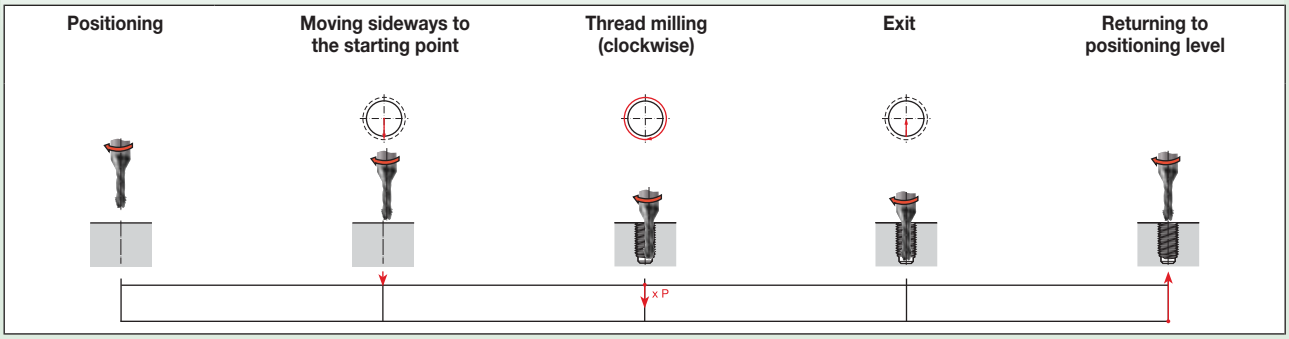
Cutting time t_h	1.4 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.

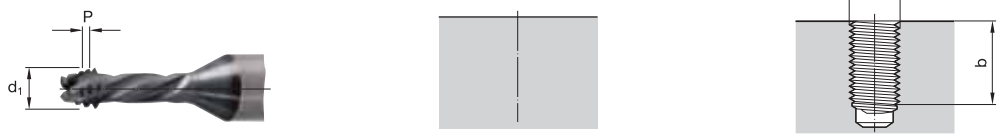
Drill Thread Mill GTM41 • Right Hand

Preparation	None
Process Principle	Milling thread and core hole, countersinking (conventional milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 ..... 8,5mm

Material — Hard steel, 50 HRC
Grade — WU16PV

Tool — GTM41 Right Hand
Catalogue number GTM415005
Number of teeth Z 4
Tool diameter d_1 ..... 7,75mm*
Tool radius compensation k[1] 0,08mm**
Tool radius to be programmed[2] 3,795mm***
Thread depth b 20mm
Cutting speed v_c ..... 100 m/min
Feed (milling) f_z ..... 0,04 mm/tooth
Number of turns[5] 17

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 4109

$v_f = f_z \bullet Z \bullet n$ F = 657 (contour)

$N = \frac{v_f \text{ contour} \bullet (D-d_1)}{D}$ F = 148 (centre point)

*(measured on the cutting part) **(0.01 x D; adjust to application) ***(1/2 d_1 - k)

Program to DIN 66025 (conventional milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 1.500	S 4109	T01 [2]	M03 [6]
Incremental programming	N 20	G 91								
Moving sideways to the starting point	N 30	G 42	G 01	X 0	Y-5	F 657	(contour)	[F 148] [4]	(centre point)	
Thread milling	N 40	G 02		X 0	Y 0	Z-1.500	I 0	J 5.000		
Repeat thread milling	... [5]									
Exit	N 50	G 40	G 01	X 0	Y 5					
Retracting tool to positioning level	N 70	G 90	G 00	Z 2						

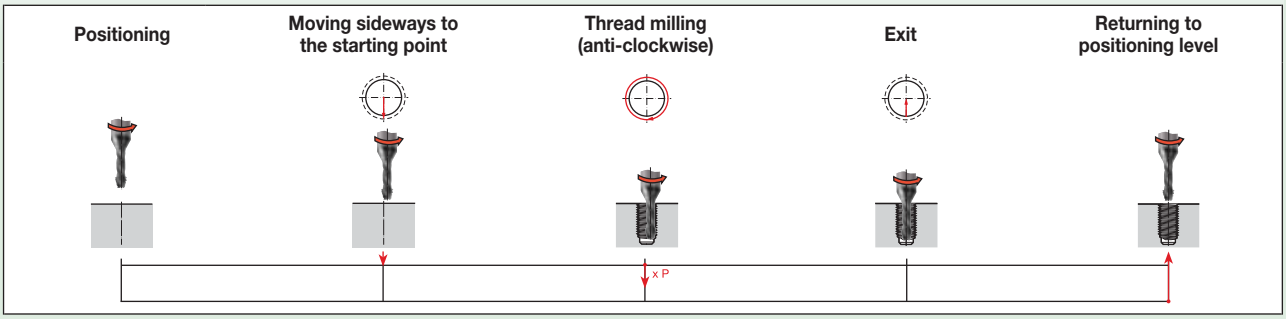
Cutting time t_h	51.6 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The thread depth b must be divisible by the thread pitch P.
[4] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.
[5] Set N40 must be repeated with the number of threads. Repetitions N = thread depth b/pitch P (rounded up to the nearest integer).

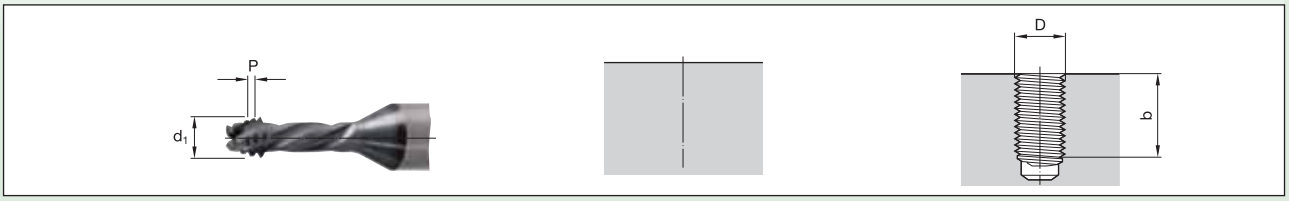
Drill Thread Mill GTM41 • Left Hand

Preparation	None
Process Principle	Milling thread and core hole, countersinking (climb milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 ..... 8,5mm
Material — TiAl6V4 titanium
Grade — WU16PV

Tool — GTM41 Left Hand
Catalogue number GTM415005
Number of teeth Z 4
Tool diameter d_1 ..... 7,75mm*
Tool radius compensation k[1] 0,08mm**
Tool radius to be programmed[2] 3,795mm***
Thread depth b 20mm
Cutting speed v_c ..... 100 m/min
Feed (milling) f_z ..... 0,03 mm/tooth
Number of turns[5] 17

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 4109

$v_f = f_z \bullet Z \bullet n$ F = 493 (contour)

$N = \frac{v_f \text{ contour} \bullet (D-d_1)}{D}$ F = 111 (centre point)

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

Program to DIN 66025 (climb milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 1.500	S 4109	T01 [2]	M04
Incremental programming	N 20	G 91								
Moving sideways to the starting point	N 30	G 42	G 01	X 0	Y-5	F 493	(contour)	[F 111] [4]	(centre point)	
Thread milling	N 40	G 02		X 0	Y 0	Z-1.500	I 0	J 5.000		
Repeat thread milling	... [5]									
Exit	N 50	G 40	G 01	X 0	Y 5					
Retracting tool to positioning level	N 70	G 90	G 00	Z 2						

Cutting time t_h

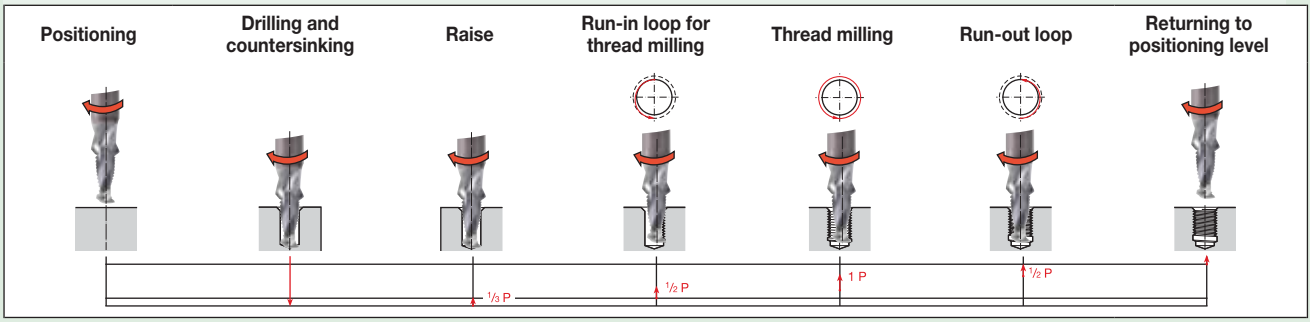
68.8 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The thread depth b must be divisible by the thread pitch P.
[4] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.
[5] Set N40 must be repeated with the number of threads. Repetitions N = thread depth b/pitch P (rounded up to the nearest integer).

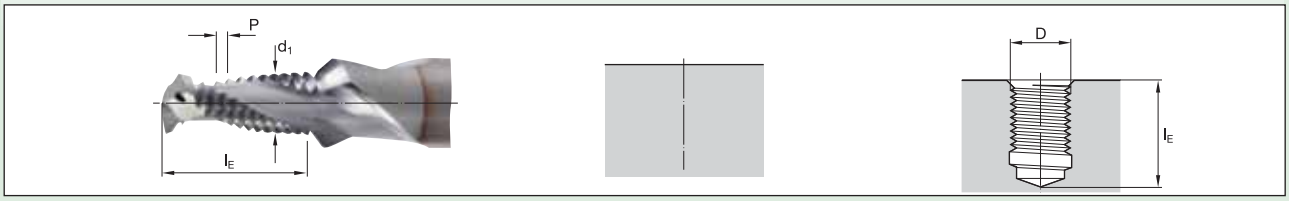
Drill Thread Mill GTM31

Preparation	Drilling of thread hole
Process Principle	Drilling, countersinking, thread milling (climb milling)

Cycle



Required Specification Values



Example

Size — M10-6H
Thread diameter D 10mm
Pitch 1,5mm
Core hole diameter D_1 ..... 8,5mm

Material — Grey cast iron
Grade — WU12PV

Tool — GTM31
Catalogue number GTM315005
Number of teeth Z 2
Tool diameter d_1 ..... 8,2mm*
Tool radius compensation k[1] 0,1mm**
Tool radius to be programmed[2] 4mm***
Countersink depth l_S 19,11mm
Cutting speed v_c ..... 250 m/min
Feed (countersinking) f_s ..... 0,25 mm/U
Feed (milling) f_z ..... 0,1 mm/tooth

*(measured on the cutting part) **(0.01 x D) ***(1/2 d_1 - k)

$N = \frac{V_c \bullet 1000}{d_1 \bullet \pi}$ S = 9709

$v_s = f_b \bullet n$ F = 2427 (drilling, countersinking)

$v_f = f_z \bullet Z \bullet n$ F = 1942 (contour)

$v_f = \frac{v_f \text{ contour} \bullet (D-d_1)}{D}$ F = 350 (centre point)

Program to DIN 66025 (climb milling, on the contour, incremental)

Positioning the tool	N 10	G 54	G 90	G 00	X...	Y...	Z 2	S 9709	T01 [2]	M03
Drilling and countersinking	N 20	G 91	G 01	Z-21.110	F 2427	(drill, countersink)				
Raise	N 30	G 01	Z 0.500							
Moving sideways to the starting point	N 40	G 41	Y-4.250	F 971	(milling, 1/2 contour)			[F 175] [3]	(1/2 centre point)	
Run-in loop in arc	N 50	G 03	X 0	Y 9.250	Z 0.750	I 0	J 4.625			
Thread milling	N 60	G 03	X 0	Y 0	Z 1.500	I 0	J -5.000			
Run-out loop in arc	N 70	G 03	X 0	Y-9.250	Z 0.750	I 0	J- 4.625	F1942	[F 350] [3]	(centre point)
Exit	N 80	G 00	G 40	X 0	Y 4.250					
Retracting tool to positioning level	N 90	G 90	Z 2							

Cutting time t_h	2.3 seconds

NOTES:
[1] The cutter radius measured over the tooth crests of the threaded part must be reduced by the amount of the cutter radius compensation. This is necessary to achieve a depth of cut to the middle of the 6H/ISO2 nut tolerance. Please note, however, that this also depends on the radial deflection of the tool (tensile strength of the material, projecting length of the tool).
[2] The cutter radius to be programmed is normally included in the tool memory.
[3] The feed values in brackets must be used for controllers, which do not calculate the centre point feed themselves.

■ Carbide Taps • Metric

Material Group		Through Holes					Blind Holes				
				Range — m/min					Range — m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P0	GX32, GX38	GP4535	60	**100**	130	GX33, GX39	GP4535	50	**70**	90
	P1	GX32, GX38	GP4535	60	**90**	120	GX33, GX39	GP4535	40	**60**	80
	P2	GX32, GX38	GP4535	50	**85**	110	GX33, GX39	GP4535	40	**60**	80
	P3	GX32, GX38	GP4535	50	**80**	100	GX33, GX39	GP4535	40	**60**	80
K	K1	GX34, GX50	WK12PG	70	**105**	140	GX35, GX50	WK12PG	50	**70**	90
	K2	GX34, GX50	WK12PG	60	**100**	130	GX35, GX50	WK12PG	50	**70**	90
	K3	GX34, GX50	WK12PG	60	**90**	120	GX35, GX50	WK12PG	40	**60**	80
N	N2	GX46, GX48	WN14PG	80	**120**	160	GX47, GX49	WN14PG	60	**80**	100
	N3	GX46, GX48	WN14PG	60	**100**	130	GX47, GX49	WN14PG	50	**70**	90
	N4	GX46, GX48	WN14PG	60	**90**	120	GX47, GX49	WN14PG	40	**60**	80
H	H3	GX10	WH16PG	1,2	**1,5**	2,0	GX10	WH16PG	0,8	**1,1**	1,4
	H4	GX10	WH16PG	0,6	**0,8**	1,0	GX10	WH16PG	0,4	**0,5**	0,7

HSS-E-PM Taps • Metric

Material Group		Through Holes					Blind Holes				
				Range — m/min					Range — m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P1	GT20	GP6520	20	**30**	45	GT30, GT32, GT50	GP6520	14	**21**	32
		GT24	WU32MG	20	**30**	45	GT24, GT26	WU32MG	14	**21**	32
	P2	GT20	GP6520	17	**25**	38	GT30, GT32, GT50	GP6520	12	**18**	26
		GT24	WU32MG	17	**25**	38	GT24, GT26	WU32MG	12	**18**	26
	P3	GT20	GP6520	12	**15**	20	GT30, GT32, GT50	GP6520	8	**11**	14
	P4	GT00	WP31MG	5	**6**	8	GT02, GT04	WP31MG	3	**4**	5
	P5	GT20	GP6520	12	**15**	20	GT30, GT32, GT50	GP6520	8	**11**	14
	P6	GT00	WP31MG	6	**8**	10	GT02, GT04	WP31MG	4	**6**	7
M	M1	GT20	GM6515	12	**15**	20	GT30, GT32, GT50	GM6515	8	**11**	14
		GT24	WU32MG	5	**8**	12	GT24, GT26	WU32MG	4	**6**	8
	M2	GT20	GM6515	9	**12**	16	GT30, GT32, GT50	GM6515	6	**8**	11
	M3	GT00	WP31MG	4	**5**	7	GT02, GT04	WP31MG	3	**4**	5
K	K1	GT40	GP6520	27	**35**	46	GT40, GT42	GP6520	19	**25**	32
	K2	GT40	GP6520	23	**30**	39	GT40, GT42	GP6520	16	**21**	27
N	N1	GT72	WN44EG	33	**50**	65	GT82, GT86	WN44EG	23	**35**	46
		GT22	WN48EG	37	**55**	72	GT22	WN48EG	26	**39**	50
	N2	GT40	GP6520	30	**45**	59	GT40, GT42	GP6520	21	**32**	41
		GT72	WN44EG	30	**45**	59	GT82, GT86	WN44EG	21	**32**	41
		GT22	WN38MG	33	**50**	65	GT22	WN38MG	23	**35**	46
	N4	GT40	GP6520	7	**10**	15	GT40, GT42	GP6520	5	**7**	11
S	S1	GT20	GP6520	8	**12**	18	GT30, GT32	GP6520	6	**8**	13
	S2, S3	GT90	WU32MG	3,3	**5,0**	7,5	GT92, GT94	WU32MG	2,3	**3,5**	5,3
		GT90	WS39MG	1,7	**2,5**	3,8	GT92, GT94	WS39MG	1,2	**1,8**	2,6
	S4	GT60	WS34MG	2,7	**4,0**	6,0	GT62	WS34MG	1,9	**2,8**	4,2
		GT60	WS30MG	1,3	**2,0**	3,0	GT62	WS30MG	0,9	**1,4**	2,1
H	H1	GT06	WN35MG	1,3	**2,0**	3,0	GT06	WN35MG	0,9	**1,4**	2,1
	H2	GT06	WN35MG	1,0	**1,5**	2,3	GT06	WN35MG	0,7	**1,1**	1,6

NOTE: Increase speed by up to 25% when using coolant taps (GT21, GT23, GT31, GT33 GT41, GT43, and GT51). Use grade GP6505™ in steels. Use 50% of the recommended speed listed for grade GP6520™.

■ VariTap • HSS-E • Metric

Material Group		Through Holes					Blind Holes				
				Range — m/min					Range — m/min		
		Tap Style	Grade	min	Starting Value	max	Tap Style	Grade	min	Starting Value	max
P	P1	VT-SPO	WP42EG, WU41EG	21	**27**	34	VT-SFT	WP42EG, WU41EG	13	**18**	26
		VT-SPO	WP49EG, WU40EG	10	**14**	17	VT-SFT	WP49EG, WU40EG	6	**9**	13
	P2	VT-SPO	WP42EG, WU41EG	16	**21**	27	VT-SFT	WP42EG, WU41EG	11	**15**	22
		VT-SPO	WP49EG, WU40EG	8	**11**	13	VT-SFT	WP49EG, WU40EG	4	**6**	9
	P3	VT-SPO	WP42EG, WU41EG	9	**12**	15	VT-SFT	WP42EG, WU41EG	6	**9**	13
		VT-SPO	WP49EG, WU40EG	5	**6**	8	VT-SFT	WP49EG, WU40EG	2	**3**	4
		VT-STR NPT	WU41EG	5	**6**	8	VT-STR NPT	WU41EG	5	**6**	8
		VT-STR NPT	WU40EG	2	**3**	4	VT-STR NPT	WU40EG	2	**3**	4
M	M1	VT-SPO	WP42EG, WU41EG	9	**12**	15	VT-SFT	WP42EG, WU41EG	6	**9**	13
		VT-SPO	WP49EG, WU40EG	5	**6**	8	VT-SFT	WP49EG, WU40EG	2	**3**	4
		VT-SFT NPT	WU41EG	5	**6**	8	VT-SFT NPT	WU41EG	5	**6**	8
		VT-SFT NPT	WP49EG, WU40EG	2	**3**	4	VT-SFT NPT	WP49EG, WU40EG	2	**3**	4
	M3	VT-SPO	WP42EG, WU41EG	7	**9**	11	VT-SFT	WP42EG, WU41EG	4	**6**	9
		VT-SPO	WP49EG, WU40EG	3	**5**	6	VT-SFT	WP49EG, WU40EG	2	**3**	4
K	K1	VT-STR NPT	WU41EG	10	**14**	17	VT-STR NPT	WU41EG	10	**14**	17
		VT-STR NPT	WU40EG	6	**8**	10	VT-STR NPT	WU40EG	6	**8**	10
	K2	VT-SPO	WP42EG, WU41EG	21	**27**	34	VT-SFT	WP42EG, WU41EG	13	**18**	26
		VT-SPO	WP49EG, WU40EG	10	**14**	17	VT-SFT	WP49EG, WU40EG	6	**9**	13
N	N1	VT-SPO	WP42EG, WU41EG	34	**46**	57	VT-SFT	WP42EG, WU41EG	23	**34**	48
		VT-SPO	WU40EG	17	**23**	29	VT-SFT	WU40EG	11	**15**	22
	N2	VT-SPO	WP42EG, WU41EG	30	**40**	50	VT-SFT	WP42EG, WU41EG	19	**27**	39
		VT-SPO	WU40EG	15	**20**	25	VT-SFT	WU40EG	11	**15**	22
	N4	VT-SPO	WP42EG, WU41EG	7	**9**	11	VT-SFT	WP42EG, WU41EG	4	**6**	9
		VT-SPO	WU40EG	3	**5**	6	VT-SFT	WU40EG	2	**3**	4

** Grades: WP42EG = TiCN*
WU41EG = TiN
WP49EG = oxide
WU40EG = bright

Reconditioning Services

Anyone can regrind our tools – but only we can recondition them

WIDIA™ Reconditioning Services optimise the value of metalcutting tools throughout their entire lifecycle by giving like-new performance — with rapid turnaround time — so tools are always on hand and perform just like new.

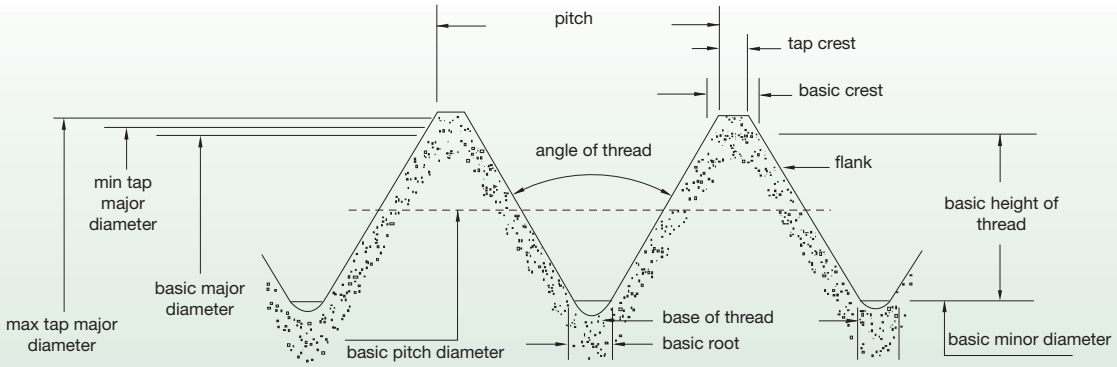
To use WIDIA tool reconditioning services, contact your authorised WIDIA distributor to get started.

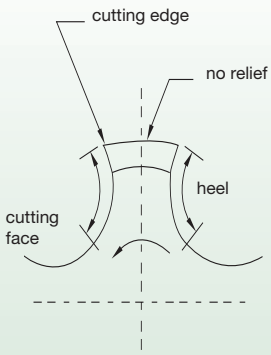
Global Reconditioning Network



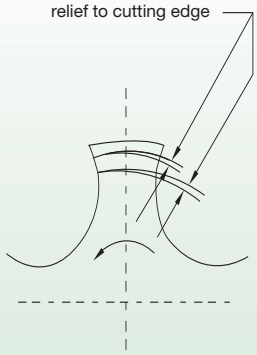
To locate a Reconditioning Center near you, visit **widia.com/services.**

WIDIA™

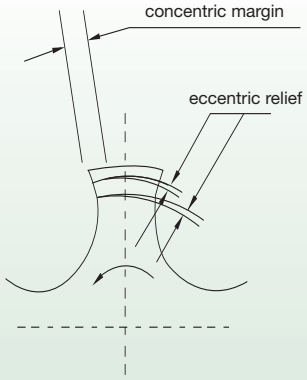




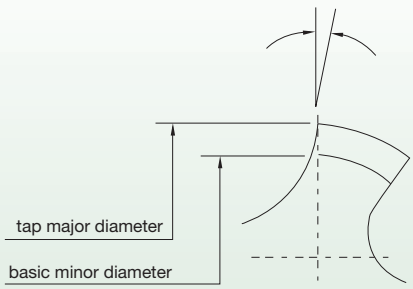
Concentric



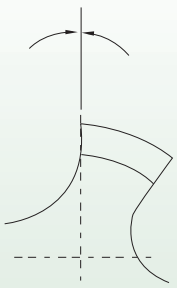
Eccentric Relief



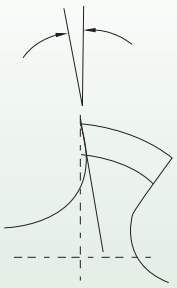
Con-Eccentric Relief



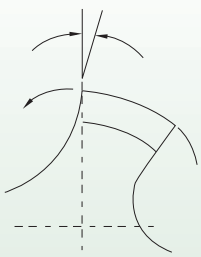
Negative Hook



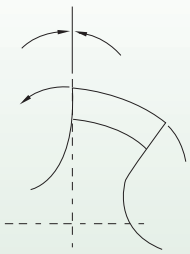
0° Hook



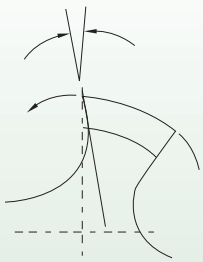
Positive Hook



Negative Rake



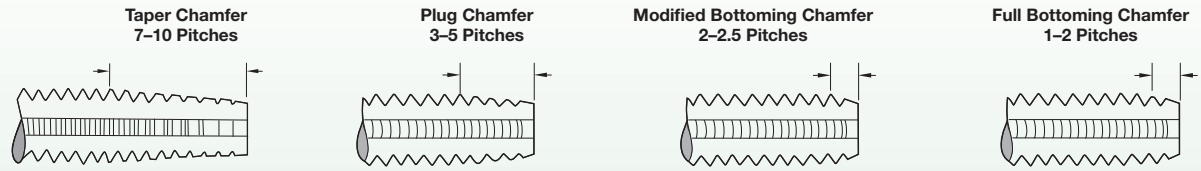
Radial Rake



Positive Rake

Reprinted with permission from United States Cutting Tool Institute (USCTI). Published by Kennametal Inc. © 2014. All rights reserved.

Tap Chamfers • ANSI Taps



Tap Chamfers

Taper (7–10 pitches)

The taper chamfer has the longest standard chamfer ensuring easier starting. It requires less tapping torque because of more working teeth.

Plug (3–5 pitches)

The most common chamfer for use by hand or machine in through or blind holes. This chamfer is more efficient than a bottoming or modified bottoming chamfer.

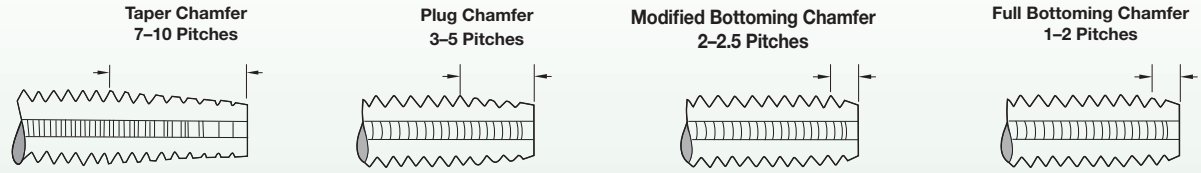
Semi-Bottom (2–2.5 pitches)

This short chamfer enables threading close to the bottom of blind holes. Due to the slightly longer chamfer and more working teeth, this chamfer is more efficient than a bottoming chamfer.

Bottoming (1–2 pitches)

For threading close to the bottom of blind holes, the bottoming chamfer is the least efficient chamfer available.

Tap Chamfers • DIN Taps



Hand Tap Chamfers

Form A (6–8 pitches)

The Form A chamfer has the longest standard chamfer ensuring easier starting. It requires less tapping torque because of more working teeth.

Form B/D (3.5–5 pitches)

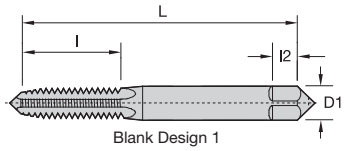
The most common chamfers for use by hand or machine in through or blind holes. Form B applies to spiral-point taps and Form D applies to straight-flute and spiral-flute taps. This chamfer is more efficient than Form E or Form C chamfer.

Form C (2–2.5 pitches)

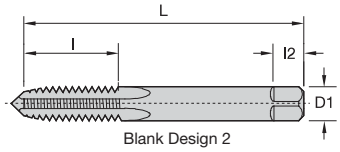
This short chamfer enables threading close to the bottom of blind holes. Due to the slightly longer chamfer and more working teeth, this chamfer is more efficient than a Form E chamfer.

Form E (1.5–2 pitches)

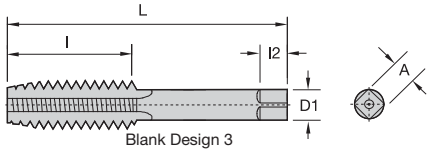
For threading close to the bottom of blind holes, the Form E chamfer is the least efficient chamfer available.



Blank Design 1



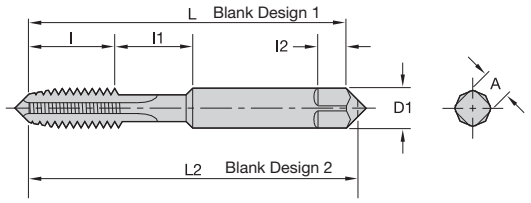
Blank Design 2

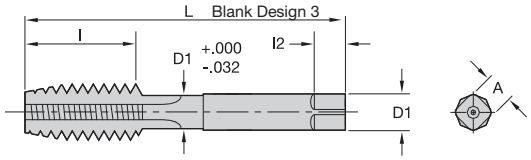


Blank Design 3

nominal diameter range (in)	machine screw size number	(in)	nominal fractional diameter	(in)	nominal metric diameter mm	(in)	blank design number	overall length L	thread length l	square length l2	shank diameter D1	square size A
.052–.065	0	(.0600)	–		M1.6	(.0630)	1	1.63	.31	.19	.1410	.110
.065–.078	1	(.0730)	–		M1.8	(.0709)	1	1.69	.38	.19	.1410	.110
.078–.091	2	(.0860)	–		M2 (0787),	M2.2 (.0866)	1	1.75	.44	.19	.1410	.110
.091–.104	3	(.0990)	–		M2.5	(.0984)	1	1.81	.50	.19	.1410	.110
.104–.117	4	(.1120)	–		–	–	1	1.88	.56	.19	.1410	.110
.117–.130	5	(.1250)	–		M3	(.1181)	1	1.94	.63	.19	.1410	.110
.130–.145	6	(.1380)	–		M3.5	(.1378)	1	2.00	.69	.19	.1410	.110
.145–.171	8	(.1640)	–		M4	(.1575)	1	2.13	.75	.25	.1680	.131
.171–.197	10	(.1900)	–		M4.5 (.1772),	M5 (.1969)	1	2.38	.88	.25	.1940	.152
.197–.223	12	(.2160)	–		–	–	1	2.38	.94	.28	.2200	.165
.223–.260	–		1/4	(.2500)	M6	(.2362)	2	2.50	1.00	.31	.2550	.191
.260–.323	–		5/16	(.3125)	M7 (.2756),	M8 (.3150)	2	2.72	1.13	.38	.3180	.238
.323–.395	–		3/8	(.3750)	M10	(.3937)	2	2.94	1.25	.44	.3810	.286
.395–.448	–		7/16	(.4375)	–	–	3	3.16	1.44	.41	.3230	.242
.448–.510	–		1/2	(.5000)	M12	(.4724)	3	3.38	1.66	.44	.3670	.275
.510–.573	–		9/16	(.5625)	M14	(.5512)	3	3.59	1.66	.50	.4290	.322
.573–.635	–		5/8	(.6250)	M16	(.6299)	3	3.81	1.81	.56	.4800	.360
.635–.709	–		11/16	(.6875)	M18	(.7087)	3	4.03	1.81	.63	.5420	.406
.709–.760	–		3/4	(.7500)	–	–	3	4.25	2.00	.69	.5900	.442
.760–.823	–		13/16	(.8125)	M20	(.7874)	3	4.47	2.00	.69	.6520	.489
.823–.885	–		7/8	(.8750)	M22	(.8661)	3	4.69	2.22	.75	.6970	.523
.885–.948	–		15/16	(.9375)	M24	(.9449)	3	4.91	2.22	.75	.7600	.570
.948–1.010	–		1	(1.0000)	M25	(.9843)	3	5.13	2.50	.81	.8000	.600
1.010–1.073	–		1-1/16	(1.0625)	M27	(1.0630)	3	5.13	2.50	.88	.8960	.672
1.073–1.135	–		1-1/8	(1.1250)	–	–	3	5.44	2.56	.88	.8960	.672
1.135–1.198	–		1-3/16	(1.1875)	M30	(1.1811)	3	5.44	2.56	1.00	1.0210	.766
1.198–1.260	–		1-1/4	(1.2500)	–	–	3	5.75	2.56	1.00	1.0210	.766
1.260–1.323	–		1-5/16	(1.3125)	M33	(1.2992)	3	5.75	2.56	1.06	1.1080	.831
1.323–1.385	–		1-3/8	(1.3750)	–	–	3	6.06	3.00	1.06	1.1080	.831
1.358–1.448	–		1-7/16	(1.4375)	M36	(1.4173)	3	6.06	3.00	1.13	1.2330	.925
1.448–1.510	–		1-1/2	(1.5000)	–	–	3	6.38	3.00	1.13	1.2330	.925
1.510–1.635	–		1-5/8	(1.6250)	M39	(1.5354)	3	6.69	3.19	1.13	1.3050	.979
1.635–1.760	–		1-3/4	(1.7500)	M42	(1.6535)	3	7.00	3.19	1.25	1.4300	1.072
1.760–1.885	–		1-7/8	(1.8750)	–	–	3	7.31	3.56	1.25	1.5190	1.139
1.885–2.010	–		2	(2.0000)	M48	(1.8898)	3	7.63	3.56	1.38	1.6440	1.233
2.010–2.135	–		2-1/8	(2.1250)	–	–	3	8.00	3.56	1.38	1.7690	1.327
2.135–2.260	–		2-1/4	(2.2500)	M56	(2.2047)	3	8.25	3.56	1.44	1.8940	1.420
2.260–2.385	–		2-3/8	(2.3750)	–	–	3	8.50	4.00	1.44	2.0190	1.514
2.385–2.510	–		2-1/2	(2.5000)	–	–	3	8.75	4.00	1.50	2.1000	1.575
2.510–2.635	–		2-5/8	(2.6250)	M64	(2.5197)	3	8.75	4.00	1.50	2.2250	1.669
2.635–2.760	–		2-3/4	(2.7500)	–	–	3	9.25	4.00	1.56	2.3500	1.762
2.760–2.885	–		2-7/8	(2.8750)	M72	(2.8346)	3	9.25	4.00	1.56	2.4750	1.856
2.885–3.010	–		3	(3.0000)	–	–	3	9.75	4.56	1.63	2.5430	1.907
3.010–3.135	–		3-1/8	(3.1250)	–	–	3	9.75	4.56	1.63	2.6680	2.001
3.135–3.260	–		3-1/4	(3.2500)	M80	(3.1496)	3	10.00	4.56	1.75	2.7930	2.095
3.260–3.385	–		3-3/8	(3.3750)	–	–	3	10.00	4.56	1.75	2.8830	2.162
3.385–3.510	–		3-1/2	(3.5000)	–	–	3	10.25	4.94	2.00	3.0080	2.256
3.510–3.635	–		3-5/8	(3.6250)	M90	(3.5433)	3	10.25	4.94	2.00	3.1330	2.350
3.635–3.760	–		3-3/4	(3.7500)	–	–	3	10.50	5.31	2.13	3.2170	2.413
3.760–3.885	–		3-7/8	(3.8750)	–	–	3	10.50	5.31	2.13	3.3420	2.506
3.885–4.010	–		4	(4.0000)	M100	(3.9370)	3	10.75	5.31	2.25	3.4670	2.600

Reprinted with permission from United States Cutting Tool Institute (USCTI). Published by Kennametal Inc. © 2014. All rights reserved.





General Dimensions

Tap Dimensions — Inches

nominal diameter range (in)		machine screw size number (in)		nominal fractional diameter (in)		nominal metric diameter mm (in)		blank design number	overall length L	thread length l	neck length l1	square length l2	shank diameter D1	square size A
.104	.117	4	(.1120)	—		—	—	1	1.88	.31	.25	.19	.1410	.110
.117	.130	5	(.1250)			M3	(.1181)	1	1.94	.31	.31	.19	.1410	.110
.130	.145	6	(.1380)	—		M3.5	(.1378)	1	2.00	.38	.31	.19	.1410	.110
.145	.171	8	(.1640)			M4	(.1575)	1	2.13	.38	.38	.25	.1680	.131
.171	.197	10	(.1900)	—		M4.5	(.1772)	1	2.38	.50	.38	.25	.1940	.152
						M5	(.1969)	—	—	—	—	—	—	—
.197	.223	12	(.2160)	—	—	—	—	1	2.38	.50	.44	.28	.2200	.165
.223	.260			1/4	(.2500)	M6	(.2362)	2	2.50	.63	.38	.31	.2550	.191
.260	.323	—		5/16	(.3125)	M7, M8	(.2756), (.3150)	2	2.72	.69	.44	.38	.3180	.238
.323	.395			3/8	(.3750)	M10	(.3937)	2	2.94	.75	.50	.44	.3810	.286
.395	.448	—		7/16	(.4375)	—	—	3	3.16	.88	–	.41	.3230	.242
.448	.510			1/2	(.5000)	M12	(.4724)	3	3.38	.94	–	.44	.3670	.275
.510	.573	—		9/16	(.5625)	M14	(.5541)	3	3.59	1.00	–	.50	.4290	.322
.573	.635			5/8	(.6250)	M16	(.6299)	3	3.81	1.09	–	.56	.4800	.360
.635	.709	—		11/16	(.6875)	M18	(.7087)	3	4.03	1.09	–	.63	.5420	.406
.709	.760			3/4	(.7500)	—	—	3	4.25	1.22	–	.69	.5900	.442
.760	.823	—		13/16	(.8125)	M20	(.7874)	3	4.47	1.22	–	.69	.6520	.489
.823	.885			7/8	(.8750)	M22	(.8661)	3	4.69	1.34	–	.75	.3670	.523
.885	.948	—		15/16	(.9375)	M24	(.9449)	3	4.91	1.34	–	.75	.7600	.570
.948	1.010			1	(1.0000)	M25	(.9843)	3	5.13	1.50	–	.81	.8000	.600

Reprinted with permission from United States Cutting Tool Institute (USCTI). Published by Kennametal Inc. © 2014. All rights reserved.

NOTE: Thread length l is based on a length of 12 pitches of the UNC thread series. Thread length "l" is a minimum value and has no tolerance. When thread length "l" is added to neck length "l1", the total shall be no less than the minimum USCTI Table 302 thread length "l". Unless otherwise specified, all tolerances are in accordance with USCTI Table 302. For eccentricity tolerances, see USCTI Table 317. Table 302 is provided for reference only. WIDIA-GTD™ tap dimensions may differ.

Tolerances

element	nominal diameter range (in)	direction	tolerance (in)
length overall — L	.0520–1.0100	plus or minus	.031
	1.0100–4.0100	plus or minus	.063
length of thread — l	.0520–.2230	plus or minus	.047
	.2230–.5100	plus or minus	.063
	.5100–1.5100	plus or minus	.094
	1.5100–4.0100	plus or minus	.125
length of square — l2	.0520–1.0100	plus or minus	.031
	1.0100–4.0100	plus or minus	.063
diameter of shank — d1	.0520–.2230	minus	.0015
	.2230–.6350	minus	.0015
	.6350–1.0100	minus	.0020
	1.0100–1.5100	minus	.0020
	1.5100–2.0100	minus	.0030
	2.0100–4.0100	minus	.0030
size of square — a	.0520–.5100	minus	.004
	.5100–1.0100	minus	.006
	1.0100–2.0100	minus	.008
	2.0100–4.0100	minus	.010

Reprinted with permission from United States Cutting Tool Institute (USCTI). Published by Kennametal Inc. © 2014. All rights reserved.

Special Taps

Unless otherwise specified:

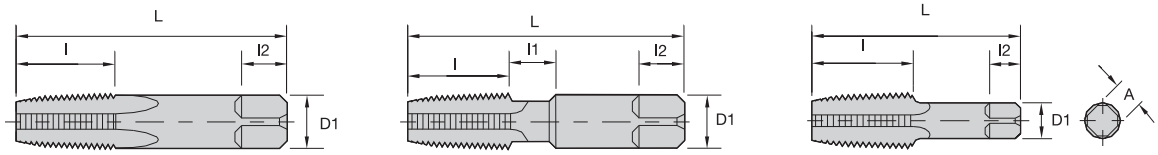
Special taps over 1.010–1.510" diameter inclusive, having 14 or more threads per inch or 1,75mm pitch and finer, and sizes over 1.510" diameter with 10 or more threads per inch or 2,5mm pitch and finer, are made to general dimensions shown in USCTI Table 303.

Special tap thread limits are determined using the formulas shown in USCTI Table 331 for Unified Inch Screw Threads and USCTI Table 341 for metric m-profile screw threads.

NOTE:
Tap sizes .395" and smaller have an external centre on the thread end (may be removed on bottoming taps). Sizes .125" and smaller have an external centre on the shank end. Sizes .224–.395" have truncated partial cone centres on the shank end (length of cone approximately 1/4 of diameter of shank). Sizes over .395" have internal centres on both the thread and shank ends.

For standard thread limits and tolerances for Unified Inch Screw Threads, see USCTI Table 327, and for metric threads, see USCTI Table 337.

For eccentricity tolerances of tap elements, see USCTI Table 317.



General Dimensions

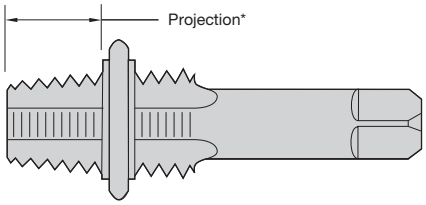
		dimensions (in)				
nominal size (in)	overall length L	thread length l	square length l2	shank diameter D1	square size A	optional neck length l1
1/16	2.13	.69	.38	.3125	.234	.375
1/8	2.13	.75	.38	.3125	.234	–
1/8	2.13	.75	.38	.4375	.328	.375
1/4	2.44	1.06	.44	.5625	.421	.375
3/8	2.56	1.06	.50	.7000	.531	.375
1/2	3.13	1.38	.63	.6875	.515	–
3/4	3.25	1.38	.69	.9063	.679	–
1	3.75	1.75	.81	1.1250	.843	–
1-1/4	4.00	1.75	.94	1.3125	.984	–
1-1/2	4.25	1.75	1.00	1.5000	1.125	–
2	4.25	1.75	1.13	1.8750	1.406	–
2-1/2	5.50	2.56	1.25	2.2500	1.687	–
3	6.00	2.63	1.38	2.6250	1.968	–
3-1/2	6.50	2.69	1.50	2.8125	2.108	–
4	6.75	2.75	1.56	3.0000	2.250	–

Reprinted with permission from United States Cutting Tool Institute (USCTI).
Published by Kennametal Inc. © 2014. All rights reserved.

Tolerances

element	range	direction	tolerance
length overall — L	1/16–3/4 inc.	plus/minus	.031
	1–4 inc.	plus/minus	.063
length of thread — l	1/16–3/4 inc.	plus/minus	.063
	1–1-1/4 inc.	plus/minus	.094
	1-1/2–4	plus/minus	.125
length of square — l2	1/16–3/4 inc.	plus/minus	.031
	1–4 inc.	plus/minus	.063
diameter of shank — d1	1/16–1/8	minus	.0015
	1/4–1 inc.	minus	.0020
	1-1/4–4 inc.	minus	.0030
size of square — a	1/16–1/8	minus	.004
	1/4–3/4 inc.	minus	.006
	1–4 inc.	minus	.008

American National Standard Taper Pipe Thread Form (NPT)
Aeronautical National Taper Pipe Thread Form (ANPT)
Dryseal American National Standard Taper Pipe Thread Form (NPTF)



nominal size (in)	threads per inch	projection* (in)	projection tolerance + / –	taper per foot limits min	taper per foot limits max	length L1	tap drill size** NPT, ANPT, NFTF
1/16	27	.312	.063	.719	.781	.160	C
1/8	27	.312	.063	.719	.781	.1615	Q
1/4	18	.459	.063	.719	.781	.2278	7/16
3/8	18	.454	.063	.719	.781	.240	9/16
1/2	14	.579	.063	.719	.781	.320	45/64
3/4	14	.565	.063	.719	.781	.339	29/32
1	11-1/2	.678	.094	.719	.781	.400	1-9/64
1-1/4	11-1/2	.686	.094	.719	.781	.420	1-31/64
1-1/2	11-1/2	.699	.094	.719	.781	.420	1-23/32
2	11-1/2	.667	.094	.719	.781	.436	2-3/16
2-1/2	8	.925	.094	.734	.781	.682	2-39/64
3	8	.925	.094	.734	.781	.766	3-15/64
3-1/2	8	.938	.125	.734	.781	.821	—
4	8	.950	.125	.734	.781	.844	—

**Distance from small end of tap projects through L1 taper thread ring gage.*
***Recommended size given permits direct tapping without reaming the hole, but only gives a full thread for approximately the L1 length.*
Reprinted with permission from United States Cutting Tool Institute (USCTI). Published by Kennametal Inc. © 2014. All rights reserved.

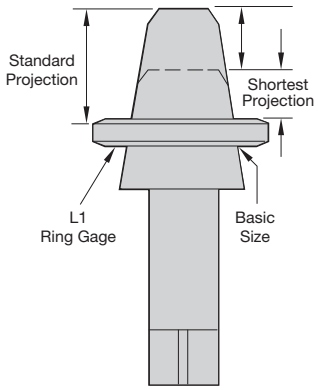
Pipe Taps

General-purpose pipe taps are appropriate for threading a wide variety of materials, both ferrous and non-ferrous.

Ground thread pipe taps are standard in American Standard Pipe Form (NPT) and American Standard Dryseal Pipe Form (NPFT). NPT threads require the use of a sealer, like Teflon® tape or pipe compound. Dryseal taps are used to tap fittings, which will give a pressure-tight joint without the use of a sealer.

The nominal size of a pipe tap is that of the pipe fitting to be tapped, not the actual size of the tap. The thread tapers 3/4" per foot.

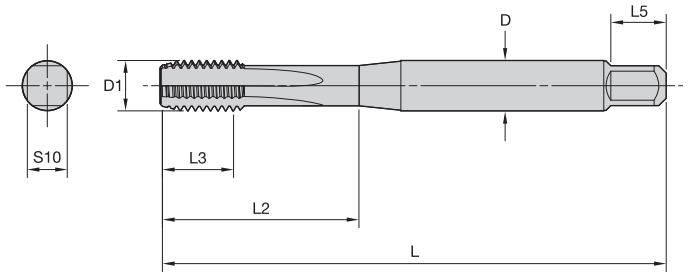
All pipe taps are furnished with 2-1/2–3-1/2 thread chamfer.



Short projection pipe taps are made with a projection shorter than standard for taper pipe tapping where the depth of tapping is limited.

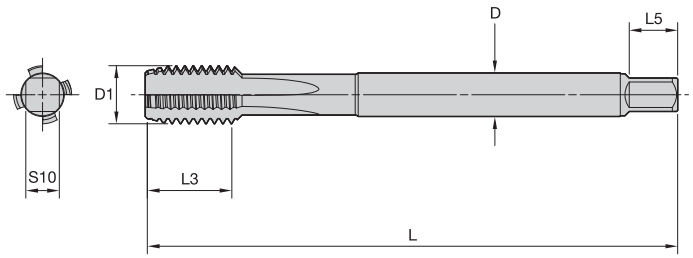
Special short projection taper pipe taps can be furnished with American National Standard Taper Pipe thread (ANPT) or Dryseal American National Standard Taper Pipe thread (NPTF, PTF-SAE Short, or PTF-SPL Extra Short).

For information on short projection pipe taps and hole preparation for NPT, NPTF, and ANPT internal pipe threads, consult WIDIA-GTD™ Technical Bulletins.



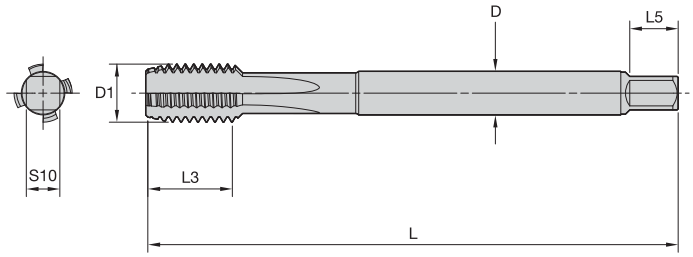
DIN 371

machine screw size number	nominal fraction diameter (in)	metric dimensions D	L	L3	L2	L5	S10
4	–	3,5	56	8	18	6	2,7
5	–	4,0	56	9	20	6	3,0
6	–	4,0	56	9	20	6	3,0
8	–	4,5	63	11	21	6	3,4
10	–	6,0	70	12	25	8	4,9
–	1/4	7,0	80	15	30	8	5,5
–	5/16	8,0	90	15	35	9	6,2
–	3/8	10,0	100	19	39	11	8,0



DIN 376

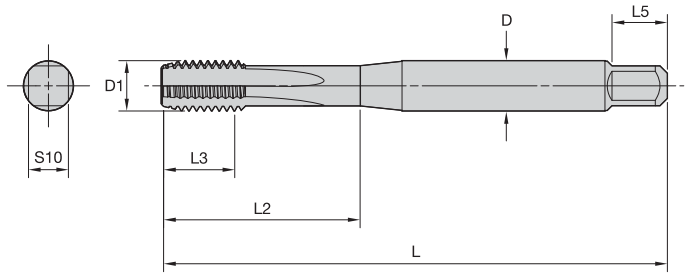
nominal fraction diameter (in)	metric dimensions D	L	L3	L5	S10
7/16	8	100	18	9	6,2
1/2	9	110	23	10	7,0
9/16	11	110	25	12	9,0
5/8	12	110	24	12	9,0
3/4	16	140	30	15	12,0
7/8	18	140	34	17	14,5
1	18	160	38	17	14,5



DIN 374

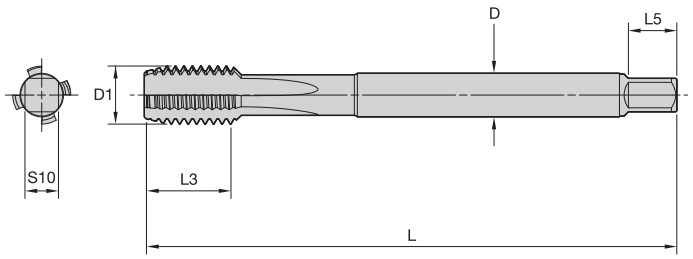
	pitch		metric dimensions				
D1	minimum	maximum	D	L	L3*	L5	S10
M8	0.2	0.75	6	80	18	8	4.9
M8	–	1	6	90	22	8	4.9
M9	0.2	0.75	7	80	18	8	5.5
M9	–	1	7	90	22	8	5.5
M10	0.2	1	7	90	20	8	5.5
M10	–	1.25	7	100	24	8	5.5
M11	0.35	1	8	90	20	9	6.2
M12	0.35	1.5	9	100	22	10	7
M14	0.35	1.5	11	100	22	12	9
M16	0.35	1.5	12	100	22	12	9
M16	–	2	12	110	32	12	9
M18	0.35	1.5	14	110	25	14	11
M18	–	2	14	125	34	14	11
M20	0.35	1.5	16	125	25	15	12
M20	–	2	16	140	34	15	12
M22	0.35	1.5	18	125	25	17	14.5
M22	–	2	18	140	34	17	14.5
M24	0.35	2	18	140	28	17	14.5
M27	0.35	2	20	140	28	19	16
M30	0.35	2	22	150	28	21	18
M30	–	3	22	180	45	21	18

** Maximum*



JIS Type 2 Metric Coarse

		metric dimensions					
D1	**pitch**	**D**	**L**	**L3**	**L2**	**L5**	**S10**
M3	0.5	4	46	11	19	6	3.2
M3.5	0.6	4	48	13	20	6	3.2
M4	0.7	5	52	13	21	7	4
M4.5	0.75	5	55	13	21	7	4
M5	0.8	5.5	60	16	24	7	4.5
M6	1	6	62	19	29	7	4.5



JIS Type 3 Metric Coarse

		metric dimensions				
D1	**pitch**	**D**	**L**	**L3**	**L5**	**S10**
M8	1.25	6.2	70	22	8	5
M9	1.25	7	72	22	8	5.5
M10	1.5	7	75	24	8	5.5
M11	1.5	8	80	25	9	6
M12	1.75	8.5	82	29	9	6.5
M14	2	10.5	88	30	11	8
M16	2	12.5	95	32	13	10
M18	2.5	14	100	37	14	11
M20	2.5	15	105	37	15	12
M22	2.5	17	115	38	16	13
M24	3	19	120	45	18	15

Through Holes Push Chips



GUN™ LHSF



- GUN™ (spiral point) or LHSF (Left-Hand Spiral Flute).
- Ideal for materials with long chips.

Blind Holes Pull Chips



RHSF



- RHSF (Right-Hand Spiral Flute).
- Ideal for materials with long chips.

Blind or Through Holes Store Chips



STFL

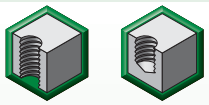


- STFL (Straight Flute).
- Ideal for materials with short chips.

Blind or Through Holes No Chips



Forming Tap



- Forming.
- Ideal for ductile materials <32 HRC.

In addition to the nominal size and pitch of a tap, there is another important dimensional factor to be considered when selecting a ground thread tap for a given job. This factor is the pitch diameter tap limit, “H” and “L”. “H” represents (high) above basic pitch diameter; “L” (low) is below basic pitch diameter. Tap limits have been established to provide a choice in the selection of the tap size best suited to produce the class of thread desired.

Figure 1 Illustrates the numbering system and the .0005" diameter increment separation between successive limits. Because the starting point is basic pitch diameter, dividing the limit number by two establishes, in thousandths of an inch, the amount the maximum tap pitch diameter is above basic in the “H” series and the amount the minimum tap pitch diameter is under basic in the “L” series.

Figure 2 Illustrates the positioning of the tap limits in relation to the various classes of threads for a 1/4–20 size.

Figure 1

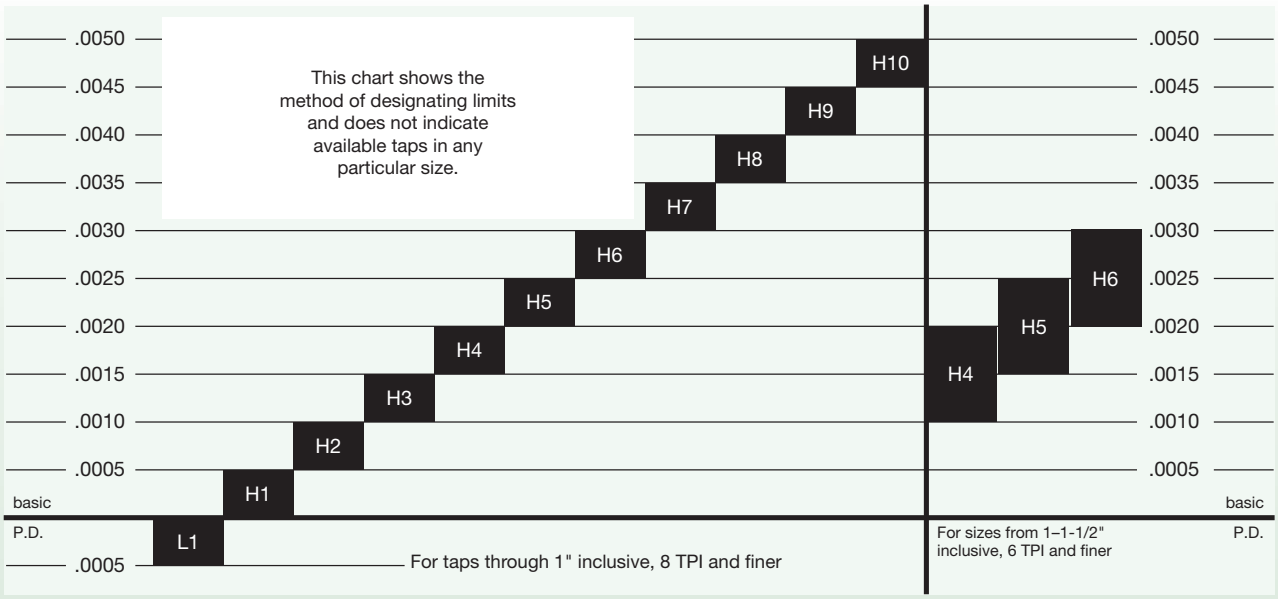
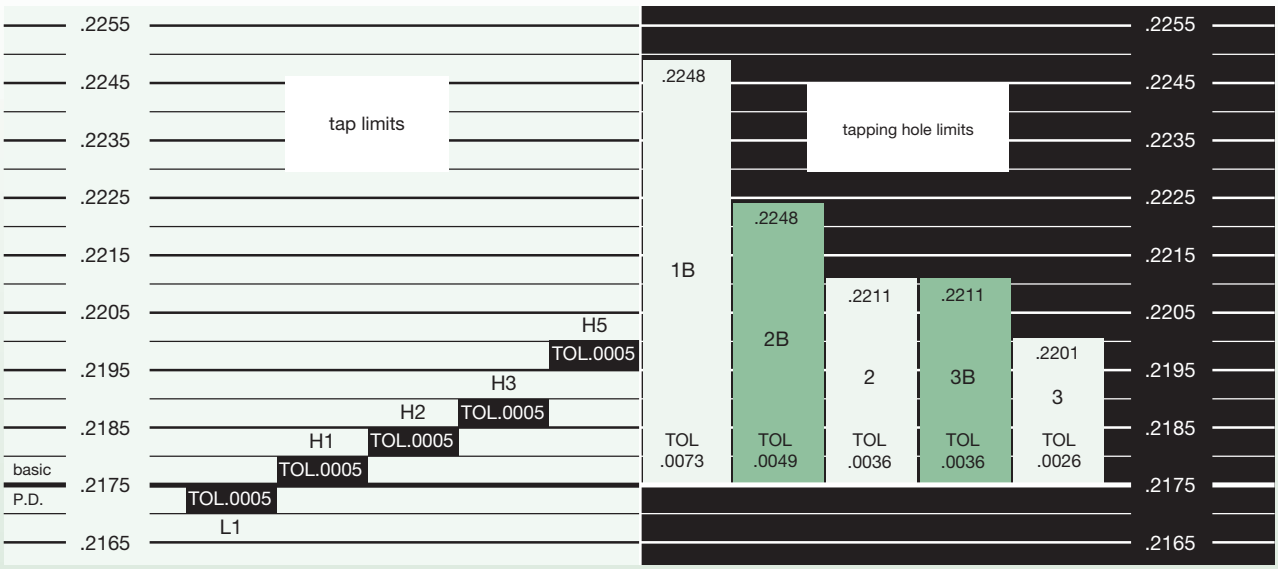
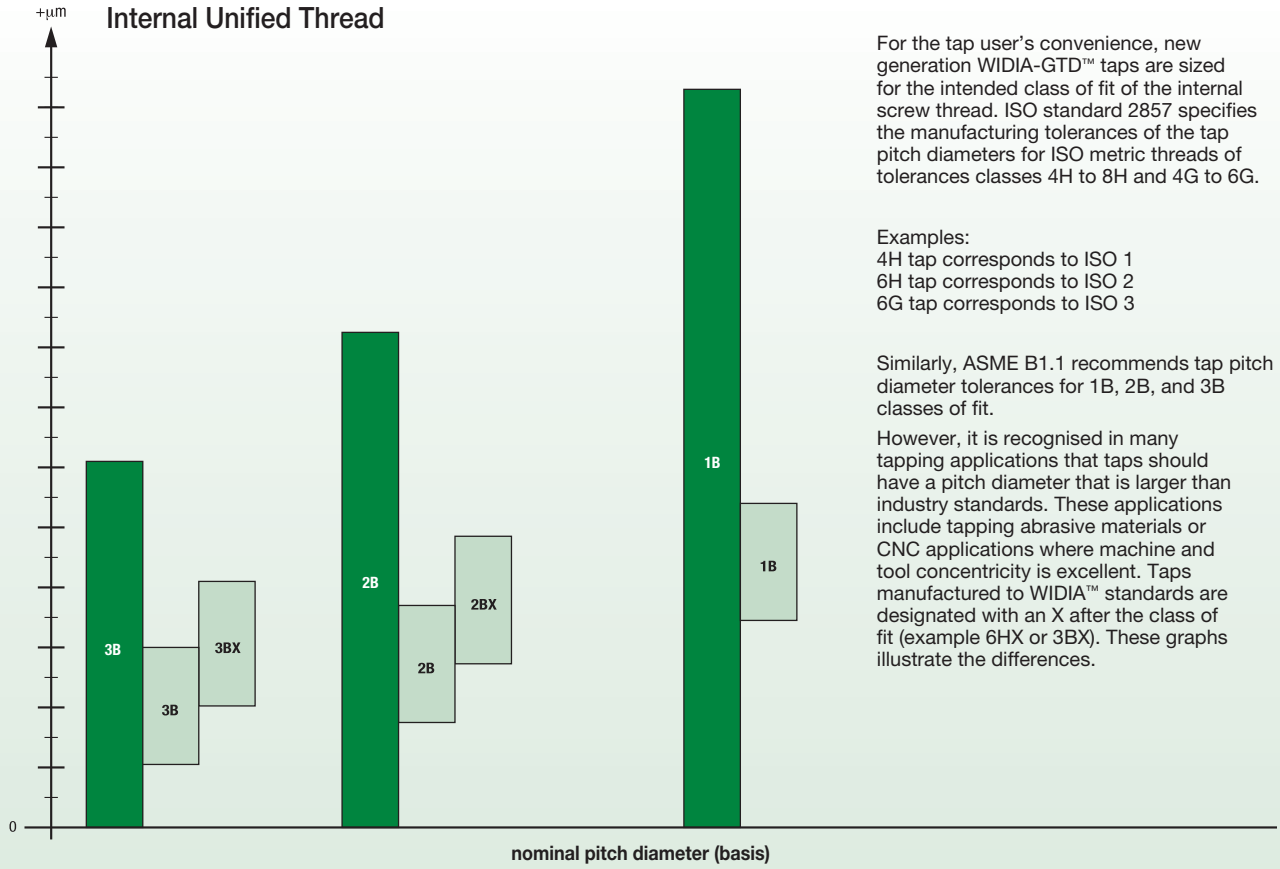


Figure 2



Internal Unified Thread



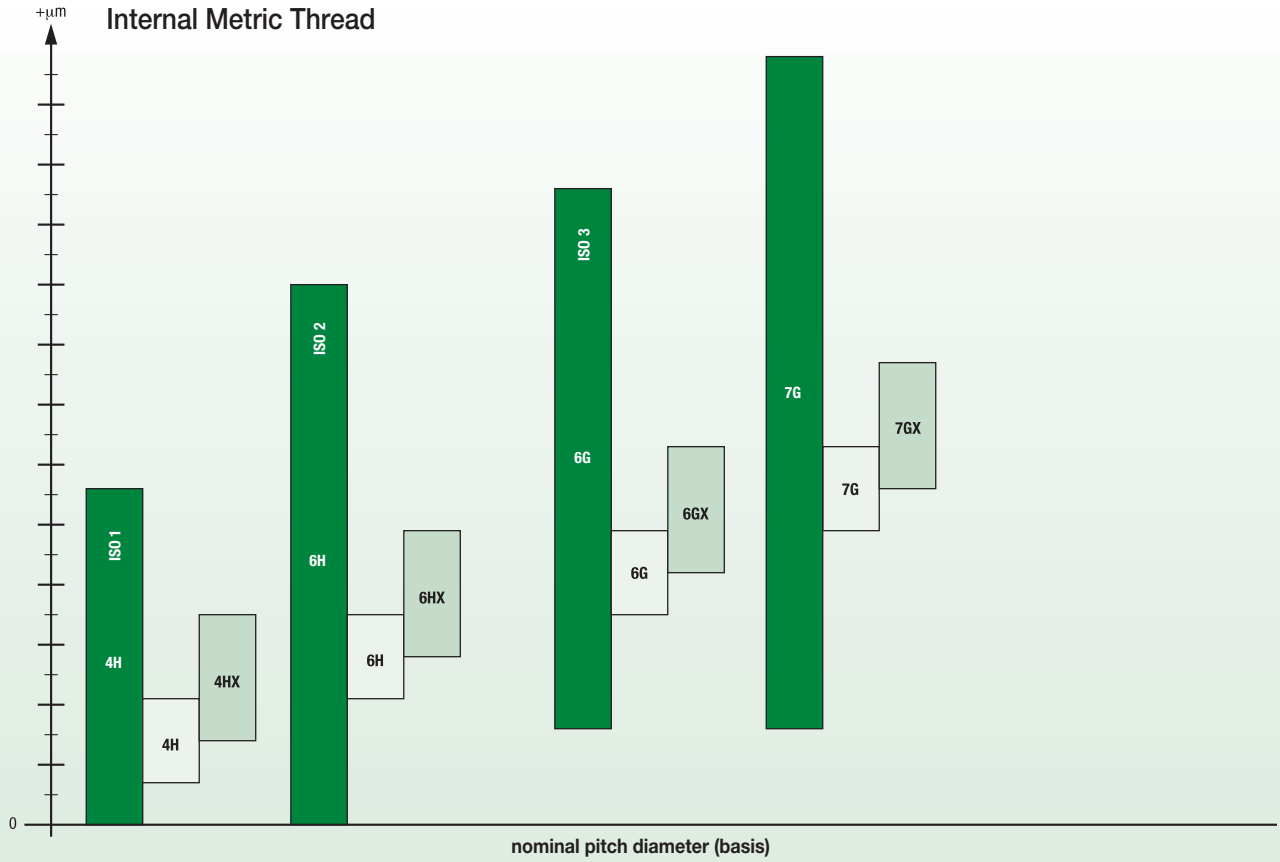
For the tap user's convenience, new generation WIDIA-GTD™ taps are sized for the intended class of fit of the internal screw thread. ISO standard 2857 specifies the manufacturing tolerances of the tap pitch diameters for ISO metric threads of tolerances classes 4H to 8H and 4G to 6G.

Examples:
4H tap corresponds to ISO 1
6H tap corresponds to ISO 2
6G tap corresponds to ISO 3

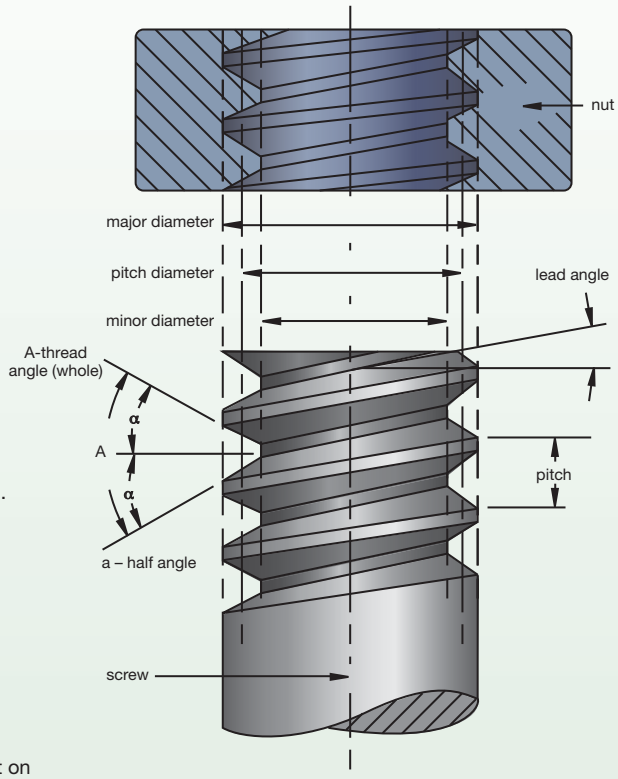
Similarly, ASME B1.1 recommends tap pitch diameter tolerances for 1B, 2B, and 3B classes of fit.

However, it is recognised in many tapping applications that taps should have a pitch diameter that is larger than industry standards. These applications include tapping abrasive materials or CNC applications where machine and tool concentricity is excellent. Taps manufactured to WIDIA™ standards are designated with an X after the class of fit (example 6HX or 3BX). These graphs illustrate the differences.

Internal Metric Thread



It is generally recognised that, in mass production, it is impossible to reproduce in exact detail the theoretically perfect product as laid out on the drawing board. The allowed slight variation between the theoretically perfect product drawing and each unit of the actual product is called the tolerance.



Allowance

An intentional difference in correlated dimensions of mating parts. It is the minimum clearance or maximum interference between such parts.

Angle of Thread

The angle included between the flanks of the thread measured in an axial plane.

Half Angle of Thread

The angle included between a flank of the thread and the normal (90°) to the axis, measured in an axial plane.

Lead of Thread

The distance a screw thread advances axially in one turn. On a single-thread screw, the lead and pitch are identical. On a double thread, the lead is 2x pitch; on a triple thread, the lead is 3x pitch, etc.

Major Diameter

The largest diameter of a straight-screw thread.

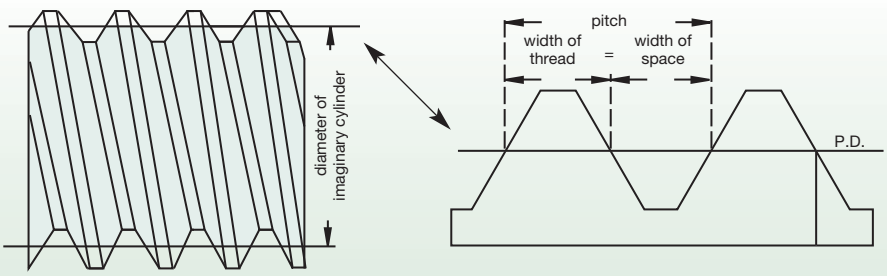
Minor Diameter

The smallest diameter of a straight-screw thread.

Pitch

The distance from a point on a screw thread to a corresponding point on the next thread measured parallel to the axis.

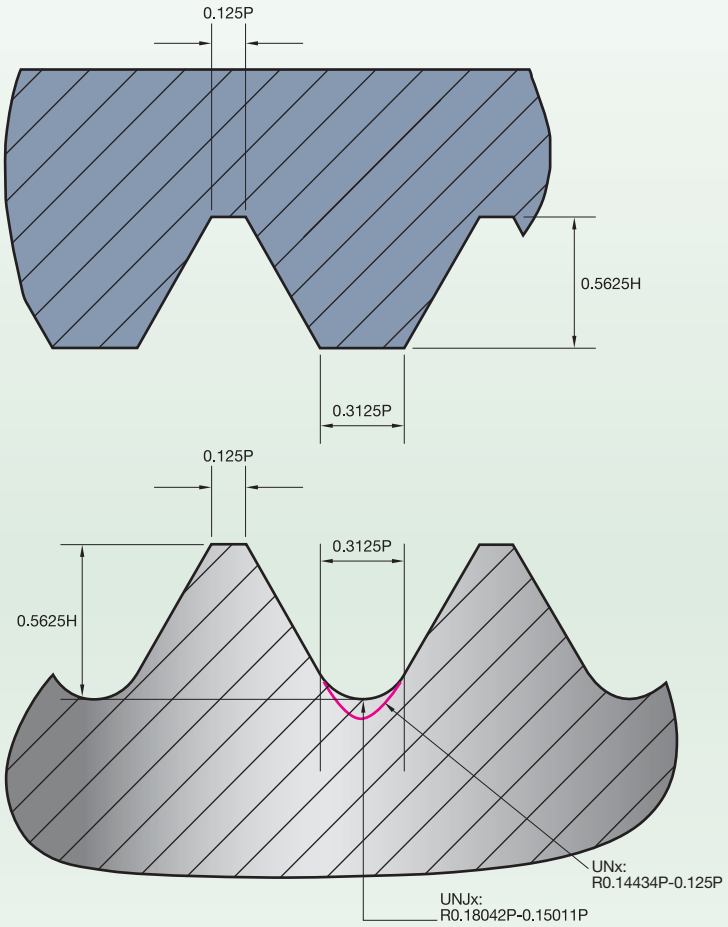
The pitch in inches = $\frac{1}{\text{number of threads per inch}}$



Pitch Diameter

On a straight-screw thread, the diameter of an imaginary cylinder that would pass through the threads at such points as to make equal the width of the threads and the width of the spaces cut by the surface of the cylinder.

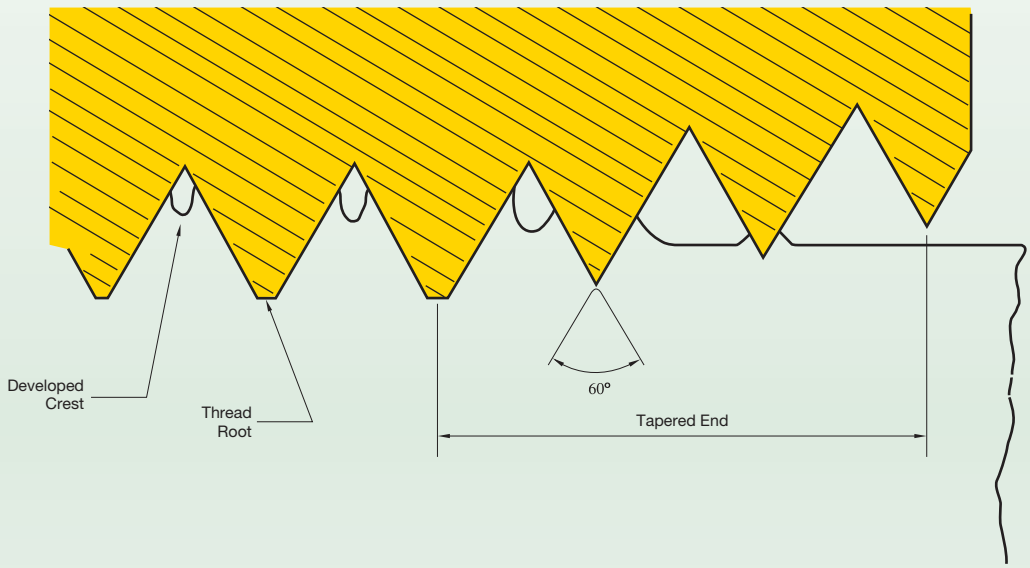
A thread system is available for aerospace and other applications where high fatigue strength is required. The UNJ thread form is defined by ASME B1.15 and is similar to Military Specification MIL-S-8879. Screw thread assemblies consist of external and internal threads. In order to minimise the stress on the external UNJ thread, a controlled root radius is required that is equal to 0.15011P to 0.18042P, where P is the thread pitch. Internal UNJ threads are not required to have a radius at either the major or minor diameters.



Because external UNJ threads must be produced with a defined root radius, standard UN tooling may not be used. However, internal UNF threads may be produced with ground thread UN taps sized to produce the proper class of fit. The tap does not need to be marked with a letter J. Attention must be paid to the tap drill since the minor diameter has to be specified so as to provide clearance with the root radius on the external thread.

For UNJ thread specifications, the reader is referred to ASME B1.15. Please note this standard includes Class 3 and Class 2 UNJ screw threads. However, only Class 3 UNJ threads meet the requirements of Military Specification MIL-S-8879. For Unified Inch (UN) thread specifications, refer to ASME B1.1.

Unlike cutting taps, which remove material, forming taps generate an internal screw thread by displacing material and forming it into the V-shaped thread. A common misconception is that a thread rolling action occurs. Instead, the threads are formed over the tapered entry section of the tap as the tap rotates into the hole. A succession of deeper penetrating lobes over the entry plastically displaces material radially between the tap's thread flanks until the entry length is reached. At this point, the thread is fully formed at the correct thread height.



Forming taps have numerous advantages over cutting taps. The most obvious advantage is that forming taps do not create chips. There are no chip removal problems. Bird nesting is a situation that occurs when chips wrap around the shank of spiral-fluted taps when tapping blind holes in long chipping materials. Forming taps help this to be avoided. Since forming taps avoid this problem, they are stronger and more resistant to breakage. Another misconception is that forming taps produce stronger threads. Although the forming process strain hardens the thread flanks, it has very little effect on the major diameter, the location where internal threads strip.

Forming taps can only be used in ductile materials. Due to increased friction relative to cutting, forming taps require higher torque than cutting taps. In some situations, oil-based lubrications are required, and this might not be convenient on CNC machining centres that use water soluble coolant. In this situation, the lubricant concentration should be increased.

Since forming taps displace material, larger diameter pre-tap holes are required. This is especially important when converting from cutting taps to forming taps. If a cutting tap hole size is used, the displaced material will over-fill the tap's threads and breakage will result. Please consult hole size charts for forming taps.

coating	properties and application	precautions
Titanium Nitride (TiN)	Proprietary TiN coating (hardness 2300 Vickers) offers significantly improved wear life and thread finish, often at higher tapping speeds, in a broad range of materials, especially steels, irons, and plastics. Golden colour.	Use with caution in non-ferrous materials such as aluminium because of tendency to gall.
Titanium Carbonitride (TiCN)	Proprietary TiCN coating (hardness 3000 Vickers) is harder, tougher, and more wear resistant than TiN under conditions of moderate cutting temperatures. Like TiN, TiCN may be used at higher cutting speeds in a broad range of materials, especially steels and irons. Blue-grey colour.	Use with caution in non-ferrous materials such as aluminium because of tendency to gall. TiAlN is a better choice when used at extreme temperatures.
Titanium Nitride + Chromium Carbide Carbon (TiN + CrC/C)	Proprietary coating (hardness 2300 Vickers) that combines the wear resistance of smooth TiN coating with a lubricous top layer of chromium carbide carbon. Effective in stainless steel and non-ferrous materials including aluminium and titanium. Ideal choice for 300 series stainless steels, wrought, and die cast aluminiums. Black/grey colour.	Effective in both ferrous and non-ferrous materials.
Titanium Aluminium Nitride (TiAlN)	Nanolayer TiAlN coating (hardness 3300 Vickers) offers improved wear life and thread finish, especially in conditions where high temperatures can be generated. Use for PH stainless steels and nickel-based alloys like INCONEL®. Violet/grey colour.	Use with caution in non-ferrous materials because of tendency to gall.
Chromium Nitride (CrN)	CrN is medium hard (hardness 1800 Vickers) and has a lower wear resistance than TiN, TiCN, and TiAlN. However, unlike these coatings, CrN does not gall when used in some non-ferrous work materials. Use for brass, bronze, zinc alloys, and magnesium alloys. Silver colour.	Ineffective in ferrous materials.
Nitride (MAXI #1)	Hardened case extends wear life in abrasive materials. Use for aluminium and other non-ferrous materials.	Avoid on taper pipe, fast spiral, and small diameter (<#6) or fine pitch taps due to tendency for thread chipping.
Oxide (SH-50)	Helps prevent galling in ferrous (iron-based) materials. For free machining steel. Use for steels, stainless steels, and irons.	Has a tendency to cause galling in non-ferrous materials such as aluminium.
Nitride and Oxide (SH-47)	Combines the benefits of nitride and oxide surface treatments. For steels, stainless steels, and nickel alloys.	See precautions for nitride and oxide surface treatments.

Factors when trying to determine the best tapping speeds:

- Material to be tapped
- Length of chamfer on tap
- Percentage of full thread to be cut
- Length of hole (depth of thread)
- Pitch of thread
- Cutting fluids
- Machine equipment
- Horizontal or vertical tapping

The best and most efficient operating speeds for taps cannot be calculated with the same certainty, as for many other metalcutting tools.

With other tools, the feed per revolution can be set at any desired point and can be varied as conditions demand. Taps, on the other hand, must always be advanced at a rate equal to one pitch for every revolution. The style of tap may vary the conditions.

For example, with a bottoming tap, the first thread on each land cuts the full height of thread, while, with a taper or starting tap, a number of threads do their share of the cutting before the full height of thread is reached.

The depth of thread also varies, depending on the pitch. The coarser the thread, the greater the advance of the tap per revolution and the greater the amount of material removed.

The method of feeding the tap, and the type of equipment for driving, also influences the permissible speeds. If taps are mechanically fed at the proper rate of advance, they can be operated at higher speeds than if they are required to feed themselves and pull some part of the machine along with them.

Speeds may be modified to take into account any or all of these factors:

- Speeds must be lowered as length of thread increases because, in deep thread holes, the accumulated chips increase friction and interfere with lubrication.
- Bottoming taps must be run slower than plug taps.
- Tapping full height of thread calls for slower speed than if the commercial 75% height only is required.
- Coarse-thread taps in the larger diameters should be run more slowly than fine-thread taps of the same diameters.
- The quantity and quality of cutting fluid may affect the permissible speeds as much as 100%.
- Taper threaded taps, such as pipe taps, should be operated from 1/2–3/4 the speed of a straight thread tap of comparable major diameter.

RPM Formulas

SFM = Surface Feet per Minute
RPM = Revolutions per Minute
IPM = Inches per Minute
TPI = Threads per Inch

S m/m = Surface Metres per Minute
$\pi = 3.1416$
mm/min = millimetres per minute
P = Pitch (1/number of threads per inch)

Inch Sizes

SFM	=	$\frac{\text{RPM x tool diameter}}{3.82}$	or	0.26 x RPM x tool diameter
RPM	=	$\frac{3.82 \text{ x SFM}}{\text{tool diameter}}$		
IPM	=	$\frac{\text{RPM}}{\text{TPI*}}$	or	*P x RPM

Metric Sizes

S m/m	=	$\frac{\pi \text{ x tool diameter x RPM}}{1000}$
RPM	=	$\frac{\text{mm/m x } 1000}{\pi \text{ x tool diameter}}$
mm/min	=	mm P x RPM

UNC/UNF and NPT/NPTF

tap size	taper pipe taps	surface feet per minute (SFM) 5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
		revolutions per minute (RPM)																	
0	—	318	637	955	1273	1592	1910	2546	3183	3820	4456	5093	5729	6366	7003	7639	8276	8913	9549
1	—	273	546	819	1046	1308	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6805	7326	1849
2	—	212	424	637	888	1110	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
3	—	191	382	573	772	964	1157	1543	1929	2315	2701	3086	3472	3858	4244	4629	5015	5401	5787
4	—	174	347	521	682	853	1023	1364	1705	2046	2387	2728	3069	3411	3751	4092	4434	4775	5115
5	—	147	294	441	611	764	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
6	—	136	273	409	553	691	829	1106	1382	1859	1935	2212	2488	2766	3042	3318	3595	3871	4148
8	—	119	239	358	466	583	699	932	1165	1398	1631	1864	2097	2330	2563	2796	3029	3262	3495
10	—	101	201	302	402	502	603	804	1005	1205	1406	1607	1808	2009	2210	2411	2612	2813	3014
12	—	87	174	260	354	442	531	707	884	1061	1238	1415	1592	1769	1945	2122	2300	2476	2653
1/4	—	76	153	229	306	382	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	—	62	123	185	245	306	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	—	50	101	151	204	255	305	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	1/8	43	87	130	175	219	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	—	38	76	115	153	191	229	305	382	458	535	611	688	764	840	917	993	1070	1146
9/16	1/4	34	68	102	137	172	206	274	342	410	478	547	616	683	752	820	888	952	1020
5/8	—	32	64	96	122	153	183	244	306	367	428	489	550	611	672	733	794	856	917
11/16	3/8	28	55	83	111	138	167	222	278	333	389	444	500	556	611	667	722	778	833
3/4	—	25	51	76	102	128	153	203	255	305	357	407	458	509	560	611	662	713	764
7/8	1/2	22	43	65	87	109	131	175	218	262	306	350	392	437	480	524	568	611	655
1	—	19	38	57	76	96	115	153	191	230	268	305	344	382	420	458	497	535	573
1-1/8	3/4	17	34	51	68	84	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4	—	15	31	46	61	76	92	122	153	183	214	244	275	305	336	367	397	428	458
1-3/8	1	14	28	42	56	69	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2	—	13	25	38	51	63	76	102	127	153	178	204	229	255	280	305	331	356	382
1-5/8	—	12	23	35	47	59	71	94	118	141	165	188	212	235	259	282	306	329	353
1-3/4	—	11	22	33	44	55	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8	—	10	20	30	41	51	61	81	102	122	143	163	183	204	224	244	265	285	306
2	—	9	19	29	38	48	57	76	96	115	134	153	172	191	210	229	248	267	287

Metric

metric taps	surface feet per minute (SFM) 5'	10'	15'	20'	25'	30'	40'	50'	60'	70'	80'	90'	10'	110'	120'	130'	140'	150'
	revolutions per minute (RPM)																	
M1	490	979	1469	1959	2449	2938	3918	4897	5877	6856	7836	8815	9795	10774	11754	12733	13713	14692
M2	242	484	725	967	1209	1451	1934	2418	2901	3385	3868	4352	4835	5319	5803	6286	6770	7253
M3	162	324	486	347	809	971	1295	1619	1942	2266	2590	2914	3237	3561	3885	4208	4532	4856
M3.5	138	277	415	554	692	830	1107	1384	1661	1938	2214	1491	2768	3045	3322	3599	3875	4152
M4	122	243	365	487	608	730	973	1217	1460	1703	1946	2190	2433	2676	2920	3163	3406	3650
M5	97	194	291	388	485	582	776	970	1163	1357	1551	1745	1939	2133	2327	2521	2715	2905
M6	81	162	243	324	405	486	647	809	971	1133	1295	1457	1619	1781	1942	2104	2266	2428
M7	69	138	208	277	346	415	554	692	830	969	1107	1246	1384	1522	1661	1799	1938	2076
M8	61	121	182	243	303	364	485	606	728	849	970	1091	1213	1334	1455	1577	1698	1819
M10	48	97	145	194	242	291	388	485	582	679	776	873	970	1067	1163	1260	1357	1454
M12	40	81	121	162	202	243	324	405	486	567	647	728	809	890	971	1052	1133	1214
M14	35	69	104	139	173	208	277	347	416	485	555	624	693	763	832	901	971	1040
M16	30	61	91	121	152	182	243	303	364	424	485	546	606	667	728	788	849	910
M18	27	54	81	108	135	162	216	269	323	377	431	485	539	593	647	700	754	808
M20	24	49	73	97	121	146	194	243	291	340	388	437	485	534	582	631	680	728
M22	22	44	66	88	110	132	176	221	265	309	353	397	441	485	529	573	618	662
M24	20	40	61	81	101	121	162	202	243	283	323	364	404	445	485	526	566	606
M27	18	36	54	72	90	108	144	180	216	252	287	323	359	395	431	467	503	539
M30	16	32	49	65	81	97	129	162	194	226	259	291	323	356	388	420	453	485

Partial List of Solutions to Tapping Problems

application	symptom	common cause	remedy
general	gage out of limits	tap size and gage mismatch	select tap size for gage
	oversize thread	alignment, spindle feed	correct
	oversize at top	runout or alignment	correct
	go gage binds part way	worn tool, tap cuts off lead	replace tap, synchronous holder
	thread shaving	feed error, high axial force	programme, synchronous holder
	chipping	high cutting force, worn tap	tap geometry, replace tap
	breakage	chip jamming flutes	tap geometry, tapping depth
	–	worn tool, high torque	replace tap with new tool
	short life, low speed	excessive wear	SC or HSS-E-PM HP taps
steel	birdnest blind hole	long, ductile chips	GT30 GP6505 (oxide), peck feed
	chipping	high material hardness	GT00, GT02 WP31MG (TiN)
	breakage in blind holes	hole depth >2D, chip jamming	GT04 WH36MG (TiN/MoS_2)
stainless steel	oversize thread, low life	galling	GT20, GT30 GM6515 (TiN-CrC/C)
	short life	work hardened core hole	replace drill
cast iron	excessive wear	abrasion	GT40 GP6520 (TiCN)
aluminium, cast	excessive wear	high silicon	GT40 GP6520 (TiCN)
aluminium, wrought	oversize thread	galling	GT70, GT80 WN48EG (DLC)
nickel, cobalt alloys	short life	high cutting temperature	GT10, GT12 WS32MG (TiCN)
titanium	short life	high cutting temperature	GT14, GT16 WN35MG (TiN-DLC)

Thread Mills

	vibration marks	major crest wear	edge chipping	cone-shaped thread	entry marks
cutting speed	check	reduce	–	–	–
feed per tooth	check	increase	reduce	–	–
workpiece clamping	improve	improve	improve	–	improve
machine tool stability	improve	improve	improve	–	improve
cantilever arm	shorten	shorten	–	–	shorten
helix angle	increase	reduce	–	–	–
radial runout	check	check	–	–	–
coating	–	improve	improve	–	–
milling operation	–	climb mill	climb mill	climb mill	–
line feed/entry ramp	check	check	–	–	improve
coolant pressure	–	check (>20 bar, 290 psi)	check (>20 bar, 290 psi)	–	–

drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)	drill size	decimal (in)
0,30mm	.0118	54	.0550	3,10mm	.1220	5,50mm	.2165	8,50mm	.3346	9/16	.5625
0,32mm	.0126	1,40mm	.0551	1/18	.1250	7/32	.2188	8,60mm	.3386	14,50mm	.5709
80	.0135	1,45mm	.0571	3,20mm	.1260	5,60mm	.2205	R	.3390	37/64	.5781
0,35mm	.0138	1,50mm	.0591	30	.1285	2	.2210	8,70mm	.3425	14,75mm	.5807
79	.0145	53	.0595	3,30mm	.1299	5,70mm	.2244	11/32	.3438	15,00mm	.5906
0,38mm	.0150	1,55mm	.0610	3,40mm	.1339	1	.2280	8,80mm	.3465	19/32	.5938
1/64	.0156	1/16	.0625	29	.1360	5,80mm	.2283	S	.3480	15,25mm	.6004
0,40mm	.0157	1,60mm	.0630	3,50mm	.1378	5,90mm	.2323	8,90mm	.3504	39/64	.6094
78	.0160	52	.0635	28	.1405	A	.2340	9,00mm	.3543	15,50mm	.6102
0,42mm	.0165	1,65mm	.0650	9/64	.1406	15/64	.2344	T	.3580	15,75mm	.6201
0,45mm	.0177	1,70mm	.0669	3,60mm	.1417	6,00mm	.2362	9,10mm	.3583	5/8	.6250
77	.0180	51	.0670	27	.1440	B	.2380	23/64	.3594	16,00mm	.6299
0,48mm	.0189	1,75mm	.0689	3,70mm	.1457	6,10mm	.2402	9,20mm	.3622	16,25mm	.6398
0,50mm	.0197	50	.0700	26	.1470	C	.2420	9,30mm	.3661	41/64	.6406
76	.0200	1,80mm	.0709	25	.1495	6,20mm	.2441	U	.3680	16,50mm	.6496
75	.0210	1,85mm	.0728	3,80mm	.1496	D	.2460	9,40mm	.3701	21/32	.6562
0,55mm	.0217	49	.0730	24	.1520	6,30mm	.2480	9,50mm	.3740	16,75mm	.6594
74	.0225	1,90mm	.0748	3,90mm	.1535	1/4, E	.2500	3/8	.3750	17,00mm	.6693
0,60mm	.0236	48	.0760	23	.1540	6,40mm	.2520	V	.3770	43/64	.6719
73	.0240	1,95mm	.0768	5/32	.1562	6,50mm	.2559	9,60mm	.3780	17,25mm	.6791
0,62mm	.0244	5/64	.0781	22	.1570	F	.2570	9,70mm	.3819	11/16	.6875
72	.0250	47	.0785	4,00mm	.1575	6,60mm	.2598	9,80mm	.3858	17,50mm	.6890
0,65mm	.0256	2,00mm	.0787	21	.1590	G	.2610	W	.3860	45/64	.7031
71	.0260	2,05mm	.0807	20	.1610	6,70mm	.2638	9,90mm	.3898	18,00mm	.7087
0,70mm	.0276	46	.0810	4,10mm	.1614	17/64	.2656	25/64	.3906	23/32	.7188
70	.0280	45	.0820	4,20mm	.1654	H	.2660	10,00mm	.3937	18,50mm	.7283
69	.0292	2,10mm	.0827	19	.1660	6,80mm	.2677	X	.3970	47/64	.7344
0,75mm	.0295	2,15mm	.0846	4,30mm	.1693	6,90mm	.2717	10,20mm	.4016	19,00mm	.7480
68	.0310	44	.0860	18	.1695	I	.2720	Y	.4040	3/4	.7500
1/32	.0312	2,20mm	.0866	11/64	.1719	7,00mm	.2756	13/32	.4062	49/64	.7656
0,80mm	.0315	2,25mm	.0886	17	.1730	J	.2770	Z	.4130	19,50mm	.7677
67	.0320	43	.0890	4,40mm	.1732	7,10mm	.2795	10,50mm	.4134	25/32	.7812
66	.0330	2,30mm	.0906	16	.1770	K	.2810	27/64	.4219	20,00mm	.7874
0,85mm	.0335	2,35mm	.0925	4,50mm	.1772	9/32	.2812	10,80mm	.4252	51/64	.7969
65	.0350	42	.0935	15	.1800	7,20mm	.2835	11,00mm	.4331	20,50mm	.8071
0,90mm	.0354	3/32	.0938	4,60mm	.1811	7,30mm	.2874	7/16	.4375	13/16	.8125
64	.0360	2,40mm	.0945	14	.1820	L	.2900	11,20mm	.4409	21,00mm	.8268
63	.0370	41	.0960	4,70mm, 13	.1850	7,40mm	.2913	11,50mm	.4528	53/64	.8281
0,95mm	.0374	2,45mm	.0965	3/16	.1875	M	.2950	29/64	.4531	27/32	.8438
62	.0380	40	.0980	4,80mm, 12	.1890	7,50mm	.2953	11,80mm	.4646	21,50mm	.8465
61	.0390	2,50mm	.0984	11	.1910	19/64	.2969	15/32	.4688	55/64	.8594
1,00mm	.0394	39	.0995	4,90mm	.1929	7,60mm	.2992	12,00mm	.4724	22,00mm	.8661
60	.0400	38	.1015	10	.1935	N	.3020	12,20mm	.4803	7/8	.8750
59	.0410	2,60mm	.1024	9	.1960	7,70mm	.3031	31/64	.4844	22,50mm	.8858
1,05mm	.0413	37	.1040	5,00mm	.1969	7,80mm	.3071	12,50mm	.4921	57/64	.8906
58	.0420	2,70mm	.1063	8	.1990	7,90mm	.3110	1/2	.5000	23,00mm	.9055
57	.0430	36	.1065	5,10mm	.2008	5/16	.3125	12,80mm	.5039	29/32	.9062
1,10mm	.0433	7/64	.1094	7	.2010	8,00mm	.3150	13,00mm	.5118	59/64	.9219
1,15mm	.0453	35	.1100	13/64	.2031	O	.3160	33/64	.5156	23,50mm	.9252
56	.0465	2,80mm	.1102	6	.2040	8,10mm	.3189	13,20mm	.5197	15/16	.9375
3/64	.0469	34	.1110	5,20mm	.2047	8,20mm	.3228	17/32	.5312	24,00mm	.9449
1,20mm	.0472	33	.1130	5	.2055	P	.3230	13,50mm	.5315	61/64	.9531
1,25mm	.0492	2,90mm	.1142	5,30mm	.2087	8,30mm	.3268	13,80mm	.5433	24,50mm	.9646
1,30mm	.0512	32	.1160	4	.2090	21/64	.3281	35/64	.5469	31/32	.9688
55	.0520	3,00mm	.1181	5,40mm	.2126	8,40mm	.3307	14,00mm	.5512	25,00mm	.9843
1,35mm	.0531	31	.1200	3	.2130	Q	.3320	14,25mm	.5610	63/64	.9844
										1"	1.0000

Metric Fractional Wire gage Letter size

Knowing the hardness of the work material to be tapped is essential in selecting the best tap for the job.

10 mm/min ball 3000 kg	120° cone 150 kg	1/16" ball 100 kg	model C	1000 lb per sq. in.	10 mm/min ball 3000 kg	120° cone 150 kg	1/16" ball 100 kg	model C	1000 lb per sq. in.
Brinell	Rockwell C	Rockwell B	Shore Scleroscope	tensile strength	Brinell	Rockwell C	Rockwell B	Shore Scleroscope	tensile strength
800	72	–	100	–	276	30	105	42	136
780	71	–	99	–	269	29	104	41	132
760	70	–	98	–	261	28	103	40	129
745	68	–	97	367	258	27	102	39	127
725	67	–	96	357	255	26	102	39	125
712	66	–	95	350	249	25	101	38	123
682	65	–	93	337	245	24	100	37	119
668	64	–	91	326	240	23	99	36	117
652	63	–	89	318	237	23	99	35	115
626	62	–	87	306	229	22	98	34	113
614	61	–	85	299	224	21	97	33	110
601	60	–	83	292	217	20	96	33	107
590	59	–	81	290	211	19	95	32	104
576	57	–	79	281	206	18	94	32	102
552	56	–	76	270	203	17	94	31	100
545	55	–	75	268	200	16	93	31	98
529	54	–	74	259	196	15	92	30	96
514	53	120	72	254	191	14	92	30	94
502	52	119	70	247	187	13	91	29	92
495	51	119	69	244	185	12	91	29	91
477	49	118	67	233	183	11	90	28	90
461	48	117	66	227	180	10	89	28	89
451	47	117	65	223	175	9	88	27	86
444	46	116	64	219	170	7	87	27	84
427	46	115	62	209	167	6	87	27	82
415	44	115	60	204	165	5	86	26	81
401	43	114	58	196	163	4	85	26	80
388	42	114	57	191	160	3	84	25	78
375	41	113	55	184	156	2	83	25	76
370	40	112	54	182	154	1	82	25	75
362	39	111	53	179	152	–	82	24	74
351	38	111	51	173	150	–	81	24	74
346	37	110	50	170	147	–	80	24	72
341	37	110	49	168	145	–	79	23	71
331	36	109	47	163	143	–	79	23	70
323	35	109	46	158	141	–	78	23	69
311	34	108	46	153	140	–	77	22	69
301	33	107	45	148	135	–	75	22	67
293	32	106	44	144	130	–	72	22	65
285	31	105	43	140	–	–	–	–	–

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
0.6010	GG10	–	Grade 100	FC 100
0.6015	GG15	FGL 150	Grade 150	FC 150
0.6020	GG20	FGL 200	Grade 220	FC 200
0.6025	GG25	FGL 250	Grade 250, 260	FC 250
0.6030	GG30	FGL 300	Grade 300	FC 300
0.6035	GG35	FGL 350	Grade 350	FC 350
0.6655	–	L-NUC 15 6 2	F1	–
0.6656	–	L-NUC 15 6 3	F1	–
0.6660	–	L-NC 20 2	F2	–
0.6661	–	L-NC 20 3	F2	–
0.6676	–	L-NC 30 3	F3	–
0.7040	GGG40	FGS 400-15	Grade 420/12	FCD 400
0.7043	GGG40.3	FGS 370-17	Grade 370/12	FCD 370
0.7050	GGG50	FGS 500-7	Grade 500/7	FCD 500
0.7060	GGG60	FGS 600-3	Grade 600/3	FCD 600
0.7070	GGG70	FGS 700-2	Grade 700/2	FCD 700
0.7080	GGG80	FGS 800-2	Grade 800/2	FCD 800
0.7652	–	S-NM 13 7	S 6	–
0.7660	–	S-NC 20 2	S 2	–
0.7661	–	S-NC 20 3	S 2	–
0.7670	–	S-N 22	S 2 C	–
0.7673	–	S-NM 23 4	S 2 M	–
0.7676	–	S-NC 30 3	S 3	–
0.7677	–	S-NC 30 1	S 3	–
0.8035	GTW35	MB 35-7	W 35-04	FCMW 330
0.8038	–	MB 380-12	–	–
0.8040	GTW40	MB 400-5	W 40-05	FCMW 370
0.8045	GTW45	MB 450-7	W 45-07	FCMWP 440
0.8135	GTS35	MN 350-10	B 35-12	FCMB 340
0.8145	GTS45	MP 50-5	P 45-06	–
0.8155	GTS55	MP 60-3	P 55-04	–
0.8165	GTS65	–	P 65-02	FCMP 540
0.8170	GTS70	MP 70-2	P 70-02	FCMP 690
0.9620	X 260 NiCr 4-2	–	Grade 2 A	–
0.9625	X 330 NiCr 4-2	–	Grade 2 B	–
0.9630	300 CrNiSi 9-5-2	–	Grade 2 C, D, E	–
0.9635	300 CrMo 15-3	–	Grade 3 A, B	–
0.9640	300 CrMoNi 15-2-1	–	Grade 3 A, B	–
0.9645	260 CrMoNi 20-2-1	–	Grade 3 C	–
0.9650	G-X 260 Cr 27	–	Grade 3 D	–
0.9655	300 CrMo 27-1	–	Grade 3 E	–
1.0301	C 10	XC 10	045 M 10040 A 10	S 10 C
1.0401	C 15	XC 12, XC 18	080 M 15	S 15 C
1.0402	C 22	C 22, XC 18, XC 25	1 C 22, 070 M 20	S 20 C, S 2 C
1.0406	C 25	1 C 25	070 M 26	S 25 C
1.0501	C 35	XC 38, 1 C 35	080 M 36, 1 C 35	S 35 C
1.0503	C 45	1 C 45, XC 48 H 1	1 C 45, 080 M 46	S 45 C
1.0511	C 40	1 C 40, XC 42 H 1	080 M 40, 1 C 40	S 40 C
1.0528	C 30	–	1 C 30, XC 32	S 30 C
1.0535	C 55	1 C 55, XC 55 H 1	1 C 55, 070 M 55	S 55 C
1.0540	C 50	1 C 50	1 C 50, 080 M50	S 50 C
1.0570	S355J2G3	E 36-3, E 36-4	Fe 510 D1 FF, 50/35	SM 490 _, SM 520 B
1.0601	C 60	1 C 60, AF 70 C 55	1 C 60, 080 A 67	S 58 C
1.0715	9 SMn 28	S 250	080 M 15, 230 M 07	SUM 22
1.0718	9 SMnPb 28	S 250 Pb	–	SUM 22 L, SUM 23 L
1.0721	10 S 20	13 MF 4, 10 F 1	210 M 15	–
1.0722	10 SPb 20	CC 10 Pb, 10 PbF 2	–	SUM 12
1.0726	35 S 20	35 MF 6	212 M 36	SUM 41
1.0727	45 S 20	45 MF 61, 45 MF 4	212 M 36	SUM 42
1.0728	60 S 20	–	–	–
1.0736	9 SMn 36	S 300	240 M 07	SUM 25
1.0737	9 SMnPb 36	S 300 Pb	–	SUM 24 L
1.1121	Ck 10 (C 10 E)	XC 10	045 M 10, 040 A 10	S 9 CK, S 10 C
1.1141	Ck 15 (C 15 E)	XC 12, XC 15	080 M 15, 040 A 15	S 15, S 15 Ck
1.1151	C 22 E	2 C 22, XC 18/25	055 M 15	S 20 C, S 20 CK, S 22 C
1.1157	40 Mn 4	35 M 5, 40 M 5	150 M 36	–
1.1158	C 25 E	2 C 25, XC 25	070 M 26	S 25 C, S 28 C

UNI - I	UNE - E	AISI - US	condition	material group
G 10	FG 10	Class 20 B	U	15
G 15	FG 15	Class 25 B	U	15
G 20	FG 20	Class 30 B	U	16
G 25	FG 25	Class 40 B	U	16
G 30	FG 30	Class 45 B	U	16
G 35	FG 35	Class 50 B	U	16
–	–	–	GG/AU	17
–	–	–	GG/AU	17
–	–	–	GG/AU	17
–	–	–	GG/AU	18
–	–	–	GG/AU	31
GS 400-12	–	Grade 60-40-18	U	17
–	–	–	U	17
GS 500-7	–	Grade 65-45-12	U	17
GS 600-3	–	Grade 80-55-06	U	18
GS 700-2	–	Grade 100-70-03	U	18
GS 800-2	–	Grade 120-90-02	U	18
–	–	–	GGG/AU	17
–	–	–	GGG/AU	17
–	–	–	GGG/AU	18
–	–	–	GGG/AU	17
–	–	–	GGG/AU	17
–	–	–	GGG/AU	31
–	–	–	GGG/AU	31
–	–	–	G	20
W 38-12	–	–	G	19
W 40-05	–	–	G	19
W 45-07	–	–	G	19
B 35-10	Type A	Grade 22010, 32510	G	19
P 45-06	Type E	–	G	19
P 55-04	Type C	–	G	20
P 65-02	–	–	G	20
P 70-02	–	–	G	20
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
–	–	–	GO	40
C 10	F. 1511	1010	–	1
C 15, C 16	F. 111	1015	–	1
1 C 22, C 20, C 21	1 C 22, F. 112	1020, 1023	–	1
C 25, 1 C 25	–	1025	var[1]	2–3
C 35, 1 C 35	1 C 35, F. 113	1035	var[1]	2–3
C 45, 1 C 45	1 C 45, F. 114	1045	var[1]	2–3
1 C 40	1 C 40, F. 114.	1040	var[1]	2–3
1 C 30	1 C 30	1030	var[1]	2–3
C 55, 1 C 55	1 C 55	1055	var[1]	4–5
1 C 50	1 C 50	1050	var[1]	2–3
Fe 510 C FN	AE 355 D, Fe 510 D1 FF	–	–	2
C 60, 1 C 60	1 C 60	1060	var[1]	4–5
CF 9 SMn 28, CF 9 M 07	F. 2111	1213	1	–
CF 9 SMnPb 28	F. 2112	12 L 14, 12 L 13	–	1
CF 10 S 20	F. 2121	1102, 1108, 1109	–	1
CF 10 SPb 20	F. 2122	1108, 11 L 08	–	1
CF 35 SMn 10	F. 2131, F. 210.	1141, 1140	var[1]	2–3
CF 44 SMn 28	F. 2133	1146	var[1]	2–3
–	–	1151	var[1]	4–5
CF 9 SMn 36	F. 2113	1215	–	1
CF 9 SMnPb 36	F. 2114	12 L 14	–	1
C10, 2 C 10	F. 1510, C 10	1010	–	1
C 15, C 16	F. 1110, F. 1511	1015	–	1
C 20, C 25	F. 1120	1020, 1023	–	1
–	–	1035, 1041	var[1]	2–3
C 25	F. 1120	1025	var[1]	2–3

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
1.1170	28 Mn 6	28 Mn 6, 35 M 5	28 Mn 6, 150 M 19	SMn 433
1.1178	C 30 E	–	2 C 30, XC 32	S 30 C
1.1181	C 35 E	2 C 35, XC 38 H 1	080 M 36	S 35 C
1.1183	Cf 35	XC 42 TS	080 A 35	S 35 C
1.1186	C 40 E	2 C 40, XC42 H 1	2 C 40, 080 M 40	S 40 C
1.1191	C 45 E	XC 48 H 1, 2 C 45	2 C 45, 080 M 46	S 45 C
1.1193	Cf 45	XC 42 TS	060 A 47	S 45 C
1.1203	C 55 E	2 C 55, XC 55 H 1	2 C 55, 070 M 55	S 55 C
1.1206	C 50 E	2 C 50	2 C 50, 080 M 50	S 50 C
1.1213	Cf 53	42 M 4 TS	060 A 57	S 50 C
1.1221	C 60 E	2 C 60	2 C 60, 060 A 62	S 58 C
1.2241	51 CrV 4	50 CV 4	735 A 51	SUP 10
1.2369	81 MoCrV 42-16	–	–	–
1.3505	100 Cr 6	100 C 6	535 A 99	SUJ 2
1.3520	100 CrMn 6	–	535 A 99	SUJ 3
1.3533	17 NiCrMo 14	16 NCD 13	–	–
1.3536	100 CrMo 7-3	–	–	–
1.3537	100 CrMo 7	100 CD 7	–	SUJ 4
1.3541	X 45 Cr 13	–	–	–
1.3543	X 102 CrMo 17	Z 100 CD 17	–	SUS440 C
1.3551	80 MoCrV 42-16	80 DCV 40	–	–
1.3553	X 82 WMoCrV 6-5-4	Z 85 WDCV 6	BM 2	SKH 51
1.3558	X 75 WCrV 18-4-1	–	BT 1	SKH 2
1.4000	X 6 Cr 13	Z 6 C 13	403 S 17	SUS 410 S
1.4002	X 6 CrAl 13	Z6 CA 13	405 S 17	SUS 405
1.4005	X 12 CrS 13	Z12 CF 13	416 S 21	SUS 416
1.4006	X 12 Cr 13 (X 10 Cr 13)	10 C 13, Z 12 C 13	410 S 21	SUS 410
1.4007	X 35 Cr 14	–	–	SUS 420
1.4016	X 6 Cr 17	Z 8 C 17	430 S 17	SUS 430
1.4021	X 20 Cr 13	Z 20 C 13	420 S 37	SUS 420
1.4024	X 15 Cr 13	–	403 S 17	–
1.4028	X 30 Cr 13	30 C 13, Z 33 C 13	420 S 45	SUS 420
1.4034	X 46 Cr 13	Z 40 C 14	420 S 45	SUS 420
1.4057	X 20 CrNi 17-2	Z 15 CN 16-02	431 S 29	SUS 431
1.4104	X 12 CrMoS 17	Z 10 CF 17	441 S 29	SUS 430 F
1.411	X 90 CrMoV 1	–	–	SUS 440 B
1.4113	X 6 CrMo 17-1	Z 8 CD 17-01	434 S 17	SUS 434
1.4125	X 105 CrMo 17	Z100 CD 17	–	SUS 440 C
1.4301	X 5 CrNi 18-10 (X 4 CrNi 18-10)	Z 6 CN 18-09	304 S 16	SUS 304
1.4303	X 5 CrNi 18-12 (X 4 CrNi 18-12)	Z 8 CN 18-12	305 S 19	–
1.4305	X 10 CrNiS 18-9	Z 10 CNF 18-09	303 S 21	SUS 303
1.4306	X 2 CrNi 19-11	Z 2 CN 18-10	304 S 11	SUS 304 L
1.4307	X 2 CrNi 18-9	Z 3 CN 18-10	304 S 11	SUS 304 L
1.4310	X 12 CrNi 17-7	Z 11 CN 18-08	301 S 21	SUS 301
1.4311	X 2 CrNiN 18-10	Z 3 CN 18-10 Az	304 S 61	SUS 304 LN
1.4362	X 2 CrNiN 23-4	Z 3 CN 23-04 Az	–	–
1.4372	X 12 CrMnNiN 17-7-5	Z 12 CMN 17-07 Az	–	–
1.4401	X 5 CrNiMo 17-12-2 (X 4 CrNiMo 17-12-2)	Z 6 CND 17-11	316 S 31	SUS 316
1.4404	X 2 CrNiMo 17-13-2 (X 2 CrNiMo 17-12-2)	Z 2 CND 17-12	316 S 11	SUS 316 L
1.4406	X 2 CrNiMoN 17-11-2 (X 2 CrNiMoN 17-11-2)	Z 2 CND 17-11 Az	316 S 62	SUS 316 LN
1.4410	X 2 CrNiMoN 25-7-4	Z 3 CND 25-06 Az	–	–
1.4418	X 4 CrNiMo 16-5	Z 6 CND 16 05 1	–	–
1.4429	X 2 CrNiMoN 17-13-3	Z 2 CND 17-13 Az	–	SUS 316 LN
1.4432	X 2 CrNiMo 17-12-3	Z 3 CND 17-12-03	316 S 13	SUS 316 L
1.4434	X 2 CrNiMoN 17-12-3	Z 3 CND 19-14 Az	–	SUS 317 LN
1.4435	X 2 CrNiMo 18-14-3	Z 2 CND 17-13	316 S 13	SUS 316 L
1.4436	X 5 CrNiMo 17-13-3 (X 4 CrNiMo 17-13-3)	Z 6 CND 17-12	316 S 33	SUS 316
1.4438	X 2 CrNiMo 18-16-4 (X 2 CrNiMo 18-15-4)	Z 2 CND 19-15	317 S 12	SUS 317 L
1.4439	X 2 CrNiMoN 17-13-5	3 CND 18-14-05 Az	–	–
1.4441	X 2 CrNiMo 18-15-3	Z 3 CND 18-14-13	316 S 13	–
1.4460	X 4 CrNiMoN 27-5-2 (X 3 CrNiMoN 27-5-2)	25 CND 27-05 A2	–	SUS 329
1.4462	X 2 CrNiMoN 22-5-3	Z2 CND 22-05 Az	–	–
1.4466	X 1 CrNiMoN 25-22-2 (X 2 CrNiMoN 25-22-2)	–	–	–
1.4504	[X 8 CrNiAl 17-7]	Z 8 CNA 17-07	316 S 111	17-7 PH
1.4510	X 6 CrTi 17 (X 3 CrTi 17)	Z 8 CT 17	–	–
1.4512	X 6 CrTi 12 (X 2 CrTi 12)	Z 3 CT 12	409 S 19	SUH 409
1.4532	X 7 CrNiMoAl 15-7 (X 8 CrNiMoAl 15-7-2)	Z 8 CNDA 15-7	–	–
1.4540	X 4 CrNiCuNb 16-4	Z 6 CNU 17-04	–	SUS 630
1.4541	X 6 CrNiTi 18-10	Z 6 CNT 18-10	321 S 12	SUS 321

UNI - I	UNE - E	AISI - US	condition	material group
28 Mn 6	28 Mn 6, 36 Mn	1330	var[1]	2–3
2 C 30, 080 M 30	2 C 30	–	var[1]	2–3
2 C 35, C 35	2 C 35, C 35 k	–	var[1]	2–3
C 36	C 38 k	1035	var[1]	2–3
2 C 40, C40	2 C 40, C 42 k	1040	var[1]	2–3
2 C 45, C 45	2 C 45, C 45 k	–	var[1]	2–3
C 43	C 42 k	1045	var[1]	2–3
2 C 55, C 55	2 C 55, C 55 k	–	var[1]	4–5
2 C 50, C 50	2 C 50, C 55 k	1050	var[1]	2–3
C 48	C 48 k	1050	var[1]	2–3
2 C 60, C 60	2 C 60	–	var[1]	4–5
50 CrV 4	F.1430	6150	var[1]	6–9
–	–	613	var[1]	10–11
100 Cr 6	–	52100	var[1]	6–9
100 CrMo 7	–	A 485/2	var[1]	6–9
–	–	E-3310	var[1]	6–9
–	–	5120	var[1]	6–9
100 CrMo 7	–	A 485/3	var[1]	6–9
X 45 Cr 13	–	–	var[1]	10–11
X 105 CrMo 17	–	440 C	var[1]	10–11
X 80 MoCrV 44	–	–	var[1]	10–11
X 82 WMoV 6 5	–	M2 regular C	var[1]	10–11
X 75 WCrV 18	–	T 1	var[1]	10–11
X5 Cr 13	–	410 S	FE	12
X 6 CrA 13	–	405	FE	12
X 12 CrS 13	–	416	FE	12
X 12 Cr 13	–	410	MA	12
–	–	420	MA	12
X 8 Cr 17	–	430	FE	12
X 20 Cr 13	–	420	MA	12
–	–	403	MA	12
–	–	420	MA	13.1
–	–	420	MA	13.1
X 15 CrNi 16	–	431	MA	13.1
X 10 CrS 17	–	430 F	MA	13.1
–	–	440 B	MA	13.1
X 8 CrMo 17	–	434	MA	13.1
–	–	440 C	MA	13.1
X 5 CrNi 18 10	–	304	AU	14.1
X 8 CrNi 18 12	–	305	AU	14.1
X 10 CrNiS 18 09	–	303	AU	14.1
X 2 CrNi 18 11	–	304 L	AU	14.1
–	–	304 L	AU	14.1
X 12 CrNi 17 07	–	301	AU	14.1
–	–	304 LN	AU	14.1
–	–	–	DU	14.2
–	–	201	DU	14.2
X 5 CrNiMo 17 12	–	316	AU	14.1
X 2 CrNiMo 17 12	–	316 L	AU	14.1
X 2 CrNiMoN	–	316 LN	AU	14.1
–	–	–	DU	14.2
–	–	–	MA	13.1
X 2 CrNiMoN 17 13	–	316 LN	AU	14.1
–	–	316 L	AU	14.1
–	–	317 LN	AU	14.1
X 2 CrNiMo 17 13	–	316 L	AU	14.1
X 5 CrNiMo 17 13	–	316	AU	14.1
X 2 CrNiMo 18 16	–	317 L	AU	14.1
–	–	–	AU	14.1
–	–	316 LVM	AU	14.1
–	–	329	DU	14.2
–	–	2205	DU	14.2
–	–	310 mod	S-AU	14.3
X 2 CrNiMo 17.12	–	17-7 PH	AU-PH	14.4
–	–	439, 430 Ti	FE	12
–	–	409	FE	12
–	–	632	AU	14.1
–	–	630	AU	14.1
X 6 CrNiTi 18 11	–	321	AU	14.1

material number	DIN EN - D	AFNOR - F	BS - UK	JIS
1.4542	X 5 CrNiCuNb 17-4	Z 6 CNU 17-04, Z 7 CNNb 17-07	–	SUS 630
1.4548	X 5 CrNiCuNb 17-4-4	Z 7 CNNb 17-07	–	SUS 630
1.4550	X 6 CrNiNb 18-10	Z 6 CNNB 18-10	347 S 17	SUS 347
1.4552	GX 5 CrNiNb 19-10 (G-X 5 CrNiNb 18-9)	Z 6 CNNb 18.10 M	347 C 17	SCS 21
1.4567	X 3 CrNiCu 18-9 (X 3 CrNiCu 18-9-4)	Z 3 CNU 18-09 FF	–	–
1.4568	X 7 CrNiAl 17-7	Z 8 CNA 17-7	316 S 111	17-7 PH
1.4571	X 6 CrNiMoTi 17-12-2	Z 6 CNDT 17-12	320 S 31	SUS 316 Ti
1.4573	X 10 CrNiMoTi 18-12	Z 6 CNDT 17-13	320 S 33	–
1.4580	X 6 CrNiMoNb 17-12-2	Z 6 CNDNb 17-12	–	–
1.4581	GX 5 CrNiMoNb 19-11 (G-X 5 CrNiMoNb 18-10)	Z 4 CNDNb 18.12 M	318 C 17	SCS 22
1.4583	X 10 CrNiMoNb 18-12	Z 6 CNDNb 17-13	–	–
1.4713	X 10 CrAl 7	Z 8 CA 7	–	–
1.4718	X 45 CrSi 9-3	Z 45 CS 9	401 S 45	SUH 1
1.4720	X 7 CrTi 12	Z 6 CT 12	–	SUS 409
1.4724	X 10 CrAl 13	Z 10 C 13	403 S 17	SUS 405
1.4731	X 40 CrSiMo 10-2	Z 40 CSD 10	–	SUH 3
1.4742	X 10 CrAl 18	Z 12 CAS 18, Z 10 CAS 18	430 S 17	SUS 430
1.4748	X 85 CrMoV 18-2	Z 85 CDV 18.02	–	–
1.4762	X 10 CrAl 24	Z10 CAS 24	–	SCH446
1.4821	X 20 CrNiSi 25-4	Z 20 CNS 25.04	–	–
1.4828	X 15 CrNiSi 20-12 Z	15 CN 23-13, Z 15 CNS 20-12	309 S 24	SUS 309 S
1.4833	X 7 CrNi 23-14	Z 15 CN 23.13, Z 15 CN 24.13	309 S 16	SUH 309
1.4841	X 15 CrNiSi 25-20	Z 15 CNS 25-20, Z 12 CNS 25-20	310 S 24	SUS310
1.4845	X 12 CrNi 25-21	Z 12 CN 26.21, Z 12 CN 25.20	310 S 31	SUH 310
1.4864	X 12 NiCrSi 36-16	Z 20 NCS 33.16, Z 12 NCS 35.16	–	SUH 330
1.4871	X 53 CrMnNiN 21-9	Z 53 CMN 21.09 Az	349 S 54	SUH 35
1.4873	X 45 CrNiW 18-9	Z 35 CNWS 14.14	331 S 40	SUH 31
1.4875	X 55 CrMnNiN 20-8	Z 55 CMN 20.08 Az	–	–
1.4876	X 10 NiCrAlTi 32-20	Z 8 NC 33.21, Z 8 NC 32.21	–	–
1.487	X 12 CrNiTi 18-9	Z 6 CNT 18.12, Z 6 CNT 18.10	321 S 12, 321 S 51	SUS 321
1.4948	X 6 CrNi 18-11	Z 6 CN 18-09	304 S 51	SUS304
1.5023	38 Si 7	46 S 7	–	–
1.5092	60 SiCr 7	61 SC 7	251 A 61	SUP 7
1.5919	15 CrNi 6	16 NC 6	815 M 17	SNC 15
1.5920	18 CrNi 8	20 NC 6	822 M17	SNCM 616
1.6511	36 CrNiMo 4	36 CrNiMo 4	36 CrNiMo 4, 817 A 37	SNCM 439
1.6580	30 CrNiMo 8	30 CrNiMo 8, 30 CND 8	30 CrNiMo 8	SNCM 630
1.6582	34 CrNiMo 6	34 CrNiMo 6	34 CrNiMo 6, 817 M 40	SNCM 447
1.6587	17 CrNiMo 6	18 NCD 6	820 M 17	SNCM 815
1.7003	38 Cr 2	38 Cr 2	38 Cr 2, 120 M 36	SMn 438
1.7003	46 Cr 2	46 Cr 2, 42 C 2	46 Cr 2, 605 M 36	SMn 443
1.7030	28 Cr 4	30 CD 4	530 A 30	–
1.7033	34 Cr 4	34 Cr 4, 32 C 4	34 Cr 4, 530 A 32	SCr 430
1.7034	37 Cr 4	37 Cr 4, 38 C 4	37 Cr 4, 530 A 36	SCr 435
1.7035	41 Cr 4	41 Cr 4, 42 C 4	41 Cr 4, 530 M 40	41 Cr 4SCr 440
1.7037	34 CrS 4	34 CrS 4, 32 C 4	34 CrS 4, 530 A 32	–
1.7038	37 CrS 4	37 CrS 4, 38 C 4	37 CrS 4, 530 A 36	–
1.7039	41 CrS 4	41 CrS 4, 42 C 4	41 CrS 4, 530 M 40	–
1.7102	54 SiCr 6	51 S 7	251 A 58	SKD12
1.7131	16 MnCr 5	16 MC 5	527 M 17	–
1.7147	20 MnCr 5	20 MC 5	–	SMnC 420
1.7176	55 Cr 3	55 C 3	525 A 60	SUP 9
1.7213	25 CrMoS 4	25 CrMoS 4, 25 CD 4	25 CrMoS 4, 708 A 25	–
1.7218	25 CrMo 4	25 CrMo 4, 25 CD 4	25 CrMo 4, 708 A 25	SCM 430
1.7220	34 CrMo 4	34 CrMo 4, 34 CD 4	34 CrMo 4, 708 A 37	SCM 435
1.7225	42 CrMo 4	42 CrMo 4, 42 CD 4	42 CrMo 4, 708 M 40	SCM440
1.7226	34 CrMoS 4	34 CrMoS 4, 34 CD 4	34 CrMoS 4708 A 37	–
1.7227	42 CrMoS 4	42 CrMoS 4, 42 CD 4	42 CrMoS 4, 708 M 40	–
1.7228	50 CrMo 4	50 CrMo 4	50 CrMo 4, 708 A 47	–
1.7321	20 MoCr 4	–	805 M 20	SNCM 220
1.7325	25 MoCr 4	18 CD 4	–	–
1.7361	32 CrMo 12	30 CD 12	722 M 24	–
1.7701	51 CrMoV 4	51 CDV 4	–	SUP 13
1.8159	51 CrV 4	51 CrV 4, 50 CV 4	51 CrV 4	SUP 10
1.8507	34 CrAlMo 5	–	–	–
1.8509	41 CrAlMo 7	40 CAD 6 12	905 M 39	–
1.8515	31 CrMo 12	30 CD 12	722 M 24	–
1.8523	39 CrMoV 13-9	–	897 M 39	–
1.8550	34 CrAlNi 7	–	–	–

UNI - I	UNE - E	AISI - US	condition	material group
–	–	630	AU-PH	14.4
–	–	630	AU-PH	14.4
X 8 CrNiNb 18 11	–	347	AU	14.1
–	–	–	AU	14.1
–	–	302 HQ	AU	14.1
X 2 CrNiMo 17.12	–	17-07 PH	AU-PH	14.4
X 6 CrNiMoTi 17 12	–	316 Ti	AU	14.1
X 6 CrNiMoTi 17 12	–	(316 Ti)	AU	14.1
X 6 CrNiMoNb 17 12	–	316 Cb	AU	14.1
GX 6 CrNiMoNb 20 11	–	–	AU	14.1
X 6 CrNiMoNb 17 13	–	316 Cb, (318)	AU	14.1
–	–	–	FE	10–11
X 45 CS 8	–	HNV 3	–	31–32
–	–	409	–	31–32
X 10 CrAl 12	X 10 CrAl 13	405	FE	12
–	–	–	–	12
X 8 Cr 17	X 10 CrAl 18	430	–	12
–	–	–	–	31–32
X 16 Cr 26	–	446	–	12
–	X 15 CrNiSi 25 04	–	DU	14.2
–	X 10 CrNiSi 20	309	AU	14.1
X 6 CrNi 23 14	–	309 S	AU	14.1
X 16 CrNiSi 25 20	X 15 CrNiSi 25 20	310	AU	14.1
–	–	310 S	AU	14.1
–	X 12 NiCrSi 36 16	330	–	31–32
–	–	EV 8	–	10
X 45 CrNiW 18 9	–	EV 9	–	31–32
–	–	EV 11	–	31–32
–	X 10 NiCrAlTi 32 20	–	S-AU	31–32
X 6 CrNiTi 18 11	–	321, 321 H	–	31–32
–	–	304H	AU	14.1
–	–	–	var1	6–9
60 SiCr 8	F.1442	9260	var1	6–9
–	F.1581	4320	var1	6–9
16 NiCrMo 12	F.1525	–	var1	6–9
36 CrNiMo 4, 39 NiCrMo 3 1	36 CrNiMo 4, 40 NiCrMo 4	–	var1	6–9
SNCM 630	30 CrNiMo 8, 32 NiCrMo 16	–	var1	6–9
34 CrNiMo 6	34 CrNiMo 6	4340	var1	6–9
18 NiCrMo 12	F.1560	–	var1	6–9
38 Cr 2	38 Cr 2, 38 Cr 3	–	var1	6–9
46 Cr 2	46 Cr 2	–	var1	6–9
–	–	–	var1	6–9
34 Cr 4	34 Cr 4	5132	var1	6–9
37 Cr 4	37 Cr 4, 38 Cr 4	5135	var1	6–9
41 Cr 4	41 Cr 4, 42 Cr 4	5140	var1	6–9
34 CrS 4	34 CrS 4	–	var1	6–9
37 CrS 4	37 Cr 4, 38 Cr 4-1	–	var1	6–9
41 CrS 4	41 CrS 4, 42 Cr 4-1	–	var1	6–9
48 Si 7	F.1450	9260	var1	6–9
16 MnCr 5	F.1516	–	var1	6–9
20 MnCr 5	F.1523	–	var1	6–9
55 Cr 3	–	5155	var1	6–9
25 CrMoS 4, 25 CrMo 4	25 CrMoS 4, 30 CrMo 4-1	–	var1	6–9
25 CrMo 4	25 CrMo 4, 30 CrMo 4	4130	var1	6–9
34 CrMo 4, 35 CrMo 4	34 CrMo 4, 35 CrMo 4	4137	var1	6–9
42 CrMo 4	42 CrMo 4	–	var1	6–9
34 CrMoS 4, 35 CrMo 4	34 CrMoS 4, 35 CrMo 4	–	var1	6–9
42 CrMoS 4, 42 CrMo 4	42 CrMoS 4, 40 CrMo 4-1	–	var1	6–9
50 CrMo 4	50 CrMo 4	4150	var1	6–9
16 NiCrMo 2	F.1523	8620	var1	6–9
20 NiCrMo 2	–	8625	var1	6–9
–	–	–	var1	6–9
51 CrMoV 4	–	–	var1	6–9
51 CrV 4, 50 CrV 4	51 CrV 4	6150	var1	6–9
–	35 CrAlMo 5	A 355/D	var1	6–9
41 CrAlMo 7	41 CrAlMo 7	A 355/A	var1	6–9
31 CrMo 12	31 CrMo 12	–	var1	6–9
36 CrMoV 12	–	–	var1	6–9
–	–	A 355/C	var1	6–9

Order No.	Catalogue No.	Page(s)
1016374	KLS40M	M12, M36, W64
1016538	SM820 K9	C36
1016544	SM837 K9	C37, C39, C109
1016546	SM840 K9	C36–37, C108
1016548	SM841 K9	C37–39, C65
1016602	SKTP343 K9	C48
1016624	SKCP343 K9	C42
1016626	SKDP343 K9	C43–45
1016628	SKCP453 K9	C42, C67
1016644	IWSN433 K9	C19, C59
1016648	ITSN323 K9	C16, C58
1016674	ISSN433 K9	C12–15
1016678	ICSN433 K9	C8–10, C56
1016680	IDSN433 K9	C11, C56–57
1016682	IDSN443 K9	C11
1017174	SMYE3 K9	F70–72, F74, F77
1017176	SMYI3 K9	F70–72, F74, F77
1017178	SMYE4 K9	F70–72, F74, F77
1017180	SMYI4 K9	F70–72, F74, F77
1017220	ITSN322 K9	C102–103
1017226	IVSN322 K9	C17–18, C58
1017228	SKVN343 K9	C48–49
1017230	IDSN432 K9	C95–96
1017248	IRSN44 K9	C12
1017252	ICSN432 K9	C92–94
1017276	ITSN433 K9	C16, C102–103
1017278	ISSN432 K9	C97–101
1017282	IVSN432 K9	C17
1017294	ITSN534 K9	C16, C102
1017298	ICSN533 K9	C56
1017300	ISSN633 K9	C97, C101
1017334	ICSN633 K9	C94
1018413	CM109	E79, F32
1018531	CM-72	F28–29, F34
1018533	CM73	F28–29, F34
1018569	CM80	E76, F24, F27
1018571	CM81	E74, E76, F25, F27
1019661	MS1495	E124–125
1019940	S310	F24–25
1020058	S352	F24–25
1020577	CKM7	C36–37
1020581	CKM9	C36–39
1020583	CKM10	C36–39, C65
1020597	CKM13	C37
1020601	CKM19	C38–39, C65
1020603	CKM20	C108
1020657	CKM41	C95
1020787	KUAM20	C110–111, C113–117, C119, C126–129
1020789	KUAM22	C92–94, C97–103, C106–109
1020791	KUAM23	C104–105, C112, C119–122, C124, C126–129
1020805	KUAM26	C102, C108
1020807	KUAM27	C94, C97, C101
1020809	KUAM28	C92, C97–101, C104–110, C112–113, C118–121, C123–129
1020811	KUAM30	C92, C97–101, C106–110, C112–113, C118–121, C123–129
1020813	KUAM31	C92–94, C97–109, C112, C119–122, C124, C126–129
1020835	KUAM32	C92–105, C108–109, C112, C120, C124
1020839	KUAM34	C110–111, C113–117, C119, C126–129
1020841	KUAM35	C110, C113, C115–116
1020843	KUAM25	C92–103, C109, C112, C120, C124
1020857	CKM38	C102
1020917	SRS3	C42–49
1020919	SRS4	C42–47, C67, C73
1020923	SSY3T	F70–72, F74, F77
1020935	SSY4T	F70–72, F74, F77
1020941	SSN2T	F70, F74, F77
1020943	SSA3T	F70–72, F74, F77
1020965	SSA4T	F70–72, F74, F77
1020969	MS110	C65
1020971	MS111	C36–39, C108
1020973	MS412	E122
1020975	MS125	C37, C39, C109
1021007	MS1321	C40–41
1021049	MS318	E122
1021053	MS1071	E125
1021085	MS1073	E125
1021095	MS518	E128
1021097	MS352	E74, E76, E127, F25, F27
1021135	MS959	C36
1021137	MS960	C37–39
1021143	MS364	C94, C97, C101–102
1021327	MS1242	M23, M31, M36
1021337	MS1152	C126–129, V10, V13, V16, V19
1021339	MS1153	C42–45, C48, C66–67, C69–73, C75–76, C78–81, C110–111, C113–119, C126–129
1021341	MS1155	C42, C44, C66–67, C69–73, C75–76, C78–81, C110, C112–113, C119–121, C123–129
1021343	MS1156	C42–49
1021375	MS1158	C42–47, C67, C73
1021421	STCM9	C36, C38–39, C65, C92–103
1021423	STCM11	C108
1021451	STCM4	C36–39
1021453	STCM5	C37
1021455	STCM8	C36–39, C65, C94, C97, C101, C109
1021505	STCM37	C102–103
1021507	STCM38	C92–94, C97–103, C106–109
1021509	STCM39	C102
1021511	STCM40	C95, C97–99
1021535	KLM43	C92–94, C97–101
1021537	KLM46	C92, C94–96, C102–103
1021539	KLM58	C102
1021541	KLM68	C94, C97, C101
1021543	KLM33L	C102–103
1021565	KLM34L	C102–103
1021569	KLM46S	C92–101
1021591	FT7	U42–43
1021593	FT8	U42–43
1021605	FT15	U42–43
1021607	FT20	U42
1022436	CKM37	C97–99
1022519	TT25	V10, V13, V16, V19
1053706	MS1254	M62, M67
1056234	SKSP453 K9	C46–47
1059844	MS326	E30–31, E34
1067609	CKC3	F71–72, F77
1067610	CKC4	F71–72, F77
1067613	CM74	E74, E76, E78, F24, F27–29, F31, F34
1067614	CM75	E74, E76, E78, F25, F27–29, F31, F34
1067630	CM146	E78, F31, F34–35
1067631	CM147	E78, F31, F34–35
1093271	75HC060M	T117
1093272	75HC080M	T117
1093273	75HC100M	T117
1093524	75HC120M	T117
1093525	75HC140M	T117
1093526	75HC160M	T117
1099381	CM182	E75, F26
1099382	CM183	E75, F26
1099429	SM819 K9	C37–39
1099440	SKSP343 K9	C46–47
1099444	SKDP453 K9	C43–45, C73
1099445	SKSN566K K9	C97–99
1099446	SKRN100300 K9	C45
1099447	SKRN160400 K9	C45
1099451	ICSN332 K9	C9
1099452	IDSN322 K9	C11, C56–57
1099614	MS1933	C78–79, C110, C113, C115–116
1099615	MS1939	C67, C69–70
1099631	SRS5	C45
1099640	MS1034	E79, F32
1099643	MS1154	C45, C119
1099644	MS1157	C67, C112, C120, C122, C124
1099645	MS1160	C45, V10, V13, V16, V19
1099646	MS1200	E74–76, E78, F24–27, F31
1099649	KLM33	C92, C97–101
1099650	KLM54	C97–99
1108062	515.018	C20–30, C60–61
1108063	513.023	C20–30, C60–61, C104–105
1108065	511.023	C20–22, C25–30, C60–61, C104–105
1108068	512.112	C20–22, C60, C104
1116889	CKM34	C92–94, C96–103, C106–109
1120807	552.240	C33–34
1121055	551.316	C31, C62–64
1121063	551.332	C32
1121078	551.333	C35
1121086	551.317	C31–34, C62, C64
1121094	557.111	C31, C33–35, C62, C64
1121102	557.125	C32–33
1121205	552.232	C63–64
1121232	552.221	C31–32, C62
1121239	552.220	C31, C62
1121265	552.225	C63
1121273	552.228	C32–33
1121302	552.230	C35
1121313	552.229	C35
1121346	554.252	C31–35, C62–64
1121353	554.253	C62
1121362	554.254	C63
1122009	512.111	C22
1127019	MS1162	E36
1129648	MS1234	J24, M23
1131459	MS1488	F28–29, F34–35
1131545	512.135	C30, C61
1131646	191.405	C97–101, C106–110, C112–113, C118–121, C123–129
1131653	191.406	C92–94, C97–109, C112, C119–122, C124, C126–129
1131658	191.407	C92–105, C108–109, C112, C120, C124
1132119	191.725	J20–24
1132436	191.848	M20–23
1132599	ISSN846 K9	C12, C14
1133349	SN3TPKG	F77
1134385	192.432	J4–8, V10, V13, V16, V19
1135392	512.134	C30
1136414	192.932	M36
1136777	125.025	J35, M12, M85, M91, M96
1136849	125.230	J8, J35, M12, M85, M91, M96
1137216	125.825	J35, M6
1137321	511.018	C22, C26–30, C60
1137331	511.024	C23–24
1137339	511.025	C20–22, C25–27, C60, C104–105
1137346	511.028	C29
1137353	511.030	C61
1137382	511.033	C20–22, C25–27
1137396	511.038	C25–27
1137452	511.060	C23
1137453	129.025	M55, M62, M67
1137493	129.512	M67
1137509	512.013	C28–29, C60
1137533	512.023	C28–29, C60
1137541	512.025	C25–27, C105
1137585	512.031	C29
1137600	512.053	C26–27
1137610	512.060	C23
1137616	512.063	C25–27, C105
1137650	512.083	C25–27
1137670	512.092	C25–27
1137678	512.100	C34
1137686	512.101	C34
1137710	512.117	C20–22, C60, C104
1137736	512.123	C20–22
1137789	512.153	C23–24
1137987	513.018	C28–30, C60
1137996	513.019	C22, C26–27
1138003	513.020	C34
1138029	513.025	C20–22, C25–27, C29, C60, C104–105
1138057	513.033	C20–22, C25–27
1138064	513.038	C25–27
1138071	513.060	C23
1138195	514.018	C22
1138315	170.004	C34
1138319	515.022	C20–22, C25–27, C29, C60
1138328	515.028	C25–27
1138413	170.023	L18
1138438	170.025	J20–24, L18, M20–23, M28–31
1138446	170.026	M36
1138465	170.028	J4–8
1146699	CKM35	C94, C97, C101–103, C109
1147002	ICSN846 K9	C9

Order No.	Catalogue No.	Page(s)
1147828	511.022	C60, C104–105
1175225	193.281	V10, V13, V16, V19
1192341	MS1072	E127
1230373	CKM36	C92, C95–101
1243898	513.123	C34
1243928	551.129	C34
1243929	551.130	C34
1260086	CC09	D10–13, D63
1260087	CC11	D10
1271092	FC11	D16
1271093	FC14	D15–17
1274022	ICSN643 K9	C8–10
1274659	IRSN84 K9	C12
1274800	ISSN443 K9	C12–15
1274805	ISSN543 K9	C12–15
1274807	ISSN643 K9	C12–15
1293458	M41223	R6
1293463	M41428	R12
1293468	M41498	R15
1293470	M40342	R9
1293476	M41434	R12
1293727	M41228	R6
1293733	M41233	R6
1293748	M41402	R11
1293770	M41479	R14
1315965	MS1489	F28–29, F34
1319470	IWSN322 K9	C19
1363654	56-1018	U40–45
1363761	56-1020	U40–45
1534016	M41431	R12
1546392	SMYE5 K9	F70–72
1546393	SMYI5 K9	F71–72, F74
1570244	490614014CW TICN-CW	066
1598896	M41222	R6
1602233	D50203002RT TIALN-RT	0134
1602235	D50204002RT TIALN-RT	0134
1602236	D50205002RT TIALN-RT	0134
1602239	D50208003RT TIALN-RT	0134
1602240	D50210004RT TIALN-RT	0134
1602251	D50212005RT TIALN-RT	0134
1602252	D50216006RT TIALN-RT	0134
1602266	463200400RT TIALN-RT	0117
1602268	463200500RT TIALN-RT	0117
1602270	463200600RT TIALN-RT	0117
1602273	463200800RT TIALN-RT	0117
1602274	463201000RT TIALN-RT	0117
1602275	463201500RT TIALN-RT	0117
1602538	465102000RT TIALN-RT	0119
1606050	50HC040M	T117
1606061	50HC060M	T117
1606062	50HC080M	T117
1606064	50HC100M	T117
1611066	465101000RT TIALN-RT	0119
1621087	MS2002	E36
1656432	410201000.. UNCOATED	0136
1656436	410201500.. UNCOATED	0136
1656440	410202000.. UNCOATED	0136
1656444	410202500.. UNCOATED	0136
1656448	410203000.. UNCOATED	0136
1656454	410204001.. UNCOATED	0136
1656458	410205001.. UNCOATED	0136
1656459	410205002.. UNCOATED	0136
1656464	410206002.. UNCOATED	0136
1656468	410208003.. UNCOATED	0136
1656473	410210004.. UNCOATED	0136
1656478	410212005.. UNCOATED	0136
1656484	410214014.. UNCOATED	0136
1656488	410216006.. UNCOATED	0136
1656492	410218018.. UNCOATED	0136
1656496	410220007.. UNCOATED	0136
1656500	410303000.. UNCOATED	0139
1656501	410304001.. UNCOATED	0139
1656502	410304001CT TICN-CT	0139
1656503	410304002.. UNCOATED	0139
1656504	410305001.. UNCOATED	0139
1656505	410305002.. UNCOATED	0139
1656506	410306002.. UNCOATED	0139
1656507	410306002CT TICN-CT	0139
1656508	410308003.. UNCOATED	0139
1656509	410308003CT TICN-CT	0139
1656510	410310004.. UNCOATED	0139
1656511	410312005.. UNCOATED	0139
1656512	410314014.. UNCOATED	0139
1656513	410316006.. UNCOATED	0139
1656514	410318018.. UNCOATED	0139
1656515	410320007.. UNCOATED	0139
1656750	460303002RT TIALN-RT	091
1656758	460304002RT TIALN-RT	091
1656765	460305002RT TIALN-RT	091
1656770	460306002.. UNCOATED	091
1656773	460306002RT TIALN-RT	091
1656781	460308003RT TIALN-RT	091
1656788	460310004.. UNCOATED	091
1656791	460310004RT TIALN-RT	091
1656799	460312005RT TIALN-RT	091
1656807	460316006RT TIALN-RT	091
1656815	460320007RT TIALN-RT	091
1656841	463200400.. UNCOATED	0117
1656844	463200500.. UNCOATED	0117
1656849	463200600.. UNCOATED	0117
1656853	463200800.. UNCOATED	0117
1656858	463201000.. UNCOATED	0117
1656863	463201500.. UNCOATED	0117
1656867	463202000.. UNCOATED	0117
1656873	463300400.. UNCOATED	0118
1656875	463300400RT TIALN-RT	0118
1656878	463300500.. UNCOATED	0118
1656880	463300500RT TIALN-RT	0118
1656883	463300600.. UNCOATED	0118
1656885	463300600RT TIALN-RT	0118
1656888	463300800.. UNCOATED	0118
1656890	463300800RT TIALN-RT	0118
1656893	463301000.. UNCOATED	0118
1656895	463301000RT TIALN-RT	0118
1656898	463301200.. UNCOATED	0118
1656900	463301200RT TIALN-RT	0118
1656901	463301500.. UNCOATED	0118
1656903	463301500RT TIALN-RT	0118
1656906	463301800.. UNCOATED	0118
1656908	463301800RT TIALN-RT	0118
1656909	463302000.. UNCOATED	0118
1656910	463302000RT TIALN-RT	0118
1656913	463302500RT TIALN-RT	0118
1656916	463303000RT TIALN-RT	0118
1656950	465101000.. UNCOATED	0119
1656951	465101000CT TICN-CT	0119
1656952	465101200.. UNCOATED	0119
1656953	465101200CT TICN-CT	0119
1656954	465101200RT TIALN-RT	0119
1656955	465101500.. UNCOATED	0119
1656956	465101500CT TICN-CT	0119
1656957	465101500RT TIALN-RT	0119
1656959	465101800CT TICN-CT	0119
1656960	465101800RT TIALN-RT	0119
1656971	465102000.. UNCOATED	0119
1656972	465102000CT TICN-CT	0119
1656997	490604002CW TICN-CW	066
1657000	490604002LW TIALN-LW	066
1657001	490604002RT TIALN-RT	066
1657002	490604002RW TIALN-RW	066
1657007	490605002CW TICN-CW	066
1657008	490605002LW TIALN-LW	066
1657009	490605002RT TIALN-RT	066
1657010	490605002RW TIALN-RW	066
1657016	490606002CW TICN-CW	066
1657017	490606002LW TIALN-LW	066
1657018	490606002RT TIALN-RT	066
1657019	490606002RW TIALN-RW	066
1657023	490607003CW TICN-CW	066
1657024	490607003LW TIALN-LW	066
1657025	490607003RW TIALN-RW	066
1657031	490608003CW TICN-CW	066
1657032	490608003LW TIALN-LW	066
1657033	490608003RT TIALN-RT	066
1657034	490608003RW TIALN-RW	066
1657039	490609004CW TICN-CW	066
1657040	490609004LW TIALN-LW	066
1657041	490609004RW TIALN-RW	066
1657048	490610004CW TICN-CW	066
1657049	490610004LW TIALN-LW	066
1657050	490610004RT TIALN-RT	066
1657051	490610004RW TIALN-RW	066
1657055	490611005CW TICN-CW	066
1657056	490611005RW TIALN-RW	066
1657061	490612005CW TICN-CW	066
1657062	490612005LW TIALN-LW	066
1657063	490612005RT TIALN-RT	066
1657064	490612005RW TIALN-RW	066
1657068	490613014CW TICN-CW	066
1657069	490613014RW TIALN-RW	066
1657083	490614014LW TIALN-LW	066
1657084	490614014RT TIALN-RT	066
1657085	490614014RW TIALN-RW	066
1657094	490616006CW TICN-CW	066
1657095	490616006LW TIALN-LW	066
1657096	490616006RT TIALN-RT	066
1657097	490616006RW TIALN-RW	066
1657102	490618018CW TICN-CW	066
1657103	490618018LW TIALN-LW	066
1657104	490618018RT TIALN-RT	066
1657105	490618018RW TIALN-RW	066
1657110	490620007CW TICN-CW	066
1657111	490620007LW TIALN-LW	066
1657112	490620007RT TIALN-RT	066
1657113	490620007RW TIALN-RW	066
1657118	490625008CW TICN-CW	066
1657119	490625008LW TIALN-LW	066
1657120	490625008RT TIALN-RT	066
1657121	490625008RW TIALN-RW	066
1657125	490906002.. UNCOATED	0140
1657126	490906002WW UNCOATEDWW	0140
1657127	490908003.. UNCOATED	0140
1657128	490908003WW UNCOATEDWW	0140
1657129	490910004.. UNCOATED	0140
1657131	490910004WW UNCOATEDWW	0140
1657132	490912005.. UNCOATED	0140
1657134	490912005WW UNCOATEDWW	0140
1657136	490914014.. UNCOATED	0140
1657137	490914014WW UNCOATEDWW	0140
1657138	490916006.. UNCOATED	0140
1657140	490916006WW UNCOATEDWW	0140
1657142	490918018.. UNCOATED	0140
1657143	490918018WW UNCOATEDWW	0140
1657144	490920007.. UNCOATED	0140
1657145	490920007WW UNCOATEDWW	0140
1657146	490925008.. UNCOATED	0140
1657148	490925008WW UNCOATEDWW	0140
1657191	496605002CW TICN-CW	067
1657192	496605002LW TIALN-LW	067
1657193	496605002RW TIALN-RW	067
1657196	496606002CW TICN-CW	067
1657197	496606002LW TIALN-LW	067
1657198	496606002RW TIALN-RW	067
1657201	496608003CW TICN-CW	067
1657202	496608003LW TIALN-LW	067
1657203	496608003RW TIALN-RW	067
1657206	496610004CW TICN-CW	067
1657207	496610004LW TIALN-LW	067
1657208	496610004RW TIALN-RW	067
1657211	496612005CW TICN-CW	067
1657212	496612005LW TIALN-LW	067
1657213	496612005RW TIALN-RW	067
1657217	496614014LW TIALN-LW	067
1657218	496614014RW TIALN-RW	067
1657221	496616006CW TICN-CW	067
1657222	496616006LW TIALN-LW	067
1657223	496616006RW TIALN-RW	067
1657227	496618018CW TICN-CW	067
1657232	496620007CW TICN-CW	067
1657234	496620007RW TIALN-RW	067
1657237	496625008CW TICN-CW	067
1657239	496625008RW TIALN-RW	067
1657259	49H608003LW TIALN-LW	055
1657260	49H608003RW TIALN-RW	055
1657263	49H610004LW TIALN-LW	055
1657264	49H610004RW TIALN-RW	055
1657268	49H612005RW TIALN-RW	055
1657273	49H616006LW TIALN-LW	055
1657274	49H616006RW TIALN-RW	055
1657277	49H618018LW TIALN-LW	055
1657278	49H618018RW TIALN-RW	055
1657281	49H620007LW TIALN-LW	055
1657282	49H620007RW TIALN-RW	055
1660373	6N0606002LW	Q5
1660389	6N0608004LW	Q5
1660397	6N0609004LW	Q5
1660405	6N0610004LW	Q5
1660413	6N0611005LW	Q5
1660421	6N0612005LW	Q5
1660437	6N0614005LW	Q5
1660453	6N0616006LW	Q5
1660471	6N0618006LW	Q5
1660479	6N0620007LW	Q5
1660487	6N0622007LW	Q5
1660497	6N0625008LW	Q5

Order No.	Catalogue No.	Page(s)
1660507	6N0630008LW	Q5
1660596	6N7006002LW	Q6
1660598	6N7008004LW	Q6
1660600	6N7010004LW	Q6
1660602	6N7012005LW	Q6
1660604	6N7014005LW	Q6
1660606	6N7016006LW	Q6
1660608	6N7018006LW	Q6
1660610	6N7020007LW	Q6
1660612	6N7025008LW	Q6
1660614	6N7032009LW	Q6
1660617	6NL610004LW	Q7
1660623	6NL612005LW	Q7
1660629	6NL616006LW	Q7
1660635	6NL620007LW	Q7
1660640	6NL625008LW	Q7
1661526	D50203002.. UNCOATED	0134
1661530	D50204002.. UNCOATED	0134
1661534	D50205002.. UNCOATED	0134
1661538	D50206002.. UNCOATED	0134
1661540	D50206002RT TIALN-RT	0134
1661543	D50208003.. UNCOATED	0134
1661547	D50210004.. UNCOATED	0134
1661551	D50212005.. UNCOATED	0134
1661555	D50214014.. UNCOATED	0134
1661560	D50216006.. UNCOATED	0134
1661569	D50220007.. UNCOATED	0134
1661573	D50302002CW TICN-CW	085
1661574	D50302002RW TIALN-RW	085
1661576	D50302002WW UNCOATEDWW	085
1661577	D50303002CW TICN-CW	085
1661578	D50303002RW TIALN-RW	085
1661580	D50303002WW UNCOATEDWW	085
1661582	D50304002CW TICN-CW	085
1661583	D50304002RW TIALN-RW	085
1661585	D50304002WW UNCOATEDWW	085
1661587	D50305002CW TICN-CW	085
1661588	D50305002RW TIALN-RW	085
1661590	D50305002WW UNCOATEDWW	085
1661592	D50306002CW TICN-CW	085
1661593	D50306002RW TIALN-RW	085
1661595	D50306002WW UNCOATEDWW	085
1661601	D50308003CW TICN-CW	085
1661603	D50308003RW TIALN-RW	085
1661605	D50308003WW UNCOATEDWW	085
1661611	D50310004CW TICN-CW	085
1661612	D50310004RW TIALN-RW	085
1661614	D50310004WW UNCOATEDWW	085
1661617	D50312005RW TIALN-RW	085
1661619	D50312005WW UNCOATEDWW	085
1661622	D50314014RW TIALN-RW	085
1661627	D50316006RW TIALN-RW	085
1661629	D50316006WW UNCOATEDWW	085
1661636	D50320007RW TIALN-RW	085
1661680	D51303002RW TIALN-RW	085
1661682	D51303002WW UNCOATEDWW	085
1661684	D51304002RW TIALN-RW	085
1661686	D51304002WW UNCOATEDWW	085
1661688	D51305002RW TIALN-RW	085
1661690	D51305002WW UNCOATEDWW	085
1661692	D51306002RW TIALN-RW	085
1661694	D51306002WW UNCOATEDWW	085
1661701	D51308003RW TIALN-RW	085
1661703	D51308003WW UNCOATEDWW	085
1661710	D51310004RW TIALN-RW	085
1661712	D51310004WW UNCOATEDWW	085
1661715	D51312005RW TIALN-RW	085
1661717	D51312005WW UNCOATEDWW	085
1661720	D51314014RW TIALN-RW	085
1661725	D51316006RW TIALN-RW	085
1661727	D51316006WW UNCOATEDWW	085
1661730	D51318018RW TIALN-RW	085
1661732	D51318018WW UNCOATEDWW	085
1661735	D51320007RW TIALN-RW	085
1661737	D51320007WW UNCOATEDWW	085
1661856	DC0303002LW TIALN-LW	086
1661858	DC0304002LW TIALN-LW	086
1661860	DC0305002LW TIALN-LW	086
1661862	DC0306002LW TIALN-LW	086
1661866	DC0308003LW TIALN-LW	086
1661868	DC0310004LW TIALN-LW	086
1661870	DC0312005LW TIALN-LW	086
1661872	DC0314014LW TIALN-LW	086
1661874	DC0316006LW TIALN-LW	086
1661876	DC0318018LW TIALN-LW	086
1661878	DC0320007LW TIALN-LW	086
1716039	6N7020007LT	Q6
1717017	6N7016006LT	Q6
1724321	705002001RT TIALN-RT1	0189
1724322	705002501RT TIALN-RT1	0189
1724323	705003002RT TIALN-RT1	0189
1724324	705004002RT TIALN-RT1	0189
1724325	705005002RT TIALN-RT1	0189
1724326	705006004RT TIALN-RT1	0189
1724327	705008004RT TIALN-RT1	0189
1724328	705010005RT TIALN-RT1	0189
1724329	705012006RT TIALN-RT1	0189
1724330	705016006RT TIALN-RT1	0189
1724361	705020007RT TIALN-RT1	0189
1724463	750508003LT TIALN-LT1	0180
1724464	750510004LT TIALN-LT1	0180
1724465	750512005LT TIALN-LT1	0180
1724466	750516006LT TIALN-LT1	0181
1724467	750520007LT TIALN-LT1	0181
1724468	751506002LT TIALN-LT1	0180
1724469	751508003LT TIALN-LT1	0180
1724481	751510004LT TIALN-LT1	0180
1724482	751512005LT TIALN-LT1	0180
1724483	751516006LT TIALN-LT1	0181
1724484	751520007LT TIALN-LT1	0181
1724487	752506002LT TIALN-LT1	0180
1724489	752508003LT TIALN-LT1	0180
1724490	752510004LT TIALN-LT1	0180
1724531	752512005LT TIALN-LT1	0181
1724533	752516006LT TIALN-LT1	0181
1724536	752520007LT TIALN-LT1	0181
1724556	767005002LT TIALN-LT1	0193
1724558	767006004LT TIALN-LT1	0193
1724559	767008004LT TIALN-LT1	0193
1724560	767010005LT TIALN-LT1	0193
1724582	767004002LT TIALN-LT1	0193
1724590	767012006LT TIALN-LT1	0193
1724621	767016006LT TIALN-LT1	0193
1724622	767020007LT TIALN-LT1	0193
1731683	750525008LT TIALN-LT1	0181
1736199	KLS32M	M12, M31, M36
1744444	KUAM33	C101
1747878	751525008LT TIALN-LT1	0181
1747931	752525008LT TIALN-LT1	0181
1752626	420.200	J35, M67
1756815	193.332	V10, V13, V16, V19
1775478	CM72LP	E74, E76, E78, F24, F27, F31
1775479	CM73LP	E74, E76, E78, F25, F27, F31
1796705	470.232	M67
1796707	470.233	J35
1806404	767025008LT TIALN-LT1	0193
1823871	MS1982	V10, V13, V16, V19
1841781	MS1336	M31
1841782	MS2038	J24, M6, M31, M36, M62, M67
1848655	ICSN443 K9	C8–10
1848805	754506002LT TIALN-LT1	0180
1852181	CS412	C40–41
1858322	497906002.. UNCOATED	0141
1858423	497906002CT TICN-CT	0141
1858424	497908003.. UNCOATED	0141
1858425	497908003CT TICN-CT	0141
1858426	497910004.. UNCOATED	0141
1858427	497910004CT TICN-CT	0141
1858428	497912005.. UNCOATED	0141
1858430	497912005CT TICN-CT	0141
1858434	497916006.. UNCOATED	0141
1858437	497916006CT TICN-CT	0141
1858441	497920007.. UNCOATED	0141
1858463	497920007CT TICN-CT	0141
1858465	497925008.. UNCOATED	0141
1858466	497925008CT TICN-CT	0141
1859874	49G908003CT TICN-CT	0143
1859875	49G910004CT TICN-CT	0143
1859876	49G912005CT TICN-CT	0143
1859877	49G916006CT TICN-CT	0143
1859878	49G920007CT TICN-CT	0143
1859879	49G925008CT TICN-CT	0143
1859880	715002000RT TIALN-RT1	0188
1859881	715002500RT TIALN-RT1	0188
1859882	715003000RT TIALN-RT1	0188
1859904	715004001RT TIALN-RT1	0188
1859906	715005001RT TIALN-RT1	0188
1859907	715006002RT TIALN-RT1	0188
1859908	715008003RT TIALN-RT1	0188
1859909	715010004RT TIALN-RT1	0188
1859910	715012005RT TIALN-RT1	0188
1859911	715016006RT TIALN-RT1	0188
1859912	715020007RT TIALN-RT1	0188
1860036	715101000RT TIALN-RT1	0174
1860090	715102000RT TIALN-RT1	0174
1860103	715102500RT TIALN-RT1	0174
1860106	715103000RT TIALN-RT1	0174
1860109	715104001RT TIALN-RT1	0174
1860111	715105001RT TIALN-RT1	0174
1860112	715106002RT TIALN-RT1	0174
1860133	715108003RT TIALN-RT1	0174
1860134	715110004RT TIALN-RT1	0174
1860135	715112005RT TIALN-RT1	0174
1860136	715116006RT TIALN-RT1	0174
1860137	715120007RT TIALN-RT1	0174
1860603	754508003LT TIALN-LT1	0180
1860604	754510004LT TIALN-LT1	0180
1860605	754512005LT TIALN-LT1	0180
1860606	754516006LT TIALN-LT1	0181
1860607	754520007LT TIALN-LT1	0181
1860608	754525008LT TIALN-LT1	0181
1860609	758506002LT TIALN-LT1	0182
1860610	758506012LT TIALN-LT1	0182
1860611	758508003LT TIALN-LT1	0182
1860612	758508013LT TIALN-LT1	0182
1860623	758510004LT TIALN-LT1	0183
1860624	758510014LT TIALN-LT1	0183
1860625	758512005LT TIALN-LT1	0183
1860626	758512015LT TIALN-LT1	0183
1860627	758516006LT TIALN-LT1	0183
1860628	758516016LT TIALN-LT1	0183
1860629	758520007LT TIALN-LT1	0183
1860630	758520017LT TIALN-LT1	0183
1860631	758525008LT TIALN-LT1	0183
1860632	758525018LT TIALN-LT1	0183
1862105	759506002LT TIALN-LT1	0182
1862106	759506012LT TIALN-LT1	0182
1862107	759508003LT TIALN-LT1	0182
1862108	759508013LT TIALN-LT1	0182
1862109	759510004LT TIALN-LT1	0182
1862110	759510014LT TIALN-LT1	0182
1862111	759512005LT TIALN-LT1	0183
1862112	759512015LT TIALN-LT1	0183
1862113	759516006LT TIALN-LT1	0183
1862114	759516016LT TIALN-LT1	0183
1862115	759520007LT TIALN-LT1	0183
1862116	759520017LT TIALN-LT1	0183
1862117	759525008LT TIALN-LT1	0183
1862118	759525018LT TIALN-LT1	0183
1862119	75N506002LT TIALN-LT1	0184
1862120	75N508003LT TIALN-LT1	0184
1862121	75N510004LT TIALN-LT1	0184
1862122	75N512005LT TIALN-LT1	0185
1862123	75N516006LT TIALN-LT1	0185
1862124	75N520007LT TIALN-LT1	0185
1862125	75N525008LT TIALN-LT1	0185
1863407	552.210	C64
1867212	SSP025016M	C8–19, C56–59
1867278	KMSP415IP	C8–17, C19, C56–57, C59
1867314	KMSP515IP	C8–10, C12–16, C56
1867321	KLM46L15IP	C8–16
1867333	KLM4615IP	C8–10, C12–15, C17, C19
1867338	KLM58L15IP	C8–10, C12–15
1867342	KLM5815IP	C16
1872409	ICSN543 K9	C8–10
1880671	193.341	M46–48
1880754	193.342	M52–55, M59–62
1888504	193.364	M42–43
1888505	193.343	M36, M66–67
1888506	193.383	M67
1896375	193.338	M59–62
1902322	410303000CT TICN-CT	0139
1902489	49G908003CW TICN-CW	0143
1902490	49G910004CW TICN-CW	0143
1902491	49G912005CW TICN-CW	0143
1902492	49G916006CW TICN-CW	0143
1902493	49G920007CW TICN-CW	0143
1902494	49G925008CW TICN-CW	0143
1902576	410305001CT TICN-CT	0139
1902578	410310004CT TICN-CT	0139
1902579	410312005CT TICN-CT	0139
1902593	410314014CT TICN-CT	0139
1902594	410316006CT TICN-CT	0139
1902595	410318018CT TICN-CT	0139
1902596	410320007CT TICN-CT	0139

Order No.	Catalogue No.	Page(s)
1905810	MS1294	E126–127, H72, J8, J24, M23, M31
1905949	410305002CT TICN-CT	O139
1926120	7F1-0875A	U30
1926121	7F2-1375A	U32
1963863	QC21	D19
1963864	QC26	D18–20
1968092	490611005LW TIALN-LW	O66
1968204	490613014LW TIALN-LW	O66
1968206	49H614014LW TIALN-LW	O55
1977373	M41304	R8
1977374	M41396	R11
1977378	M41452	R13
1977382	M41497	R15
1977385	M41474	R14
1977415	M41231	R6
1977417	M41399	R11
1977419	M41503	R15
1977421	M41226	R6
1977429	M41453	R13
1977519	M41229	R6
1977546	M41309	R8
1977548	M41312	R8
1977549	M41316	R8
1977555	M41401	R11
1977556	M41403	R11
1977564	M41501	R15
1977567	M41505	R15
1977570	M41373	R10
1977572	M41477	R14
1977573	M41478	R14
1977630	M40578	R11
1981089	6N7010004LT	Q6
1981090	6N7012005LT	Q6
1985751	KLM34L9IP	C9, C11, C16–19
1985784	KMSP315IP	C9, C11, C16–19, C56–58
1988432	7F0-0656T	U29
2002367	12396202200 W	H52
2002370	12396202600 W	H52
2002473	RCGT0803M0AL1 HCK10	B156
2002474	RCGT0803M0AL1 HWK10	B156
2002503	VCGT160412AL3 HCK10	B157
2002505	VCGT220530AL3 HCK10	B157
2002506	VCGT220530AL3 HWK15	B157
2003541	12396203800 W	H53
2003555	12396943800 W	J48
2003556	12396953800 W	J44
2003557	12396954000 W	J44
2003558	12396204200 W	H53
2003562	12396944200 W	J48
2003573	12396954200 W	J44
2003574	12396954400 W	J44
2003575	12396204600 W	H53
2003579	12396944600 W	J48
2003580	12396954600 W	J44
2003581	12396954800 W	J44
2003582	12396205000 W	H53
2003593	12396215000 W	H58
2003595	12396945000 W	J48
2003596	12396955000 W	J44
2003597	12396955200 W	J44
2003598	12399010200 W	L24
2003602	12399111400 W	L25
2003679	12396205400 W	H53
2003682	12396945400 W	J48
2003693	12396955400 W	J44
2003694	12396955600 W	J44
2003695	12399010400 W	L24
2003696	12399011600 W	L24
2003697	12399012800 W	L24
2003700	12399110400 W	L25
2003701	12399111600 W	L25
2003702	12399112800 W	L25
2003780	12396205800 W	H53
2003793	12396955800 W	J44
2003794	12396956000 W	J44
2003796	12399011800 W	L24
2003797	12399013000 W	L24
2003800	12399110600 W	L25
2003801	12399111800 W	L25
2003802	12399113000 W	L25
2003879	12399012000 W	L24
2003880	12399013200 W	L24
2003881	12399014400 W	L27
2003882	12399015600 W	L27
2003897	12399110800 W	L25
2003898	12399112000 W	L25
2003899	12399113200 W	L25
2003900	12399114400 W	L28
2003901	12399115600 W	L28
2003993	12399014600 W	L27
2003994	12399015800 W	L27
2003997	12399113400 W	L25
2003998	12399114600 W	L28
2003999	12399115800 W	L28
2004081	12399014800 W	L27
2004082	12399016000 W	L27
2004095	12399113600 W	L25
2004096	12399114800 W	L28
2004097	12399116000 W	L28
2004133	12627270700 WG	W54
2004134	12627270800 WG	W55
2004140	12627276500 WG	W54
2004141	12627276800 WG	W55
2004161	12627277700 WG	W54
2004162	12627277800 WG	W55
2004177	12627278700 WG	W54
2004178	12627278800 WG	W55
2004781	12627270300 WG	W54
2004782	12627275300 WG	W54
2005499	12627010200 WG	W51
2005500	12600210900 WG	W38
2005542	12627013200 WG	W51
2005553	12600213200 WG	W38
2005556	12600215500 WG	W38
2005558	12627016200 WG	W51
2005560	12600217800 WG	W38
2005573	12627019300 WG	W51
2005574	12600020000 WG	W40
2005576	12614020100 WG	W41
2005580	12625702200 WG	W44
2005581	12625902200 WG	W45
2005602	12600027800 WG	W40
2005618	12625703000 WG	W44
2005619	12625903000 WG	W45
2005620	12626003000 WG	W42
2005656	12600035800 WG	W40
2005673	12625704000 WG	W44
2005674	12625804000 WG	W43
2005675	12625904000 WG	W45
2005676	12626004000 WG	W42
2005722	12600043800 WG	W40
2005801	12625705000 WG	W44
2005802	12625805100 WG	W43
2005813	12625905000 WG	W45
2005814	12626005000 WG	W42
2005938	12625706700 WG	W39, W44
2005939	12625806800 WG	W39, W43
2005940	12625906700 WG	W39, W45
2005941	12626006700 WG	W39, W42
2005954	12627006200 WG	W51
2006015	12627008200 WG	W51
2006019	12600208800 WG	W38
2006041	12625708986 WG	W44
2006054	12625908986 WG	W45
2006331	12748210100 W	L24–25
2006332	12748210300 W	L24–25
2006343	12748210500 W	L24–25
2006344	12748210700 W	L27–28
2006345	12748210900 W	L27–28
2006346	M4000CA-RC1606	H73
2006347	M4000CA-XP16	H73
2006348	M4000CA-SN12	H73
2006359	M4000CA-SD1506	H73
2006360	M4000CA-SN15	H73
2006361	M4000CA-MDHX10	H73
2006362	M4000CA-SP12	H73
2006373	M4000CA-SP1203	H73
2006374	M4000CA-SE1203	H73
2006376	M4000CA-SP1504	H73
2006377	M4000CA-SE1504	H73
2006379	M4000CA-TP2204	H73
2006380	12748210200 W	L24–25
2006381	12748210400 W	L24–25
2006382	12748210600 W	L24–25
2006393	12748210800 W	L27–28
2006394	12748211000 W	L27–28
2006396	12748307600 W	L24–25
2006397	12748307700 W	L24–25, L27–28
2006398	12748307800 W	L27–28
2006399	12748308500 W	H72
2006991	TCGT110204AL1 HWK10	B157
2007004	TCGT16T308AL1 HWK10	B157
2007105	12251762000 W	E103
2007108	12251762100 W	E103
2007111	12251763200 W	E103
2007124	12251763300 W	E103
2007127	12251763400 W	E103
2007130	12251764200 W	E103
2007133	12251764300 W	E103
2007136	12251782000 W	E102
2007139	12251782100 W	E102
2007142	12251783200 W	E102
2007145	12251783300 W	E102
2007148	12251784200 W	E102
2007151	12251784300 W	E102
2007404	2ERA60 TN6025	F46
2007414	12191062086 W	E107
2007419	3ILG60 TN6025	F47
2007542	2ER15ISO TN6025	F48
2007585	2IR075ISO TN6025	F51
2007613	2IR10ISO TN6025	F51
2007622	2IR125ISO TN6025	F51
2007826	12251222000 W	E104
2007832	12251762200 W	E103
2008113	12251352000 W	E104
2008116	12251353000 W	E104
2008119	12251354000 W	E104
2008122	12251355000 W	E104
2008135	12251356000 W	E104
2008138	12251358000 W	E104
2008141	12251213200 W	E104
2008144	12250110400 W	E106
2008147	12250110300 W	E106
2008150	12251783700 W	E102
2008153	12251783600 W	E102
2008156	12251223200 W	E104
2008159	12251233200 W	E104
2008187	3EL10ISO TN6025	F50
2008190	3ELG55 TN6025	F60
2008256	3ER30ISO TN6025	F48
2008275	3ILAG60 TN6025	F47
2008329	12749723200 W	L27–28
2008424	SCMW09T308 SP0G00	B70
2008521	12250110900 W	E106
2008876	123567320 THM	E97
2008931	123567330 THM	E97
2009080	123567340 THM	E97
2009385	123567360 THM	E97
2009482	123567380 TN8025	E97
2009504	123567380 THM	E97
2009562	123568080 TTM	E105
2009587	AL163R W	F70
2009591	AL203R W	F70
2009594	AL253R W	F70
2009597	AL254R W	F70
2009600	AL323R W	F70
2009603	AL324R W	F70
2009609	AVR203R W	F74
2009612	AVR253R W	F74
2009625	AVR254R W	F74
2009628	AVR25D3R W	F74
2009631	AVR25D4R W	F74
2009634	AVR324R W	F74
2009637	AVR325R W	F74
2009640	AVR32D3R W	F74
2009643	AVR403R W	F74
2009646	AVR405R W	F74
2009649	AVR505R W	F74
2009671	123506599 THM	L19
2009686	123506600 THM	L20
2009711	123506601 THM	L19
2010027	CCMT12040441 THM	B31
2010047	E06JSCFPR04 WG	C67
2010061	CCMT12040841 THM	B31
2010068	E08KSCLCR06 WG	C68
2010090	E10MSTFCL11 WG	C77
2010111	E12QSDQCR07 WG	C72
2010120	E12QSTFCL11 WG	C77
2010139	E16RSCLCR09 WG	C68
2010148	E16RSDQCL07 WG	C72
2010157	E16RSDUCR07 W	C74
2010174	E16RSTFCR16 WG	C77
2010175	CNMG12040422 TTI15	B37
2010184	E20SSCLCR09T3 WG	C68
2010193	E20SSDUCL11 W	C74
2010215	E25TSCLCL09 WG	C68
2010224	E25TSCLCR09T3 WG	C68
2010233	E25TSTFCL16 WG	C77
2010882	CNMM19061665 TN8025	B44
2010919	CNMM190616SR TN7015	B44
2011507	DCMX11T302R18 THM	B50

Order No.	Catalogue No.	Page(s)
2012231	LNUX400924EN95 TTR	B64
2012307	NVR163R W	F74
2012325	OVR122R W	F75
2012416	RCMT1606M0TX TN2510	M97
2012418	RCMT1606M0TX TN7525	M97
2012426	RDHT0802M0T TN7525	M75
2012446	RDHT1003M0T TN7525	M80
2012462	RDHT1605M0TX TTI25	M92
2012480	RDHW1003M0MH TN2510	M80
2012484	RDHW1204M0MH TN2510	M86
2012518	RDMT0802M0T TN7525	M75
2012534	RDMT1003M0T TN7525	M81
2012564	RDMW0802M0 TN2510	M76
2012566	RDMW0802M0 THM	M76
2012572	RDMW1003M0 TN2510	M81
2012578	RDMW1003M0T TTI25	M81
2012594	RDMW1204M0TX TN2510	M87
2012610	M270BR10 TN2510	M109
2012612	M270BR10 TN7525	M109
2012624	M270BR10 TN7535	M109
2012630	M270BR12 TN2510	M109
2012632	M270BR12 TN7525	M109
2012634	M270BR12 TN7535	M109
2012640	M270BR16 TN2510	M109
2012642	M270BR16 TN7525	M109
2012658	M270BR20 TN2510	M109
2012660	M270BR20 TN7525	M109
2012662	M270BR20 TN7535	M109
2012668	M270BR25 TN2510	M109
2012670	M270BR25 TN7525	M109
2012672	M270BR25 TN7535	M109
2012688	M270BR32 TN2510	M109
2012690	M270BR32 TN7525	M109
2012692	M270BR32 TN7535	M109
2012698	M270BF10 TN2505	M108
2012700	M270BF10 TN2510	M108
2012718	M270BF12 TN2505	M108
2012720	M270BF12 TN2510	M108
2012728	M270BF16 TN2505	M108
2012730	M270BF16 TN2510	M108
2012748	M270BF20 TN2505	M108
2012750	M270BF20 TN2510	M108
2012758	M270BF25 TN2505	M108
2012760	M270BF25 TN2510	M108
2012778	M270BF32 TN2505	M108
2012780	M270BF32 TN2510	M108
2013602	SNMM190616SR TN7015	B76
2013677	SNMT1205AZR31 TN2510	H55
2014041	TCAX1103ZZ18 TTM08	L12
2014054	TCAX1103ZZ26 THM	L12
2014056	TCAX1103ZZ26 TTM	L12
2014066	SPMW120408 THM	I9
2014082	TCMT1102042 TTI15	B81
2014152	TNAX1604ZZ26 THM	L12
2014164	TNAX1604ZZ26 TTM08	L12
2014166	TNAX1604ZZ31 THM	L12
2014168	TNAX1604ZZ31 TTM08	L12
2014170	TNAX1604ZZ41 THM	L12
2014172	TNAX1604ZZ41 TTM	L12
2014176	TNAX2206ZZ41 TTM	L13
2014635	TNMM16041265 TN8025	B90
2014695	TNMM22040865 TN7015	B90
2014740	TNMM22041665 TN8025	B90
2014890	DCGT11T304AL3 HCK10	B156
2015018	12147548500 W	L18
2015081	TPGA110204 THM	B91
2015242	XNKT1205AZER11 TN7525	H55
2015244	XNKT1205AZER11 TTI25	H55
2015246	XNKT1205AZER11 THM	H55
2015264	XNKT1205AZTR12 TN7525	H55
2015266	XNKT1205AZTR12 TTI25	H55
2015526	12748551100 W	L24–25, L27–28
2015527	12748551200 W	L24–25, L27–28
2015754	12251763000 W	E103
2015782	12251765500 W	E103
2015792	12251768400 W	E103
2015814	12251784400 W	E102
2015816	12251784500 W	E102
2015839	12251786500 W	E102
2015842	12251788500 W	E102
2016118	AL404R W	F70
2016122	AL405R W	F70
2016502	12299510400 W	L18
2016514	12299515500 W	L18
2016516	12299515600 W	L18
2016518	12299515700 W	L18
2016520	12299515800 W	L18
2016524	12299520400 W	L18
2016526	12299525500 W	L18
2016528	12299525600 W	L18
2016530	12299525700 W	L18
2016532	12299525800 W	L18
2016544	12299526000 W	L18
2016547	12299530400 W	L18
2016551	12299535600 W	L18
2016555	12299535800 W	L18
2016562	12299546000 W	L18
2017822	123567330 TN8025	E97
2017912	123567730 TN8025	E100
2017973	123568080 THM	E105
2017976	123568100 THM	E105
2017980	123568120 THM	E105
2017993	123568121 THM	E105
2017996	123568141 THM	E105
2018194	12748610000 W	V10, V13, V16, V19
2018214	3ERA60 TN6025	F46
2018222	3ERG60 TN6025	F46
2018236	3ELG60 TN6025	F46
2018246	3ERAG60 TN6025	F46
2018252	4ERN60 TN6025	F46
2018256	5ERQ60 TN6025	F46
2018262	2IRA60 TN6025	F47
2018265	12148001300 W	M74
2018272	3IRA60 TN6025	F47
2018278	3IRG60 TN6025	F47
2018281	12148005800 W	C67, C70, W51
2018284	3IRAG60 TN6025	F47
2018290	4IRN60 TN6025	F47
2018294	12148007200 W	H52–53, H58, I7, L4, L11, M90–91, M96, W42, W45
2018295	5IRQ60 TN6025	F47
2018296	MS2260	C68, J48, M36
2018301	3ERA55 TN6025	F60
2018308	3ERG55 TN6025	F60
2018314	3ERAG55 TN6025	F60
2018320	4ERN55 TN6025	F60
2018328	2IRA55 TN6025	F61
2018334	3IRA55 TN6025	F61
2018340	3IRG55 TN6025	F61
2018346	3IRAG55 TN6025	F61
2018348	3ILAG55 TN6025	F61
2018354	4IRN55 TN6025	F61
2018377	3ER05ISO TN6025	F48
2018389	3ER07ISO TN6025	F48
2018395	3ER075ISO TN6025	F48
2018403	3ER08ISO TN6025	F48
2018411	3ER10ISO TN6025	F48
2018412	12148021100 W	E107
2018421	3ER125ISO TN6025	F48
2018429	3ER15ISO TN6025	F48
2018435	3EL15ISO TN6025	F50
2018445	3ER175ISO TN6025	F48
2018447	3EL175ISO TN6025	F50
2018460	3ER20ISO TN6025	F48
2018466	3EL20ISO TN6025	F50
2018472	3ER25ISO TN6025	F48
2018489	3EL30ISO TN6025	F50
2018495	4ER35ISO TN6025	F48
2018496	12148032586 W	E107
2018501	4ER40ISO TN6025	F48
2018508	4ER45ISO TN6025	F48
2018517	4ER50ISO TN6025	F49
2018522	5ER55ISO TN6025	F49
2018527	12148036300 W	C66, C68
2018528	5ER60ISO TN6025	F49
2018533	12148036700 W	M78–79
2018539	12148037700 W	J44, K4
2018549	12148038800 W	C44, C68, C72, C74, C77, H44–45, L4, M84–85, W42–43, W54–55
2018550	2IR15ISO TN6025	F51
2018557	2IL15ISO TN6025	F52
2018564	2IR175ISO TN6025	F51
2018582	3IR05ISO TN6025	F51
2018596	3IR075ISO TN6025	F51
2018598	3IL075ISO TN6025	F53
2018612	3IR10ISO TN6025	F51
2018626	3IR125ISO TN6025	F51
2018636	3IR15ISO TN6025	F51
2018642	3IL15ISO TN6025	F53
2018649	12148060600 W	E106
2018651	12148060700 W	E106
2018652	3IR175ISO TN6025	F51
2018653	12148060800 W	E106
2018663	3IR20ISO TN6025	F51
2018667	3IL20ISO TN6025	F53
2018673	12148067200 W	L4, L10–11, L24–25, W42
2018674	3IR25ISO TN6025	F51
2018678	3IL25ISO TN6025	F53
2018679	12148068700	C68, C74, C77, L4, W43, W45–49, W51, W54–55
2018684	3IR30ISO TN6025	F51
2018688	3IL30ISO TN6025	F53
2018695	4IR35ISO TN6025	F51
2018702	4IR40ISO TN6025	F52
2018703	12148080000 W	C72, C74, L10
2018708	4IR45ISO TN6025	F52
2018714	4IR50ISO TN6025	F52
2018720	5IR60ISO TN6025	F52
2018736	3ER48UN TN6025	F54
2018744	3ER40UN TN6025	F54
2018748	3ER36UN TN6025	F54
2018752	3ER32UN TN6025	F54
2018756	3ER28UN TN6025	F54
2018760	3ER27UN TN6025	F54
2018766	3ER24UN TN6025	F54
2018772	3ER20UN TN6025	F54
2018778	3ER18UN TN6025	F54
2018782	3ER16UN TN6025	F54
2018790	3ER14UN TN6025	F54
2018796	3ER13UN TN6025	F55
2018802	3ER12UN TN6025	F55
2018805	12148094300 W	E106
2018807	12148094400 W	E106
2018808	3ER11UN TN6025	F55
2018809	12148094500 W	E106
2018811	12148094600 W	E106
2018813	12148094700 W	E106
2018814	3ER10UN TN6025	F55
2018817	12148095100 W	I4–6
2018824	3ER8UN TN6025	F55
2018860	2IR32UN TN6025	F56
2018876	2IR20UN TN6025	F56
2018882	2IR18UN TN6025	F56
2018886	2IR16UN TN6025	F56
2018918	3IR32UN TN6025	F56
2018922	3IR28UN TN6025	F56
2018932	3IR24UN TN6025	F56
2018938	3IR20UN TN6025	F56
2018944	3IR18UN TN6025	F56
2018950	3IR16UN TN6025	F56
2018955	3IR14UN TN6025	F56
2018966	3IR12UN TN6025	F57
2018979	3IR10UN TN6025	F57
2018990	3IR8UN TN6025	F57
2019023	3ER32W TN6025	F62
2019029	3ER28W TN6025	F62
2019055	3ER19W TN6025	F62
2019061	3ER16W TN6025	F62
2019071	3ER14W TN6025	F62
2019077	3ER12W TN6025	F62
2019083	3ER11W TN6025	F62
2019089	3ER10W TN6025	F62
2019101	3ER8W TN6025	F62
2019104	12148574100 W	E106, L24–25, L27–28
2019118	12148574900 W	E106
2019121	2IR19W TN6025	F63
2019136	2IR14W TN6025	F63
2019146	12148580411 W	E107
2019148	12148580511PKG W	E107
2019150	12148580611 W	E107
2019171	12148582511 W	E107
2019172	3IR19W TN6025	F63
2019178	3IR16W TN6025	F63
2019189	3IR14W TN6025	F63
2019195	3IR12W TN6025	F63
2019202	12148586000 W	E107
2019205	3IR11W TN6025	F63
2019215	12148586800 W	E107
2019217	12148586900 W	E107
2019224	3IR8W TN6025	F63
2019234	4IR6W TN6025	F63
2019235	12148588211 W	E107
2019239	12148588411 W	E107
2019249	12148589200 W	E107
2019251	12148589300 W	E107
2019264	12148591011 W	E107

Order No.	Catalogue No.	Page(s)
2019266	12148591111 W	E107
2019278	3ER18NPT TN6025	F58
2019287	12148596200 W	E102–103
2019288	3ER14NPT TN6025	F58
2019298	3ER115NPT TN6025	F58
2019305	3ER8NPT TN6025	F58
2019323	3IR18NPT TN6025	F59
2019329	3IR14NPT TN6025	F59
2019335	3IR115NPT TN6025	F59
2019339	3IR8NPT TN6025	F59
2019347	3ER8RD TN6025	F65
2019359	4ER6RD TN6025	F65
2019375	3IR10RD TN6025	F66
2019381	3IR8RD TN6025	F66
2019394	4IR6RD TN6025	F66
2019400	4IR4RD TN6025	F66
2019441	3IR16PG TN6025	F65
2019453	3ER2TR TN6025	F67
2019461	3ER3TR TN6025	F67
2019463	3EL3TR TN6025	F67
2019469	4ER4TR TN6025	F67
2019471	4EL4TR TN6025	F67
2019479	4ER5TR TN6025	F67
2019487	5ER6TR TN6025	F67
2019511	3IR3TR TN6025	F68
2019520	4IR4TR TN6025	F68
2019528	4IR5TR TN6025	F68
2019534	5IR6TR TN6025	F68
2019608	3ER10APIRD TN6025	F64
2019618	3IR10APIRD TN6025	F64
2019622	3IR8APIRD TN6025	F64
2020009	CNMM12040865 TN7025	B44
2020061	CNMM16061665 TN7025	B44
2020663	SNMT1205AZR31 TN7535	H55
2020673	SNMT1205AZR31 TN7525	H55
2020677	SNKT1205AZR31 TN7535	H55
2020681	SNKT1205AZR31 TN25M	H55
2020683	SNKT1205AZR31 TN7525	H55
2020691	SNKT1205AZER20 TN7535	H54
2020693	SNKT1205AZER20 TN450	H54
2020695	SNMT1505AZR31 TN7535	H59
2020701	SNMT1505AZR31 TN7525	H59
2020703	SNMT1505AZR31 TN450	H59
2020705	SNKT1505AZR31 TN7535	H59
2020711	SNKT1505AZR31 TN7525	H59
2020713	SNKT1505AZR31 TN450	H59
2020723	CPNT120408T TN7535	L6
2020727	RDMW0802M0T TN7535	M76
2020735	RDMW1003M0T TN7535	M81
2020741	RDMW1204M0TX TN7535	M87
2020749	RDMW1605M0TX TN7535	M93
2020757	RDMT0802M0T TN7535	M75
2020763	RDMT1204M0TX TN7525	M87
2020767	RDMT1605M0TX TN7525	M92
2020771	RCMT1606M043M TN7525	M97
2020775	RDHT1204M0TX TN7525	M86
2020781	RCMT1606M0TX TN7535	M97
2021331	12391010000 W	M74
2021332	12391010400 W	M74
2021333	12391010600 W	M74
2021334	12391011000 W	M74
2021335	12391011400 W	M74
2021336	12391011600 W	M79
2021337	12391012000 W	M79
2021338	12391012400 W	M79
2021339	12391012800 W	M79
2021340	12391013200 W	M79
2021341	12391013800 W	M90
2021342	12391020000 W	M85
2021343	12391020200 W	M85
2021344	12391020400 W	M85
2021345	12391020600 W	M85
2021346	12391020800 W	M85
2021347	12391021000 W	M91
2021348	12391021200 W	M91
2021349	12391021400 W	M91
2021350	12391021600 W	M91
2021351	12391021800 W	M91
2021352	12391022000 W	M96
2021353	12391022200 W	M96
2021354	12391022400 W	M96
2021355	12391022600 W	M96
2021356	12391022800 W	M96
2021357	12391023200 W	M96
2021358	12391023400 W	M96
2021359	12391023600 W	M96
2021360	12391023800 W	M96
2021361	12391024000 W	M85
2021374	12391050200 W	M84
2021375	12391050400 W	M78
2021376	12391050600 W	M78
2021378	12391051000 W	M84
2021379	12391051200 W	M84
2021380	12391602600M W	L4
2021381	12391603000 W	L4
2021382	12391603400 W	L4
2021383	12391603800 W	L4
2021422	12393041200 W	K4
2021423	12393041400 W	K4
2021424	12393041800 W	K4
2021428	12393051200 W	K4–5
2021429	12393051400 W	K4–5
2021430	12393051800 W	K4–5
2021597	5IR55ISO TN6025	F52
2021625	12251221900 W	E104
2021626	12251221600 W	E104
2021627	12251763500 W	E103
2021629	12251332000 W	E104
2021631	12251762300 W	E103
2021634	12251212500 W	E104
2021635	12251222500 W	E104
2021636	12251762500 W	E103
2021637	12251762400 W	E103
2021639	12251342000 W	E104
2021640	12251343000 W	E104
2021641	12251344000 W	E104
2021656	2ILA60 TN6025	F47
2021677	3ER18W TN6025	F62
2021718	12250110600 W	E106
2021719	12250110500 W	E106
2021720	12250110800 W	E106
2021721	12250110700 W	E106
2021722	12250111000 W	E106
2021723	12251234000 W	E104
2021725	4ER6W TN6025	F62
2021743	12251368000 W	E104
2021798	123568160 TTM	E105
2021804	123567320 TN8025	E97
2021836	123567440 TPC35	E99
2021873	123567350 THM	E97
2021925	123506602 THM	L20
2021947	CCMT0602042 TTI15	B30
2022071	CNMM250924SR TN7025	B44
2022079	CPGT04T1043 TN35	B45
2022082	CPGT04T1043 TTR	B45
2022089	CPNT080308T THM	L5
2022092	CPNT09T308T TTM08	L6
2022221	DNMG11040822 TTI15	B53
2022257	CCGT060202AL3 HCK10	B155
2022258	CCGT060202AL3 HWK15	B155
2022259	CCGT060204AL3 HCK10	B155
2022260	CCGT060204AL3 HWK15	B155
2022261	CCGT09T304AL3 HCK10	B155
2022262	CCGT09T304AL3 HWK15	B155
2022323	CCGT120404AL3 HCK10	B155
2022324	CCGT120404AL3 HWK15	B155
2022325	CCGT120408AL3 HCK10	B155
2022326	CCGT120408AL3 HWK15	B155
2022327	DCGT070202AL3 HCK10	B156
2022328	DCGT070202AL3 HWK15	B156
2022329	DCGT070204AL3 HCK10	B156
2022330	DCGT070204AL3 HWK15	B156
2022331	DCGT11T304AL3 HWK15	B156
2022332	DCGT11T308AL3 HCK10	B156
2022335	MDHW120408 THM	L29
2022340	NL82R W	F70
2022342	NVR132R W	F74
2022343	NVR204R W	F74
2022345	OVR152R W	F75
2022370	SNKT1205AZER20 TN7525	H54
2022371	SNKT1205AZER20 TTI25	H54
2022373	SNKT1205AZR21 TN7525	H54
2022374	SNKT1205AZR21 TTI25	H54
2022375	SNKT1205AZR21 THM	H54
2022446	12250110100 W	E106
2022447	12250110200 W	E106
2022483	DCGT11T308AL3 HWK15	B156
2022484	VCGT160404AL3 HCK10	B157
2022485	VCGT160404AL3 HWK15	B157
2022487	VCGT160408AL3 HCK10	B157
2022488	VCGT160408AL3 HWK15	B157
2022489	VCGT160412AL3 HWK15	B157
2022547	12251763100 W	E103
2022548	12251764000 W	E103
2022549	12251764100 W	E103
2022550	12251764400 W	E103
2022551	12251764500 W	E103
2022552	12251765200 W	E103
2022553	12251765300 W	E103
2022555	12251766200 W	E103
2022556	12251766300 W	E103
2022557	12251766400 W	E103
2022558	12251766500 W	E103
2022559	12251768500 W	E103
2022560	12251783000 W	E102
2022561	12251783100 W	E102
2022562	12251784000 W	E102
2022563	12251784100 W	E102
2022564	12251785200 W	E102
2022565	12251785300 W	E102
2022566	12251785400 W	E102
2022567	12251785500 W	E102
2022568	12251786400 W	E102
2022569	12251788400 W	E102
2022589	AL325R W	F70
2022619	12290900800 W	L10
2022620	12290901200 W	L10
2022621	12290911600 W	L11
2022622	12290911800 W	L11
2022628	12292510400 W	I4
2022629	12292510800 W	I4
2022630	12292511000 W	I4
2022631	12292511200 W	I6
2022632	12292511400 W	I7
2022633	12292511600 W	I7
2022634	12292550400 W	I5
2022635	12292550800 W	I5
2022636	12292551000 W	I5
2022648	12299535500 W	L18
2022650	12299536000 W	L18
2022652	12299545800 W	L18
2022716	12346292100 W	W52–53
2022717	12346292200	W52–53
2022787	123568081 THM	E105
2022789	123568140 THM	E105
2022790	123568160 THM	E105
2022791	123568161 THM	E105
2022854	CCGT09T302AL3 HWK15	B155
2022858	CCGT09T308AL3 HWK15	B155
2022859	CCGT120402AL3 HWK15	B155
2022861	DCGT11T302AL3 HWK15	B156
2022921	12191061900 W	E107
2022922	12191062586 W	E107
2022923	12191063286 W	E107
2023597	E06JSCLPL04 WG	C70
2023598	E06JSCLPR04 WG	C70
2023600	E08KSCFCR06 WG	C66
2023601	E08KSCLCL06 WG	C68
2023603	E08KSCLCR065 WG	C68
2023607	E12QSCLCL06 WG	C68
2023608	E12QSCLCR06 WG	C68
2023610	E12QSDUCL07 W	C74
2023611	E12QSDUCR07 W	C74
2023613	E16RSCLCL09 WG	C68
2023614	E16RSCLCR09T3 WG	C68
2023615	E16RSCLCL09T3 WG	C68
2023617	E16RSDUCL07 W	C74
2023618	E16RSTFCL16 WG	C77
2023621	E20SSCLCR09 WG	C68
2023622	E20SSDQCL11 WG	C72
2023623	E20SSDQCR11 WG	C72
2023624	E20SSDUCR11 W	C74
2023625	E20SSTFCL16 WG	C77
2023626	E20SSTFCR16 WG	C77
2023629	E25TSDUCL11 W	C74
2023630	E25TSDUCR11 W	C74
2023631	E25TSTFCR16 WG	C77
2023632	E32USCLCR12 WG	C68
2023638	SCGT120408AL3 HWK15	B156
2024450	SDJCL1616H11 W	C44
2024559	VCGT110302AL3 HWK15	B157
2024561	VCGT110304AL3 HWK15	B157
2025073	12146011800 W	V10, V13, V16, V19
2025074	12147548600 W	L18
2025731	12147562300 W	L18
2025735	12147572400 W	L18
2025828	NVR102R W	F74
2026017	TCAX1103ZZ21 THM	L12
2026018	TCAX1103ZZ21 TTM08	L12
2026022	TNAX2206ZZ51 TTM	L13
2027339	CCMT090308 TTR	B30
2027432	CCMT09T308 THM	B30
2027465	CCMT09T312 TTR	B30

Order No.	Catalogue No.	Page(s)
2027472	CCMT120408 THM	B30
2027484	CCMT120408 TTR	B30
2027507	CCMW060204 THM	B34
2027509	CCMW090304 THM	B34
2027511	CCMW09T304 THM	B34
2027512	CCMW09T308 THM	B34
2027524	CCMW120404 THM	B34
2027525	CCMW120408 THM	B34
2027567	CNMG120408 THM	B37
2027768	DCMT070204 THM	B47
2027804	DCMT11T304 TTI15	B47
2027805	DCMT11T304 THM	B47
2027807	DCMT11T304 TTR	B47
2027843	DCMT11T308 THM	B47
2027868	DCMT11T312 THM	B47
2027887	DCMT150404 THM	B47
2027908	DCMT150408 THM	B47
2027910	DCMT150408 TTR	B47
2027932	DCMT150412 THM	B47
2027965	DCMT150416 THM	B47
2027966	DCMW070204 THM	B50
2027967	DCMW11T304 THM	B50
2028115	RCMT0602M0 THM	B65
2028129	RCMT0803M0 THM	B65
2028143	RCMT10T3M0 THM	B65
2028145	RCMT10T3M0 TTR	B65
2028157	RCMT1204M0 THM	B65
2028170	RCMT1606M043 THM	B65
2028196	RCMX2507M0T TTR	B66
2028225	SCMT090304 TTR	B68
2028255	SCMT09T304 THM	B68
2028259	SCMT09T304MU TN8025	B69
2028270	SCMT09T308 THM	B68
2028272	SCMT09T308 TTR	B68
2028286	SCMT120408 THM	B68
2028289	SCMT120408 TTR	B68
2028295	SCMT120412 TTI15	B68
2028296	SCMT120412 THM	B68
2028306	SCMT150512 THM	B68
2028307	SCMT150512 TTR	B68
2028308	SCMW090304 THM	B70
2028310	SCMW120408 THM	B70
2028314	SDMT1204PDRMH TN2510	J46
2028318	SDMT1204PDRMH THM	J46, K7
2028323	SDMT1204PDRML THM	J45, K6
2028325	SDMT1506PDRMH TN2510	J50
2028332	SDMW090308 THM	I8
2028336	SDNT090308T TN2510	I8
2028338	SDNT090308T SPTM00	I8
2028371	SNMA120408 THM	B71
2028535	SPNT120408 SPTM00	I9
2028543	SPUN090308 THM	B80
2028547	SPUN120304 THM	B80
2028555	SPUN120308 THM	B80
2028560	SPUN120312 THM	B80
2028562	SPUN120412 THM	B80
2028565	SPUN150412 THM	B80
2028567	SPUN150412 TTR	B80
2028568	SPUN190412 THM	B80
2028579	TCMT110202 THM	B81
2028587	TCMT110204 THM	B81
2028589	TCMT110204 TTR	B81
2028607	TCMT16T304 THM	B81
2028624	TCMT16T308 THM	B81
2028627	TCMT16T308 TTR	B81
2028660	TCMT220408 THM	B81
2028668	TCMW110204 THM	B83
2028670	TCMW16T304 THM	B83
2028806	TPUN110304 THM	B93
2028814	TPUN110308 THM	B93
2028821	TPUN160304 THM	B93
2028830	TPUN160308 THM	B93
2028832	TPUN160308 TTR	B93
2028833	TPUN160312 THM	B93
2028843	TPUN220412 THM	B93
2028847	TPUN220412 TTR	B93
2029211	12146003800 W	E104
2029212	12146006300	M102–104
2029220	12146009500 W	E104
2029221	12146010000	V10, V13, V16, V19
2029222	12146012600 W	E102–103
2029223	12146012700 W	E102–103
2029224	12146013400 W	E104
2029249	12147519100 W	W38–39, W41
2029266	12147549000	M42–43, M46–48
2029276	12147579300 W	W44–45
2029281	12147600100 W	W36–37
2029282	12147600200 W	W36–37
2029283	12147600300 W	W36–38, W40
2029284	12147600400 W	W36–37
2029291	12147602200 W	W42–45
2029292	12147602300 W	W36–37
2029293	12147602400 W	W36–37
2029294	12147602500 W	W36–37
2029295	12147602600 W	W36–37
2029296	12147602700 W	W36–37
2029297	12147602800 W	W36–37
2029299	12147603900 W	W36–37
2029300	12147604000 W	W36–37
2029316	12147613500 W	W38
2029335	12147617400 W	W50
2029348	12147621100 W	W52–53
2029349	12147621200 W	W52–53
2029350	12147621300 W	W52–53
2029351	12147621400 W	W52–53
2029352	12147621500 W	W52–53
2029353	12147621600 W	W52–53
2029356	12147622300 W	W52–53
2029359	12147625200 W	W41
2029360	12147625400 W	K4, W40
2029398	12147665000 W	W39, W42–45
2029399	12147666700 W	W40
2029424	12147680200 W	W52–53
2029425	12147680300 W	W52–53
2029426	12147680400 W	W52–53
2029427	12147680500 W	W49–50, W52–53
2029428	12147680600 W	W52–53
2029429	12147680700 W	W52–53
2029459	12147739900 W	W40
2029461	12147740200 W	W38
2029478	12148000600	H44–45, I4–6, J44, K4, L4, M78–79, M84–85
2029481	12148001100 W	F75
2029484	12148005900	W51
2029488	12148007500	H52–53, H58, I7, J48, L4, L11, M90–91, M96, V10, V13, V16, V19
2029499	12148021900 W	E107
2029506	12148024100 W	E107
2029507	12148024200 W	E107
2029508	12148024500 W	E107
2029511	12148024800 W	E107
2029521	12148031686 TTR	E107
2029523	12148032086 TTR	E107
2029535	12148036000 W	E104
2029542	12148040900 W	E106, W42–45, W52–53
2029543	12148041000 W	E106, W42–45, W52–53
2029544	12148041100 W	E102–103, E106, W39, W42–45, W49–50, W52–53, W56, W58, W60, W62, W65–66
2029545	12148041200 W	E106, W41, W52–53, W56–62, W65–66
2029546	12148041300 W	E102–104, W41, W49–50, W52–53, W56–63, W65–66
2029547	12148041400 W	E104, W52–53, W56–63, W65–66
2029548	12148042400 W	W49–50
2029559	12148046000 W	E106, W44–45
2029560	12148050000	L24–25, L27–28
2029582	12148069600 W	W42–45
2029585	12148079000 W	W52–53
2029596	12148082400	H5–7, H12–15, H20, H26, H30, H32, H38, M52–55, M59–62, V10, V13, V16, V19, W42, W44–45, W54–55
2029598	12148086600 W	L4, L10–11, M74, W42–48, W51, W54–55
2029599	12148086800	M102–104
2029604	12148099300	M102–105, M118–120, M124–126
2029605	12148099400	M66–67, W42–45
2029622	12148541600 W	W44
2029662	12148575900 W	W52–53
2029667	12148580011 TTR	E107
2029684	12148586611 TTR	E107
2029685	12148587011 TTR	E107
2029686	12148587111 TTR	E107
2029691	12148588311 TTR	E107
2029696	12148589800 W	E107
2029712	12148788900 W	M102–105, M118–120, M124–126
2029751	CCMT09T308MU SPN3W1	B33
2029792	SPNT120408 TN7535	I9
2029794	SPNT120408 TN7525	I9
2030198	SDNT090308 TN7535	I8
2030200	SDNT090308 TN7525	I8
2030201	SDNT090308 TN450	I8
2030400	SDMT1506PDRMH TN7535	J50
2030414	SDMT1506PDRMH TN7525	J50
2030417	SDMT1204PDRMH TN7535	J46, K7
2030419	SDMT1204PDRMH TN7525	J46, K7
2030420	SDMT1506PDRML TN7535	J49
2030434	SDMT1506PDRML TN7525	J49
2030437	SDMT1204PDRML TN7535	J45, K6
2030439	SDMT1204PDRML TN7525	J45, K6
2030677	12147522400 W	W64
2030737	12147789100 W	F75
2031018	E06JSCFPL04 WG	C67
2031019	E08KSCFCL06 WG	C66
2031020	E08KSCLCL065 WG	C68
2031021	E10MSCLCR06	C68
2031022	E10MSCLCL06 WG	C68
2031023	E12QSDQCL07 WG	C72
2031024	E12QSTFCR11 WG	C77
2031025	E16RSDQCR07 WG	C72
2031026	E20SSCLCL09 WG	C68
2031027	E20SSCLCL09T3 WG	C68
2031028	E25TSCLCL09T3 WG	C68
2031029	E25TSCLCR09 WG	C68
2031658	CCMT060202 THM	B30
2031665	CCMT060204 TTI15	B30
2031666	CCMT060204 THM	B30
2031668	CCMT060204 TTR	B30
2031693	CCMT090304 THM	B30
2031695	CCMT090304 TTR	B30
2031706	CCMT090308 THM	B30
2031723	CCMT09T304 THM	B30
2031733	CCMW060202 THM	B34
2031734	CCMW090302 THM	B34
2031737	DCMW150408 THM	B50
2031778	12147739800 W	W41
2031786	TPGA110208 THM	B91
2031813	12147620000 W	W52–53
2031814	12147620300 W	W52–53
2031815	12147620400 W	W52–53
2031816	12147620500 W	W52–53
2031817	12147620600 W	W52–53
2031825	12147676800 W	L18
2031826	12147676900 W	L18
2031827	12147677000 W	L18
2031836	12148087100 W	W52–53
2031888	E10MSTFCR11 WG	C77
2031953	12148574000 W	E106
2032252	12748605300 W	L27–28
2032259	12748600900 W	H72
2033475	12749726100 W	L24–25
2033495	M4000CA-SE1204	H73
2033496	M4000CA-TP1603	H73
2050081	MS2111	E74–76, E78, F24–27, F31
2050082	S2112	F24–25
2050269	CCMT090304MU TN2000	B33
2055461	12748701000	H7, H15, H20, H26, H32, H38
2058066	12191062686	E107
2065134	AVR25D3L W	F74
2065135	AVR25D4L W	F74
2065289	3EL11W TN6025	F62
2065591	12399010800 W	L24
2067140	RCMT1606M043M TN7535	M97
2067470	M270BD016A16L155 W	M104
2067492	M4000CA-SD1204	H73
2067540	12399011400 W	L24
2067541	12399013400 W	L24
2071294	AL163L W	F70
2071295	AL203L W	F70
2071317	NVR163L W	F74
2071318	AVR203L W	F74
2071904	3ELAG60 TN6025	F46
2071923	2IL20ISO TN6025	F52
2071943	3EL8RD TN6025	F65
2074676	12148783700	K4
2076776	4IL50ISO TN6025	F53
2095640	M270TF12R2 TN2505	M122

Order No.	Catalogue No.	Page(s)
2095682	M270TF10R1 TN2505	M122
2100489	4ILN60 TN6025	F47
2101539	4EL40ISO TN6025	F50
2101597	4EL50ISO TN6025	F50
2102322	4IL40ISO TN6025	F53
2102347	4IL45ISO TN6025	F53
2102653	2IL32UN TN6025	F57
2102749	3IL12UN TN6025	F57
2103046	3EL8W TN6025	F62
2105263	SDMW090308 TN7525	I8
2109381	RDMW1003M0T TN7525	M81
2109440	RDMW1204M0TX TN7525	M87
2109476	RDMW1605M0TX TN7525	M93
2109542	RDMT1204M0TX TN7535	M87
2109552	RDMT1204M0TX TN2510	M87
2109972	12748610500 W	M102–105, M119–120, M125–126
2109974	12748610600 W	M102–105, M118–120, M124–126
2109976	12748610700 W	M102–105, M118–120, M124–126
2109978	12748610800 W	M102–105, M118–120, M124–126
2109980	12748610900 W	M102–104
2109982	12748611000 W	M102–104
2113506	M270BR16 TN7535	M109
2114772	AL254L W	F70
2114832	AVR253L W	F74
2116241	12399013600 W	L24
2157715	MDHX09T308 THM	L26
2192607	3EL12UN TN6025	F55
2202572	M41406	R11
2207645	RDMT1605M0TX TN7535	M92
2207906	12346233000	W38
2219983	M41237	R6
2220466	M41263	R7
2243613	M270BD010A12L140 W	M104
2243614	M270BD012A12L145 W	M104
2243615	M270BD020A20L170 W	M104
2243616	M270BD025A25L195 W	M104
2243617	M270BD032A32L205 W	M104
2243618	M270BD010B12L90 W	M103
2243619	M270BD012B12L95 W	M103
2243620	M270BD016B16L105 W	M103
2243621	M270BD020B20L120 W	M103
2243622	M270BD025B25L145 W	M103
2243623	M270BD032B32L155 W	M103
2243624	M270BD010M08 W	M102
2243625	M270BD012M08 W	M102
2243626	M270BD016M08 W	M102
2243627	M270BD020M10 W	M102
2243628	M270BD025M12 W	M102
2243629	M270BD032M16 W	M102
2248993	50HC030M	T117
2248994	50HC050M	T117
2248995	75HC030M	T117
2248996	75HC040M	T117
2248997	75HC050M	T117
2251521	SSP025018M	C9, C12, C14, C56
2255810	7F1-0806A	U30
2256338	D61803002RJ TIALN-RJ	0191
2256340	D61805002RJ TIALN-RJ	0191
2256341	D61806002RJ TIALN-RJ	0191
2256342	D61807003RJ TIALN-RJ	0191
2256353	D61808003RJ TIALN-RJ	0191
2256354	D61810004RJ TIALN-RJ	0191
2256355	D61812005RJ TIALN-RJ	0191
2256356	D61816006RJ TIALN-RJ	0191
2256357	D61820007RJ TIALN-RJ	0191
2256358	7N0100302RJ TIALN-RJ1	0165
2256359	7N0100402RJ TIALN-RJ1	0165
2256360	7N0100502RJ TIALN-RJ1	0165
2256361	7N0100602RJ TIALN-RJ1	0165
2256362	7N0100802RJ TIALN-RJ1	0165
2256363	7N0101002RJ TIALN-RJ1	0165
2256364	7N0101202RJ TIALN-RJ1	0165
2256365	7N0101402RJ TIALN-RJ1	0165
2256366	7N0101502RJ TIALN-RJ1	0165
2256367	7N0101602RJ TIALN-RJ1	0165
2256368	7N0101802RJ TIALN-RJ1	0165
2256369	7N0102002RJ TIALN-RJ1	0165
2256370	7N0102502RJ TIALN-RJ1	0165
2256371	7N0103002RJ TIALN-RJ1	0165
2256372	7N0104002RJ TIALN-RJ1	0165
2256373	7N0106002RJ TIALN-RJ1	0165
2256390	7N0200302RJ TIALN-RJ1	0160
2256391	7N0200402RJ TIALN-RJ1	0160
2256392	7N0200502RJ TIALN-RJ1	0160
2256393	7N0200602RJ TIALN-RJ1	0160
2256394	7N0200802RJ TIALN-RJ1	0160
2256395	7N0201002RJ TIALN-RJ1	0161
2256396	7N0201202RJ TIALN-RJ1	0161
2256397	7N0201402RJ TIALN-RJ1	0161
2256398	7N0201502RJ TIALN-RJ1	0161
2256399	7N0201602RJ TIALN-RJ1	0162
2256400	7N0201802RJ TIALN-RJ1	0162
2256401	7N0202002RJ TIALN-RJ1	0162
2256402	7N0202502RJ TIALN-RJ1	0163
2256403	7N1200502RJ TIALN-RJ1	0160
2256404	7N1200602RJ TIALN-RJ1	0160
2256405	7N1200802RJ TIALN-RJ1	0160
2256406	7N1201002RJ TIALN-RJ1	0161
2256407	7N1201202RJ TIALN-RJ1	0161
2256408	7N1201402RJ TIALN-RJ1	0161
2256409	7N1201502RJ TIALN-RJ1	0161
2256410	7N1201602RJ TIALN-RJ1	0162
2256411	7N1201802RJ TIALN-RJ1	0162
2256412	7N1202002RJ TIALN-RJ1	0162
2256413	7N1202502RJ TIALN-RJ1	0163
2256438	7N2200400RJ TIALN-RJ1	0160
2256439	7N2200410RJ TIALN-RJ1	0160
2256440	7N2200500RJ TIALN-RJ1	0160
2256441	7N2200510RJ TIALN-RJ1	0160
2256442	7N2200520RJ TIALN-RJ1	0160
2256443	7N2200600RJ TIALN-RJ1	0160
2256444	7N2200610RJ TIALN-RJ1	0160
2256445	7N2200620RJ TIALN-RJ1	0160
2256446	7N2200701RJ TIALN-RJ1	0160
2256447	7N2200711RJ TIALN-RJ1	0160
2256448	7N2200721RJ TIALN-RJ1	0160
2256449	7N2200801RJ TIALN-RJ1	0160
2256450	7N2200811RJ TIALN-RJ1	0160
2256451	7N2200821RJ TIALN-RJ1	0160
2256452	7N2200901RJ TIALN-RJ1	0160
2256453	7N2200911RJ TIALN-RJ1	0161
2256454	7N2200921RJ TIALN-RJ1	0161
2256455	7N2201001RJ TIALN-RJ1	0161
2256456	7N2201011RJ TIALN-RJ1	0161
2256457	7N2201021RJ TIALN-RJ1	0161
2256458	7N2201031RJ TIALN-RJ1	0161
2256459	7N2201201RJ TIALN-RJ1	0161
2256460	7N2201211RJ TIALN-RJ1	0161
2256461	7N2201221RJ TIALN-RJ1	0161
2256462	7N2201231RJ TIALN-RJ1	0161
2256463	7N2201401RJ TIALN-RJ1	0161
2256464	7N2201411RJ TIALN-RJ1	0161
2256465	7N2201421RJ TIALN-RJ1	0161
2256466	7N2201431RJ TIALN-RJ1	0161
2256467	7N2201441RJ TIALN-RJ1	0161
2256468	7N2201501RJ TIALN-RJ1	0161
2256469	7N2201511RJ TIALN-RJ1	0161
2256470	7N2201521RJ TIALN-RJ1	0161
2256471	7N2201531RJ TIALN-RJ1	0161
2256472	7N2201541RJ TIALN-RJ1	0161
2256473	7N2201551RJ TIALN-RJ1	0161
2256474	7N2201601RJ TIALN-RJ1	0162
2256475	7N2201611RJ TIALN-RJ1	0161
2256476	7N2201621RJ TIALN-RJ1	0161
2256477	7N2201631RJ TIALN-RJ1	0161
2256478	7N2201641RJ TIALN-RJ1	0161
2256479	7N2201701RJ TIALN-RJ1	0162
2256480	7N2201711RJ TIALN-RJ1	0162
2256481	7N2201721RJ TIALN-RJ1	0162
2256482	7N2201731RJ TIALN-RJ1	0162
2256483	7N2201741RJ TIALN-RJ1	0162
2256484	7N2201801RJ TIALN-RJ1	0162
2256485	7N2201811RJ TIALN-RJ1	0162
2256486	7N2201821RJ TIALN-RJ1	0162
2256487	7N2201831RJ TIALN-RJ1	0162
2256488	7N2201841RJ TIALN-RJ1	0162
2256489	7N2201901RJ TIALN-RJ1	0162
2256490	7N2201911RJ TIALN-RJ1	0162
2256491	7N2201921RJ TIALN-RJ1	0162
2256492	7N2201931RJ TIALN-RJ1	0162
2256493	7N2201941RJ TIALN-RJ1	0162
2256494	7N2202001RJ TIALN-RJ1	0162
2256495	7N2202011RJ TIALN-RJ1	0162
2256496	7N2202021RJ TIALN-RJ1	0162
2256497	7N2202031RJ TIALN-RJ1	0162
2256498	7N2202041RJ TIALN-RJ1	0162
2256499	7N2202501RJ TIALN-RJ1	0162
2256500	7N2202511RJ TIALN-RJ1	0163
2256501	7N2202521RJ TIALN-RJ1	0163
2256502	7N2202531RJ TIALN-RJ1	0163
2256503	7N2202541RJ TIALN-RJ1	0163
2256504	7N2203002RJ TIALN-RJ1	0163
2256505	7N2203012RJ TIALN-RJ1	0163
2256506	7N2203022RJ TIALN-RJ1	0163
2256507	7N2203032RJ TIALN-RJ1	0163
2256508	7N2203042RJ TIALN-RJ1	0163
2257304	D61804002RJ TIALN-RJ	0191
2261849	7F2-1078A	U31
2263132	12395410200 W	H45
2263154	12395410400 W	H45
2263156	12395410600 W	H45
2263158	12395410800 W	H45
2263159	12395415800 W	H45
2263160	12395411000 W	H45
2263165	12395405200 W	H44
2269913	DT9IP	M4–6
2269914	DT15IP	J32–35, M11–12
2270852	M41224	R6
2271759	HPPT06T3DZENGD TN7535	H47
2271760	HPPT06T3DZENGD TN7525	H47
2276618	RDMT1003M0T TN7535	M81
2281545	022849-000020 K10F	0133
2281546	022849-000030 K10F	0133
2281547	022849-000040 K10F	0133
2281548	022849-000050 K10F	0133
2281549	022849-000060 K10F	0133
2281550	022849-000080 K10F	0133
2281551	022849-000100 K10F	0133
2281552	022849-000120 K10F	0133
2283423	050221-000020 K10	W8
2283424	050221-000022 K10	W8
2283426	050221-000025 K10	W8
2283427	050221-000028 K10	W8
2283428	050221-000030 K10	W8
2283429	050221-000032 K10	W8
2283430	050221-000035 K10	W8
2283431	050221-000040 K10	W8
2283445	050221-000050 K10	W8
2283450	050221-000075 K10	W8
2283451	050221-000080 K10	W8
2283463	050221-000085 K10	W8
2283464	050221-000090 K10	W8
2283465	050221-000095 K10	W8
2283466	050221-000100 K10	W8
2288066	HPGT06T3DZENGD TN7535	H47
2288067	HPGT06T3DZENGD TN7525	H47
2288069	HPGT06T3DZENGD TN2510	H47
2288070	HPGT06T3DZERLD TN7525	H46
2288072	HPGT06T3DZERLD TN2510	H46
2288103	HPGT06T3DZERGD3W TN7525	H47
2288106	HPGT06T3DZFRLDAL THM	H46
2288107	HPGT06T3DZFRLDAL THM-U	H46
2293636	050221-000014 K10	W8
2293637	050221-000015 K10	W8
2293638	050221-000016 K10	W8
2293640	050221-000045 K10	W8
2293641	050221-000055 K10	W8
2293642	050221-000060 K10	W8
2293643	050221-000065 K10	W8
2293644	050221-000070 K10	W8
2332115	022801-000020 K30F	088–89
2332116	022801-000025 K30F	088–89
2332117	022801-000030 K30F	088–89
2332118	022801-000035 K30F	088–89
2332119	022801-000040 K30F	088, 090
2332121	022801-000050 K30F	088, 090
2332122	022801-000060 K30F	088, 090
2332123	022801-000070 K30F	088, 090
2332124	022801-000080 K30F	088, 090
2332125	022801-000090 K30F	089–90
2332127	022801-000120 K30F	089–90
2332131	022801-000200 K30F	089–90
2332132	022802-000020 K30F	088
2332133	022802-000025 K30F	088
2332135	022802-000030 K30F	088
2332136	022802-000035 K30F	088
2332137	022802-000040 K30F	088
2332138	022802-000045 K30F	088, 090
2332139	022802-000050 K30F	088
2332140	022802-000060 K30F	088
2332143	022802-000090 K30F	089
2332144	022802-000100 K30F	089–90
2332147	022802-000140 K30F	089–90
2332150	022802-000200 K30F	089
2332153	022804-000030 K30F	088–89
2332154	022804-000035 K30F	088–89

Order No.	Catalogue No.	Page(s)
2332155	022804-000040 K30F	088, 090
2332156	022804-000045 K30F	088, 090
2332157	022804-000050 K30F	088, 090
2332158	022804-000060 K30F	088, 090
2332159	022804-000070 K30F	088, 090
2332160	022804-000080 K30F	088, 090
2332161	022804-000090 K30F	089–90
2332162	022804-000100 K30F	089–90
2332163	022804-000120 K30F	089–90
2332164	022804-000140 K30F	089–90
2332165	022804-000160 K30F	089–90
2332167	022804-000200 K30F	089–90
2332170	022806-000035 K30F	088
2332171	022806-000040 K30F	088
2332172	022806-000045 K30F	088
2332173	022806-000050 K30F	088
2332174	022806-000060 K30F	088
2332175	022806-000070 K30F	088
2332176	022806-000080 K30F	088
2332177	022806-000090 K30F	089
2332178	022806-000100 K30F	089
2332179	022806-000120 K30F	089
2332180	022806-000140 K30F	089
2332181	022806-000160 K30F	089
2332182	022806-000180 K30F	089–90
2332183	022806-000200 K30F	089
2332360	022813-000060 K30F	063
2332361	022813-000080 K30F	063
2332362	022813-000100 K30F	063
2332363	022813-000120 K30F	063
2332364	022813-000160 K30F	063
2332365	022813-000200 K30F	063
2332366	022813-000250 K30F	063
2332369	022814-000040 K10F	0135
2332370	022814-000050 K10F	0135
2332371	022814-000060 K10F	0135
2332372	022814-000080 K10F	0135
2332373	022814-000100 K10F	0135
2332374	022814-000120 K10F	0135
2332375	022814-000140 K10F	0135
2332376	022814-000160 K10F	0135
2332377	022814-000180 K10F	0135
2332378	022814-000200 K10F	0135
2332410	022817-000040 K10F	0135
2332411	022817-000050 K10F	0135
2332412	022817-000060 K10F	0135
2332413	022817-000080 K10F	0135
2332414	022817-000100 K10F	0135
2332415	022817-000120 K10F	0135
2332416	022817-000140 K10F	0135
2332417	022817-000160 K10F	0135
2332418	022817-000180 K10F	0135
2332419	022817-000200 K10F	0135
2332420	022818-000060 K30F	064
2332421	022818-000080 K30F	064
2332422	022818-000100 K30F	064
2332423	022818-000120 K30F	064
2332425	022818-000160 K30F	064
2332427	022818-000200 K30F	064
2332652	022846-000060 K30F	065
2332653	022846-000080 K30F	065
2332654	022846-000100 K30F	065
2332655	022846-000120 K30F	065
2332656	022846-000160 K30F	065
2332657	022846-000200 K30F	065
2332658	022846-000250 K30F	065
2333055	023007-000004 K30F	0116
2333056	023007-000005 K30F	0116
2333057	023007-000006 K30F	0116
2333058	023007-000008 K30F	0116
2333060	023007-000010 K30F	0116
2333061	023007-000012 K30F	0116
2333064	023007-000015 K30F	0116
2333067	023007-000018 K30F	0116
2333069	023007-000020 K30F	0116
2333070	023007-000025 K30F	0116
2333071	023007-000030 K30F	0116
2333086	024101-000060 PKD	0138
2333087	024101-000080 PKD	0138
2333088	024101-000100 PKD	0138
2333099	024111-000020 K10F-DIA	098
2333100	024111-000030 K10F-DIA	098
2333101	024111-000040 K10F-DIA	098
2333102	024111-000050 K10F-DIA	098
2333103	024111-000060 K10F-DIA	098
2333104	024111-000080 K10F-DIA	098
2333105	024111-000100 K10F-DIA	098
2333106	024111-000120 K10F-DIA	098
2333112	024112-006005 K10F-DIA	097
2333113	024112-008010 K10F-DIA	097
2333114	024112-010020 K10F-DIA	097
2333138	026621-000080 CERMET	096
2333140	026621-000120 CERMET	096
2333143	026621-000160 CERMET	096
2333145	026621-000200 CERMET	096
2335347	322801-000020 K30F-TICN	088
2335348	322801-000025 K30F-TICN	088
2335349	322801-000030 K30F-TICN	088
2335350	322801-000035 K30F-TICN	088
2335351	322801-000040 K30F-TICN	088
2335352	322801-000045 K30F-TICN	088
2335353	322801-000050 K30F-TICN	088
2335354	322801-000060 K30F-TICN	088
2335355	322801-000070 K30F-TICN	088
2335356	322801-000080 K30F-TICN	088
2335357	322801-000090 K30F-TICN	089
2335358	322801-000100 K30F-TICN	089
2335360	322801-000120 K30F-TICN	089
2335361	322801-000140 K30F-TICN	089
2335362	322801-000160 K30F-TICN	089–90
2335363	322801-000180 K30F-TICN	089–90
2335364	322801-000200 K30F-TICN	089
2335365	322802-000020 K30F-TICN	088
2335366	322802-000025 K30F-TICN	088
2335368	322802-000030 K30F-TICN	088
2335369	322802-000035 K30F-TICN	088
2335370	322802-000040 K30F-TICN	088
2335371	322802-000045 K30F-TICN	088
2335372	322802-000050 K30F-TICN	088
2335374	322802-000060 K30F-TICN	088
2335376	322802-000070 K30F-TICN	088
2335378	322802-000080 K30F-TICN	088
2335379	322802-000090 K30F-TICN	089
2335381	322802-000100 K30F-TICN	089
2335383	322802-000120 K30F-TICN	089
2335384	322802-000140 K30F-TICN	089
2335385	322802-000160 K30F-TICN	089
2335386	322802-000180 K30F-TICN	089
2335387	322802-000200 K30F-TICN	089
2335388	322804-000030 K30F-TICN	088
2335389	322804-000035 K30F-TICN	088
2335390	322804-000040 K30F-TICN	088
2335391	322804-000045 K30F-TICN	088
2335392	322804-000050 K30F-TICN	088
2335393	322804-000060 K30F-TICN	088
2335394	322804-000070 K30F-TICN	088
2335395	322804-000080 K30F-TICN	088
2335396	322804-000090 K30F-TICN	089
2335397	322804-000100 K30F-TICN	089
2335398	322804-000120 K30F-TICN	089
2335399	322804-000140 K30F-TICN	089
2335400	322804-000160 K30F-TICN	089
2335401	322804-000180 K30F-TICN	089
2335402	322804-000200 K30F-TICN	089
2335403	322806-000030 K30F-TICN	088
2335404	322806-000035 K30F-TICN	088
2335406	322806-000040 K30F-TICN	088
2335407	322806-000045 K30F-TICN	088
2335408	322806-000050 K30F-TICN	088
2335409	322806-000060 K30F-TICN	088
2335410	322806-000070 K30F-TICN	088
2335411	322806-000080 K30F-TICN	088
2335412	322806-000090 K30F-TICN	089
2335413	322806-000100 K30F-TICN	089
2335415	322806-000120 K30F-TICN	089
2335417	322806-000140 K30F-TICN	089
2335420	322806-000160 K30F-TICN	089
2335421	322806-000180 K30F-TICN	089
2335422	322806-000200 K30F-TICN	089
2336740	323001-000020 K30F-TICN	P4
2336747	323001-000030 K30F-TICN	P4
2336753	323001-000040 K30F-TICN	P4
2336759	323001-000050 K30F-TICN	P4
2336765	323001-000060 K30F-TICN	P4
2336771	323001-000080 K30F-TICN	P4
2336777	323001-000100 K30F-TICN	P4
2336783	323001-000120 K30F-TICN	P4
2341532	422801-000020 K30F-DCF	089
2341534	422801-000025 K30F-DCF	089
2341536	422801-000030 K30F-DCF	089
2341538	422801-000035 K30F-DCF	089
2341540	422801-000040 K30F-DCF	090
2341542	422801-000045 K30F-DCF	090
2341544	422801-000050 K30F-DCF	090
2341546	422801-000060 K30F-DCF	090
2341548	422801-000070 K30F-DCF	090
2341550	422801-000080 K30F-DCF	090
2341553	422801-000090 K30F-DCF	090
2341555	422801-000100 K30F-DCF	090
2341557	422801-000120 K30F-DCF	090
2341559	422801-000140 K30F-DCF	090
2341561	422801-000160 K30F-DCF	090
2341562	422801-000180 K30F-DCF	090
2341564	422801-000200 K30F-DCF	090
2341566	422802-000020 K30F-DCF	089
2341568	422802-000025 K30F-DCF	089
2341570	422802-000030 K30F-DCF	089
2341573	422802-000035 K30F-DCF	089
2341575	422802-000040 K30F-DCF	090
2341577	422802-000045 K30F-DCF	090
2341579	422802-000050 K30F-DCF	090
2341581	422802-000060 K30F-DCF	090
2341583	422802-000070 K30F-DCF	090
2341587	422802-000080 K30F-DCF	090
2341589	422802-000090 K30F-DCF	090
2341591	422802-000100 K30F-DCF	090
2341593	422802-000120 K30F-DCF	090
2341595	422802-000140 K30F-DCF	090
2341597	422802-000160 K30F-DCF	090
2341599	422802-000180 K30F-DCF	090
2341601	422802-000200 K30F-DCF	090
2341603	422804-000030 K30F-DCF	089
2341606	422804-000035 K30F-DCF	089
2341608	422804-000040 K30F-DCF	090
2341610	422804-000045 K30F-DCF	090
2341612	422804-000050 K30F-DCF	090
2341614	422804-000060 K30F-DCF	090
2341616	422804-000070 K30F-DCF	090
2341618	422804-000080 K30F-DCF	090
2341620	422804-000090 K30F-DCF	090
2341622	422804-000100 K30F-DCF	090
2341624	422804-000120 K30F-DCF	090
2341626	422804-000140 K30F-DCF	090
2341628	422804-000160 K30F-DCF	090
2341630	422804-000180 K30F-DCF	090
2341632	422804-000200 K30F-DCF	090
2341634	422806-000030 K30F-DCF	089
2341636	422806-000035 K30F-DCF	089
2341638	422806-000040 K30F-DCF	090
2341640	422806-000045 K30F-DCF	090
2341642	422806-000050 K30F-DCF	090
2341644	422806-000060 K30F-DCF	090
2341646	422806-000070 K30F-DCF	090
2341648	422806-000080 K30F-DCF	090
2341650	422806-000090 K30F-DCF	090
2341653	422806-000100 K30F-DCF	090
2341657	422806-000120 K30F-DCF	090
2341659	422806-000140 K30F-DCF	090
2341661	422806-000160 K30F-DCF	090
2341663	422806-000180 K30F-DCF	090
2341665	422806-000200 K30F-DCF	090
2342043	422813-000060 K30F-DCF	063
2342045	422813-000080 K30F-DCF	063
2342047	422813-000100 K30F-DCF	063
2342049	422813-000120 K30F-DCF	063
2342051	422813-000160 K30F-DCF	063
2342053	422813-000200 K30F-DCF	063
2342055	422813-000250 K30F-DCF	063
2342154	422818-000060 K30F-DCF	064
2342156	422818-000080 K30F-DCF	064
2342158	422818-000100 K30F-DCF	064
2342160	422818-000120 K30F-DCF	064
2342162	422818-000160 K30F-DCF	064
2342164	422818-000200 K30F-DCF	064
2342270	422822-000060 K30F-DCHP	093
2342272	422822-000080 K30F-DCHP	093
2342274	422822-000100 K30F-DCHP	093
2342276	422822-000120 K30F-DCHP	093
2342280	422822-000160 K30F-DCHP	093
2342282	422822-000180 K30F-DCHP	093
2342284	422822-000200 K30F-DCHP	093
2342286	422822-000250 K30F-DCHP	093
2342341	422826-000060 K30F-DCHP	093
2342343	422826-000080 K30F-DCHP	093
2342345	422826-000100 K30F-DCHP	093
2342347	422826-000120 K30F-DCHP	093
2342351	422826-000160 K30F-DCHP	093
2342353	422826-000180 K30F-DCHP	093
2342355	422826-000200 K30F-DCHP	093
2342357	422826-000250 K30F-DCHP	093
2342360	422827-000060 K30F-DCHP	094
2342362	422827-000080 K30F-DCHP	094
2342364	422827-000100 K30F-DCHP	094
2342366	422827-000120 K30F-DCHP	094

Order No.	Catalogue No.	Page(s)
2342368	422827-000160 K30F-DCHP	094
2342370	422827-000200 K30F-DCHP	094
2342372	422827-000250 K30F-DCHP	094
2342388	422831-006005 K10UF-DCHP	0192
2342390	422831-008005 K10UF-DCHP	0192
2342392	422831-010005 K10UF-DCHP	0192
2342394	422831-012010 K10UF-DCHP	0192
2342396	422831-016010 K10UF-DCHP	0192
2342398	422831-020010 K10UF-DCHP	0192
2342400	422831-025015 K10UF-DCHP	0192
2342495	422837-006005 K10UF-DCHP	0192
2342497	422837-008005 K10UF-DCHP	0192
2342499	422837-010005 K10UF-DCHP	0192
2342501	422837-012010 K10UF-DCHP	0192
2342502	422837-016010 K10UF-DCHP	0192
2342505	422837-020010 K10UF-DCHP	0192
2342676	422846-000060 K30F-DCF	065
2342678	422846-000080 K30F-DCF	065
2342680	422846-000100 K30F-DCF	065
2342684	422846-000120 K30F-DCF	065
2342686	422846-000160 K30F-DCF	065
2342688	422846-000200 K30F-DCF	065
2342690	422846-000250 K30F-DCF	065
2343169	422868-000060 K10UF-DCHP	0177
2343171	422868-000080 K10UF-DCHP	0177
2343173	422868-000100 K10UF-DCHP	0177
2343179	422869-000010 K10UF-DCHP	0177
2343183	422869-000020 K10UF-DCHP	0177
2343186	422869-000030 K10UF-DCHP	0177
2343188	422869-000040 K10UF-DCHP	0177
2343190	422869-000050 K10UF-DCHP	0177
2343192	422869-000060 K10UF-DCHP	0177
2343194	422869-000080 K10UF-DCHP	0177
2343196	422869-000100 K10UF-DCHP	0177
2343198	422869-000120 K10UF-DCHP	0177
2343200	422869-000160 K10UF-DCHP	0177
2343202	422870-000020 K10UF-DCHP	0178
2343204	422870-000030 K10UF-DCHP	0178
2343206	422870-000040 K10UF-DCHP	0178
2343208	422870-000050 K10UF-DCHP	0178
2343210	422870-000060 K10UF-DCHP	0178
2343212	422870-000080 K10UF-DCHP	0178
2343214	422870-000100 K10UF-DCHP	0178
2343216	422870-000120 K10UF-DCHP	0178
2343218	422871-030075 K10UF-DCHP	0190
2343220	422871-030100 K10UF-DCHP	0190
2343222	422871-040075 K10UF-DCHP	0190
2343224	422871-040100 K10UF-DCHP	0190
2343227	422871-050075 K10UF-DCHP	0190
2343229	422871-050100 K10UF-DCHP	0190
2343230	422871-060075 K10UF-DCHP	0190
2343233	422871-060100 K10UF-DCHP	0190
2343235	422871-080100 K10UF-DCHP	0190
2343237	422871-080150 K10UF-DCHP	0190
2343239	422871-100100 K10UF-DCHP	0190
2343241	422871-100150 K10UF-DCHP	0190
2343265	422873-050100 K10UF-DCHP	0179
2343269	422873-060100 K10UF-DCHP	0179
2343275	422873-100100 K10UF-DCHP	0179
2343277	422873-100150 K10UF-DCHP	0179
2343303	422875-002005 K10UF-DCHP	0173
2343305	422875-003005 K10UF-DCHP	0173
2343307	422875-004005 K10UF-DCHP	0173
2343309	422875-005005 K10UF-DCHP	0173
2343311	422875-006010 K10UF-DCHP	0173
2343313	422875-008020 K10UF-DCHP	0173
2343315	422875-010030 K10UF-DCHP	0173
2343317	422875-012040 K10UF-DCHP	0173
2343319	422875-002003 K10UF-DCHP	0173
2343321	422875-003010 K10UF-DCHP	0173
2343323	422875-004010 K10UF-DCHP	0173
2343325	422875-005010 K10UF-DCHP	0173
2343327	422875-006005 K10UF-DCHP	0173
2343329	422875-008010 K10UF-DCHP	0173
2343331	422875-010020 K10UF-DCHP	0173
2343333	422875-012030 K10UF-DCHP	0173
2343352	423001-000020 K30F-DCF	P4
2343354	423001-000030 K30F-DCF	P4
2343356	423001-000040 K30F-DCF	P4
2343358	423001-000050 K30F-DCF	P4
2343360	423001-000060 K30F-DCF	P4
2343362	423001-000080 K30F-DCF	P4
2343364	423001-000100 K30F-DCF	P4
2343366	423001-000120 K30F-DCF	P4
2343368	423007-000004 K30F-DCHP	0116
2343370	423007-000005 K30F-DCHP	0116
2343372	423007-000006 K30F-DCHP	0116
2343374	423007-000008 K30F-DCHP	0116
2343376	423007-000010 K30F-DCHP	0116
2343378	423007-000012 K30F-DCHP	0116
2343380	423007-000015 K30F-DCHP	0116
2343382	423007-000018 K30F-DCHP	0116
2343384	423007-000020 K30F-DCHP	0116
2343386	423007-000025 K30F-DCHP	0116
2343388	423007-000030 K30F-DCHP	0116
2343490	423034-000005 K10UF-DCHP	0164
2343492	423034-000006 K10UF-DCHP	0164
2343494	423034-000008 K10UF-DCHP	0164
2343496	423034-000010 K10UF-DCHP	0164
2343498	423034-000012 K10UF-DCHP	0164
2343500	423034-000015 K10UF-DCHP	0164
2343502	423034-000020 K10UF-DCHP	0164
2343504	423034-000025 K10UF-DCHP	0164
2343506	423034-000030 K10UF-DCHP	0164
2343508	423036-000060 K30F-DCF	P8
2343510	423036-000080 K30F-DCF	P8
2343512	423036-000100 K30F-DCF	P8
2343514	423038-000020 K30F-DCHP	P7
2343516	423038-000030 K30F-DCHP	P7
2343519	423038-000040 K30F-DCHP	P7
2343521	423038-000050 K30F-DCHP	P7
2343523	423038-000060 K30F-DCHP	P7
2343525	423038-000080 K30F-DCHP	P7
2343527	423038-000100 K30F-DCHP	P7
2343529	423038-000120 K30F-DCHP	P7
2343531	423039-000020 K30F-DCHP	P7
2343533	423039-000030 K30F-DCHP	P7
2343535	423039-000040 K30F-DCHP	P7
2343537	423039-000050 K30F-DCHP	P7
2343539	423039-000060 K30F-DCHP	P7
2343541	423039-000080 K30F-DCHP	P7
2343543	423039-000100 K30F-DCHP	P7
2343545	423039-000120 K30F-DCHP	P7
2343548	423047-000020 K30F-DCHP	P6
2343550	423047-000030 K30F-DCHP	P6
2343552	423047-000040 K30F-DCHP	P6
2343554	423047-000050 K30F-DCHP	P6
2343556	423047-000060 K30F-DCHP	P6
2343558	423047-000080 K30F-DCHP	P6
2343560	423047-000100 K30F-DCHP	P6
2343562	423047-000120 K30F-DCHP	P6
2343564	423048-000020 K30F-DCHP	P6
2343566	423048-000030 K30F-DCHP	P6
2343568	423048-000040 K30F-DCHP	P6
2343570	423048-000050 K30F-DCHP	P6
2343572	423048-000060 K30F-DCHP	P6
2343574	423048-000080 K30F-DCHP	P6
2343576	423048-000100 K30F-DCHP	P6
2343579	423048-000120 K30F-DCHP	P6
2345784	022806-000030 K30F	O88
2387228	7F1-0750T	U30
2388660	SKRN1203M0 K9	C45
2397765	KLM68L25IP	C8–10, C12–15
2397767	KMSP625IP	C8–10, C12–15
2397770	KMSP39IP	C9, C19
2421384	SSY5T K9	F70–72, F74
2421386	SSA5T	F70–72, F74
2424550	M270BD010A12L140C W	M105
2424587	M270BD012A12L145C W	M105
2424634	M270BD016A16L155C W	M105
2429601	514.112	C61
2429602	514.118	C23, C26–30, C60
2429633	514.122	C60, C104–105
2429634	514.123	C20–22, C25–30, C60–61, C104–105
2429636	514.125	C20–22, C25–27, C60, C104–105
2429637	514.128	C23–24, C29
2429638	514.133	C20–22, C25–27
2429639	514.138	C25–27
2436494	050227-000200 K10F	W9
2436871	050227-000300 K10F	W9
2436872	050227-000400 K10F	W9
2436913	050227-000500 K10F	W9
2436914	050227-000600 K10F	W9
2436916	050227-000800 K10F	W9
2436919	050227-001000 K10F	W9
2436922	050227-001200 K10F	W9
2436946	050227-001400 K10F	W9
2437425	050271-000500 K10F	W10
2437426	050271-000600 K10F	W10
2437428	050271-000800 K10F	W10
2437430	050271-001000 K10F	W10
2437432	050271-001200 K10F	W10
2437468	050271-001400 K10F	W10
2437472	050270-000500 K10F	W14
2437523	050270-000600 K10F	W14
2437525	050270-000800 K10F	W14
2437526	050270-001000 K10F	W14
2437527	050270-001200 K10F	W14
2437529	050270-001400 K10F	W14
2441162	450227-000200 K10F-DCFD	W9
2441253	450227-000300 K10F-DCFD	W9
2441254	450227-000400 K10F-DCFD	W9
2441256	450227-000500 K10F-DCFD	W9
2441257	450227-000600 K10F-DCFD	W9
2441260	450227-000800 K10F-DCFD	W9
2441261	450227-001000 K10F-DCFD	W9
2441284	450227-001200 K10F-DCFD	W9
2441285	450227-001400 K10F-DCFD	W9
2441337	450270-000500 K10F-DCFD	W14
2441339	450270-000600 K10F-DCFD	W14
2441341	450270-000800 K10F-DCFD	W14
2441342	450270-001000 K10F-DCFD	W14
2441353	450270-001200 K10F-DCFD	W14
2441354	450270-001400 K10F-DCFD	W14
2441380	450271-000500 K10F-DCFD	W10
2441381	450271-000600 K10F-DCFD	W10
2441453	450271-000800 K10F-DCFD	W10
2441455	450271-001000 K10F-DCFD	W10
2441457	450271-001200 K10F-DCFD	W10
2441494	450271-001400 K10F-DCFD	W10
2446025	050222-000200 K10F	W13
2446029	050222-000300 K10F	W13
2446031	050222-000400 K10F	W13
2446371	450222-000200 K10F-DCFD	W13
2446372	450222-000300 K10F-DCFD	W13
2446415	450222-000400 K10F-DCFD	W13
2460213	56-1015	U40–41, U44–45
2495913	706002001RT TIALN-RT1	0189
2495914	706002501RT TIALN-RT1	0189
2495915	706003002RT TIALN-RT1	0189
2495916	706004002RT TIALN-RT1	0189
2495917	706005002RT TIALN-RT1	0189
2495918	706006004RT TIALN-RT1	0189
2495919	706008004RT TIALN-RT1	0189
2495920	706010005RT TIALN-RT1	0189
2495921	706012006RT TIALN-RT1	0189
2495994	706101001RT TIALN-RT1	0175
2495995	706102001RT TIALN-RT1	0175
2495996	706102501RT TIALN-RT1	0175
2495997	706103002RT TIALN-RT1	0175
2495998	706104002RT TIALN-RT1	0175
2495999	706105002RT TIALN-RT1	0175
2496000	706106004RT TIALN-RT1	0175
2496001	706108004RT TIALN-RT1	0175
2496002	706110005RT TIALN-RT1	0175
2496023	706112006RT TIALN-RT1	0175
2498713	123567320 TN7535	E97
2498714	123567330 TN7535	E97
2498715	123567340 TN7535	E97
2498716	123567350 TN7535	E97
2498717	123567230 TN7535	E98
2498718	123567231 TN7535	E98
2498719	123567240 TN7535	E98
2498721	123567420 TN7535	E99
2498722	123567430 TN7535	E99
2498723	123567440 TN7535	E99
2498724	123567450 TN7535	E99
2498725	123567320 TN7525	E97
2498727	123567340 TN7525	E97
2498728	123567350 TN7525	E97
2498729	123567230 TN7525	E98
2498730	123567231 TN7525	E98
2498731	123567240 TN7525	E98
2498733	123567420 TN7525	E99
2498734	123567430 TN7525	E99
2498735	123567440 TN7525	E99
2498736	123567450 TN7525	E99
2499567	750503002LT TIALN-LT1	0180
2499568	750504002LT TIALN-LT1	0180
2499569	750505002LT TIALN-LT1	0180
2499570	754503002LT TIALN-LT1	0180
2499571	754504002LT TIALN-LT1	0180
2499572	754505002LT TIALN-LT1	0180
2510324	49N906002.. UNCOATED	0142
2510325	49N908003.. UNCOATED	0142
2510326	49N910004.. UNCOATED	0142
2510327	49N912005.. UNCOATED	0142
2510328	49N916006.. UNCOATED	0142
2510329	49N920007.. UNCOATED	0142
2511344	M4000CA-HP06	H73
2526391	KMSP825IP	C9, C12, C14

Order No.	Catalogue No.	Page(s)
2526442	KLM81025IP	C9, C12, C14
2526554	M40403	R11
2539334	CM184LP	E75, F26
2539335	CM185LP	E75, F26
2540317	759503002LT TIALN-LT1	0182
2540318	759503012LT TIALN-LT1	0182
2540319	759504002LT TIALN-LT1	0182
2540320	759504012LT TIALN-LT1	0182
2540321	759505002LT TIALN-LT1	0182
2540322	759505012LT TIALN-LT1	0182
2541273	759506022LT TIALN-LT1	0182
2541274	759506032LT TIALN-LT1	0182
2541275	759508023LT TIALN-LT1	0182
2541276	759508033LT TIALN-LT1	0182
2541277	759510024LT TIALN-LT1	0183
2541278	759510034LT TIALN-LT1	0183
2541279	759512025LT TIALN-LT1	0183
2541280	759512035LT TIALN-LT1	0183
2541282	759516036LT TIALN-LT1	0183
2541293	759520027LT TIALN-LT1	0183
2541622	56-1585	U40–42, U44–45
2544367	75N503022LT TIALN-LT1	0184
2544368	75N503042LT TIALN-LT1	0184
2544369	75N504022LT TIALN-LT1	0184
2544370	75N504042LT TIALN-LT1	0184
2544371	75N505022LT TIALN-LT1	0184
2544372	75N505042LT TIALN-LT1	0184
2544443	75N506022LT TIALN-LT1	0184
2544444	75N506042LT TIALN-LT1	0184
2544445	75N506062LT TIALN-LT1	0184
2544446	75N506082LT TIALN-LT1	0184
2544447	75N508023LT TIALN-LT1	0184
2544448	75N508033LT TIALN-LT1	0184
2544449	75N508043LT TIALN-LT1	0184
2544450	75N508053LT TIALN-LT1	0184
2544452	75N510024LT TIALN-LT1	0184
2544483	75N510034LT TIALN-LT1	0184
2544484	75N510044LT TIALN-LT1	0184
2544485	75N510054LT TIALN-LT1	0185
2544486	75N512025LT TIALN-LT1	0185
2544487	75N512035LT TIALN-LT1	0185
2544488	75N512045LT TIALN-LT1	0185
2544489	75N512055LT TIALN-LT1	0185
2544490	75N516026LT TIALN-LT1	0185
2544491	75N516046LT TIALN-LT1	0185
2544492	75N520027LT TIALN-LT1	0185
2544523	75N520047LT TIALN-LT1	0185
2544524	75N525028LT TIALN-LT1	0185
2544525	75N525048LT TIALN-LT1	0185
2544526	75N806002RT TIALN-RT1	0186
2544527	75N808003RT TIALN-RT1	0186
2544528	75N810004RT TIALN-RT1	0186
2544529	75N812005RT TIALN-RT1	0186
2544530	75N203022RT TIALN-RT1	0172
2544735	75N203042RT TIALN-RT1	0172
2544736	75N203062RT TIALN-RT1	0172
2544737	75N204022RT TIALN-RT1	0172
2544738	75N204042RT TIALN-RT1	0172
2544739	75N204062RT TIALN-RT1	0172
2544740	75N205022RT TIALN-RT1	0172
2544741	75N205042RT TIALN-RT1	0172
2544742	75N206032RT TIALN-RT1	0172
2545163	75N206042RT TIALN-RT1	0172
2545164	75N206052RT TIALN-RT1	0172
2545166	75N206062RT TIALN-RT1	0172
2545167	75N206072RT TIALN-RT1	0172
2545168	75N208023RT TIALN-RT1	0172
2545169	75N208043RT TIALN-RT1	0172
2545170	75N208063RT TIALN-RT1	0172
2545171	75N210024RT TIALN-RT1	0172
2545172	75N210034RT TIALN-RT1	0172
2545183	75N210044RT TIALN-RT1	0172
2545184	75N210064RT TIALN-RT1	0172
2545185	75N212025RT TIALN-RT1	0172
2545186	75N212035RT TIALN-RT1	0172
2545187	75N212045RT TIALN-RT1	0172
2545188	75N212055RT TIALN-RT1	0172
2545189	75N212065RT TIALN-RT1	0172
2545190	70N101001RT TIALN-RT1	0176
2545191	70N101501RT TIALN-RT1	0176
2545192	70N102002RT TIALN-RT1	0176
2545213	70N103002RT TIALN-RT1	0176
2545214	70N104002RT TIALN-RT1	0176
2545215	70N105002RT TIALN-RT1	0176
2545216	70N106002RT TIALN-RT1	0176
2545217	70N108003RT TIALN-RT1	0176
2545218	70N110004RT TIALN-RT1	0176
2545219	70N112005RT TIALN-RT1	0176
2545563	477804002MT ALTIN-MT	06
2545564	477805002MT ALTIN-MT	06
2545565	477806002MT ALTIN-MT	06
2545570	477807003MT ALTIN-MT	06
2545603	477808003MT ALTIN-MT	06
2545605	477809004MT ALTIN-MT	06
2559301	CNMG190616 HK1500	B37
2559317	CNMG190616 THM	B37
2559352	CNMG190612 HK1500	B37
2559382	CNMG190612 THM	B37
2559474	CNMG120408 HK1500	B37
2559538	CNMG120404 HK1500	B37
2559561	CNMG120404 THM	B37
2559805	CNMA120412 HK1500	B36
2559834	CNMA120408 HK1500	B36
2559864	CNMA120404 HK1500	B36
2559989	SNMA120412 HK1500	B71
2560009	SNMA120408 HK1500	B71
2560926	CNMG12040422 TN2000	B37
2561892	SPUN190416 THM	B80
2562359	CCMT09T304 HK1500	B30
2562499	DCMT11T308MU TN2000	B49
2562545	CCMT09T304MU TN2000	B33
2562755	TPUN160308 HK1500	B93
2563459	DCMT11T308 HK1500	B47
2563563	DCMT11T304 HK1500	B47
2563990	CCMT09T308 HK1500	B30
2564010	CCMT090308 HK1500	B30
2564044	CCMT090304 HK1500	B30
2564132	CCMT060204 HK1500	B30
2601245	477810004MT ALTIN-MT	06
2601246	477812005MT ALTIN-MT	06
2601248	477814014MT ALTIN-MT	06
2601249	477816006MT ALTIN-MT	06
2601250	477818018MT ALTIN-MT	06
2601251	477820007MT ALTIN-MT	06
2601252	477825008MT ALTIN-MT	06
2604191	7F1-0756T	U30
2605576	1N0M03002LJ	Q8
2605577	1N0M04003LJ	Q8
2605578	1N0M05003LJ	Q8
2605579	1N0M06003LJ	Q8
2605580	1N0M08004LJ	Q8
2605581	1N0M10004LJ	Q8
2605582	1N0M12005LJ	Q8
2605583	1N0M14006LJ	Q8
2605584	1N0M16006LJ	Q8
2605585	1N0M18007LJ	Q8
2605586	1N0M20007LJ	Q8
2605587	1N0M22007LJ	Q8
2605715	1N7706002CT	Q9
2605716	1N7706002CW	Q9
2605717	1N7708004CT	Q9
2605718	1N7708004CW	Q9
2605719	1N7710004CT	Q9
2605720	1N7710004CW	Q9
2605721	1N7712005CT	Q9
2605722	1N7712005CW	Q9
2605823	1N7714005CT	Q9
2605824	1N7714005CW	Q9
2605825	1N7716006CT	Q9
2605826	1N7716006CW	Q9
2605827	1N7718006CT	Q9
2605828	1N7718006CW	Q9
2605829	1N7720007CT	Q9
2605830	1N7720007CW	Q9
2605831	1N7722007CT	Q9
2605832	1N7722007CW	Q9
2605843	1N7725008CT	Q9
2605844	1N7725008CW	Q9
2605845	1N7730008CT	Q9
2605846	1N7730008CW	Q9
2627800	323002-000020 K30F-TICN	P4
2627801	323002-000030 K30F-TICN	P4
2627802	323002-000040 K30F-TICN	P4
2627983	323002-000050 K30F-TICN	P4
2627984	323002-000060 K30F-TICN	P4
2627985	323002-000080 K30F-TICN	P4
2627986	323002-000100 K30F-TICN	P4
2627987	323002-000120 K30F-TICN	P4
2627990	423002-000020 K30F-DCF	P4
2628043	423002-000030 K30F-DCF	P4
2628044	423002-000040 K30F-DCF	P4
2628045	423002-000050 K30F-DCF	P4
2628046	423002-000060 K30F-DCF	P4
2628047	423002-000080 K30F-DCF	P4
2628048	423002-000100 K30F-DCF	P4
2628049	423002-000120 K30F-DCF	P4
2628396	422820-000060 K30F-DCHP	058
2628397	422820-000080 K30F-DCHP	058
2628400	422820-000100 K30F-DCHP	058
2628401	422820-000120 K30F-DCHP	058
2628446	422820-000160 K30F-DCHP	058
2628447	422820-000200 K30F-DCHP	058
2628448	422820-000250 K30F-DCHP	058
2628451	422824-000060 K30F-DCHP	058
2628473	422824-000080 K30F-DCHP	058
2628475	422824-000100 K30F-DCHP	058
2628477	422824-000120 K30F-DCHP	058
2628478	422824-000160 K30F-DCHP	058
2628481	422824-000200 K30F-DCHP	058
2628482	422824-000250 K30F-DCHP	058
2628498	423037-000060 K30F-DCHP	P8
2628499	423037-000080 K30F-DCHP	P8
2628500	423037-000100 K30F-DCHP	P8
2628898	422876-004005 K10UF-DCHP	0187
2629013	422876-004010 K10UF-DCHP	0187
2629015	422876-005005 K10UF-DCHP	0187
2629016	422876-005010 K10UF-DCHP	0187
2629018	422876-006005 K10UF-DCHP	0187
2629021	422876-006010 K10UF-DCHP	0187
2629056	422876-008005 K10UF-DCHP	0187
2629060	422876-008010 K10UF-DCHP	0187
2629061	422876-008020 K10UF-DCHP	0187
2629062	422876-010005 K10UF-DCHP	0187
2629077	422876-010010 K10UF-DCHP	0187
2629086	422876-010020 K10UF-DCHP	0187
2629089	422876-012005 K10UF-DCHP	0187
2629094	422876-012010 K10UF-DCHP	0187
2629095	422876-012020 K10UF-DCHP	0187
2629097	422876-012030 K10UF-DCHP	0187
2629541	422875-008005 K10UF-DCHP	0173
2629555	422875-008015 K10UF-DCHP	0173
2629559	422875-010005 K10UF-DCHP	0173
2629560	422875-010010 K10UF-DCHP	0173
2629561	422875-012005 K10UF-DCHP	0173
2629573	422875-012010 K10UF-DCHP	0173
2630276	422878-006005 K10UF-DCHP	0187
2630285	422878-008010 K10UF-DCHP	0187
2630288	422878-008015 K10UF-DCHP	0187
2630290	422878-008020 K10UF-DCHP	0187
2630291	422878-010005 K10UF-DCHP	0187
2630292	422878-010010 K10UF-DCHP	0187
2630345	422878-010020 K10UF-DCHP	0187
2630347	422878-012010 K10UF-DCHP	0187
2630386	422878-012030 K10UF-DCHP	0187
2630665	422150-000060 K30F-DCHP	056
2630667	422150-000080 K30F-DCHP	056
2630669	422150-000100 K30F-DCHP	056
2630670	422150-000120 K30F-DCHP	056
2630672	422150-000160 K30F-DCHP	056
2630675	422150-000200 K30F-DCHP	056
2630677	422150-000250 K30F-DCHP	056
2630679	422152-000060 K30F-DCHP	056
2630680	422152-000080 K30F-DCHP	056
2630713	422152-000100 K30F-DCHP	056
2630714	422152-000120 K30F-DCHP	056
2630717	422152-000160 K30F-DCHP	056
2630718	422152-000200 K30F-DCHP	056
2630719	422152-000250 K30F-DCHP	056
2635004	022852-003005 K10F	0137
2635006	022852-004005 K10F	0137
2635010	022852-004010 K10F	0137
2635063	022852-005005 K10F	0137
2635065	022852-005010 K10F	0137
2635068	022852-006005 K10F	0137
2635072	022852-006010 K10F	0137
2635094	022852-006020 K10F	0137
2635097	022852-008005 K10F	0137
2635100	022852-008010 K10F	0137
2635101	022852-008020 K10F	0137
2635103	022852-010005 K10F	0137
2635104	022852-010010 K10F	0137
2635107	022852-010020 K10F	0137
2635109	022852-012005 K10F	0137
2635110	022852-012010 K10F	0137
2635124	022852-012020 K10F	0137
2635127	022852-016005 K10F	0137
2635128	022852-016010 K10F	0137
2635129	022852-016020 K10F	0137
2635130	022852-016030 K10F	0137
2635131	524152-003005 K10F-DCL	0137
2635153	524152-004005 K10F-DCL	0137
2635155	524152-004010 K10F-DCL	0137
2635156	524152-005005 K10F-DCL	0137

Order No.	Catalogue No.	Page(s)
2635157	524152-005010 K10F-DCL	0137
2635158	524152-006005 K10F-DCL	0137
2635161	524152-006010 K10F-DCL	0137
2635162	524152-006020 K10F-DCL	0137
2635173	524152-008005 K10F-DCL	0137
2635175	524152-008010 K10F-DCL	0137
2635176	524152-008020 K10F-DCL	0137
2635180	524152-010005 K10F-DCL	0137
2635181	524152-010010 K10F-DCL	0137
2635193	524152-010020 K10F-DCL	0137
2635344	524152-012005 K10F-DCL	0137
2635348	524152-012020 K10F-DCL	0137
2635349	524152-016005 K10F-DCL	0137
2635350	524152-016010 K10F-DCL	0137
2635351	524152-016020 K10F-DCL	0137
2635383	524152-016030 K10F-DCL	0137
2638760	M270TF10R1 TN2525	M122
2638761	M270TF12R2 TN2525	M122
2638762	M270TF16R3 TN2525	M122
2639023	M270TF20R4 TN2525	M122
2639257	M270BD020A20L170C W	M105
2642318	5IL55ISO TN6025	F53
2642319	5IL60ISO TN6025	F53
2651100	524149-000030 K10F-DCL	0132
2651314	524149-000040 K10F-DCL	0132
2651317	524149-000050 K10F-DCL	0132
2651318	524149-000060 K10F-DCL	0132
2651319	524149-000080 K10F-DCL	0132
2651320	524149-000100 K10F-DCL	0132
2651321	524149-000120 K10F-DCL	0132
2656458	422837-012005 K10UF-DCHP	0192
2656459	422837-016005 K10UF-DCHP	0192
2656460	422837-020005 K10UF-DCHP	0192
2656461	422837-025005 K10UF-DCHP	0192
2656784	M40343	R9
2657057	422831-012005 K10UF-DCHP	0192
2657058	422831-016005 K10UF-DCHP	0192
2729457	M41480	R14
2729472	M41476	R14
2729483	M41473	R14
2729591	M41439	R12
2729701	M41397	R11
2729793	M41368	R10
2729840	M41356	R9
2729850	M41352	R9
2729855	M41348	R9
2729860	M41347	R9
2729863	M41344	R9
2729868	M41343	R9
2729973	M41311	R8
2729982	M40584	R14
2730002	M40560	R8
2730007	M40559	R8
2730139	M40503	R15
2730149	M40496	R15
2730217	M40479	R14
2730227	M40475	R14
2730232	M40474	R14
2730335	M40430	R12
2730416	M40400	R11
2730421	M40399	R11
2730426	M40398	R11
2730515	M40373	R10
2730567	M40347	R9
2730572	M40344	R9
2730690	M40309	R8
2735310	M42039	R17
2735316	M42038	R17
2735320	M42037	R17
2735326	M42036	R17
2735331	M42035	R17
2735336	M42034	R17
2735341	M42033	R17
2735346	M42032	R17
2735352	M42031	R17
2735357	M42030	R17
2735361	M42029	R17
2735366	M42028	R17
2735371	M42027	R17
2735376	M42026	R17
2735381	M42025	R17
2735386	M42024	R17
2735391	M42023	R17
2735396	M42022	R17
2735401	M42021	R17
2735406	M42020	R17
2735411	M42019	R17
2735417	M42018	R17
2735423	M42016	R17
2735427	M42015	R17
2735432	M42014	R17
2735439	M42013	R17
2735443	M42012	R17
2735449	M42010	R17
2735454	M42009	R17
2735459	M42008	R17
2735464	M42007	R17
2735469	M42006	R17
2735503	M41306	R8
2735681	M41241	R6
2735696	M41232	R6
2736206	M40598	R18
2736212	M40597	R18
2736217	M40596	R18
2736231	M40592	R18
2736241	M40589	R18
2736256	M40553	R6
2736260	M40552	R6
2736314	M40316	R8
2736319	M40304	R8
2736416	M40282	R7
2736421	M40274	R7
2736488	M40239	R6
2736500	M40233	R6
2736505	M40230	R6
2736509	M40229	R6
2736516	M40228	R6
2736521	M40224	R6
2759445	7SZTL	U45
2759446	7SZSS	U40
2759447	7SZSM	U40
2759448	7SZSL	U41
2759459	7S7TM	U44
2759460	7S7TL	U45
2759462	7S5TS	U44
2759463	7S5TM	U44
2759464	7S5TL	U45
2759465	7S5SS	U40
2759466	7S5SM	U40
2759469	7S4TS	U44
2759470	7S4TM	U44
2759471	7S4TL	U45
2759472	7S4SS	U40
2759473	7S4SM	U40
2759474	7S4SL	U41
2759475	7S4SE	U41
2759476	7S3TS	U44
2759477	7S3TM	U44
2759478	7S3TL	U45
2759479	7S3SS	U40
2759480	7S3SM	U40
2759481	7S3SL	U41
2759482	7S2TS	U44
2759483	7S2TM	U44
2759484	7S2TL	U45
2759485	7S2TE	U45
2759486	7S2SS	U40
2759489	7S2SE	U41
2759491	7S2.5SS	U40
2759492	7S2.5SM	U40
2759494	7S1TS	U44
2759495	7S1TM	U44
2759496	7S1TL	U45
2759498	7S1SS	U40
2759499	7S1SM	U40
2759500	7S1SL	U41
2759501	7S1SE	U41
2759502	7S1.5TM	U44
2759503	7S1.5SS	U40
2759504	7S1.5SM	U40
2759506	7S0TM	U44
2759507	7S0TL	U45
2759508	7S0TE	U45
2759509	7S0SS	U40
2759510	7S0SM	U40
2759511	7S0SL	U41
2759512	7S0SE	U41
2759513	7S0.5SS	U40
2759514	7S0.5SM	U40
2759515	7S0.5SL	U41
2759516	7S0.5SE	U41
2759581	7FZ-0500T	U28
2759588	7FZ-0492A	U28
2759592	7FZ-0484A	U28
2759599	7FZ-0472A	U28
2759621	7FZ-0438A	U28
2759684	7F7-4000A	U37
2759688	7F7-3938T	U37
2759698	7F7-3688T	U37
2759703	7F7-3563T	U37
2759709	7F6-3500T	U37
2759715	7F6-3438T	U37
2759718	7F6-3375T	U37
2759726	7F6-3250T	U37
2759731	7F6-3188T	U37
2759736	7F6-3150A	U37
2759739	7F6-3125A	U37
2759742	7F6-3071A	U37
2759743	7F6-3063T	U37
2759745	7F6-3063A	U37
2759748	7F5-3000T	U36
2759751	7F5-3000A	U36
2759753	7F5-2969T	U36
2759755	7F5-2969A	U36
2759756	7F5-2938T	U36
2759764	7F5-2875T	U36
2759766	7F5-2875A	U36
2759773	7F5-2813A	U36
2759778	7F5-2750T	U36
2759780	7F5-2750A	U36
2759781	7F5-2719T	U36
2759788	7F5-2677A	U36
2759789	7F5-2656T	U36
2759791	7F5-2625T	U36
2759801	7F5-2563T	U36
2759802	7F5-2563A	U36
2759808	7F5-2500T	U36
2759811	7F4-2563T	U35
2759813	7F4-2563A	U35
2759816	7F4-2531T	U35
2759820	7F4-2500T	U35
2759822	7F4-2500A	U35
2759823	7F4-2480T	U35
2759828	7F4-2469A	U35
2759830	7F4-2441A	U35
2759831	7F4-2438T	U35
2759833	7F4-2438A	U35
2759840	7F4-2375T	U35
2759843	7F4-2375A	U35
2759845	7F4-2362T	U34
2759848	7F4-2344T	U34
2759851	7F4-2323A	U34
2759852	7F4-2313T	U34
2759854	7F4-2313A	U34
2759857	7F4-2284A	U34
2759858	7F4-2281T	U34
2759862	7F4-2250T	U34
2759865	7F4-2250A	U34
2759868	7F4-2244A	U34
2759870	7F4-2219T	U34
2759872	7F4-2219A	U34
2759874	7F4-2205A	U34
2759876	7F4-2188T	U34
2759880	7F4-2166A	U32
2759882	7F4-2156T	U34
2759887	7F4-2126A	U34
2759888	7F4-2125T	U34
2759891	7F4-2125A	U34
2759892	7F4-2094T	U34
2759896	7F4-2063T	U34
2759899	7F4-2063A	U34
2759900	7F4-2047T	U34
2759901	7F4-2047A	U34
2759902	7F4-2031T	U34
2759904	7F4-2031A	U34
2759911	7F4-2008T	U34
2759913	7F4-2000T	U34
2759916	7F4-2000A	U34
2759919	7F4-1969T	U34
2759921	7F4-1969A	U34
2759925	7F4-1938T	U34
2759927	7F4-1938A	U34
2759930	7F4-1929A	U34
2759932	7F4-1906T	U34
2759934	7F4-1906A	U34
2759935	7F4-1890T	U34
2759936	7F4-1890A	U34
2759937	7F4-1880T	U34
2759942	7F3-1875T	U33
2759945	7F3-1875A	U33
2759949	7F3-1850T	U33
2759951	7F3-1844T	U33
2759956	7F3-1813T	U33
2759958	7F3-1813A	U33

Order No.	Catalogue No.	Page(s)
2759960	7F3-1811A	U33
2759963	7F3-1781T	U33
2759967	7F3-1772T	U33
2759969	7F3-1772A	U33
2759970	7F3-1766T	U33
2759974	7F3-1750T	U33
2759977	7F3-1750A	U33
2759984	7F3-1732A	U33
2759985	7F3-1719T	U33
2759987	7F3-1719A	U33
2759989	7F3-1693T	U33
2759991	7F3-1688T	U33
2759993	7F3-1688A	U33
2759996	7F3-1656T	U33
2760001	7F3-1654A	U33
2760004	7F3-1625T	U33
2760008	7F3-1625A	U33
2760011	7F3-1614A	U33
2760015	7F3-1594T	U33
2760021	7F3-1575T	U33
2760023	7F3-1575A	U33
2760024	7F3-1563T	U33
2760027	7F3-1563A	U33
2760034	7F3-1535A	U33
2760035	7F3-1531T	U33
2760038	7F3-1516T	U33
2760045	7F3-1500T	U33
2760048	7F3-1500A	U33
2760051	7F3-1496A	U33
2760053	7F3-1484T	U33
2760056	7F3-1469T	U33
2760058	7F3-1469A	U33
2760059	7F3-1457T	U33
2760060	7F3-1457A	U33
2760063	7F3-1438T	U33
2760066	7F3-1438A	U33
2760069	7F3-1417T	U33
2760072	7F3-1417A	U33
2760076	7F3-1406T	U33
2760078	7F3-1406A	U33
2760079	7F3-1391T	U33
2760089	7F2-1378A	U32
2760090	7F2-1375T	U32
2760094	7F2-1359T	U32
2760098	7F2-1344T	U32
2760101	7F2-1344A	U32
2760105	7F2-1339A	U32
2760106	7F2-1328T	U32
2760109	7F2-1313T	U31
2760112	7F2-1313A	U31
2760118	7F2-1299A	U31
2760121	7F2-1281T	U31
2760128	7F2-1260T	U31
2760131	7F2-1260A	U31
2760134	7F2-1250T	U31
2760137	7F2-1250A	U31
2760141	7F2-1234T	U31
2760142	7F2-1234N	U31
2760147	7F2-1221A	U31
2760148	7F2-1219T	U31
2760150	7F2-1219A	U31
2760152	7F2-1203T	U31
2760159	7F2-1188T	U31
2760162	7F2-1188A	U31
2760164	7F2-1181T	U31
2760167	7F2-1181A	U31
2760169	7F2-1172T	U31
2760174	7F2-1156T	U31
2760181	7F2-1142A	U31
2760184	7F2-1125T	U31
2760188	7F2-1125A	U31
2760189	7F2-1109T	U31
2760194	7F2-1102T	U31
2760195	7F2-1102A	U31
2760196	7F2-1094T	U31
2760199	7F2-1094A	U31
2760203	7F2-1078T	U31
2760207	7F2-1063T	U31
2760214	7F2-1047T	U31
2760216	7F2-1047A	U31
2760219	7F2-1031T	U31
2760222	7F2-1031A	U31
2760223	7F2-1024T	U31
2760226	7F2-1016T	U31
2760234	7F2-1003A	U31
2760235	7F2-1000T	U31
2760239	7F2-1000A	U31
2760240	7F2-0984T	U31
2760243	7F2-0984A	U31
2760247	7F2-0969T	U31
2760248	7F2-0969N	U31
2760253	7F1-0953T	U30
2760256	7F1-0953A	U30
2760257	7F1-0945T	U30
2760262	7F1-0938T	U30
2760265	7F1-0938A	U30
2760268	7F1-0922T	U30
2760273	7F1-0906T	U30
2760276	7F1-0906A	U30
2760278	7F1-0891T	U30
2760280	7F1-0891A	U30
2760282	7F1-0875T	U30
2760287	7F1-0866T	U30
2760290	7F1-0859T	U30
2760292	7F1-0859A	U30
2760296	7F1-0844T	U30
2760300	7F1-0828T	U30
2760302	7F1-0828A	U30
2760303	7F1-0827T	U30
2760305	7F1-0827A	U30
2760310	7F1-0813T	U30
2760315	7F1-0813A	U30
2760316	7F1-0807T	U30
2760319	7F1-0807A	U30
2760323	7F1-0797T	U30
2760324	7F1-0797N	U30
2760328	7F1-0787T	U30
2760330	7F1-0787A	U30
2760331	7F1-0781T	U30
2760335	7F1-0781A	U30
2760338	7F1-0768T	U30
2760341	7F1-0766T	U30
2760344	7F1-0766A	U30
2760359	7F1-0748T	U30
2760361	7F1-0748A	U30
2760362	7F1-0734T	U30
2760365	7F1-0734A	U30
2760371	7F1-0719T	U30
2760377	7F1-0709T	U30
2760380	7F1-0709A	U30
2760381	7F1-0703T	U30
2760383	7F1-0703A	U30
2760386	7F0-0689T	U29
2760390	7F0-0688T	U29
2760393	7F0-0688A	U29
2760397	7F0-0672T	U29
2760399	7F0-0672A	U29
2760404	7F0-0669A	U29
2760413	7F0-0656A	U29
2760415	7F0-0650T	U29
2760418	7F0-0641T	U29
2760420	7F0-0641A	U29
2760424	7F0-0630T	U29
2760430	7F0-0625T	U29
2760440	7F0-0610A	U29
2760441	7F0-0609T	U29
2760444	7F0-0609A	U29
2760449	7F0-0594T	U29
2760452	7F0-0594A	U29
2760453	7F0-0591T	U29
2760454	7F0-0591A	U29
2760458	7F0-0578T	U29
2760460	7F0-0578A	U29
2760463	7F0-0571A	U29
2760466	7F0-0563T	U29
2760472	7F0-0563A	U29
2760473	7F0-0551T	U29
2760477	7F0-0551A	U29
2760478	7F0-0547T	U29
2760481	7F0-0547A	U29
2760485	7F0-0531T	U29
2760489	7F0-0531A	U29
2760492	7F0-0516A	U29
2760494	7F0-0512T	U29
2760712	56-2125	U40–41, U44–45
2760714	56-2028	U40–41, U44–45
2760715	56-2026	U40–41, U44–45
2760718	56-2017	U40–41, U44–45
2760719	56-2015	U40–41, U44–45
2760725	56-1025	U40–41, U44–45
2760731	56-1014	U40–45
2820783	FNR150472R CG5	D56
2820829	FNT1512ACME2R CG5	D57
2820865	FNT1528UN2R CG5	D57
2820981	LTM16 WG	D59, D71, D84
2821023	WPMT06T308LF CG55	D54
2821036	WPMT06T304LF CG55	D54
2821067	TPHH160308 CG5	D52
2821070	TPHH160304 CG5	D52
2821115	TPHH160308L CG5	D51
2821121	TPHH160308R CG5	D51
2821150	TPHH160304L CG6	D51
2821162	TPHH160304L CG5	D51
2821168	TPHH160304R CG5	D51
2821208	TPHH160302L CG5	D51
2821213	TPHH160302R CG5	D51
2821319	TPHH17T309LF CG5	D52
2821331	TPHB160308 TN7	D50
2821349	TPHB160308 CM1	D50
2821371	TPHB160308 C2	D50
2821377	TPHB160308 CG6	D50
2821381	TPHB160308 CG5	D50
2821392	TPHB160304 CG5	D50
2821397	TPHB160302 CG5	D50
2821402	TPHB1603X0 CG5	D50
2821484	CPMT09T308LF CG5	D45
2821499	CPMT09T304LF CG5	D45
2821519	CPMT09T302LF CG5	D45
2821536	TPGT16T304HP CG5	D53
2821566	TPMT160308LF CG5	D53
2821571	TPMT160304LF CG6	D53
2821577	TPMT160304LF CG5	D53
2821670	TPHH160308 CG6	D52
2821688	TPHH160308 ALO	D52
2821705	TPHH160304 CG6	D52
2821718	TPHH160304LF C25	D52
2821749	TPHB160304 TN7	D50
2821772	TPHB160304 CM1	D50
2821778	TPHB160304 CG6	D50
2821799	TPHB160304 C2	D50
2821816	TPHB160302 CM1	D50
2821822	TPCB160302 CG6	D50
2821834	TPHB160302 C2	D50
2821844	TPHB1603X0 CM1	D50
2822085	SDBM162545R WG	D22
2823182	SKEY WG	D59, D71, D84
2823196	STBIT WG	D59, D71, D84
2823203	STM31 WG	D59, D71, D84
2823227	SC30 WG	D21–22, D59, D71, D84
2823236	SBIT WG	D59, D71, D84
2823592	TPGT110204HP CG5	D53
2823595	TPGT110204HP CM1	D53
2823605	TPGT110202HP CG5	D53
2823619	TPMT110204LF CG6	D53
2823625	TPMT110204LF CG5	D53
2823646	TPMT110202LF CG5	D53
2823739	TPHH110204L CG6	D51
2823753	TPHH110204L CG5	D51
2823767	TPHH110202L TN7	D51
2823805	TPHH110202L CG5	D51
2823812	TPHH110202R CG5	D51
2823851	TPCH110204 CG6	D52
2823858	TPHH110204 CG5	D52
2823908	TPHH110202 CG6	D52
2823914	TPHH110202 CG5	D52
2823942	TPHB110204M CBN6	D50
2823949	TPHB110202M CBN6	D50
2823954	TPHB1102X0M CBN6	D50
2824015	TPHB110204M CPD1	D50
2824022	TPHB110202M CPD1	D50
2824037	TPHB110208 TN7	D50
2824044	TPHB110208 CM1	D50
2824077	TPHB110208 CG5	D50
2824090	TPHB110204 TN7	D50
2824104	TPHB110204 CM1	D50
2824122	TPHB110204 C3	D50
2824129	TPHB110204 CG6	D50
2824136	TPHB110204 CG5	D50
2824148	TPHB110202 TN7	D50
2824168	TPHB110202 CM1	D50
2824191	TPHB110202 C3	D50
2824195	TPHB110202 CG6	D50
2824200	TPHB110202 CG5	D50
2824220	TPHB1102X0 CM1	D50
2824236	TPHB1102X0 C3	D50
2824251	TPHB1102X0 CG5	D50
2824266	TBHB110201 CG5	D47
2824316	WPHT040204 CG5	D54
2824331	WPGT040202UF CG5	D54
2824344	WPHT040201 CG5	D54
2824362	WPMT040204LF CG55	D54
2824441	CPHH06T104 CG5	D45
2824454	CPHH06T102 CG6	D45
2824461	CPHH06T102 CG5	D45

Order No.	Catalogue No.	Page(s)
2824468	CPHH06T102 CM1	D45
2824516	CPT20052R CG5	D56
2824523	CPT20052R CM1	D56
2824531	CPG2062R CG5	D55
2824546	CPG2032R CG5	D55
2824562	CPHB06T104 CG5	D44
2824583	CPHB06T102 CG5	D44
2824747	QCBM122545R WG	D20
2824776	QCBM102545R WG	D20
2824819	QSOM9516385R WG	D20
2824945	QSBM9920385L WG	D19
2824950	QSBM9920385R WG	D19
2824993	QSBM9916485R WG	D19
2825013	QSBM9912480R WG	D19
2825019	QSBM9912485L WG	D19
2825024	QSBM9912485R WG	D19
2825052	QSBM9912295R WG	D19
2825941	QTM20 WG	D24, D59, D71, D84
2825948	QTM26 WG	D59, D71, D84
2825963	QTBIT WG	D59, D71, D84
2825964	Q8BIT WG	D59, D71, D84
2825973	Q8KEY WG	D59, D71, D84
2825982	QKEY WG	D59, D71, D84
2826005	QC15 WG	D59, D71, D84
2826038	QC21 WG	D18–20, D59, D71, D84
2826045	QBIT WG	D59, D71, D84
2827471	WPHTS30104 CG5	D54
2827477	WPHTS30104 CM1	D54
2827483	WPHTS30102 CG5	D54
2827490	WPHTS30102 CM1	D54
2827496	WPHTS30101 CG5	D54
2827521	WPMTS3T104LF CG55	D54
2827525	GCHT060204 CG5	D46
2827531	GCHT060204 CM1	D46
2827537	GCHT060202 CG5	D46
2827548	GPHT050104 CG5	D47
2827554	GPHT050104 CM1	D47
2827560	GPHT050102 CG5	D47
2827566	GPHT050102 CM1	D47
2827577	GCHW060204 CG5	D46
2827584	GCHW060204 CM1	D46
2827596	GCHW060202 CG5	D46
2827601	GCHW060202 CM1	D46
2827608	GPHW050104 CG6	D46
2827615	GPHW050104 CG5	D46
2827621	GPHW050104 CM1	D46
2827625	GPHW050102 CG6	D46
2827631	GPHW050102 CG5	D46
2827637	GPHW050102 CM1	D46
2827644	GCPM162545L WG	D27
2827656	GCPM10254225R WG	D27
2827705	GCBMW61523L WG	D23
2827711	GCBMW61523R WG	D23
2828116	GSBMW61003L WG	D23
2828122	GSBMW61003R WG	D23
2828318	GTKEY WG	D59, D71, D84
2828337	GT21 WG	D26–27, D59, D71, D84
2828386	TDHH07S104 CG5	D49
2828398	TDHH07S102 CG5	D49
2828460	TDHH07S104L TN7	D49
2828472	TDHH07S104L CM1	D49
2828494	TDHH07S104L CG5	D49
2828499	TDHH07S104R CG5	D49
2828508	TDHH07S102L TN7	D49
2828516	TDHH07S102L CM1	D49
2828529	TDHH07S102L CG6	D49
2828541	TDHH07S102L CG5	D49
2828547	TDHH07S102R CG5	D49
2828556	TBHB07S1X0 CG5	D47
2828579	TDHB07S102M CBN6	D48
2828622	TDHB07S1X0M CPD1	D48
2828634	TDHB07S104M CBN6	D48
2828682	TDHB07S108 CG5	D48
2828688	TDHB07S104 TN7	D48
2828693	TDHB07S104 CM1	D48
2828697	TDHB07S104 C25	D48
2828702	TDHB07S104 CG6	D48
2828708	TDHB07S104 CG5	D48
2828720	TDHB07S102 TN7	D48
2828727	TDHB07S102 CM1	D48
2828732	TDHB07S102 C25	D48
2828749	TDHB07S102 CG6	D48
2828755	TDHB07S102 CG5	D48
2828763	TDHB07S102 ALO	D48
2828778	TDHB07S1X0 CM1	D48
2828784	TDHB07S1X0 C25	D48
2828796	TDHB07S1X0 CG5	D48
2829268	FCBM8212790R WG	D17
2829279	FCBM8212795R WG	D17
2829295	FCBM8212385L WG	D17
2829301	FCBM8212385R WG	D17
2829319	FCBM6612325L WG	D17
2829323	FCBM6612325R WG	D17
2829344	FCBM5312255L WG	D17
2829350	FCBM5312255R WG	D17
2829356	FCBM81520R WG	D16
2829368	FCBM81525R WG	D16
2829385	FCBM61525L WG	D16
2829390	FCBM61525R WG	D16
2829429	FSBM6616195R WG	D15
2829442	FSBM8212380L WG	D15
2829448	FSBM8212380R WG	D15
2829459	FSBM8212385R WG	D15
2829472	FSBM8212250R WG	D15
2829508	FSBM6612195R WG	D15
2829533	FSBM5212125R WG	D15
2829545	FSBM81005L WG	D14
2829554	FSBM61000R WG	D14
2829566	FSBM61005R WG	D14
2830477	FC11 WG	D14–17, D59, D71, D84
2830492	FKEY WG	D59, D71, D84
2830497	FBIT WG	D59, D71, D84
2830529	CDG50302R CG5	D55
2830535	CDG50302R CM1	D55
2830541	CDG50252R CG5	D55
2830567	CDT50022R CG5	D56
2830619	CDHHS4T004 CG5	D44
2830632	CDHHS4T002 CG5	D44
2830638	CDHHS4T002 CM1	D44
2830678	CDHHS4T004L CG5	D43–44
2830682	CDHHS4T004R CG5	D43–44
2830700	CDHHS4T002L CM1	D43–44
2830706	CDHHS4T002R CM1	D43–44
2830712	CDHHS4T002L CG6	D43–44
2830724	CDHHS4T002L CG5	D43–44
2830731	CDHHS4T002R CG5	D43–44
2830741	CDHBS4T002M CBN6	D42
2830746	CDHBS4T0X0M CBN6	D42
2830769	CDHBS4T004M CPD1	D42
2830774	CDHBS4T002M CPD1	D42
2830788	CDHBS4T004 CG5	D42
2830803	CDHBS4T004 TN7	D42
2830813	CDHBS4T004 CM1	D42
2830817	CDHBS4T004 CG6	D42
2830830	CDHBS4T004 C25	D42
2830843	CDHBS4T002 TN7	D42
2830848	CDHBS4T002 CM1	D42
2830853	CDHBS4T002 CG6	D42
2830864	CDHBS4T002 C25	D42
2830870	CDHBS4T002 ALO	D42
2830881	CDHBS4T0X0 CM1	D42
2830888	CDHBS4T0X0 CG6	D42
2830897	CDHBS4T0X0 C25	D42
2830980	CCPM8152225L WG	D26
2831004	CCPM6152225L WG	D26
2831010	CCPM6152225R WG	D26
2831020	CCPM61525R WG	D26
2831025	CCBM51525L WG	D12
2831048	CSMM6760R WG	D28
2831110	CCBM6516320R WG	D13
2831117	CCBM6516325L WG	D13
2831127	CCBM5316510R WG	D13
2831132	CCBM5316515L WG	D13
2831139	CCBM5316515R WG	D13
2831157	CCBM5316255L WG	D13
2831162	CCBM5316255R WG	D13
2831175	CCBM6612630R WG	D13
2831188	CCBM6612320R WG	D13
2831194	CCBM6612325L WG	D13
2831201	CCBM6612325R WG	D13
2831211	CCBM5312510R WG	D13
2831244	CCBM5312255R WG	D13
2831255	CCBM4812485R WG	D13
2831265	CCBM4812225R WG	D13
2831277	CCBM81520R WG	D12
2831283	CCBM81525L WG	D12
2831289	CCBM81525R WG	D12
2831307	CCBM61525L WG	D12
2831311	CCBM61525R WG	D12
2831324	CCBM41527R WG	D12
2831378	CSPM81232225L WG	D25
2831383	CSPM812325L WG	D25
2831394	CSPM71225225L WG	D25
2831399	CSPM71225225R WG	D25
2831405	CSPM712255L WG	D25
2831411	CSPM712255R WG	D25
2831441	CSBM5655R WG	D10
2831462	CSBM6412320R WG	D11
2831468	CSBM6412325R WG	D11
2831477	CSBM6412190R WG	D11
2831483	CSBM6412195L WG	D11
2831490	CSBM6412195R WG	D11
2831499	CSBM5212250R WG	D11
2831512	CSBM5212255R WG	D11
2831528	CSBM5212125L WG	D11
2831548	CSBM4512125R WG	D11
2831588	CSBM6410195L WG	D11
2831595	CSBM6410195R WG	D11
2831606	CSBM5210250R WG	D11
2831615	CSBM5210255R WG	D11
2831639	CSBM5210125R WG	D11
2831656	CSBM4510125L WG	D11
2831661	CSBM4510125R WG	D11
2831666	CSBM8765R WG	D10
2831676	CSBM6650R WG	D10
2831687	CSBM6655R WG	D10
2831695	CSBM4657L WG	D10
2831701	CSBM4657R WG	D10
2831791	CCBM61005L WG	D12
2831801	CCBM51000R WG	D12
2831807	CCBM51005L WG	D12
2831813	CCBM41007L WG	D12
2831821	CCBM61005R WG	D12
2831826	CCBM51005R WG	D12
2831832	CCBM41007R WG	D12
2832628	CKEY WG	D59, D71, D84
2832635	CT11 WG	D23, D59, D71, D84
2832641	CT15 WG	D25–26, D59, D71, D84
2832647	CC11 WG	D10–13, D28, D59, D71, D84
2832661	CBIT WG	D59, D71, D84
2832689	BP250825R CG5	D70
2832702	BP187600R CG5	D70
2832719	BB3121250R CM1	D69
2832724	BB3121250R CG5	D69
2832742	BB2501000R CM1	D69
2832747	BB2501000R CG5	D69
2832758	BB1871250R CG5	D69
2832769	BB187750R CG5	D69
2832809	CSM22500 WG	D29
2832813	CSM22375 WG	D29
2832820	CSM22312 WG	D29
2832827	CSM22250 WG	D29
2832832	CSM22187 WG	D29
2832838	CSM22156 WG	D29
2836024	BW312 WG	D59, D62, D71, D84
2836085	MB010062R CM1	D79
2836098	MB010062R CG5	D79
2836168	MT15660F2R CM1	D83
2836180	MT09560F2R CM1	D83
2836184	MP156500R CM1	D82
2836190	MP125375R CM1	D82
2836210	MG156050R CM1	D81
2836223	MG095030R CM1	D81
2836229	MB156875R CM1	D79
2836240	MB125625R CM1	D79
2836251	MB094500R CM1	D79
2836263	MB062312R CM1	D79
2836328	MT12560F2R CG5	D83
2836339	MP156500R CG5	D82
2836345	MP125375R CG5	D82
2836351	MP094281R CG5	D82
2836357	MP062187R CG5	D82
2836388	MB156500R CG5	D79
2836405	MB094500R CG5	D79
2836418	MB062312R CG5	D79
2836423	MB062187R CG5	D79
2836436	ATD15660F2 CM1	D69
2836443	ATD15660F2 CG5	D69
2836450	ATD12560F2 CM1	D69
2836473	APD156500R CM1	D68
2836489	APD125375R CG5	D68
2836495	APD09281R CM1	D68
2836511	APD06187R CG5	D68
2836524	AGD15605 CG5	D68
2836537	AGD12504 CG5	D68
2836545	AGD09503 CM1	D68
2836550	AGD09503 CG5	D68
2836561	ABD156875R CG5	D67
2836573	ABD156500R CG5	D67

Order No.	Catalogue No.	Page(s)
2836579	ABD125625R CM1	D67
2836582	ABD125625R CG5	D67
2836588	ABD125375R CM1	D67
2836593	ABD125375R CG5	D67
2836599	ABD09500R CM1	D67
2836604	ABD09500R CG5	D67
2836608	ABD09281R CM1	D67
2836614	ABD09281R CG5	D67
2836621	ABD06312R CM1	D67
2836627	ABD06312R CG5	D67
2836632	ABD06187R CM1	D67
2836639	ABD06187R CG5	D67
2836645	ABC1500R WG	D63
2836651	ABC1250R WG	D63
2836656	ABC1000R WG	D63
2836660	ABC750R WG	D63
2836667	ABC500R WG	D63
2836679	ABD156875RM CBN6	D67
2839192	ATBM1638 WG	D62
2840089	MBIT WG	D59, D71, D84
2840094	MKEY WG	D59, D71, D84
2840098	MSM46 WG	D59, D71, D74, D84
2840174	AKEY WG	D59, D71, D84
2840186	AS832/AS-8-32 WG	D59, D62, D71, D84
2840192	AW250/AW-250 WG	D59, D62, D71, D84
2872844	M41504	R15
2875848	7S2SL	U41
2891175	7FZ-0500A	U28
2891178	7F0-0630A	U29
2891181	7F1-0945A	U30
2892513	BS832 WG	D59, D62, D71, D84
2894600	M41518	R16
2894601	M41432	R12
2894603	M41310	R8
2894604	M41307	R8
2894606	M41261	R7
2895961	7SZTS	U44
2895963	7S7SL	U41
2895971	7F4-2087A	U34
2895976	7F2-1254T	U31
2907270	7F0-0509A	U29
2907272	7F2-1231A	U31
2940716	7F1-0866A	U30
2949031	M41227	R6
2952069	SNMX120712T02020 CW5025	B190
2952070	SNMX120716T02020 CW5025	B190
2952071	SNMX150716T02020 CW5025	B190
2952072	TNGN160408T02020 CW5025	B192
2952082	CNGN120408T02020 CW5025	B177
2952113	CNGN120412T02020 CW5025	B177
2952114	CNGN120416T02020 CW5025	B177
2952115	CNGN120712T02020 CW5025	B177
2952117	CNGX120708T02020 CW5025	B179
2952118	CNGX120712T01020FW CW5025	B179
2952119	CNGX120712T02020 CW5025	B179
2952121	CNGX160716T02020 CW5025	B179
2952124	DNGX120712T02020 CW5025	B181
2952125	DNGX120716T02020 CW5025	B181
2952126	DNGX150708T02020 CW5025	B181
2952127	DNGX150712T02020 CW5025	B181
2952128	DNGX150716T02020 CW5025	B181
2952130	ENGX130716T02020 CW5025	B182
2952131	RNGN120400T02020 CW5025	B184
2952133	RNGN150700T02020 CW5025	B184
2952135	SNGN120408T02020 CW5025	B187
2952136	SNGN120412T02020 CW5025	B187
2952137	SNGN120416T02020 CW5025	B187
2952138	SNGN120712T02020 CW5025	B188
2952139	SNGN120716T02020 CW5025	B188
2952140	SNGX120708T02020 CW5025	B189
2952141	SNGX120712T01020FW CW5025	B190
2952144	SNGX150716T02020 CW5025	B189
2952147	SCGN090412T00520 CW5025	B186
2952153	TNGN160412T02020 CW5025	B192
2952154	TNGN220416T02020 CW5025	B192
2952155	TPGN160308T02020 CW5025	B194
2952156	TPGN160312T02020 CW5025	B194
2952157	WNGX080712T02020 CW5025	B196
2952158	CNGA120408T01020FW CW5025	B178
2952159	CNGA120408T02020 CW5025	B178
2952160	CNGA120412T01020FW CW5025	B178
2952161	CNGA120412T02020 CW5025	B178
2952162	CNGA120416T01020FW CW5025	B178
2952173	CNGA120416T02020 CW5025	B178
2952174	CNGA160612T02020 CW5025	B178
2952175	CNGA160616T02020 CW5025	B178
2952176	CNGA190612T02020 CW5025	B178
2952184	DNGA150412T02020 CW5025	B181
2952185	DNGA150612T02020 CW5025	B181
2952187	SNGA120408T02020 CW5025	B189
2952188	SNGA120412T02020 CW5025	B189
2952189	SNGA120416T02020 CW5025	B189
2952190	SNGA150612T02020 CW5025	B189
2952191	SNGA150616T02020 CW5025	B189
2952195	TNGA160408T02020 CW5025	B193
2952196	TNGA160412T02020 CW5025	B193
2952197	TNGA160416T02020 CW5025	B193
2952198	VNGA160408T02020 CW5025	B195
2952199	WNGA080408T02020 CW5025	B195
2952200	WNGA080412T02020 CW5025	B195
2952201	WNGA080416T02020 CW5025	B195
2952333	123567360 TN7525	E97
2952335	123567460 TN7525	E99
2952336	123567480 TN7525	E99
2952337	123567803 TN7525	E101
2952338	123567804 TN7525	E101
2952339	123567805 TN7525	E101
2952340	123567806 TN7525	E101
2952341	123568080 TN7525	E105
2952342	123568100 TN7525	E105
2952343	123568120 TN7525	E105
2952344	123568140 TN7525	E105
2952345	123568160 TN7525	E105
2952350	123567360 TN7535	E97
2952351	123567380 TN7535	E97
2952352	123567460 TN7535	E99
2952353	123567480 TN7535	E99
2952354	123567702 TN7535	E100
2952355	123567703 TN7535	E100
2952356	123567704 TN7535	E100
2952357	123567720 TN7535	E100
2952358	123567721 TN7535	E100
2952359	123567730 TN7535	E100
2952360	123567731 TN7535	E100
2952361	123567740 TN7535	E100
2952363	123568080 TN7535	E105
2952364	123568100 TN7535	E105
2952365	123568120 TN7535	E105
2952366	123568140 TN7535	E105
2952367	123568160 TN7535	E105
2952526	CNGA120404T02020 CW2015	B178
2952527	CNGA120408T02020 CW2015	B178
2952528	CNGA120412T02020 CW2015	B178
2952529	CNGA160612T02020 CW2015	B178
2952530	CNGA190612T02020 CW2015	B178
2952531	CNGA190616T02020 CW2015	B178
2952532	DNGA150404T02020 CW2015	B181
2952533	DNGA150408T02020 CW2015	B181
2952534	DNGA150412T02020 CW2015	B181
2952535	DNGA150604T02020 CW2015	B181
2952536	DNGA150608T02020 CW2015	B181
2952537	DNGA150612T02020 CW2015	B181
2952538	SNGA120408T02020 CW2015	B189
2952539	SNGA120412T02020 CW2015	B189
2952540	SNGA120416T02020 CW2015	B189
2952541	TNGA160408T02020 CW2015	B193
2952542	TNGA160412T02020 CW2015	B193
2952543	TNGA160416T02020 CW2015	B193
2952544	TNGA220408T02020 CW2015	B193
2952545	VNGA160404T02020 CW2015	B195
2952546	VNGA160408T02020 CW2015	B195
2952547	VNGA160412T02020 CW2015	B195
2952548	VNGA220408T02020 CW2015	B195
2952551	CNGN120404T02020 CW2015	B177
2952552	CNGN120408T02020 CW2015	B177
2952603	CNGN120412T02020 CW2015	B177
2952604	CNGN120416T02020 CW2015	B177
2952605	CNGN120712T02020 CW2015	B177
2952607	DNGN150704T02020 CW2015	B180
2952608	DNGN150708T02020 CW2015	B180
2952609	DNGN150712T02020 CW2015	B180
2952611	ENGN130704T02020 CW2015	B182
2952612	ENGN130708T02020 CW2015	B182
2952613	ENGN130712T02020 CW2015	B182
2952614	ENGN130716T02020 CW2015	B182
2952615	RNGN090400T02020 CW2015	B184
2952616	RNGN120400T02020 CW2015	B184
2952617	RNGN120700T02020 CW2015	B184
2952618	RNGN120700T10015 CW2015	B184
2952619	RNGN120700T20015 CW2015	B184
2952620	RNGN150700T02020 CW2015	B184
2952693	RCGX090700T01020 CW2015	B183
2952694	RCGX090700T02020 CW2015	B183
2952695	RCGX090700T07015 CW2015	B183
2952697	RCGX120700T02020 CW2015	B183
2952698	RCGX120700T20015 CW2015	B183
2952699	SCUN120412T00520 CW2015	B186
2952700	SPGN090308T01020 CW2015	B190
2952701	SPGN120304T01020 CW2015	B190
2952702	SPGN120308T01020 CW2015	B190
2952703	SPUN120304T00520 CW2015	B191
2952704	SPUN120308T00520 CW2015	B191
2952705	SPUN120312T00520 CW2015	B191
2952706	TPGN110304T01020 CW2015	B194
2952707	TPGN110308T01020 CW2015	B194
2952708	TPGN110312T01020 CW2015	B194
2952709	TPGN160304T00520 CW2015	B194
2952710	TPGN160304T01020 CW2015	B194
2952711	TPGN160308T00520 CW2015	B194
2952712	TPGN160308T01020 CW2015	B194
2952713	TPGN160312T01020 CW2015	B194
2952747	7F4-2016T	U34
2952748	SNGN090308T02020 CW2015	B187
2952749	SNGN090412T00515 CW2015	B187
2952750	SNGN120408T00520 CW2015	B187
2952751	SNGN120408T02020 CW2015	B187
2952752	SNGN120412T02020 CW2015	B187
2952824	SNGN120704T02020 CW2015	B187
2952825	SNGN120708T02020 CW2015	B187
2952826	SNGN120712T02020 CW2015	B188
2952828	SNGN120720T02020 CW2015	B188
2952829	SNGN120720T10015 CW2015	B188
2952830	SNGN150712T02020 CW2015	B188
2952831	SNGN150716T02020 CW2015	B188
2952832	SNGN190720K20015 CW2015	B188
2952833	SNGN190720T20015 CW2015	B188
2952835	TNGN160404T02020 CW2015	B192
2952836	TNGN160408T02020 CW2015	B192
2952837	TNGN160412T02020 CW2015	B192
2952838	TNGN160416T02020 CW2015	B192
2952839	TNGN160708T02020 CW2015	B192
2952840	TNGN160712T02020 CW2015	B192
2952841	TNGN220408T02020 CW2015	B192
2953284	123567330 TN6030	E97
2953286	123567340 TN6030	E97
2953289	123567320 TN6030	E97
2953291	123567230 TN6030	E98
2953339	SNGN120712T00520 CW2015	B187
2953340	SNGN120716T00520 CW2015	B188
2953432	7S7SM	U40
2953663	123567440 TN6030	E99
2953666	123567380 TN6030	E97
2953667	123567240 TN6030	E98
2953671	123567450 TN6030	E99
2953672	123567231 TN6030	E98
2953673	123567350 TN6030	E97
2953674	123567360 TN6030	E97
2953675	123567480 TN6030	E99
2953676	123567241 TN6030	E98
2953677	123567460 TN6030	E99
2953678	123567430 TN6030	E99
2953679	123567420 TN6030	E99
2957427	RCMT1606M0TX TN6540	M97
2957428	RDMT1003M0T TN6540	M81
2957429	RDMT1003M0T TN6525	M81
2957430	RDMT1204M0TX TN6525	M87
2957432	RDMT1204M0TX TN6540	M87

Order No.	Catalogue No.	Page(s)
2957533	RDMT1605M0TX TN6540	M92
2957535	RCMT1606M0TX TN6525	M97
2957536	RDMT1605M0TX TN6525	M92
2957537	RCMT1606M043M TN6540	M97
2957538	M270BF12 TN6525	M108
2957539	M270BR12 TN6540	M109
2957540	M270BR16 TN6540	M109
2957541	M270BF16 TN6525	M108
2957542	M270BF20 TN6525	M108
2957543	M270BR20 TN6540	M109
2957546	HPGT06T3DZENGD TN6540	H47
2957547	HPGT06T3DZERLD TN6525	H46
2957548	HPGT06T3DZFRLDAL TN6501	H46
2957549	HPGT06T3DZERGD3W TN6510	H47
2957552	HPPT06T3DZENGD TN6540	H47
2957583	HPPT06T3DZENGD TN6520	H47
2957584	HPGT06T3DZERGD3W TN6525	H47
2957585	HPGT06T3DZERLD TN6520	H46
2957586	HPPT06T3DZENGD TN6525	H47
2957587	HPGT06T3DZERLD TN6540	H46
2957588	HPGT06T3DZENGD TN6525	H47
2957589	HPGT06T3DZENGD TN6510	H47
2961525	M40227	R6
2961641	7F5-2756A	U36
2962743	12250023000 W	E102
2962744	12250023100 W	E102
2962745	12250023200 W	E102
2962751	12250025200 W	E102
2964201	SNKT1205AZER20 TN6540	H54
2964204	SNMT1205AZR31 TN6540	H55
2964205	SNKT1205AZR31 TN6540	H55
2964206	SNMT1205AZR31 TN6525	H55
2964208	SNKT1205AZR31 TN6525	H55
2964222	TDS301A03000 WU25PD	T78
2964233	TDS301A03100 WU25PD	T78
2964234	TDS301A03200 WU25PD	T78
2964235	TDS301A03250 WU25PD	T78
2964236	TDS301A03300 WU25PD	T78
2964237	TDS301A03400 WU25PD	T78
2964238	TDS301A03500 WU25PD	T78
2964239	TDS301A03600 WU25PD	T78
2964240	TDS301A03700 WU25PD	T78
2964241	TDS301A03800 WU25PD	T78
2964242	TDS301A03900 WU25PD	T78
2964243	TDS301A04000 WU25PD	T78
2964244	TDS301A04100 WU25PD	T78
2964245	TDS301A04200 WU25PD	T78
2964246	TDS301A04300 WU25PD	T78
2964247	TDS301A04370 WU25PD	T78
2964248	TDS301A04400 WU25PD	T78
2964249	TDS301A04500 WU25PD	T78
2964250	TDS301A04600 WU25PD	T78
2964251	TDS301A04650 WU25PD	T78
2964252	TDS301A04700 WU25PD	T78
2964273	TDS301A04760 WU25PD	T78
2964274	TDS301A04800 WU25PD	T78
2964275	TDS301A04900 WU25PD	T78
2964276	TDS301A05000 WU25PD	T79
2964277	TDS301A05100 WU25PD	T79
2964278	TDS301A05160 WU25PD	T79
2964279	TDS301A05200 WU25PD	T79
2964280	TDS301A05300 WU25PD	T79
2964281	TDS301A05400 WU25PD	T79
2964282	TDS301A05500 WU25PD	T79
2964293	TDS301A05550 WU25PD	T79
2964294	TDS301A05560 WU25PD	T79
2964295	TDS301A05600 WU25PD	T79
2964296	TDS301A05700 WU25PD	T79
2964297	TDS301A05800 WU25PD	T79
2964298	TDS301A05900 WU25PD	T79
2964299	TDS301A05950 WU25PD	T79
2964300	TDS301A06000 WU25PD	T79
2964301	TDS301A06100 WU25PD	T79
2964302	TDS301A06200 WU25PD	T79
2964313	TDS301A06300 WU25PD	T79
2964314	TDS301A06350 WU25PD	T79
2964315	TDS301A06400 WU25PD	T79
2964316	TDS301A06500 WU25PD	T79
2964317	TDS301A06600 WU25PD	T79
2964318	TDS301A06700 WU25PD	T79
2964319	TDS301A06750 WU25PD	T79
2964320	TDS301A06800 WU25PD	T79
2964321	TDS301A06900 WU25PD	T79
2964322	TDS301A07000 WU25PD	T79
2964333	TDS301A07100 WU25PD	T79
2964334	TDS301A07140 WU25PD	T79
2964335	TDS301A07200 WU25PD	T79
2964336	TDS301A07300 WU25PD	T79
2964337	TDS301A07400 WU25PD	T79
2964338	TDS301A07500 WU25PD	T79
2964339	TDS301A07540 WU25PD	T79
2964340	TDS301A07600 WU25PD	T79
2964341	TDS301A07700 WU25PD	T79
2964342	TDS301A07800 WU25PD	T79
2964353	TDS301A07900 WU25PD	T79
2964354	TDS301A07940 WU25PD	T79
2964355	TDS301A08000 WU25PD	T79
2964356	TDS301A08100 WU25PD	T80
2964357	TDS301A08200 WU25PD	T80
2964358	TDS301A08300 WU25PD	T80
2964359	TDS301A08330 WU25PD	T80
2964360	TDS301A08400 WU25PD	T80
2964361	TDS301A08500 WU25PD	T80
2964362	TDS301A08600 WU25PD	T80
2964373	TDS301A08700 WU25PD	T80
2964374	TDS301A08800 WU25PD	T80
2964375	TDS301A08900 WU25PD	T80
2964376	TDS301A09000 WU25PD	T80
2964377	TDS301A09100 WU25PD	T80
2964378	TDS301A09130 WU25PD	T80
2964379	TDS301A09200 WU25PD	T80
2964380	TDS301A09300 WU25PD	T80
2964381	TDS301A09400 WU25PD	T80
2964382	TDS301A09500 WU25PD	T80
2964393	TDS301A09520 WU25PD	T80
2964394	TDS301A09600 WU25PD	T80
2964395	TDS301A09700 WU25PD	T80
2964396	TDS301A09800 WU25PD	T80
2964397	TDS301A09900 WU25PD	T80
2964398	TDS301A09920 WU25PD	T80
2964399	TDS301A10000 WU25PD	T80
2964400	TDS301A10100 WU25PD	T80
2964401	TDS301A10200 WU25PD	T80
2964402	TDS301A10300 WU25PD	T80
2964413	TDS301A10320 WU25PD	T80
2964414	TDS301A10400 WU25PD	T80
2964415	TDS301A10500 WU25PD	T80
2964416	TDS301A10600 WU25PD	T80
2964417	TDS301A10700 WU25PD	T80
2964418	TDS301A10720 WU25PD	T80
2964419	TDS301A10800 WU25PD	T80
2964420	TDS301A10900 WU25PD	T80
2964421	TDS301A11000 WU25PD	T80
2964423	TDS301A11100 WU25PD	T80
2964424	TDS301A11110 WU25PD	T80
2964425	TDS301A11200 WU25PD	T80
2964426	TDS301A11300 WU25PD	T80
2964427	TDS301A11400 WU25PD	T81
2964428	TDS301A11500 WU25PD	T81
2964429	TDS301A11600 WU25PD	T81
2964430	TDS301A11700 WU25PD	T81
2964431	TDS301A11800 WU25PD	T81
2964432	TDS301A11900 WU25PD	T81
2964433	TDS301A11910 WU25PD	T81
2964434	TDS301A12000 WU25PD	T81
2964435	TDS301A12300 WU25PD	T81
2964436	TDS301A12500 WU25PD	T81
2964437	TDS301A12700 WU25PD	T81
2964438	TDS301A12800 WU25PD	T81
2964439	TDS301A13000 WU25PD	T81
2964440	TDS301A13500 WU25PD	T81
2964441	TDS301A13800 WU25PD	T81
2964442	TDS301A14000 WU25PD	T81
2964443	TDS301A14290 WU25PD	T81
2964444	TDS301A14500 WU25PD	T81
2964445	TDS301A14800 WU25PD	T81
2964446	TDS301A15000 WU25PD	T81
2964447	TDS301A15500 WU25PD	T81
2964448	TDS301A15800 WU25PD	T81
2964449	TDS301A15870 WU25PD	T81
2964450	TDS301A16000 WU25PD	T81
2964451	TDS301A16500 WU25PD	T81
2964452	TDS301A16670 WU25PD	T81
2964453	TDS301A16800 WU25PD	T81
2964454	TDS301A17000 WU25PD	T81
2964455	TDS301A17500 WU25PD	T81
2964456	TDS301A17800 WU25PD	T81
2964457	TDS301A18000 WU25PD	T81
2964458	TDS301A18500 WU25PD	T81
2964459	TDS301A18800 WU25PD	T81
2964460	TDS301A19000 WU25PD	T81
2964461	TDS301A19050 WU25PD	T81
2964462	TDS301A19500 WU25PD	T81
2964463	TDS301A19800 WU25PD	T81
2964464	TDS301A20000 WU25PD	T81
2964736	TDS501A11200 WU25PD	T85
2964737	TDS501A11300 WU25PD	T85
2964738	TDS501A11400 WU25PD	T85
2964739	TDS501A11500 WU25PD	T85
2964740	TDS501A11600 WU25PD	T85
2964741	TDS501A11700 WU25PD	T85
2964742	TDS501A11800 WU25PD	T85
2964803	TDS502A03000 WU25PD	T87
2964804	TDS502A03100 WU25PD	T87
2964805	TDS502A03200 WU25PD	T87
2964806	TDS502A03250 WU25PD	T87
2964807	TDS502A03300 WU25PD	T87
2964808	TDS502A03400 WU25PD	T87
2964809	TDS502A03500 WU25PD	T87
2964810	TDS502A03600 WU25PD	T87
2964811	TDS502A03700 WU25PD	T87
2964812	TDS502A03800 WU25PD	T87
2964813	TDS502A03900 WU25PD	T87
2964814	TDS502A04000 WU25PD	T87
2964815	TDS502A04100 WU25PD	T87
2964816	TDS502A04200 WU25PD	T87
2964817	TDS502A04300 WU25PD	T87
2964818	TDS502A04370 WU25PD	T87
2964819	TDS502A04400 WU25PD	T87
2964820	TDS502A04500 WU25PD	T87
2964821	TDS502A04600 WU25PD	T87
2964822	TDS502A04650 WU25PD	T87
2964823	TDS502A04700 WU25PD	T87
2964824	TDS502A04760 WU25PD	T87
2964825	TDS502A04800 WU25PD	T88
2964826	TDS502A04900 WU25PD	T88
2964827	TDS502A05000 WU25PD	T88
2964828	TDS502A05100 WU25PD	T88
2964829	TDS502A05160 WU25PD	T88
2964830	TDS502A05200 WU25PD	T88
2964831	TDS502A05300 WU25PD	T88
2964832	TDS502A05400 WU25PD	T88
2964833	TDS502A05500 WU25PD	T88
2964834	TDS502A05550 WU25PD	T88
2964835	TDS502A05560 WU25PD	T88
2964836	TDS502A05600 WU25PD	T88
2964837	TDS502A05700 WU25PD	T88
2964838	TDS502A05800 WU25PD	T88
2964839	TDS502A05900 WU25PD	T88
2964840	TDS502A05950 WU25PD	T88
2964841	TDS502A06000 WU25PD	T88
2964842	TDS502A06100 WU25PD	T88
2964843	TDS502A06200 WU25PD	T88
2964844	TDS502A06300 WU25PD	T88
2964845	TDS502A06350 WU25PD	T88
2964846	TDS502A06400 WU25PD	T88
2964847	TDS502A06500 WU25PD	T88
2964848	TDS502A06600 WU25PD	T88
2964849	TDS502A06700 WU25PD	T88
2964850	TDS502A06750 WU25PD	T88
2964851	TDS502A06800 WU25PD	T88
2964852	TDS502A06900 WU25PD	T88
2964853	TDS502A07000 WU25PD	T88
2964854	TDS502A07100 WU25PD	T88
2964855	TDS502A07140 WU25PD	T88
2964856	TDS502A07200 WU25PD	T88
2964857	TDS502A07300 WU25PD	T88
2964858	TDS502A07400 WU25PD	T88
2964859	TDS502A07500 WU25PD	T88
2964860	TDS502A07540 WU25PD	T88
2964861	TDS502A07600 WU25PD	T88
2964862	TDS502A07700 WU25PD	T88
2964863	TDS502A07800 WU25PD	T88
2964864	TDS502A07900 WU25PD	T88
2964865	TDS502A07940 WU25PD	T89
2964866	TDS502A08000 WU25PD	T89
2964867	TDS502A08100 WU25PD	T89
2964868	TDS502A08200 WU25PD	T89
2964869	TDS502A08300 WU25PD	T89
2964870	TDS502A08330 WU25PD	T89
2964871	TDS502A08400 WU25PD	T89
2964872	TDS502A08500 WU25PD	T89
2964873	TDS502A08600 WU25PD	T89
2964874	TDS502A08700 WU25PD	T89
2964875	TDS502A08800 WU25PD	T89
2964876	TDS502A08900 WU25PD	T89
2964877	TDS502A09000 WU25PD	T89
2964878	TDS502A09100 WU25PD	T89
2964879	TDS502A09130 WU25PD	T89
2964880	TDS502A09200 WU25PD	T89
2964881	TDS502A09300 WU25PD	T89
2964882	TDS502A09400 WU25PD	T89
2964883	TDS502A09500 WU25PD	T89
2964884	TDS502A09520 WU25PD	T89

Order No.	Catalogue No.	Page(s)
2964885	TDS502A09600 WU25PD	T89
2964886	TDS502A09700 WU25PD	T89
2964887	TDS502A09800 WU25PD	T89
2964888	TDS502A09900 WU25PD	T89
2964889	TDS502A09920 WU25PD	T89
2964890	TDS502A10000 WU25PD	T89
2964891	TDS502A10100 WU25PD	T89
2964892	TDS502A10200 WU25PD	T89
2964893	TDS502A10300 WU25PD	T89
2964894	TDS502A10320 WU25PD	T89
2964895	TDS502A10400 WU25PD	T89
2964896	TDS502A10500 WU25PD	T89
2964897	TDS502A10600 WU25PD	T89
2964898	TDS502A10700 WU25PD	T89
2964899	TDS502A10720 WU25PD	T89
2964900	TDS502A10800 WU25PD	T89
2964901	TDS502A10900 WU25PD	T89
2964902	TDS502A11000 WU25PD	T89
2964903	TDS502A11100 WU25PD	T89
2964904	TDS502A11110 WU25PD	T89
2964905	TDS502A11200 WU25PD	T90
2964906	TDS502A11300 WU25PD	T90
2964947	TDS501A03000 WU25PD	T82
2964948	TDS501A03100 WU25PD	T82
2964949	TDS501A03200 WU25PD	T82
2964950	TDS501A03250 WU25PD	T82
2964951	TDS501A03300 WU25PD	T82
2964952	TDS501A03400 WU25PD	T82
2964953	TDS501A03500 WU25PD	T82
2964954	TDS501A03600 WU25PD	T82
2964955	TDS501A03700 WU25PD	T82
2964956	TDS501A03800 WU25PD	T82
2964957	TDS501A03900 WU25PD	T82
2964958	TDS501A04000 WU25PD	T82
2964959	TDS501A04100 WU25PD	T82
2964960	TDS501A04200 WU25PD	T82
2964961	TDS501A04300 WU25PD	T82
2964962	TDS501A04370 WU25PD	T82
2964963	TDS501A04400 WU25PD	T82
2964964	TDS501A04500 WU25PD	T82
2964965	TDS501A04600 WU25PD	T82
2964966	TDS501A04650 WU25PD	T82
2964967	TDS501A04700 WU25PD	T83
2964969	TDS501A04800 WU25PD	T83
2964970	TDS501A04900 WU25PD	T83
2964971	TDS501A05000 WU25PD	T83
2964972	TDS501A05100 WU25PD	T83
2964973	TDS501A05160 WU25PD	T83
2964974	TDS501A05200 WU25PD	T83
2964975	TDS501A05300 WU25PD	T83
2964976	TDS501A05400 WU25PD	T83
2964977	TDS501A05500 WU25PD	T83
2964978	TDS501A05550 WU25PD	T83
2964980	TDS501A05600 WU25PD	T83
2964981	TDS501A05700 WU25PD	T83
2964982	TDS501A05800 WU25PD	T83
2964983	TDS501A05900 WU25PD	T83
2964984	TDS501A05950 WU25PD	T83
2964985	TDS501A06000 WU25PD	T83
2964986	TDS501A06100 WU25PD	T83
2964987	TDS501A06200 WU25PD	T83
2964988	TDS501A06300 WU25PD	T83
2964989	TDS501A06350 WU25PD	T83
2964990	TDS501A06400 WU25PD	T83
2964991	TDS501A06500 WU25PD	T83
2964992	TDS501A06600 WU25PD	T83
2964993	TDS501A06700 WU25PD	T83
2964995	TDS501A06800 WU25PD	T83
2964996	TDS501A06900 WU25PD	T83
2964997	TDS501A07000 WU25PD	T83
2964998	TDS501A07100 WU25PD	T83
2965000	TDS501A07200 WU25PD	T83
2965001	TDS501A07300 WU25PD	T83
2965002	TDS501A07400 WU25PD	T83
2965003	TDS501A07500 WU25PD	T83
2965004	TDS501A07541 WU25PD	T83
2965005	TDS501A07600 WU25PD	T84
2965006	TDS501A07700 WU25PD	T84
2965007	TDS501A07800 WU25PD	T84
2965008	TDS501A07900 WU25PD	T84
2965010	TDS501A08000 WU25PD	T84
2965011	TDS501A08100 WU25PD	T84
2965012	TDS501A08200 WU25PD	T84
2965013	TDS501A08300 WU25PD	T84
2965015	TDS501A08400 WU25PD	T84
2965016	TDS501A08500 WU25PD	T84
2965017	TDS501A08600 WU25PD	T84
2965018	TDS501A08700 WU25PD	T84
2965019	TDS501A08800 WU25PD	T84
2965020	TDS501A08900 WU25PD	T84
2965021	TDS501A09000 WU25PD	T84
2965022	TDS501A09100 WU25PD	T84
2965023	TDS501A09129 WU25PD	T84
2965024	TDS501A09200 WU25PD	T84
2965025	TDS501A09300 WU25PD	T84
2965026	TDS501A09400 WU25PD	T84
2965027	TDS501A09500 WU25PD	T84
2965029	TDS501A09600 WU25PD	T84
2965030	TDS501A09700 WU25PD	T84
2965031	TDS501A09800 WU25PD	T84
2965032	TDS501A09900 WU25PD	T84
2965033	TDS501A09921 WU25PD	T84
2965034	TDS501A10000 WU25PD	T84
2965035	TDS501A10100 WU25PD	T84
2965036	TDS501A10200 WU25PD	T84
2965037	TDS501A10300 WU25PD	T84
2965038	TDS501A10320 WU25PD	T84
2965039	TDS501A10400 WU25PD	T84
2965040	TDS501A10500 WU25PD	T84
2965041	TDS501A10600 WU25PD	T84
2965042	TDS501A10700 WU25PD	T85
2965044	TDS501A10800 WU25PD	T85
2965045	TDS501A10900 WU25PD	T85
2965046	TDS501A11000 WU25PD	T85
2965047	TDS501A11100 WU25PD	T85
2965048	TDS501A11113 WU25PD	T85
2965053	TDS501A11900 WU25PD	T85
2965054	TDS501A11910 WU25PD	T85
2965055	TDS501A12000 WU25PD	T85
2965056	TDS501A12300 WU25PD	T85
2965057	TDS501A12500 WU25PD	T85
2965058	TDS501A12700 WU25PD	T85
2965059	TDS501A12800 WU25PD	T85
2965060	TDS501A13000 WU25PD	T85
2965061	TDS501A13500 WU25PD	T85
2965062	TDS501A13800 WU25PD	T85
2965063	TDS501A14000 WU25PD	T85
2965064	TDS501A14290 WU25PD	T85
2965065	TDS501A14500 WU25PD	T85
2965066	TDS501A14800 WU25PD	T85
2965067	TDS501A15000 WU25PD	T85
2965068	TDS501A15500 WU25PD	T85
2965069	TDS501A15800 WU25PD	T85
2965070	TDS501A15870 WU25PD	T85
2965071	TDS501A16000 WU25PD	T85
2965072	TDS501A16500 WU25PD	T85
2965073	TDS501A16670 WU25PD	T85
2965074	TDS501A16800 WU25PD	T85
2965075	TDS501A17000 WU25PD	T85
2965076	TDS501A17500 WU25PD	T85
2965077	TDS501A17800 WU25PD	T86
2965078	TDS501A18000 WU25PD	T86
2965079	TDS501A18500 WU25PD	T86
2965080	TDS501A18800 WU25PD	T86
2965081	TDS501A19000 WU25PD	T86
2965082	TDS501A19050 WU25PD	T86
2965083	TDS501A19500 WU25PD	T86
2965084	TDS501A19800 WU25PD	T86
2965085	TDS501A20000 WU25PD	T86
2967699	7F2-1266T	U31
2968374	TDS502A11400 WU25PD	T90
2968375	TDS502A11500 WU25PD	T90
2968376	TDS502A11600 WU25PD	T90
2968377	TDS502A11700 WU25PD	T90
2968378	TDS502A11800 WU25PD	T90
2968379	TDS502A11900 WU25PD	T90
2968380	TDS502A11910 WU25PD	T90
2968381	TDS502A12000 WU25PD	T90
2968382	TDS502A12300 WU25PD	T90
2968393	TDS502A12500 WU25PD	T90
2968394	TDS502A12700 WU25PD	T90
2968395	TDS502A12800 WU25PD	T90
2968396	TDS502A13000 WU25PD	T90
2968397	TDS502A13500 WU25PD	T90
2968398	TDS502A13800 WU25PD	T90
2968399	TDS502A14000 WU25PD	T90
2968400	TDS502A14290 WU25PD	T90
2968401	TDS502A14500 WU25PD	T90
2968402	TDS502A14800 WU25PD	T90
2968403	TDS502A15000 WU25PD	T90
2968404	TDS502A15500 WU25PD	T90
2968405	TDS502A15800 WU25PD	T90
2968406	TDS502A15870 WU25PD	T90
2968407	TDS502A16000 WU25PD	T90
2968408	TDS502A16500 WU25PD	T90
2968409	TDS502A16670 WU25PD	T90
2968410	TDS502A16800 WU25PD	T90
2968411	TDS502A17000 WU25PD	T90
2968412	TDS502A17500 WU25PD	T90
2968413	TDS502A17800 WU25PD	T90
2968414	TDS502A18000 WU25PD	T90
2968415	TDS502A18500 WU25PD	T90
2968416	TDS502A18800 WU25PD	T90
2968417	TDS502A19000 WU25PD	T90
2968418	TDS502A19050 WU25PD	T90
2968419	TDS502A19500 WU25PD	T90
2968420	TDS502A19800 WU25PD	T90
2968421	TDS502A20000 WU25PD	T90
2968422	TDS503A03000 WU25PD	T91
2968503	TDS503A03300 WU25PD	T91
2968504	TDS503A03500 WU25PD	T91
2968505	TDS503A03700 WU25PD	T91
2968506	TDS503A03800 WU25PD	T91
2968507	TDS503A04000 WU25PD	T91
2968508	TDS503A04200 WU25PD	T91
2968509	TDS503A04370 WU25PD	T91
2968510	TDS503A04500 WU25PD	T91
2968511	TDS503A04700 WU25PD	T91
2968512	TDS503A04760 WU25PD	T91
2968513	TDS503A04800 WU25PD	T91
2968514	TDS503A05000 WU25PD	T92
2968515	TDS503A05160 WU25PD	T92
2968516	TDS503A05500 WU25PD	T92
2968517	TDS503A05560 WU25PD	T92
2968518	TDS503A05800 WU25PD	T92
2968519	TDS503A05950 WU25PD	T92
2968520	TDS503A06000 WU25PD	T92
2968521	TDS503A06350 WU25PD	T92
2968522	TDS503A06500 WU25PD	T92
2968523	TDS503A06750 WU25PD	T92
2968524	TDS503A06800 WU25PD	T92
2968525	TDS503A07000 WU25PD	T92
2968526	TDS503A07140 WU25PD	T92
2968527	TDS503A07500 WU25PD	T92
2968528	TDS503A07540 WU25PD	T92
2968529	TDS503A07800 WU25PD	T92
2968530	TDS503A07940 WU25PD	T92
2968531	TDS503A08000 WU25PD	T93
2968532	TDS503A08330 WU25PD	T93
2968533	TDS503A08500 WU25PD	T93
2968534	TDS503A09000 WU25PD	T93
2968535	TDS503A09130 WU25PD	T93
2968536	TDS503A09500 WU25PD	T93
2968537	TDS503A09520 WU25PD	T93
2968538	TDS503A09800 WU25PD	T93
2968539	TDS503A09920 WU25PD	T93
2968540	TDS503A10000 WU25PD	T93
2968541	TDS503A10200 WU25PD	T93
2968542	TDS503A10320 WU25PD	T93
2968543	TDS503A10500 WU25PD	T93
2968544	TDS503A10720 WU25PD	T93
2968545	TDS503A10800 WU25PD	T93
2968546	TDS503A11000 WU25PD	T93
2968547	TDS503A11500 WU25PD	T94
2968548	TDS503A11800 WU25PD	T94
2968549	TDS503A11910 WU25PD	T94
2968550	TDS503A12000 WU25PD	T94
2968551	TDS503A12300 WU25PD	T94
2968552	TDS503A12500 WU25PD	T94
2968553	TDS503A12700 WU25PD	T94
2968554	TDS503A12800 WU25PD	T94
2968555	TDS503A13000 WU25PD	T94
2968556	TDS503A13500 WU25PD	T94
2968557	TDS503A13800 WU25PD	T94
2968558	TDS503A14000 WU25PD	T94
2968559	TDS503A14290 WU25PD	T94
2968560	TDS503A14500 WU25PD	T94
2968561	TDS503A14800 WU25PD	T94
2968562	TDS503A15000 WU25PD	T94
2968563	TDS503A15500 WU25PD	T94
2968564	TDS503A15800 WU25PD	T94
2968565	TDS503A15870 WU25PD	T94
2968566	TDS503A16000 WU25PD	T94
2969583	M41372	R10
2972689	7F7-3813A	U37
2973335	M41345	R9
2978948	M40582	R14
2979468	M41235	R6
2979470	M40272	R7
2981749	M40271	R7
2981799	M40436	R12
2986664	M40268	R7
2986716	7S3SE	U41
2987322	M41457	R13

Order No.	Catalogue No.	Page(s)
2987323	M41455	R13
2987326	M41436	R12
2987327	M41435	R12
2987329	M41433	R12
2987331	M41398	R11
2987333	M41370	R10
2987334	M41349	R9
2987335	M41346	R9
2987336	M41314	R8
2987337	M41274	R7
2987338	M41272	R7
2987339	M41271	R7
2987340	M41270	R7
2987341	M41269	R7
2987342	M41268	R7
2987343	M41239	R6
2987345	M40590	R18
2987348	M40574	R10
2987349	M40561	R8
2987350	M40551	R6
2987352	M40497	R15
2987353	M40455	R13
2987354	M40396	R11
2990411	M40237	R6
2990413	M40498	R15
2990415	M41303	R8
2990416	M41351	R9
2990417	M41496	R15
2990418	M41502	R15
2990812	6N7006002LT	Q6
2991245	M40232	R6
2991248	M40303	R8
2991249	M40310	R8
2991252	M40349	R9
2991254	M40352	R9
2991255	M40354	R9
2991256	M40370	R10
2991258	M40428	R12
2991261	M40434	R12
2991264	M40555	R6
2991265	M40568	R9
2991266	M40572	R9
2991268	M40585	R14
2991270	M41225	R6
2991272	M41276	R7
2991273	M41308	R8
2991274	M41318	R8
2991275	M41320	R8
2991276	M41350	R9
2991277	M41371	R10
2991278	M41375	R10
2991284	M41454	R13
2991803	M40368	R10
2991807	M40452	R13
2991809	M40477	R14
2991812	M41262	R7
2991813	M41265	R7
2991815	M41369	R10
2991816	M41377	R10
2991818	M41519	R16
2992083	6N7008004LT	Q6
2992087	6N7025008LT	Q6
3005591	M41319	R8
3009447	M40222	R6
3009448	M40223	R6
3009451	M40242	R6
3009453	M40263	R7
3009454	M40267	R7
3009458	M40346	R9
3009463	M40406	R11
3009465	M40431	R12
3009471	M40454	R13
3009475	M40478	R14
3009478	M40516	R16
3009484	M40567	R9
3009487	M40576	R11
3009488	M40595	R18
3009494	M41245	R6
3009496	M41266	R7
3009499	M41317	R8
3009500	M41354	R9
3009502	M41395	R11
3009503	M41405	R11
3009511	M41525	R16
3019444	M40521	R16
3020185	SDMT1204PDRML TN6540	J45, K6
3021212	MS1242CG	M23, M31, M36
3022866	MS1294 W	M55, M62
3024915	7F2-1141A	U31
3025376	M1200D063Z07HN09	H31–32
3025377	M1200D080Z09HN09	H31–32
3025378	M1200D100Z11HN09	H31–32
3026450	12MHC030M	T117
3026451	12MHC040M	T117
3026452	12MHC050M	T117
3026643	12MHC060M	T117
3026644	12MHC070M	T117
3026645	12MHC080M	T117
3026646	12MHC090M	T117
3026647	12MHC100M	T117
3026648	20MHC030M	T117
3026649	20MHC040M	T117
3026650	20MHC050M	T117
3026651	20MHC060M	T117
3026652	20MHC070M	T117
3026653	20MHC080M	T117
3026654	20MHC090M	T117
3026655	20MHC100M	T117
3026656	20MHC110M	T117
3026657	20MHC120M	T117
3026658	20MHC130M	T117
3026659	20MHC140M	T117
3026660	20MHC150M	T117
3026661	20MHC160M	T117
3026662	25MHC030M	T117
3026663	25MHC040M	T117
3026664	25MHC050M	T117
3026665	25MHC060M	T117
3026666	25MHC070M	T117
3026667	25MHC080M	T117
3026668	25MHC090M	T117
3026669	25MHC100M	T117
3026670	25MHC120M	T117
3026671	25MHC140M	T117
3026672	25MHC160M	T117
3026675	32MHC060M	T117
3026676	32MHC070M	T117
3026677	32MHC080M	T117
3026678	32MHC090M	T117
3026679	32MHC100M	T117
3026680	32MHC110M	T117
3026681	32MHC120M	T117
3026682	32MHC130M	T117
3026683	32MHC140M	T117
3026684	32MHC150M	T117
3026685	32MHC160M	T117
3027222	7F4-2559A	U35
3027643	MB156500L CG5	D80
3029009	S40TCCLNR12MX7 WG	C62
3029010	S40TCCLNL12MX7 WG	C62
3029011	S40TCCLNR12MN4 WG	C62
3029012	S40TCCLNL12MN4 WG	C62
3029143	S40TCCLNR12MN7 WG	C62
3029144	S40TCCLNL12MN7 WG	C62
3029151	S40TCSSNR12MX7 WG	C63
3029152	S40TCSSNL12MX7 WG	C63
3029153	S40TCWLNR08MX7 WG	C64
3029154	S40TCWLNL08MX7 WG	C64
3030017	HNGJ0905ANENLD TN7535	H33, H39
3030034	HNGJ0905ANENLD TN6540	H33, H39
3032539	7F2-1266A	U31
3032544	CDJNL2525M15MN7 WG	C33
3032545	CDJNR3225P15MN7 WG	C33
3032546	CDJNL3225P15MN7 WG	C33
3032549	CRDNN2525M12MN4 WG	C35
3032550	CRDNN3225P12MN4 WG	C35
3032551	CRDNN2525M12MN7 WG	C35
3032552	CRDNN3225P12MN7 WG	C35
3032675	CRSNR3225P12MN4 WG	C35
3032676	CRSNL3225P12MN4 WG	C35
3032677	CRSNR2525M12MN7 WG	C35
3032678	CRSNL2525M12MN7 WG	C35
3032679	CRSNR3225P12MN7 WG	C35
3032680	CRSNL3225P12MN7 WG	C35
3032691	CCLNR2525M12MX7 WG	C31
3032692	CCLNL2525M12MX7 WG	C31
3032713	CCLNR3225P12MX7 WG	C31
3032715	CCLNR2525M12MN4 WG	C31
3032716	CCLNL2525M12MN4 WG	C31
3032717	CCLNR2525M12MN7 WG	C31
3032719	CCLNR3225P12MN7 WG	C31
3032723	CCLNR2525M12MF7 WG	C32
3032726	CDJNR2525M15MX7 WG	C32
3032727	CDJNL2525M15MX7 WG	C32
3032728	CDJNR2525M15MN7 WG	C33
3037596	HNGJ0905ANSNGD TN6540	H28, H34, H40
3044700	7S2SM	U40
3048459	022804-000020 K30F	O88–89
3048461	022804-000025 K30F	O88–89
3048480	022806-000020 K30F	O88
3048483	022806-000025 K30F	O88
3048485	322804-000020 K30F-TICN	O88
3048486	322804-000025 K30F-TICN	O88
3048488	322806-000020 K30F-TICN	O88
3048489	322806-000025 K30F-TICN	O88
3048490	422804-000020 K30F-DCF	O89
3048491	422804-000025 K30F-DCF	O89
3048492	422806-000020 K30F-DCF	O89
3048503	422806-000025 K30F-DCF	O89
3048961	422875-010015 K10UF-DCHP	O173
3053979	7F0-0625A	U29
3055655	050280-001400 K10F	W15
3055656	050280-001600 K10F	W15
3055657	050280-001800 K10F	W15
3056095	050280-002000 K10F	W15
3056096	050280-002200 K10F	W15
3056097	050280-002400 K10F	W15
3056098	050280-002500 K10F	W15
3056099	050280-002600 K10F	W15
3056100	050280-002800 K10F	W15
3056102	050280-003000 K10F	W15
3056273	050280-003200 K10F	W15
3066118	M1200D160Z12HN09	H31
3066119	M1200D160Z16HN09	H31–32
3066479	XNGJ0905ANSNGD3W TN6540	H35
3077292	450280-002000 K10F-DCFD	W15
3077681	6N7018006LT	Q6
3078687	6N7014005LT	Q6
3078692	6N7032009LT	Q6
3081507	M1200D080Z06HN09	H31
3081508	M1200D125Z10HN09	H31
3083635	7F0-0689A	U29
3084312	450281-001400 K10F-DCFD	W11
3084317	450281-001600 K10F-DCFD	W11
3084319	450281-002000 K10F-DCFD	W11
3084320	450281-003000 K10F-DCFD	W11
3084321	450281-001800 K10F-DCFD	W11
3084322	450281-002200 K10F-DCFD	W11
3084323	450281-002400 K10F-DCFD	W11
3084324	450281-002500 K10F-DCFD	W11
3084325	450281-002600 K10F-DCFD	W11
3084327	450281-002800 K10F-DCFD	W11
3084328	450281-003200 K10F-DCFD	W11
3084512	450280-001400 K10F-DCFD	W15
3084526	450280-001600 K10F-DCFD	W15
3084528	450280-001800 K10F-DCFD	W15
3084529	450280-002200 K10F-DCFD	W15
3084530	450280-002400 K10F-DCFD	W15
3084531	450280-002500 K10F-DCFD	W15
3084532	450280-002600 K10F-DCFD	W15
3084593	450280-002800 K10F-DCFD	W15
3084594	450280-003000 K10F-DCFD	W15
3084595	450280-003200 K10F-DCFD	W15
3084978	050281-001400 K10F	W11
3084983	050281-001600 K10F	W11
3084992	050281-001800 K10F	W11
3085083	050281-002000 K10F	W11
3085084	050281-002200 K10F	W11
3085087	050281-002400 K10F	W11
3085089	050281-002500 K10F	W11
3085090	050281-002600 K10F	W11
3085092	050281-002800 K10F	W11
3085104	050281-003000 K10F	W11
3088200	7F2-1016A	U31
3088746	7F2-1156A	U31
3089237	7N0100502MJ ALTIN-MJ1	O165
3089238	7N0100602MJ ALTIN-MJ1	O165
3089239	7N0101202MJ ALTIN-MJ1	O165
3089240	7N0101402MJ ALTIN-MJ1	O165
3089241	7N0101602MJ ALTIN-MJ1	O165
3089242	7N0101802MJ ALTIN-MJ1	O165
3089243	7N0104002MJ ALTIN-MJ1	O165
3089244	7N0200402MJ ALTIN-MJ1	O160
3089245	7N0201002MJ ALTIN-MJ1	O161
3089246	7N0201402MJ ALTIN-MJ1	O161
3089247	7N0202002MJ ALTIN-MJ1	O162
3089248	7N1200502MJ ALTIN-MJ1	O160
3089249	7N1200602MJ ALTIN-MJ1	O160
3089250	7N1200802MJ ALTIN-MJ1	O160
3089251	7N1201002MJ ALTIN-MJ1	O161

Order No.	Catalogue No.	Page(s)
3089252	7N1201202MJ ALTIN-MJ1	0161
3089253	7N1201502MJ ALTIN-MJ1	0161
3089254	7N1201802MJ ALTIN-MJ1	0162
3089255	7N1202002MJ ALTIN-MJ1	0162
3089256	7N1202502MJ ALTIN-MJ1	0163
3091240	7N0106002MJ ALTIN-MJ1	0165
3093559	HNGJ0905ANENLD TN6520	H33, H39
3093593	M1200D125Z14HN09	H31–32
3093594	M1200D063Z06HN09	H31
3093721	HNGJ0905ANSNGD TN7535	H28, H34, H40
3094667	SDMT1204PDRML TN6520	J45, K6
3094669	SDMT1204PDRMH TN6520	J46, K7
3096207	7F2-1063A	U31
3096208	7F2-1024A	U31
3099442	7F1-0922A	U30
3101466	70N610004MT ALTIN-MT1	0152
3101467	70N612005MT ALTIN-MT1	0152
3104431	7F6-3188N	U37
3107859	510206002.. UNCOATED	0126
3107860	510204001.. UNCOATED	0126
3114699	7F1-0750A	U30
3117962	XNGJ0905ANSNGD3W TN6510	H35
3118234	2EL05ISO TN6025	F49
3118236	2EL06ISO TN6025	F49
3118238	2EL075ISO TN6025	F49
3118240	2EL07ISO TN6025	F49
3118242	2EL08ISO TN6025	F49
3118374	2EL10ISO TN6025	F49
3118376	2EL125ISO TN6025	F49
3118378	2EL15ISO TN6025	F49
3118380	2EL175ISO TN6025	F49
3118382	2IL035ISO TN6025	F52
3118384	2IL04ISO TN6025	F52
3118386	2IL05ISO TN6025	F52
3118387	2IL06ISO TN6025	F52
3118389	2IL075ISO TN6025	F52
3118390	2IL07ISO TN6025	F52
3118392	2IL08ISO TN6025	F52
3119541	HNGJ0905ANSNGD TN6520	H28, H34, H40
3121225	193.492	M28–31
3122015	3EL035ISO TN6025	F49
3122017	3EL045ISO TN6025	F49
3122018	3EL04ISO TN6025	F49
3122021	3EL06ISO TN6025	F50
3122028	3EL10UN TN6025	F55
3122032	3EL11UN TN6025	F55
3122039	3EL13UN TN6025	F55
3122414	3IL56UN TN6025	F57
3122416	3IL64UN TN6025	F57
3122422	3IL8RD TN6025	F66
3122444	3IL8UN TN6025	F57
3122446	3IL9UN TN6025	F57
3122449	3ILA55 TN6025	F61
3123198	2IL125ISO TN6025	F52
3124269	3IL035ISO TN6025	F53
3124271	3IL04ISO TN6025	F53
3124272	3IL05ISO TN6025	F53
3124274	3IL06ISO TN6025	F53
3124276	3IL07ISO TN6025	F53
3126691	M4000CA-HN09	H73
3133084	490607003RT TIALN-RT	066
3133085	490609004RT TIALN-RT	066
3133086	490611005RT TIALN-RT	066
3133087	490613014RT TIALN-RT	066
3133459	MS1294CG	J8, J24, J35, M6, M23, M31, M55, M62
3134515	MS1254CG	M62, M67
3139827	M41516	R16
3176688	MS2173	C110, C113, C115–116
3176689	MS2175	C110–111, C113–117, C119, C126–129
3279094	56-2020	U40–41, U44–45
3279755	7F7-3543T	U37
3279914	7S0.5TE	U45
3279918	7S1.5SE	U41
3279923	7S2.5TM-4MT	U44
3279924	7S2.5TS	U44
3287987	CSWM 035 040	C110, C113, C115–116
3287988	CSWM 040 050	C110–111, C113–117, C119, C126–129
3287989	CSWM 060 050	C92–94, C97–110, C112–113, C118–129
3287990	CSWM 080 050	C92–105, C108–109, C112, C120, C124
3287991	CSWM 100 080	C94, C97, C101–102
3321510	7N0100302MJ ALTIN-MJ1	0165
3321511	7N0100402MJ ALTIN-MJ1	0165
3321512	7N0100802MJ ALTIN-MJ1	0165
3321513	7N0101002MJ ALTIN-MJ1	0165
3321514	7N0101502MJ ALTIN-MJ1	0165
3321515	7N0102002MJ ALTIN-MJ1	0165
3321516	7N0102502MJ ALTIN-MJ1	0165
3321517	7N0103002MJ ALTIN-MJ1	0165
3321518	7N0200302MJ ALTIN-MJ1	0160
3321519	7N0200502MJ ALTIN-MJ1	0160
3321520	7N0200602MJ ALTIN-MJ1	0160
3321521	7N0200802MJ ALTIN-MJ1	0160
3321522	7N0201202MJ ALTIN-MJ1	0161
3321523	7N0201502MJ ALTIN-MJ1	0161
3321524	7N0201602MJ ALTIN-MJ1	0162
3321525	7N0201802MJ ALTIN-MJ1	0162
3321526	7N0202502MJ ALTIN-MJ1	0163
3321527	7N1201402MJ ALTIN-MJ1	0161
3321528	7N1201602MJ ALTIN-MJ1	0162
3321529	7N2200400MJ ALTIN-MJ1	0160
3321530	7N2200410MJ ALTIN-MJ1	0160
3321531	7N2200500MJ ALTIN-MJ1	0160
3321532	7N2200510MJ ALTIN-MJ1	0160
3321533	7N2200520MJ ALTIN-MJ1	0160
3321534	7N2200600MJ ALTIN-MJ1	0160
3321535	7N2200610MJ ALTIN-MJ1	0160
3321536	7N2200620MJ ALTIN-MJ1	0160
3321537	7N2200701MJ ALTIN-MJ1	0160
3321538	7N2200711MJ ALTIN-MJ1	0160
3321539	7N2200721MJ ALTIN-MJ1	0160
3321540	7N2200801MJ ALTIN-MJ1	0160
3321541	7N2200811MJ ALTIN-MJ1	0160
3321542	7N2200821MJ ALTIN-MJ1	0160
3321543	7N2200901MJ ALTIN-MJ1	0160
3321544	7N2200911MJ ALTIN-MJ1	0161
3321545	7N2200921MJ ALTIN-MJ1	0161
3321546	7N2201001MJ ALTIN-MJ1	0161
3321547	7N2201011MJ ALTIN-MJ1	0161
3321548	7N2201021MJ ALTIN-MJ1	0161
3321549	7N2201031MJ ALTIN-MJ1	0161
3321550	7N2201201MJ ALTIN-MJ1	0161
3321551	7N2201211MJ ALTIN-MJ1	0161
3321552	7N2201221MJ ALTIN-MJ1	0161
3321553	7N2201231MJ ALTIN-MJ1	0161
3321554	7N2201401MJ ALTIN-MJ1	0161
3321555	7N2201411MJ ALTIN-MJ1	0161
3321556	7N2201421MJ ALTIN-MJ1	0161
3321557	7N2201431MJ ALTIN-MJ1	0161
3321558	7N2201441MJ ALTIN-MJ1	0161
3321559	7N2201501MJ ALTIN-MJ1	0161
3321560	7N2201511MJ ALTIN-MJ1	0161
3321561	7N2201521MJ ALTIN-MJ1	0161
3321562	7N2201531MJ ALTIN-MJ1	0161
3321563	7N2201541MJ ALTIN-MJ1	0161
3321564	7N2201551MJ ALTIN-MJ1	0161
3321565	7N2201601MJ ALTIN-MJ1	0162
3321566	7N2201611MJ ALTIN-MJ1	0161
3321567	7N2201621MJ ALTIN-MJ1	0161
3321568	7N2201631MJ ALTIN-MJ1	0161
3321569	7N2201641MJ ALTIN-MJ1	0161
3321570	7N2201701MJ ALTIN-MJ1	0162
3321571	7N2201711MJ ALTIN-MJ1	0162
3321572	7N2201721MJ ALTIN-MJ1	0162
3321573	7N2201731MJ ALTIN-MJ1	0162
3321574	7N2201741MJ ALTIN-MJ1	0162
3321575	7N2201801MJ ALTIN-MJ1	0162
3321576	7N2201811MJ ALTIN-MJ1	0162
3321577	7N2201821MJ ALTIN-MJ1	0162
3321578	7N2201831MJ ALTIN-MJ1	0162
3321579	7N2201841MJ ALTIN-MJ1	0162
3321580	7N2201901MJ ALTIN-MJ1	0162
3321581	7N2201911MJ ALTIN-MJ1	0162
3321582	7N2201921MJ ALTIN-MJ1	0162
3321583	7N2201931MJ ALTIN-MJ1	0162
3321584	7N2201941MJ ALTIN-MJ1	0162
3321585	7N2202001MJ ALTIN-MJ1	0162
3321586	7N2202011MJ ALTIN-MJ1	0162
3321587	7N2202021MJ ALTIN-MJ1	0162
3321588	7N2202031MJ ALTIN-MJ1	0162
3321589	7N2202041MJ ALTIN-MJ1	0162
3321590	7N2202501MJ ALTIN-MJ1	0162
3321591	7N2202511MJ ALTIN-MJ1	0163
3321592	7N2202521MJ ALTIN-MJ1	0163
3321593	7N2202531MJ ALTIN-MJ1	0163
3321594	7N2202541MJ ALTIN-MJ1	0163
3321595	7N2203002MJ ALTIN-MJ1	0163
3321596	7N2203012MJ ALTIN-MJ1	0163
3321597	7N2203022MJ ALTIN-MJ1	0163
3321598	7N2203032MJ ALTIN-MJ1	0163
3321599	7N2203042MJ ALTIN-MJ1	0163
3324657	M40353	R9
3324689	M41275	R7
3324690	M41277	R7
3324697	M41374	R10
3324707	M41442	R12
3325040	SDMT1204PDRMH TN6525	J46, K7
3325310	M1200D040Z03B25HN09	H30
3325311	M1200D040Z04B25HN09	H30
3325312	M1200D050Z04HN09	H31
3325693	M1200D050Z05HN09	H31–32
3325694	M1200D100Z08HN09	H31
3326330	SDMT1204PDRMH TN6540	J46, K7
3330950	HNGJ0905ANENLD TN6525	H33, H39
3339713	7F1-0960T	U30
3341346	70N606002MT ALTIN-MT1	0152
3341348	70N608003MT ALTIN-MT1	0152
3350935	510316006.. UNCOATED	0127
3353278	RDMW0802M0T TN6540	M76
3353279	RDMW1003M0T TN6540	M81
3353281	RDMW1204M0TX TN6540	M87
3353311	CKC5	F71–72
3374385	M270TF10R05 TN2510	M122
3374387	M270TF12R05 TN2510	M122
3374388	M270TF12R1 TN2510	M122
3374389	M270TF16R03 TN2510	M122
3374390	M270TF16R05 TN2510	M122
3374391	M270TF16R1 TN2510	M122
3374392	M270TF16R2 TN2510	M122
3375713	M270TF20R03 TN2510	M122
3375714	M270TF20R05 TN2510	M122
3375716	M270TF20R2 TN2510	M122
3378676	SDMT1506PDRMH TN6540	J50
3378677	SDMT1506PDRML TN6540	J49
3380486	12146111000	H15, H20, H26, H32, H38
3380487	12146111100	H26, H32, H38, J24
3382203	12146034500	H5–7, H12–15, H20, H26, H30, H32, H38
3382204	12146101000	H26
3382205	12146101800	H26
3382206	12146107000	H15, H20, H26, H32, H38, J24
3384424	M270TF10R05 TN2525	M122
3384426	M270TF12R05 TN2525	M122
3384427	M270TF12R1 TN2525	M122
3384428	M270TF16R03 TN2525	M122
3384429	M270TF16R05 TN2525	M122
3384430	M270TF16R1 TN2525	M122
3384431	M270TF16R2 TN2525	M122
3384453	M270TF20R05 TN2525	M122
3384454	M270TF20R1 TN2525	M122
3384455	M270TF20R2 TN2525	M122
3393828	QSBMW121523R WG	D24
3396984	MS2085	M11–12
3397551	12146109400	H15, H20, H26, H32, H38
3403492	70N712005MT ALTIN-MT1	0153
3450355	MS1234CG	J8, J24, J35, M6, M12, M23, M85, M91, M96
3450356	MS2189C	J35
3454427	7N2201561RJ TIALN-RJ1	0161
3454428	7N2201571RJ TIALN-RJ1	0161
3454429	7N2202051RJ TIALN-RJ1	0162
3454430	7N2202061RJ TIALN-RJ1	0162
3454431	7N2202071RJ TIALN-RJ1	0162
3454432	7N2202091RJ TIALN-RJ1	0162
3454433	7N2203052RJ TIALN-RJ1	0163
3454434	7N2203062RJ TIALN-RJ1	0163
3462450	47N704002LT TIALN-LT	09
3462451	47N704012LT TIALN-LT	09
3462452	47N704012MT ALTIN-MT	09
3462453	47N704022LT TIALN-LT	09
3462454	47N705002LT TIALN-LT	09
3462455	47N705012LT TIALN-LT	09
3462456	47N705012MT ALTIN-MT	09
3462457	47N706002LT TIALN-LT	09
3462458	47N706002MT ALTIN-MT	09
3462459	47N706012LT TIALN-LT	09
3462460	47N706012MT ALTIN-MT	09

Order No.	Catalogue No.	Page(s)
3462461	47N706022LT TIALN-LT	09
3462462	47N708003LT TIALN-LT	09
3462463	47N708003MT ALTIN-MT	09
3462464	47N708013LT TIALN-LT	09
3462465	47N708013MT ALTIN-MT	09
3462466	47N708023LT TIALN-LT	09
3462467	47N708033LT TIALN-LT	09
3462468	47N710004LT TIALN-LT	09
3462469	47N710004MT ALTIN-MT	09
3462470	47N710014LT TIALN-LT	09
3462471	47N710014MT ALTIN-MT	09
3462472	47N710024LT TIALN-LT	09
3462473	47N710034LT TIALN-LT	09
3462474	47N710034MT ALTIN-MT	09
3462475	47N712005LT TIALN-LT	09
3462476	47N712005MT ALTIN-MT	09
3462477	47N712015LT TIALN-LT	09
3462478	47N712015MT ALTIN-MT	09
3462479	47N712025LT TIALN-LT	09
3462480	47N712035LT TIALN-LT	09
3462481	47N712035MT ALTIN-MT	09
3462482	47N712045LT TIALN-LT	010
3462483	47N712045MT ALTIN-MT	010
3462484	47N716006LT TIALN-LT	010
3462485	47N716006MT ALTIN-MT	010
3462486	47N716016LT TIALN-LT	010
3462487	47N716016MT ALTIN-MT	010
3462488	47N716026LT TIALN-LT	010
3462489	47N716026MT ALTIN-MT	010
3462490	47N720007LT TIALN-LT	010
3462491	47N720007MT ALTIN-MT	010
3462492	47N720017LT TIALN-LT	010
3462493	47N720017MT ALTIN-MT	010
3462494	47N720027LT TIALN-LT	010
3462495	47N720027MT ALTIN-MT	010
3474583	49N604002MW ALTIN-MW	061
3474584	49N605002MW ALTIN-MW	061
3474585	49N606002MW ALTIN-MW	061
3474587	49N608003MW ALTIN-MW	061
3474589	49N610004MW ALTIN-MW	061
3474591	49N612005MW ALTIN-MW	061
3474593	49N614014MW ALTIN-MW	061
3474594	49N616006MW ALTIN-MW	061
3474595	49N618018MW ALTIN-MW	061
3474596	49N620007MW ALTIN-MW	061
3474597	49N625008MW ALTIN-MW	061
3477329	70N716006MT ALTIN-MT1	0153
3484680	510201500.. UNCOATED	0126
3484681	510202000.. UNCOATED	0126
3484682	510202500.. UNCOATED	0126
3484683	510203000.. UNCOATED	0126
3484684	510205001.. UNCOATED	0126
3484685	510205002.. UNCOATED	0126
3484686	510208003.. UNCOATED	0126
3484687	510210004.. UNCOATED	0126
3484688	510212005.. UNCOATED	0126
3484689	510214014.. UNCOATED	0126
3484690	510216006.. UNCOATED	0126
3484691	510218018.. UNCOATED	0126
3484692	510220007.. UNCOATED	0126
3484693	510303000.. UNCOATED	0127
3484694	510304001.. UNCOATED	0127
3484695	510305001.. UNCOATED	0127
3484696	510306002.. UNCOATED	0127
3484697	510308003.. UNCOATED	0127
3484698	510310004.. UNCOATED	0127
3484699	510312005.. UNCOATED	0127
3484700	510314014.. UNCOATED	0127
3484701	510318018.. UNCOATED	0127
3484702	510320007.. UNCOATED	0127
3484703	51N306002.. UNCOATED	0128
3484704	51N306012.. UNCOATED	0128
3484705	51N306022.. UNCOATED	0128
3484706	51N308003.. UNCOATED	0128
3484707	51N308013.. UNCOATED	0128
3484708	51N308023.. UNCOATED	0128
3484709	51N310004.. UNCOATED	0128
3484710	51N310014.. UNCOATED	0128
3484711	51N310024.. UNCOATED	0128
3484712	51N312005.. UNCOATED	0128
3484713	51N312015.. UNCOATED	0128
3484714	51N312025.. UNCOATED	0128
3484715	51N316006.. UNCOATED	0128
3484716	51N316016.. UNCOATED	0128
3484717	51N316026.. UNCOATED	0128
3484718	51N316036.. UNCOATED	0128
3484719	51N320007.. UNCOATED	0128
3484720	51N320017.. UNCOATED	0128
3484721	51N320027.. UNCOATED	0128
3484722	51N320037.. UNCOATED	0128
3484748	70N616006MT ALTIN-MT1	0152
3484749	70N620007MT ALTIN-MT1	0152
3484756	70N706002MT ALTIN-MT1	0153
3484757	70N708003MT ALTIN-MT1	0153
3484758	70N710004MT ALTIN-MT1	0153
3484759	70N720007MT ALTIN-MT1	0153
3503901	MS2187C	J8, J24, J35, M12, M36
3503902	MS2195C	J8, J24, M12, M31, M36
3517652	CSBM8765L WG	D10
3518694	GSPM1316515R WG	D26
3523083	RDMW1605M0TX TN6540	M93
3523620	XNGJ0905ANSNGD3W TN6525	H35
3524707	XNGJ0905ANSNGD3W TN6520	H35
3526093	M41400	R11
3538705	206264	E122
3538706	206265	E122
3538707	206266	E122
3538710	206271	E125
3538711	206272	E122
3538712	206273	E122
3538713	206274	E122
3538714	206275	E122
3538715	206276	E122
3538716	206277	E122
3538717	206278	E122
3538718	206279	E122
3538719	206280	E122
3538720	206281	E122
3538721	206282	E122
3538722	206283	E122
3538723	206284	E122
3538739	206411	E127
3538741	206417	E123
3538742	206418	E123
3538743	206419	E123
3538751	206446	E122
3538752	206447	E122
3538753	206450	E122
3538754	206452	E122
3538755	206454	E122
3538756	206455	E122
3538766	206506	E128
3538767	206507	E128
3538769	206509	E128
3538772	206518	E124–125
3538773	206519	E124–125
3538774	206523	E124–125
3539170	WMTCR1212H2B16	E32
3539171	WMTCL1212H2B16	E32
3539172	WMTSR1616K2B19	E30
3539173	WMTSL1616K2B19	E31
3539174	WMTSR2020K2B19	E30
3539175	WMTSL2020K2B19	E31
3539221	WMTCR2525M2B19	E30
3539428	309105	E127
3539432	309111	E127
3539439	310102	E126
3539440	310108	E126
3539441	310109	E126
3539504	331101	E125
3539505	331102	E125
3539508	331109	E125
3539509	331110	E125
3539510	331118	E125
3539515	333101	E124
3539516	333102	E124
3539517	333103	E124
3539518	333104	E124
3539522	333111	E124
3539795	409182	E128
3539796	409183	E128
3539798	409185	E128
3539825	435101	E107, E126
3539826	435102	E126
3539827	435103	E127
3539828	435104	E126
3539829	435105	E126
3539830	435106	E127
3539833	435109	E126
3539834	435110	E126
3539837	435116	E126
3539838	435117	E126
3539841	435126	E122
3539842	435127	E122
3539843	435128	E125
3539844	435129	E125
3539845	435130	E122
3539846	435131	E122
3539849	435136	E127
3539850	435137	E127
3539851	435140	E122
3539852	435141	E122
3539853	435142	E125
3539854	435143	E125
3539859	435148	E126
3539860	435149	E126
3539861	435150	E126
3539862	435151	E126
3539863	435152	E122
3539864	435153	E122
3539865	435154	E124
3539866	435155	E124
3539867	435156	E124
3539868	435157	E124
3539876	435170	E122
3539877	435171	E122
3539880	435180	E123
3539881	435181	E123
3539884	435194	E124
3539887	435200	E122
3539888	435201	E122
3539889	435202	E122
3539890	435203	E122
3539891	435204	E122
3539892	435205	E122
3539955	446101 W	E33
3539956	446102 W	E33
3539957	446103 W	E33
3539958	446104 W	E33–34
3540016	606243	E128
3540017	606244	E128
3540019	606247	E124–125
3540021	606249 W	E30–32
3540039	613139	E128
3540093	619168 W	E30–31, E33–34, E123
3540117	619205 W	E30–31, E33
3540447	507116 M45	E119
3540449	507116 M40	E119
3540452	507116 C5	E119
3540456	507117 C2	E119
3540459	507117 M45	E119
3540460	507117 M93	E119
3540461	507117 M40	E119
3540476	507124 GC	E120
3540477	507124 M45	E120
3540478	507124 M93	E120
3540479	507124 M40	E120
3540487	507125 M40	E119
3540493	507128 C2	E120
3540496	507128 M45	E120
3540497	507128 M93	E120
3540498	507128 M40	E120
3540509	507129 M45	E119
3540510	507129 M40	E119
3540528	507140 M45	E119
3540529	507140 M93	E119
3540530	507140 M40	E119
3540539	507143 C2	E120
3540542	507143 M45	E120
3540543	507143 M93	E120
3540544	507143 M40	E120
3540553	507144 M45	E119
3540554	507144 M40	E119
3540560	507146 M45	E120
3540562	507146 M40	E120
3540585	507151 M43	E120
3540587	507151 M45	E120
3540589	507151 M40	E120
3540594	507152 M40	E119
3540597	507154 M45	E119
3540598	507154 M40	E119
3540602	507155 M45	E120
3540603	507155 M40	E120
3540612	507161 M45	E120
3540613	507161 M40	E120
3540628	507171 M40	E120
3540633	507176 M45	E120
3540634	507176 M40	E120
3540663	507196 M45	E119
3540664	507196 M40	E119
3540666	507197 M40	E120
3540685	507207 M45	E120

Order No.	Catalogue No.	Page(s)
3540691	507214 M45	E120
3540692	507214 M40	E120
3540698	507224 M45	E120
3540700	507224 M40	E120
3540743	507240 M45	E121
3540744	507240 M40	E121
3540746	507241 M45	E121
3540747	507241 M40	E121
3540749	507242 M45	E121
3540750	507242 M40	E121
3540752	507243 M45	E121
3540753	507243 M40	E121
3540755	507244 M45	E121
3540756	507244 M40	E121
3540758	507245 M45	E121
3540759	507245 M40	E121
3540761	507246 M45	E121
3540762	507246 M40	E121
3540763	507247 M45	E121
3540764	507247 M40	E121
3540773	507252 M45	E121
3540774	507252 M40	E121
3540776	507253 M45	E121
3540777	507253 M40	E121
3540781	507255 M40	E121
3540784	507257 M45	E121
3540803	507275 M43	E116
3540805	507275 M45	E116
3540806	507275 M93	E116
3540807	507275 M40	E116
3540808	507276 M43	E117
3540810	507276 M45	E117
3540811	507276 M93	E117
3540812	507276 M40	E117
3540815	507277 M45	E116
3540816	507277 M93	E116
3540818	507278 M43	E116
3540820	507278 M45	E116
3540821	507278 M93	E116
3540822	507278 M40	E116
3540823	507279 M43	E117
3540825	507279 M45	E117
3540826	507279 M93	E117
3540827	507279 M40	E117
3540830	507280 M45	E116
3540833	507281 M43	E116
3540835	507281 M45	E116
3540836	507281 M93	E116
3540838	507282 M43	E117
3540840	507282 M45	E117
3540841	507282 M93	E117
3540846	507283 M93	E116
3540857	507295 M43	E116
3540858	507295 M45	E116
3540859	507295 M93	E116
3540860	507296 M43	E117
3540861	507296 M45	E117
3540862	507296 M93	E117
3540863	507297 M43	E116
3540865	507297 M93	E116
3540866	507298 M43	E117
3540867	507298 M45	E117
3540868	507298 M93	E117
3540870	507301 M45	E117
3540872	507305 M45	E114
3540873	507305 M93	E114
3540874	507306 M45	E114
3540875	507306 M93	E114
3540876	507307 M45	E114
3540877	507307 M93	E114
3540878	507308 M43	E114
3540879	507308 M45	E114
3540880	507308 M93	E114
3540882	507309 M45	E114
3540883	507309 M93	E114
3540884	507310 M45	E114
3540885	507310 M93	E114
3540907	507329 M433B	E118
3540908	507330 M433B	E118
3540909	507331 M433B	E118
3540910	507332 M433B	E118
3540911	507333 M433B	E118
3540912	507334 M433B	E118
3540926	507354 M433B	E115
3540927	507355 M433B	E115
3540928	507356 M433B	E115
3540929	507357 M433B	E115
3540930	507358 M433B	E115
3540931	507359 M433B	E115
3540951	507378 M43	E116
3540952	507378 M45	E116
3540953	507378 M93	E116
3540954	507379 M43	E117
3540955	507379 M45	E117
3548062	SCMT09T308MU TN5120	B69
3558220	CCMT060208MU TN5120	B33
3558297	CCMT120408MU TN5120	B33
3558306	SCMT090308MU TN5120	B69
3562029	606266 W	E32
3563591	331117	E125
3563900	HNGJ0905ANSNHD TN6520	H28, H34, H40
3563901	HNGJ0905ANSNHD TN6525	H28, H34, H40
3563902	HNGJ0905ANSNHD TN6540	H28, H34, H40
3564083	HNGJ090543ANSNHD TN6520	H28, H34, H40
3564084	HNGJ090543ANSNHD TN6525	H28, H34, H40
3564085	HNGJ090543ANSNHD TN6540	H28, H34, H40
3565364	206285	E122
3587590	206448	E122
3592826	477804002MW ALTIN-MW	06
3592827	477805002MW ALTIN-MW	06
3592828	477806002MW ALTIN-MW	06
3592829	477807003MW ALTIN-MW	06
3592830	477808003MW ALTIN-MW	06
3592831	477809004MW ALTIN-MW	06
3592832	477810004MW ALTIN-MW	06
3592833	477812005MW ALTIN-MW	06
3592834	477814014MW ALTIN-MW	06
3592835	477816006MW ALTIN-MW	06
3592836	477818018MW ALTIN-MW	06
3592837	477820007MW ALTIN-MW	06
3592838	477825008MW ALTIN-MW	06
3597589	MS2219	M4–6
3606383	HNGJ0905ANFNLDJ THM-U	H27, H33, H39
3606522	NG3M300LK TN6010	E58
3606660	NG3094RK TN6010	E54
3606673	NG2M170RK TN6010	E53
3606674	NG3M225RK TN6010	E54
3606676	NG2M300RK TN6010	E55
3606677	NG3M275RK TN6010	E55
3606678	NG3M400RK TN6010	E55
3606679	NG2M120RK TN6010	E53
3606680	NG2M300LK TN6010	E58
3606827	NG2M120LK TN6010	E57
3606828	NG2M225RK TN6010	E54
3606829	NG2M195RK TN6010	E54
3606830	NG4M500RK TN6010	E56
3606831	NG3M275LK TN6010	E58
3606832	NG4M500LK TN6010	E59
3606903	NG2M080RK TN6010	E53
3606904	NG2M140LK TN6010	E57
3606905	NG2M170LK TN6010	E57
3606906	NG3M400LK TN6010	E59
3606907	NG2M225LK TN6010	E58
3606908	NG4M400RK TN6010	E55
3606909	NG3M225LK TN6010	E58
3606910	NG2M195LK TN6010	E57
3606911	NG2M080LK TN6010	E56
3606912	NG4M400LK TN6010	E59
3606913	NG2M275LK TN6010	E58
3606914	NG3M425RK TN6010	E55
3606915	NG3M120RK TN6010	E53
3606916	NG2M275RK TN6010	E54
3606917	NG3M120LK TN6010	E57
3606918	NG3M425LK TN6010	E59
3606921	NGD3M400LK TN6010	E62
3606922	NGD3M300RK TN6010	E60
3606923	NGD4M400LK TN6010	E62
3606924	NR2M075L TN6010	E68
3606925	NR2M100L TN6010	E68
3606926	NR2M125L TN6010	E69
3606927	NR2M150L TN6010	E69
3606928	NR2M175L TN6010	E69
3606929	NR2M075R TN6010	E67
3606930	NR2M100R TN6010	E67
3606931	NR2M125R TN6010	E67
3606932	NR2M150R TN6010	E67
3606933	NR2M175R TN6010	E67
3606934	NR3M225L TN6010	E69
3606935	NGD2M150LK TN6010	E61
3606936	NGD2M200LK TN6010	E61
3606937	NGD2M150RK TN6010	E60
3606938	NGD2M200RK TN6010	E60
3606939	NGD2M250RK TN6010	E60
3606940	NGD3M400RK TN6010	E60
3606941	NGD3M200LK TN6010	E61
3606942	NGD3M250LK TN6010	E61
3606943	NGD3M300LK TN6010	E61
3606945	NGD3M200RK TN6010	E60
3606946	NGD3M250RK TN6010	E60
3606948	NR2M050L TN6010	E68
3606949	NR3M100L TN6010	E68
3606950	NR3M125L TN6010	E69
3606951	NR3M150L TN6010	E69
3606952	NR3M175L TN6010	E69
3606953	NR3M200L TN6010	E69
3606954	NR4M200L TN6010	E69
3606955	NR4M225L TN6010	E69
3606956	NR4M250L TN6010	E69
3606957	NR2M050R TN6010	E67
3606958	NR3M100R TN6010	E67
3606959	NR3M125R TN6010	E67
3606960	NR3M150R TN6010	E67
3606961	NR3M175R TN6010	E67
3606962	NR3M200R TN6010	E68
3606963	NR3M225R TN6010	E68
3606964	NR4M200R TN6010	E68
3606965	NR4M225R TN6010	E68
3606966	NR4M250R TN6010	E68
3606967	NGP2M150L TN6010	E64
3606968	NGP2M200L TN6010	E64
3606969	NGP2M250L TN6010	E64
3606971	NGP3M150L TN6010	E64
3606972	NGP3M200L TN6010	E64
3606973	NGP3M250L TN6010	E64
3606974	NGP3M300L TN6010	E64
3606975	NGP2M150R TN6010	E63
3606976	NGP2M200R TN6010	E63
3606977	NGP2M250R TN6010	E63
3606978	NGP2M300R TN6010	E63
3606979	NGP3M150R TN6010	E63
3606980	NGP3M200R TN6010	E63
3606981	NGP3M250R TN6010	E63
3606986	NGD4M400RK TN6010	E60
3606988	NGD4M500RK TN6010	E61
3606989	NGD4M550RK TN6010	E61
3606990	NG2M050LK TN6010	E56
3606991	NG2M050RK TN6010	E53
3606992	NGD2M250LK TN6010	E61
3607014	NG3062R THM	E51
3607015	NR3031R THM	E67
3607016	NB2L THM	E72
3607017	NB3L THM	E72
3607018	NG3094R THM	E51
3607019	NB3R THM	E72
3607020	NG3125R THM	E51
3607022	NG3125L THM	E52
3607026	NR3062R THM	E67
3607027	NG2062R THM	E51
3607028	NR3047L THM	E68
3607029	NGD3094RK THM	E60
3607030	NG2031R THM	E51
3607031	NR3047R THM	E67
3607032	NR3062L THM	E69
3607034	NR3031L THM	E68
3607035	NGD3094LK THM	E61
3607036	NG3047L THM	E51
3607037	NGP2M150L THM	E64
3607038	NGP2M200L THM	E64
3607039	NGP2M250L THM	E64
3607040	NGP2M300L THM	E64
3607041	NGP3M150L THM	E64
3607042	NGP3M200L THM	E64
3607043	NGP3M250L THM	E64
3607044	NGP3M300L THM	E64
3607045	NGP2M150R THM	E63
3607046	NGP2M200R THM	E63
3607047	NGP2M250R THM	E63
3607048	NGP2M300R THM	E63
3607049	NGP3M150R THM	E63
3607050	NGP3M200R THM	E63
3607051	NGP3M250R THM	E63
3607052	NGP3M300R THM	E63
3607055	NG3062RK TN6010	E53
3607056	NR3062RK TN6010	E70
3607057	NG3125RK TN6010	E55
3607058	NG3094LK TN6010	E58
3607061	NG3125LK TN6010	E58

Order No.	Catalogue No.	Page(s)
3607062	NR3031RK TN6010	E70
3607064	NB2R THM	E72
3607068	NG3125RK TN6025	E55
3607069	NG3094RK TN6025	E54
3607070	NG3062RK TN6025	E53
3607071	NG2M200RK TN6025	E54
3607072	NG3M300RK TN6025	E55
3607083	NGD3094RK TN6010	E60
3607084	NG3047RK TN6010	E53
3607085	NRD3031L TN6010	E71
3607086	NR3047RK TN6010	E70
3607087	NRD3031R TN6010	E71
3607088	NGD3125RK TN6010	E60
3607089	NG2062RK TN6010	E53
3607090	NG2031RK TN6010	E53
3607091	NR3062LK TN6010	E70
3607092	NG3062LK TN6010	E57
3607093	NR3047R TN6010	E67
3607094	NR3078RK TN6010	E70
3607095	NR3031LK TN6010	E70
3607096	NGD3094LK TN6010	E61
3607097	NGD3125LK TN6010	E61
3607098	NGD3062LK TN6010	E61
3607099	NRD3062R TN6010	E71
3607100	NG2M200RK TN6010	E54
3607101	NR4094RK TN6010	E70
3607102	NR3047LK TN6010	E70
3607103	NG4189RK TN6010	E56
3607104	NGD3062RK TN6010	E60
3607105	NG3047LK TN6010	E56
3607106	NG3078LK TN6010	E57
3607107	NG3189LK TN6010	E59
3607108	NG3189RK TN6010	E56
3607109	NG3062R TN6010	E51
3607110	NG3125R TN6010	E51
3607111	NG3078RK TN6010	E54
3607112	NG2031LK TN6010	E56
3607123	NG2047RK TN6010	E53
3607124	NRD3062L TN6010	E71
3607125	NR3031R TN6010	E67
3607126	NG2062LK TN6010	E57
3607127	NG3156RK TN6010	E55
3607128	NGP2062R TN6010	E63
3607129	NG2M100RK TN6010	E53
3607130	NR4125R TN6010	E68
3607131	NR3062R TN6010	E67
3607132	NGD4125LK TN6010	E61
3607133	NGD4125RK TN6010	E60
3607134	NGD4250RK TN6010	E61
3607135	NR3047L TN6010	E68
3607136	NP2002RK TN6010	E66
3607137	NG3094R TN6010	E51
3607138	NG3M300RK TN6010	E55
3607139	NR3031L TN6010	E68
3607140	NG4189LK TN6010	E59
3607141	NR4125RK TN6010	E70
3607142	NG4250LK TN6010	E59
3607143	NG4250R TN6010	E51
3607144	NG2M200LK TN6010	E57
3607145	NG3072RK TN6010	E54
3607146	NG2094RK TN6010	E54
3607147	NGD4189LK TN6010	E62
3607148	NGD3189LK TN6010	E62
3607149	NG2094LK TN6010	E58
3607150	NR4094LK TN6010	E70
3607151	NG2M140RK TN6010	E53
3607152	NG3125L TN6010	E52
3607153	NG2031R TN6010	E51
3607154	NP3002RK TN6010	E66
3607155	NG2125RK TN6010	E55
3607156	NR4062LK TN6010	E70
3607157	NG3047R TN6010	E51
3607158	NG3062L TN6010	E51
3607159	NG2M100LK TN6010	E56
3607160	NG3094L TN6010	E52
3607161	NGD4189RK TN6010	E61
3607162	NRD4062L TN6010	E71
3607163	NG4125RK TN6010	E55
3607165	NG2125LK TN6010	E58
3607166	NR4125LK TN6010	E70
3607167	NG2062R TN6010	E51
3607168	NG4250RK TN6010	E56
3607169	NR3094L TN6010	E69
3607170	NGD3189RK TN6010	E60
3607171	NR3062L TN6010	E69
3607172	NR3078LK TN6010	E70
3607173	NRD4062R TN6010	E71
3607174	NR2031R TN6010	E67
3607175	NG4250L TN6010	E52
3607176	NR2031L TN6010	E68
3607177	NG3156LK TN6010	E59
3607178	NGD4250LK TN6010	E62
3607179	NG3047L TN6010	E51
3607180	NR3094R TN6010	E68
3607181	NR4125L TN6010	E69
3607182	NGP2062L TN6010	E64
3607183	NG4125LK TN6010	E58
3607184	NG3072LK TN6010	E57
3607186	NRD4125L TN6010	E71
3607203	NG3125LK TN6025	E58
3607204	NG3094LK TN6025	E58
3607205	NGD3094RK TN6025	E60
3607206	NR3031RK TN6025	E70
3607207	NG2M200LK TN6025	E57
3607208	NG3M200RK TN6025	E54
3607209	NGD3125LK TN6025	E61
3607210	NGD3125RK TN6025	E60
3607211	NG3M200LK TN6025	E57
3607212	NG3M300LK TN6025	E58
3607213	NG3062LK TN6025	E57
3607214	NR3047RK TN6025	E70
3607215	NG2062RK TN6025	E53
3607216	NR3062LK TN6025	E70
3607217	NG3M250RK TN6025	E54
3607218	NG2M100RK TN6025	E53
3607219	NG3M100RK TN6025	E53
3607220	NG4189RK TN6025	E56
3607221	NG3M150RK TN6025	E53
3607222	NR3031LK TN6025	E70
3607233	NGD3062RK TN6025	E60
3607234	NG2M150RK TN6025	E53
3607235	NG3M400RK TN6025	E55
3607236	NR3062RK TN6025	E70
3607237	NG3M400LK TN6025	E59
3607238	NG3047RK TN6025	E53
3607239	NG2M100LK TN6025	E56
3607240	NGD3094LK TN6025	E61
3607241	NF3125RK TN6025	E65
3607242	NG2M170RK TN6025	E53
3607291	NG2M080RK TN6025	E53
3607292	NG2M275LK TN6025	E58
3607293	NFD3125LK TN6025	E66
3607294	NG2M150LK TN6025	E57
3607295	NRD4062L TN6025	E71
3607296	NFD3125RK TN6025	E66
3607297	NG3M275LK TN6025	E58
3607298	NRD4125L TN6025	E71
3607299	NG2M120RK TN6025	E53
3607300	NG3M250LK TN6025	E58
3607301	NR2031R TN6025	E67
3607302	NG3M350RK TN6025	E55
3607303	NR4125RK TN6025	E70
3607304	NG4250RK TN6025	E56
3607305	NG3189RK TN6025	E56
3607306	NR3078LK TN6025	E70
3607307	NG2062LK TN6025	E57
3607308	NG3M150LK TN6025	E57
3607309	NG3078RK TN6025	E54
3607310	NG3M225RK TN6025	E54
3607311	NG4250LK TN6025	E59
3607312	NGD4125RK TN6025	E60
3607313	NG2031RK TN6025	E53
3607314	NGD4189LK TN6025	E62
3607315	NG3M325LK TN6025	E59
3607316	NGD4125LK TN6025	E61
3607317	NG2094RK TN6025	E54
3607318	NG2M140RK TN6025	E53
3607319	NR2031L TN6025	E68
3607320	NG3189LK TN6025	E59
3607321	NGD4189RK TN6025	E61
3607322	NF3125LK TN6025	E65
3607323	NG3094L TN6025	E52
3607324	NG2M250RK TN6025	E54
3607325	NFD4189RK TN6025	E66
3607326	NG2M300LK TN6025	E58
3607327	NG2M170LK TN6025	E57
3607328	NP3012RK TN6025	E66
3607329	NG3M225LK TN6025	E58
3607330	NG2041R TN6025	E51
3607331	NG3M175LK TN6025	E57
3607332	NG3072RK TN6025	E54
3607333	NF3156LK TN6025	E65
3607334	NG2M120LK TN6025	E57
3607335	NG3156LK TN6025	E59
3607336	NG3M220RK TN6025	E54
3607337	NG3M275RK TN6025	E55
3607338	NG2M140LK TN6025	E57
3607339	NR3094L TN6025	E69
3607340	NG2M300RK TN6025	E55
3607362	NG3M450RK TN6025	E56
3607363	NG4M400LK TN6025	E59
3607364	NG4M400RK TN6025	E55
3607365	NG3M320RK TN6025	E55
3607366	NG4M550LK TN6025	E59
3607367	NG2M220LK TN6025	E57
3607368	NG2M325LK TN6025	E59
3607369	NG3M450LK TN6025	E59
3607370	NG4M350RK TN6025	E55
3607371	NG4M350LK TN6025	E59
3607372	NG3M320LK TN6025	E58
3607373	NGD3189RK TN6025	E60
3607374	NG3047LK TN6025	E56
3607375	NG3125R TN6025	E51
3607376	NG2047LK TN6025	E56
3607377	NG4189LK TN6025	E59
3607378	NFD4250RK TN6025	E66
3607379	NG2M175RK TN6025	E54
3607380	NG2094LK TN6025	E58
3607381	NG2125RK TN6025	E55
3607382	NG4250R TN6025	E51
3607383	NG4M550RK TN6025	E56
3607384	NG3M120LK TN6025	E57
3607385	NG4M600RK TN6025	E56
3607386	NG4M300LK TN6025	E58
3607387	NG4M600LK TN6025	E59
3607388	NG4M300RK TN6025	E55
3607389	NG4M450LK TN6025	E59
3607390	NG4M450RK TN6025	E56
3607391	NGD2M250LK TN6025	E61
3607393	NR2M050R TN6025	E67
3607394	NG2M050RK TN6025	E53
3607395	NR3M100L TN6025	E68
3607396	NR3M200L TN6025	E69
3607397	NR3M100R TN6025	E67
3607398	NR3M200R TN6025	E68
3607399	NGD2M200LK TN6025	E61
3607400	NGD3M300LK TN6025	E61
3607401	NR2M050L TN6025	E68
3607402	NGD2M150LK TN6025	E61
3607403	NG3062R TN6025	E51
3607404	NG2047RK TN6025	E53
3607405	NR4062LK TN6025	E70
3607406	NG3094R TN6025	E51
3607407	NR3078RK TN6025	E70
3607408	NR3047LK TN6025	E70
3607409	NG2M275RK TN6025	E54
3607410	NGD3189LK TN6025	E62
3607411	NG2M225RK TN6025	E54
3607412	NG3M120RK TN6025	E53
3607413	NG2M225LK TN6025	E58
3607414	NGD4250RK TN6025	E61
3607415	NFD4189LK TN6025	E66
3607416	NG3047R TN6025	E51
3607417	NG2M195RK TN6025	E54
3607418	NG3M175RK TN6025	E54
3607419	NG3M100LK TN6025	E56
3607420	NG2M195LK TN6025	E57
3607421	NG2M175LK TN6025	E57
3607422	NGD4250LK TN6025	E62
3607423	NGD3M250LK TN6025	E61
3607424	NGD3M400LK TN6025	E62
3607425	NGD3M250RK TN6025	E60
3607426	NGD3M300RK TN6025	E60
3607427	NGD3M400RK TN6025	E60
3607428	NF3M200LK TN6025	E65
3607429	NF3M300LK TN6025	E65
3607430	NR2M075L TN6025	E68
3607431	NR2M100L TN6025	E68
3607432	NR2M125L TN6025	E69
3607433	NR2M150L TN6025	E69
3607434	NR2M175L TN6025	E69
3607435	NR3M125L TN6025	E69
3607436	NR3M150L TN6025	E69
3607437	NR3M175L TN6025	E69
3607438	NR3M225L TN6025	E69
3607439	NR3M125R TN6025	E67
3607440	NR3M150R TN6025	E67
3607441	NR3M175R TN6025	E67
3607442	NR3M225R TN6025	E68
3607443	NG2031LK TN6025	E56
3607444	NG2125LK TN6025	E58
3607445	NG3125L TN6025	E52
3607446	NR2047L TN6025	E68
3607447	NG4M500RK TN6025	E56

Order No.	Catalogue No.	Page(s)
3607448	NG4125LK TN6025	E58
3607449	NG4125RK TN6025	E55
3607450	NG2058R TN6025	E51
3607451	NGD3062LK TN6025	E61
3607452	NR4094LK TN6025	E70
3607453	NG2062R TN6025	E51
3607454	NG3072LK TN6025	E57
3607455	NRD3031L TN6025	E71
3607456	NG3156RK TN6025	E55
3607457	NRD3031R TN6025	E71
3607458	NR4125LK TN6025	E70
3607459	NG3062L TN6025	E51
3607460	NG3078LK TN6025	E57
3607461	NR4062RK TN6025	E70
3607462	NRD3062L TN6025	E71
3607463	NG2M050LK TN6025	E56
3607464	NFD3M300LK TN6025	E66
3607465	NGD2M200RK TN6025	E60
3607466	NR4M200L TN6025	E69
3607467	NR4M225L TN6025	E69
3607468	NR4M250L TN6025	E69
3607469	NR2M075R TN6025	E67
3607470	NR2M100R TN6025	E67
3607471	NR2M125R TN6025	E67
3607472	NR2M150R TN6025	E67
3607473	NR3062R TN6025	E67
3607474	NRD3062R TN6025	E71
3607475	NR3031R TN6025	E67
3607476	NR3094R TN6025	E68
3607477	NP2002RK TN6025	E66
3607478	NR3031L TN6025	E68
3607479	NR3047L TN6025	E68
3607480	NR4094RK TN6025	E70
3607481	NG2062L TN6025	E51
3607482	NG2031L TN6025	E51
3607483	NR2M175R TN6025	E67
3607484	NR4M200R TN6025	E68
3607485	NR4M225R TN6025	E68
3607486	NR4M250R TN6025	E68
3607487	NGD3M200LK TN6025	E61
3607488	NGD3M350LK TN6025	E61
3607489	NGD4M400LK TN6025	E62
3607490	NGD4M450LK TN6025	E62
3607491	NGD4M500LK TN6025	E62
3607492	NGD4M550LK TN6025	E62
3607493	NP3002RK TN6025	E66
3607494	NR2047R TN6025	E67
3607495	NG2031R TN6025	E51
3607496	NRD4125R TN6025	E71
3607497	NR3062L TN6025	E69
3607498	NG2058L TN6025	E51
3607499	NRD4062R TN6025	E71
3607500	NR4125R TN6025	E68
3607501	NG3047L TN6025	E51
3607502	NR3047R TN6025	E67
3607503	NGD2M150RK TN6025	E60
3607504	NGD2M250RK TN6025	E60
3607505	NGD3M200RK TN6025	E60
3607506	NGD3M350RK TN6025	E60
3607507	NGD4M400RK TN6025	E60
3607508	NGD4M450RK TN6025	E60
3607509	NGD4M500RK TN6025	E61
3607511	NF3M200RK TN6025	E65
3607512	NF3M300RK TN6025	E65
3607513	NG4250L TN6025	E52
3607514	NR4125L TN6025	E69
3607515	NG3M325RK TN6025	E55
3607516	NG3M220LK TN6025	E58
3607517	NG3M425RK TN6025	E55
3607518	NG2M250LK TN6025	E58
3607519	NG3M350LK TN6025	E59
3607520	NG3M425LK TN6025	E59
3607521	NG2M220RK TN6025	E54
3607522	NG4M500LK TN6025	E59
3607523	NFD3M300RK TN6025	E66
3607528	NTK3R TN6010	F16
3607530	NT3R TN6010	F14
3607531	NTF3R TN6010	F16
3607532	NT3L TN6010	F14
3607533	NG2M325RK TN6025	E55
3607534	NG2M080LK TN6025	E56
3607628	NG3062RK TN7110	E53
3607629	NG3189LK TN7110	E59
3607630	NG3189RK TN7110	E56
3607631	NG3062LK TN7110	E57
3607643	NT3RK TN6010	F13
3607644	NTP3R TN6010	F15
3607645	NT3LK TN6010	F13
3607646	NTK2R TN6010	F16
3607647	NT2R TN6010	F14
3607648	NJK3008R20 TN6010	F18
3607649	NT3RCK TN6010	F15
3607650	NTP3L TN6010	F15
3607651	NT2RK TN6010	F13
3607652	NTF3L TN6010	F16
3607653	NG4M350LK TN7110	E59
3607655	NG3M300RK TN7110	E55
3607656	NG3M400LK TN7110	E59
3607662	NG3M200RK TN7110	E54
3607663	NG3M150LK TN7110	E57
3607664	NG3M250RK TN7110	E54
3607666	NG3M200LK TN7110	E57
3607668	NG3M150RK TN7110	E53
3607672	NR2M050L TN7110	E68
3607673	NTF2R TN6010	F16
3607674	NT2LK TN6010	F13
3607675	NT2L TN6010	F14
3607676	NT4R TN6010	F14
3607677	NTP2R TN6010	F15
3607678	NTP2L TN6010	F15
3607684	NR2M100L TN7110	E68
3607689	NR3M125L TN7110	E69
3607691	NR3M175L TN7110	E69
3607823	NTP3R TN6025	F15
3607824	NT3RK TN6025	F13
3607825	NT3R TN6025	F14
3607826	NT3L TN6025	F14
3607827	NTK3R TN6025	F16
3607828	NT3LK TN6025	F13
3607829	NAS3L6 TN6025	F22
3607830	NTF3R TN6025	F16
3607831	NTP3L TN6025	F15
3607832	NTF3L TN6025	F16
3607833	NT2LK TN6025	F13
3607834	NT4R TN6025	F14
3607835	NT2L TN6025	F14
3607836	NTK2R TN6025	F16
3607837	NT2RK TN6025	F13
3607838	NT3RCK TN6025	F15
3607839	NTP4R TN6025	F15
3607840	NTP2L TN6025	F15
3607841	NTP2R TN6025	F15
3607842	NA3L4 TN6025	F21
3607843	NT2R TN6025	F14
3607844	NAS3L12 TN6025	F22
3607845	NAS3L8 TN6025	F22
3607846	NT4RK TN6025	F13
3607847	NA3L6 TN6025	F21
3607848	NA3R4 TN6025	F21
3607849	NT4L TN6025	F14
3607850	NJP3014R12 TN6025	F18
3607851	NA3R6 TN6025	F21
3607852	NTF2R TN6025	F16
3607853	NTK3L TN6025	F16
3607854	NA3R8 TN6025	F21
3607855	NA3L8 TN6025	F21
3607856	NAS3R8 TN6025	F22
3613695	MS2072CG	M31, M55, M62, M67
3613696	MS2038CG	J8, J24, J35, M6, M12, M31, M36, M62, M67, M85, M91, M96
3614289	206408	E126
3614290	206445	E122
3614291	206451	E122
3614292	206453	E122
3614344	206522	E124–125
3614650	HNGJ0905ANSNGD TN6525	H28, H34, H40
3615303	206424	E123
3615305	206440	E125
3615306	206443	E127
3615308	206449	E122
3615309	206456	E122
3632138	NSL162C W	F25
3632145	NSL122B W	F25
3632147	NSR062 W	F24
3632152	NSL123A W	F25
3632161	NSL062 W	F25
3634282	WMTAR2525M316-070-100	E34
3634283	WMTAL2525M316-070-100	E34
3634284	WMTAR2525M319-100-205	E34
3634285	WMTAL2525M319-100-205	E34
3634290	WMTAR2525M619-070-100	E34
3636536	NSR2525M3 W	E74, F24
3636539	NSL2525M3 W	E74, F25
3636540	NSR2525M4 W	E74, F24
3636541	NER2525M3 W	E76, F27
3636542	NSR1616H2 W	E74, F24
3636543	NEL2525M3 W	E76, F27
3636544	NSL2525M4 W	E74, F25
3636545	NSL1616H2 W	E74, F25
3636548	NDC88VR75M TN6010	F19
3636549	NTC3R12E TN6010	F17
3636550	NDC3115VR75 TN6010	F18
3636551	NT1L TN6010	F13
3636552	NDC8115VR75M TN6010	F19
3636553	NTC3R16E TN6010	F17
3636554	NTC3R14E TN6010	F17
3636555	NT1L TN6025	F13
3636556	NTC3L12I TN6025	F17
3636557	NTC3R16E TN6025	F17
3636558	NDC38RDR75 TN6025	F20
3636559	NDC38RDL75 TN6025	F20
3636560	NA4L4 TN6025	F21
3636561	NA6L3 TN6025	F21
3636562	NTC3R12E TN6025	F17
3636563	NTB3LB TN6025	F22
3636564	NA6R3 TN6025	F21
3636565	NDC310RDL75 TN6025	F20
3636566	NA4R4 TN6025	F21
3636567	NA6R2 TN6025	F21
3636568	NA6L2 TN6025	F21
3636569	NG1062L TN6025	E52
3636570	NG1094L TN6025	E52
3636571	NG1047L TN6025	E52
3636572	NG5M500L TN6025	E52
3637485	NSL082V W	F25
3637496	NSR853D W	F24
3637506	NSR243D W	F24
3637508	NSL853D W	F25
3637509	NSR205D W	F24
3637510	NSL102B W	F25
3637515	NSL243D W	F25
3637535	NSR243E W	F24
3637536	NSL205D W	F25
3637540	NSR245D W	F24
3637548	NSL243E W	F25
3637636	D40MTTB560KM40	C84
3637637	D50MTTB737KM40	C84
3637638	D60MTTB1000KM40	C84
3638588	NSR2020K3 W	E74, F24
3638589	NSR2020K2 W	E74, F24
3638590	NSR2525M2 W	E74, F24
3638591	NSR163D W	F24
3638592	NSR163C W	F24
3639023	NSR123B W	F24
3639024	NSL163D W	F25
3639025	NSR162C W	F24
3639026	NSR122B W	F24
3639027	NSR123A W	F24
3639028	NSR203D W	F24
3639029	NSL163C W	F25
3639032	NSL123B W	F25
3639035	NSR082V W	F24
3639037	NSL203D W	F25
3639044	NSR102B W	F24
3639045	NSL2020K2 W	E74, F25
3639046	NSL2020K3 W	E74, F25
3639047	NSL2525M2 W	E74, F25
3639048	NASR1616K3Q W	E75, F26
3639112	TCMT16T304MU TN7115	B83
3639137	DNMM15060865 TN7115	B62
3639203	CCMT090308MU TN7115	B33
3639293	SNMM19061665 TN7115	B76
3639354	DNMM15061265 TN7115	B62
3639360	CNMM12041265 TN7115	B44
3640161	SCMT090304 TN7115	B68
3641112	471706002LW TIALN-LW	07
3641113	471708003LW TIALN-LW	07
3641114	471710004LW TIALN-LW	07
3641115	471712005LW TIALN-LW	07
3641116	471716006LW TIALN-LW	07
3641117	471720007LW TIALN-LW	07
3641118	472712005LW TIALN-LW	08
3641119	472716006LW TIALN-LW	08
3641120	472720007LW TIALN-LW	08
3641622	A25RNNTOR3 W	E78, F31
3641643	A16MNNTOR2 W	E78, F31
3641644	A12MNNTOR2 W	E78, F31
3641645	A20QNNTOR2 W	E78, F31
3641646	A32SNNTOR3 W	E78, F31
3641647	A12MNNTOR1 W	E79, F32
3641648	A10KNNTOR1 W	E79, F32
3641649	A16MNNTOL2 W	E78, F31

Order No.	Catalogue No.	Page(s)
3641650	A25RNNTOL3 W	E78, F31
3641651	A25RNNTOR2 W	E78, F31
3641652	A20QNNTOL2 W	E78, F31
3641653	A40TNNTOR3 W	E78, F31
3641654	A40TNNTOR4 W	E78, F31
3641655	A12MNNTOL2 W	E78, F31
3641656	A32SNNTOL3 W	E78, F31
3641657	A25RNNTOL2 W	E78, F31
3641658	NER2020K2 W	E76, F27
3641659	A40TNNTOL3 W	E78, F31
3641660	NSR1212F2 W	E74, F24
3641661	A50UNNTOR4 W	E78, F31
3641662	NASR1212M2Q W	E75, F26
3641663	A40TNNTOL4 W	E78, F31
3641664	NSR3225P3 W	E74, F24
3641665	NER2525M2 W	E76, F27
3641666	NSR3232P3 W	E74, F24
3641667	NASR1010M2Q W	E75, F26
3641668	NEL2525M4 W	E76, F27
3641669	NSR3232P4 W	E74, F24
3641670	NSL3225P3 W	E74, F25
3641671	NSL3232P3 W	E74, F25
3641672	NER2525M4 W	E76, F27
3641674	NER1616H2 W	E76, F27
3641675	NSR3225P4 W	E74, F24
3641676	NEL2525M2 W	E76, F27
3641677	NEL2020K2 W	E76, F27
3641678	NSL3225P4 W	E74, F25
3641679	NSL3232P4 W	E74, F25
3641680	NER3225P3 W	E76, F27
3641681	NSL1212F2 W	E74, F25
3641682	NSR1010E2 W	E74, F24
3641683	NSL1010E2 W	E74, F25
3641684	NEL1616H2 W	E76, F27
3641685	NEL3225P3 W	E76, F27
3641686	NASL1212M2Q W	E75, F26
3641687	NASL1616K3Q W	E75, F26
3641688	NSL3232P5 W	E74, F25
3641689	NER3225P4 W	E76, F27
3641690	A50UNNTOL4 W	E78, F31
3641691	NASL1010M2Q W	E75, F26
3641692	NER3232P5 W	E76, F27
3641693	NER3232P4 W	E76, F27
3641694	NEL3225P4 W	E76, F27
3641695	NEL3232P5 W	E76, F27
3641696	NEL3232P4 W	E76, F27
3642134	D80MTTB1120KM63	C84
3642135	D100MTTB1330KM63	C84
3644074	MP094281L CG5	D82
3650456	WMTSR1616K216 WG	E30
3650457	WMTSL1616K216 WG	E31
3650458	WMTSR2020K216 WG	E30
3650459	WMTSL2020K216 WG	E31
3650460	WMTSR1616K311 WG	E30
3650461	WMTSL1616K311 WG	E31
3650462	WMTSR1616K322 WG	E30
3650463	WMTSL1616K322 WG	E31
3650464	WMTSR1616K422 WG	E30
3650465	WMTSL1616K422 WG	E31
3650466	WMTSR1616K514 WG	E30
3650467	WMTSL1616K514 WG	E31
3650468	WMTSR2020K311 WG	E30
3650469	WMTSL2020K311 WG	E31
3650470	WMTSR2020K322 WG	E30
3650471	WMTSL2020K322 WG	E31
3650472	WMTSL2020K22 W	E31
3650473	WMTSR2020K514 WG	E30
3650474	WMTSL2020K514 WG	E31
3650475	WMTSR2020L525 WG	E30
3650477	WMTSR2020L614 WG	E30
3650478	WMTSL2020L614 WG	E31
3650479	WMTSR2525M311 WG	E30
3650480	WMTSL2525M311 WG	E31
3650481	WMTSR2525M322 WG	E30
3650482	WMTSL2525M322 WG	E31
3650483	WMTSR2525M422 WG	E30
3650484	WMTSL2525M422 WG	E31
3650485	WMTSR2525M514 WG	E30
3650486	WMTSL2525M514 WG	E31
3650487	WMTSR2525M525 WG	E30
3650488	WMTSL2525M525 WG	E31
3650489	WMTSR2525M614 WG	E30
3650490	WMTSL2525M614 WG	E31
3650491	WMTSR2525M625 WG	E30
3650493	WMTSL2525M625 WG	E31
3650494	WMTSR2525M814 WG	E30
3650495	WMTSL2525M814	E31
3650496	WMTSR2525M825 WG	E30
3650497	WMTSL2525M825 WG	E31
3650498	WMTSR3232M814 WG	E30
3650499	WMTSL3232M814 WG	E31
3650500	WMTSR3232M825 WG	E30
3650501	WMTSL3232M825 WG	E31
3650502	WMTSR1616411 WG	E30
3650504	WMTSR2020K411 WG	E30
3650505	WMTSL2020K411 WG	E31
3650506	WMTSR2525M216 WG	E30
3650507	WMTSL2525M216 WG	E31
3650508	WMTCR1010H110 WG	E32
3650509	WMTCL1010H110 WG	E32
3650510	WMTCR1212H110 WG	E32
3650511	WMTCL1212H110 WG	E32
3650512	WMTCR1616K113 WG	E32
3650513	WMTCL1616K113 WG	E32
3650514	WMTCR2020K113 WG	E32
3650515	WMTCL2020K113 WG	E32
3650516	WMTSR2525M116 WG	E30
3650535	M1200D063Z04HN09	H31
3650536	M1200D080Z05HN09	H31
3650537	M1200D100Z06HN09	H31
3650538	M1200D125Z08HN09	H31
3653332	WMTSL2525M116 WG	E31
3653413	WMTCR1010H210 WG	E32
3653414	WMTCL1010H210 WG	E32
3653415	WMTCR1212H210 WG	E32
3653416	WMTCL1212H210 WG	E32
3653417	WMTCR1616K213 WG	E32
3653418	WMTCL1616K213 WG	E32
3653419	WMTCR2020K213 WG	E32
3653420	WMTCL2020K213 WG	E32
3653421	WMTBR2525M313-038-052 WG	E33
3653422	WMTBL2525M313-038-052 WG	E33
3653423	WMTBR2525M316-052-070 WG	E33
3653424	WMTBL2525M316-052-070 WG	E33
3653425	WMTBR2525M316-070-100 WG	E33
3653426	WMTBL2525M316-070-100 WG	E33
3653427	WMTBR2525M319-100-205 WG	E33
3653428	WMTBL2525M319-100-205 WG	E33
3653431	WMTBR2525M519-052-070 WG	E33
3653432	WMTBL2525M519-052-070 WG	E33
3653433	WMTBR2525M519-070-100 WG	E33
3653434	WMTBL2525M519-070-100 WG	E33
3653435	WMTBR2525M525-100-205 WG	E33
3653436	WMTBL2525M525-100-205 WG	E33
3653437	WMTBR2525M616-038-052 WG	E33
3653438	WMTBL2525M616-038-052 WG	E33
3653441	WMTBR2525M619-070-100 WG	E33
3653443	WMTBR2525M625-100-205 WG	E33
3653444	WMTBL2525M625-100-205 WG	E33
3653751	WMTSR2020K20 W	E30
3653752	WMTSR2525M11 W	E30
3653763	WMTSL2525M11 W	E31
3653764	WMTBR2525M412-032-052 W	E33
3653765	WMTBL2525M412-032-052 W	E33
3653766	WMTBR2525M415-052-070 W	E33
3653767	WMTBL2525M415-052-070 W	E33
3653769	WMTBL2525M415-070-100 W	E33
3653770	WMTBR2525M418-100-205 W	E33
3653771	WMTBL2525M418-100-205 W	E33
3657756	423003-000040 K30F-DCHP	P5
3657757	423003-000060 K30F-DCHP	P5
3657758	423003-000080 K30F-DCHP	P5
3657759	423003-000100 K30F-DCHP	P5
3657760	423003-000120 K30F-DCHP	P5
3657761	423004-000040 K30F-DCHP	P5
3657762	423004-000060 K30F-DCHP	P5
3657763	423004-000080 K30F-DCHP	P5
3657764	423004-000100 K30F-DCHP	P5
3657765	423004-000120 K30F-DCHP	P5
3660590	CM214	C40–41
3660591	CM219	C40–41
3660592	CM216	C40–41
3662835	CNMM190624SR TN7115	B44
3665122	7N2100501RT TIALN-RT1	O166
3665140	7N2100601RT TIALN-RT1	O166
3665141	7N2100801RT TIALN-RT1	O166
3665142	7N2101001RT TIALN-RT1	O166
3665163	7N2101201RT TIALN-RT1	O166
3665164	7N2101501RT TIALN-RT1	O166
3665166	7N2102001RT TIALN-RT1	O166
3665167	7N2102501RT TIALN-RT1	O166
3665168	7N2103001RT TIALN-RT1	O166
3669071	NST1	C40–41
3669072	NST2	C40–41
3669183	NST3	C40–41
3669653	619168	E35
3670842	HNPJ0905ANSNHD TN6540	H28, H34, H40
3670864	HNPJ0905ANSNHD TN6520	H28, H34, H40
3670865	HNPJ090543ANSNHD TN6540	H28, H34, H40
3670866	HNPJ090543ANSNHD TN6520	H28, H34, H40
3684608	CCMT09T312 TN7125	B30
3684633	CNMM16061265 TN7125	B44
3745400	71N606002MT ALTIN-MT1	O152
3745401	71N608003MT ALTIN-MT1	O152
3745402	71N610004MT ALTIN-MT1	O152
3745413	71N612005MT ALTIN-MT1	O152
3745833	CNMM19061265 TN7125	B44
3745847	SNMM19061265 TN7125	B76
3745851	CNMM16060865 TN7125	B44
3745855	SNMM12040865 TN7125	B76
3750370	M1200HF050Z04HN09	H26
3750372	M1200HF063Z05HN09	H26
3750434	M1200HF080Z06HN09	H26
3750435	M1200HF100Z08HN09	H26
3750436	M1200HF125Z09HN09	H26
3758942	CSPM81232225R WG	D25
3759184	GCPM122545R WG	D27
3761185	HNPJ0905ANSNGD TN6520	H27, H34, H40
3761187	HNPJ0905ANSNGD TN6540	H27, H34, H40
3761188	HNPJ0905ANSNGD TN7535	H27, H34, H40
3780360	MS-2071	J32–35
3782377	GCPM102545L WG	D27
3782378	QCBMW102543R WG	D24
3786518	FCBM6616635R WG	D17
3786519	FCBM8216795R WG	D17
3790247	FCBM6616325R WG	D17
3795071	DCMT11T304MU TN5105	B49
3795073	DCMT150408MU TN5105	B49
3795074	DCMT150412MU TN5105	B49
3795085	TCMT16T308MU TN5105	B83
3811638	NWC3R14E TN6025	F19
3811639	NWC3R11E TN6025	F19
3848984	TDM0800UPM WU25PD	U10
3848985	TDM0810UPM WU25PD	U10
3848986	TDM0830UPM WU25PD	U10
3848987	TDM0840UPM WU25PD	U10
3848988	TDM0850UPM WU25PD	U10
3848989	TDM0860UPM WU25PD	U10
3848990	TDM0870UPM WU25PD	U10
3848991	TDM0880UPM WU25PD	U10
3848992	TDM0890UPM WU25PD	U10
3849043	TDM0900UPM WU25PD	U10
3849044	TDM0910UPM WU25PD	U10
3849045	TDM0920UPM WU25PD	U10
3849046	TDM0930UPM WU25PD	U10
3849047	TDM0940UPM WU25PD	U11
3849048	TDM0950UPM WU25PD	U11
3849049	TDM0960UPM WU25PD	U11
3849050	TDM0990UPM WU25PD	U11
3849051	TDM1000UPM WU25PD	U11
3849052	TDM1010UPM WU25PD	U11
3849053	TDM1020UPM WU25PD	U11
3849054	TDM1030UPM WU25PD	U11
3849055	TDM1040UPM WU25PD	U11
3849056	TDM1050UPM WU25PD	U11
3849057	TDM1060UPM WU25PD	U11
3849058	TDM1070UPM WU25PD	U11
3849059	TDM1080UPM WU25PD	U11
3849060	TDM1090UPM WU25PD	U11
3849061	TDM1100UPM WU25PD	U11
3849062	TDM1110UPM WU25PD	U11
3849063	TDM1120UPM WU25PD	U11
3849064	TDM1130UPM WU25PD	U11
3849065	TDM1140UPM WU25PD	U11
3849066	TDM1150UPM WU25PD	U11
3849067	TDM1160UPM WU25PD	U11
3849068	TDM1170UPM WU25PD	U11
3849069	TDM1180UPM WU25PD	U11
3849070	TDM1190UPM WU25PD	U11
3849071	TDM1200UPM WU25PD	U12
3849072	TDM1210UPM WU25PD	U12
3849073	TDM1220UPM WU25PD	U12
3849074	TDM1240UPM WU25PD	U12
3849075	TDM1250UPM WU25PD	U12
3849076	TDM1260UPM WU25PD	U12
3849077	TDM1280UPM WU25PD	U12
3849078	TDM1300UPM WU25PD	U12

Order No.	Catalogue No.	Page(s)
3849079	TDM1320UPM WU25PD	U12
3849080	TDM1330UPM WU25PD	U12
3849081	TDM1340UPM WU25PD	U12
3849082	TDM1350UPM WU25PD	U12
3849083	TDM1360UPM WU25PD	U12
3849084	TDM1370UPM WU25PD	U12
3849085	TDM1380UPM WU25PD	U12
3849086	TDM1400UPM WU25PD	U12
3849087	TDM1410UPM WU25PD	U12
3849088	TDM1420UPM WU25PD	U12
3849089	TDM1430UPM WU25PD	U12
3849090	TDM1440UPM WU25PD	U12
3849091	TDM1450UPM WU25PD	U12
3849092	TDM1460UPM WU25PD	U12
3849093	TDM1470UPM WU25PD	U12
3849094	TDM1480UPM WU25PD	U12
3849095	TDM1490UPM WU25PD	U12
3849096	TDM1500UPM WU25PD	U12
3849097	TDM1510UPM WU25PD	U12
3849098	TDM1520UPM WU25PD	U12
3849099	TDM1530UPM WU25PD	U13
3849100	TDM1540UPM WU25PD	U13
3849101	TDM1550UPM WU25PD	U13
3849102	TDM1560UPM WU25PD	U13
3849103	TDM1570UPM WU25PD	U13
3849104	TDM1580UPM WU25PD	U13
3849105	TDM1600UPM WU25PD	U13
3849106	TDM1610UPM WU25PD	U13
3849107	TDM1620UPM WU25PD	U13
3849108	TDM1630UPM WU25PD	U13
3849109	TDM1640UPM WU25PD	U13
3849110	TDM1650UPM WU25PD	U13
3849111	TDM1660UPM WU25PD	U13
3849112	TDM1670UPM WU25PD	U13
3849113	TDM1680UPM WU25PD	U13
3849114	TDM1690UPM WU25PD	U13
3849119	TDM1700UPM WU25PD	U13
3849120	TDM1710UPM WU25PD	U13
3849121	TDM1720UPM WU25PD	U13
3849122	TDM1730UPM WU25PD	U13
3849193	TDM1740UPM WU25PD	U13
3849194	TDM1750UPM WU25PD	U13
3849195	TDM1760UPM WU25PD	U13
3849196	TDM1770UPM WU25PD	U13
3849197	TDM1780UPM WU25PD	U13
3849198	TDM1790UPM WU25PD	U13
3849199	TDM1800UPM WU25PD	U13
3849200	TDM1810UPM WU25PD	U13
3849201	TDM1820UPM WU25PD	U13
3849202	TDM1830UPM WU25PD	U14
3849203	TDM1840UPM WU25PD	U14
3849204	TDM1850UPM WU25PD	U14
3849205	TDM1860UPM WU25PD	U14
3849206	TDM1870UPM WU25PD	U14
3849207	TDM1880UPM WU25PD	U14
3849208	TDM1890UPM WU25PD	U14
3849209	TDM1900UPM WU25PD	U14
3849210	TDM1910UPM WU25PD	U14
3849211	TDM1920UPM WU25PD	U14
3849212	TDM1930UPM WU25PD	U14
3849213	TDM1940UPM WU25PD	U14
3849214	TDM1950UPM WU25PD	U14
3849215	TDM1960UPM WU25PD	U14
3849216	TDM1970UPM WU25PD	U14
3849217	TDM1980UPM WU25PD	U14
3849218	TDM1990UPM WU25PD	U14
3849219	TDM2000UPM WU25PD	U14
3849220	TDM2010UPM WU25PD	U14
3849221	TDM2020UPM WU25PD	U14
3849222	TDM2030UPM WU25PD	U14
3849223	TDM2040UPM WU25PD	U14
3849224	TDM2050UPM WU25PD	U14
3849225	TDM2060UPM WU25PD	U14
3849226	TDM2070UPM WU25PD	U14
3849227	TDM2080UPM WU25PD	U14
3849228	TDM2090UPM WU25PD	U14
3849229	TDM2099UPM WU25PD	U14
3850904	TDM080R3SCF12M WG	U6
3850905	TDM080R5SCF12M WG	U7
3850906	TDM085R3SCF12M WG	U6
3850907	TDM085R5SCF12M WG	U7
3850908	TDM090R3SCF12M WG	U6
3850909	TDM090R5SCF12M WG	U7
3850910	TDM095R3SCF12M WG	U6
3850911	TDM095R5SCF12M WG	U7
3850912	TDM100R3SCF16M WG	U6
3850923	TDM100R5SCF16M WG	U7
3850924	TDM105R3SCF16M WG	U6
3850925	TDM105R5SCF16M WG	U7
3850926	TDM110R3SCF16M WG	U6
3850927	TDM110R5SCF16M WG	U7
3850928	TDM115R3SCF16M WG	U6
3850929	TDM115R5SCF16M WG	U7
3850930	TDM120R3SCF16M WG	U6
3850931	TDM120R5SCF16M WG	U7
3850932	TDM125R3SCF16M WG	U6
3850933	TDM125R5SCF16M WG	U7
3850934	TDM130R3SCF16M WG	U6
3850935	TDM130R5SCF16M WG	U7
3850936	TDM135R3SCF16M WG	U6
3850937	TDM135R5SCF16M WG	U7
3850938	TDM140R3SCF16M WG	U6
3850939	TDM140R5SCF16M WG	U7
3850940	TDM145R3SCF16M WG	U6
3850941	TDM145R5SCF16M WG	U7
3850942	TDM150R3SCF20M WG	U6
3850943	TDM150R5SCF20M WG	U7
3850944	TDM160R3SCF20M WG	U6
3850945	TDM160R5SCF20M WG	U7
3850946	TDM170R3SCF20M WG	U6
3850947	TDM170R5SCF20M WG	U7
3850948	TDM180R3SCF25M WG	U6
3850949	TDM180R5SCF25M WG	U7
3850950	TDM190R3SCF25M WG	U6
3850951	TDM190R5SCF25M WG	U7
3850952	TDM200R3SCF25M WG	U6
3850953	TDM200R5SCF25M WG	U7
3850959	TDM0794UPM WU25PD	U10
3850960	TDM0816UPM WU25PD	U10
3850961	TDM0820UPM WU25PD	U10
3850962	TDM0833UPM WU25PD	U10
3850963	TDM0843UPM WU25PD	U10
3850964	TDM0861UPM WU25PD	U10
3850965	TDM0873UPM WU25PD	U10
3850966	TDM0884UPM WU25PD	U10
3850967	TDM0909UPM WU25PD	U10
3850968	TDM0913UPM WU25PD	U10
3850969	TDM0935UPM WU25PD	U10
3850970	TDM0953UPM WU25PD	U11
3850971	TDM0956UPM WU25PD	U11
3850972	TDM0958UPM WU25PD	U11
3850973	TDM0970UPM WU25PD	U11
3850974	TDM0980UPM WU25PD	U11
3850975	TDM0992UPM WU25PD	U11
3850976	TDM1002UPM WU25PD	U11
3850977	TDM1008UPM WU25PD	U11
3850978	TDM1026UPM WU25PD	U11
3850979	TDM1032UPM WU25PD	U11
3850980	TDM1049UPM WU25PD	U11
3850981	TDM1072UPM WU25PD	U11
3850982	TDM1111UPM WU25PD	U11
3850983	TDM1151UPM WU25PD	U11
3850984	TDM1161UPM WU25PD	U11
3850985	TDM1191UPM WU25PD	U11
3850986	TDM1230UPM WU25PD	U12
3850987	TDM1247UPM WU25PD	U12
3850988	TDM1270UPM WU25PD	U12
3850989	TDM1290UPM WU25PD	U12
3850990	TDM1310UPM WU25PD	U12
3850991	TDM1349UPM WU25PD	U12
3850992	TDM1389UPM WU25PD	U12
3850993	TDM1390UPM WU25PD	U12
3850994	TDM1429UPM WU25PD	U12
3850995	TDM1467UPM WU25PD	U12
3850996	TDM1468UPM WU25PD	U12
3850997	TDM1508UPM WU25PD	U12
3850998	TDM1548UPM WU25PD	U13
3850999	TDM1588UPM WU25PD	U13
3851000	TDM1603UPM WU25PD	U13
3851001	TDM1608UPM WU25PD	U13
3851002	TDM1627UPM WU25PD	U13
3851003	TDM1667UPM WU25PD	U13
3851004	TDM1687UPM WU25PD	U13
3851005	TDM1707UPM WU25PD	U13
3851006	TDM1746UPM WU25PD	U13
3851007	TDM1786UPM WU25PD	U13
3851008	TDM1826UPM WU25PD	U14
3851009	TDM1865UPM WU25PD	U14
3851010	TDM1905UPM WU25PD	U14
3851011	TDM1923UPM WU25PD	U14
3851012	TDM1925UPM WU25PD	U14
3851013	TDM1928UPM WU25PD	U14
3851014	TDM1935UPM WU25PD	U14
3851015	TDM1945UPM WU25PD	U14
3851016	TDM1984UPM WU25PD	U14
3851017	TDM2024UPM WU25PD	U14
3851018	TDM2064UPM WU25PD	U14
3854445	QCBM102540R WG	D20
3855796	CM234R ASSY	C8–16, C19, C56–59
3857732	MB094281R CM1	D79
3860419	RFX320RFX185030M WG	W66
3860420	RFX320RFX245040M WG	W66
3860421	RFX420RFX185035M WG	W66
3860422	RFX420RFX245045M WG	W66
3860443	RFX420RFX320045M WG	W66
3860444	RFX550RFX185040M WG	W66
3860445	RFX550RFX245050M WG	W66
3860446	RFX550RFX320050M WG	W66
3860447	RFX550RFX420055M WG	W66
3860448	RFX720RFX420060M WG	W66
3860449	RFX720RFX550060M WG	W66
3860450	RFX185RFX185030M WG	W65
3860451	RFX245RFX245035M WG	W65
3860452	RFX320RFX320050M WG	W65
3860473	RFX420RFX420060M WG	W65
3860474	RFX550RFX550090M WG	W65
3860475	RFX720RFX720100M WG	W65
3860547	RFX550CS27030M WG	W64
3860548	RFX720CS40035M WG	W64
3860549	HSK63ARFX185060M WG	W62
3860550	HSK63ARFX245060M WG	W62
3860551	HSK63ARFX320060M WG	W62
3860552	HSK63ARFX420070M WG	W62
3860623	HSK63ARFX550080M WG	W62
3860624	HSK63ARFX720095M WG	W62
3860676	BT40BRFX185060M WG	W60
3860677	BT40BRFX245060M WG	W60
3860678	BT40BRFX320060M WG	W60
3860679	BT40BRFX420060M WG	W60
3860680	BT40BRFX550065M WG	W60
3860681	BT50BRFX320060M WG	W61
3860682	BT50BRFX420060M WG	W61
3860693	BT50BRFX550065M WG	W61
3860694	BT50BRFX720070M WG	W61
3860696	DV40BRFX185060M WG	W58
3860697	DV40BRFX245060M WG	W58
3860698	DV40BRFX320060M WG	W58
3860699	DV40BRFX420060M WG	W58
3860700	DV40BRFX550065M WG	W58
3860701	DV50BRFX320060M WG	W59
3860702	DV50BRFX420060M WG	W59
3860853	DV50BRFX550060M WG	W59
3860854	DV50BRFX720065M WG	W59
3860896	CV40BRFX185236 WG	W56
3860897	CV40BRFX245236 WG	W56
3860898	CV40BRFX320236 WG	W56
3860899	CV40BRFX420236 WG	W56
3860900	CV40BRFX550256 WG	W56
3860901	CV50BRFX320236 WG	W57
3860902	CV50BRFX420236 WG	W57
3860903	CV50BRFX550236 WG	W57
3860904	CV50BRFX720276 WG	W57
3860905	SMAC200 WG	W41
3860906	RFX420FBHBB006022 WG	W49
3860907	KM40TSFBHBB006022 WG	W50
3860908	MASCFCR09CA06F WG	W46
3860909	MASCLCR09CA06F WG	W47
3860910	MASTFCR09CA11F WG	W48
3861123	KM32TSFBH022029 WG	W53
3861124	KM32TSFBH029038 WG	W53
3861125	KM32TSFBH038050 WG	W53
3861126	KM40TSFBH029038 WG	W53
3861127	KM40TSFBH038050 WG	W53
3861128	KM40TSFBH050065 WG	W53
3861129	KM50TSFBH050065 WG	W53
3861130	KM50TSFBH065088 WG	W53
3861131	KM63TSFBH065088 WG	W53
3861132	KM63TSFBH088115 WG	W53
3861143	RFX185FBH022029 WG	W52
3861144	RFX245FBH029038 WG	W52
3861145	RFX320FBH038050 WG	W52
3861146	RFX420FBH050065 WG	W52
3861147	RFX550FBH065088 WG	W52
3861148	RFX720FBH088115 WG	W52
3861149	KM32TSTCHS022030 WG	W37
3861150	KM32TSTCHS030039 WG	W37
3861151	KM32TSTCHS039050 WG	W37
3861152	KM40TSTCHS030039 WG	W37
3861173	KM40TSTCHS039050 WG	W37
3861174	KM40TSTCHS050067 WG	W37
3861175	KM50TSTCHS050067 WG	W37
3861176	KM50TSTCHS067088 WG	W37
3861177	KM63TSTCHS067088 WG	W37

Order No.	Catalogue No.	Page(s)
3861178	KM63TSTCHS088115 WG	W37
3861179	RFX185TCHS022030 WG	W36
3861180	RFX245TCHS030039 WG	W36
3861181	RFX320TCHS039050 WG	W36
3861182	RFX420TCHS050067 WG	W36
3861183	RFX550TCHS067088 WG	W36
3861184	RFX720TCHS088115 WG	W36
3864461	RFX185LS WG	W56, W58, W60, W62, W65–66
3864462	RFX245LS WG	W56, W58, W60, W62, W65–66
3864643	RFX320LS WG	W56–62, W65–66
3864644	RFX420LS WG	W56–63, W65–66
3864645	RFX550LS WG	W56–63, W65–66
3864646	RFX720LS WG	W57, W59, W61–63, W65
3864647	SMAC087 WG	W39
3865358	XNGJ0905ANFNLDJ3W THM-U	H35
3865373	HNGJ0905ANFNLDJ TN6501	H27, H33, H39
3865375	XNGJ0905ANFNLDJ3W TN6501	H35
3869578	CNGN120408T01020 CW3020	B177
3869579	CNGN120412T01020 CW3020	B177
3869580	CNGN120416T01020 CW3020	B177
3869581	CNGN120712T01020 CW3020	B177
3869582	CNGN120716T01020 CW3020	B177
3869743	DNGN150708T01020 CW3020	B180
3869745	DNGN150716T01020 CW3020	B180
3869746	RCGX060400T01020 CW3020	B183
3869747	RCGX090700T01020 CW3020	B183
3869748	RCGX120700T01020 CW3020	B183
3869749	RNGN090300T01020 CW3020	B184
3869750	RNGN120400T01020 CW3020	B184
3869751	RNGN120700T01020 CW3020	B184
3869753	RPGX060400T01020 CW3020	B185
3869754	RPGX090700T01020 CW3020	B185
3869755	RPGX120700T01020 CW3020	B185
3869756	SNGN120412T01020 CW3020	B187
3869757	SNGN120416T01020 CW3020	B187
3869758	SNGN120712T01020 CW3020	B187
3869759	SNGN120716T01020 CW3020	B188
3869761	TNGN160408T01020 CW3020	B192
3870042	CKJNL2525M16 WG	C34
3870063	CKJNL3225P16 WG	C34
3870064	CKJNR2525M16 WG	C34
3870065	CKJNR3225P16 WG	C34
3870066	CSBPL2020K12 WG	C36
3870068	CSBPR2020K12 WG	C36
3870069	CSBPR2525M12 WG	C36
3870070	CSDPN1616H09 WG	C36
3870071	CSDPN2020K12 WG	C36
3870072	CSDPN2525M12 WG	C36
3870073	CSSPL2525M12 WG	C37
3870074	CSSPR2020K12 WG	C37
3870075	CSSPR2525M12 WG	C37
3870076	CTCPN2510M11 WG	C37
3870077	CTCPN2514M16 WG	C37
3870078	CTCPN2518M22 WG	C37
3870079	CTCPN2520M22 WG	C37
3870080	CTCPN4018R22 WG	C37
3870082	CTDPL1212F11 WG	C38
3870083	CTDPR1212F11 WG	C38
3870086	CTFPL2525M16 WG	C38
3870087	CTFPR2020K16 WG	C38
3870088	CTFPR2525M16 WG	C38
3870089	CTGPL1212F11 WG	C39
3870090	CTGPL2020K16 WG	C39
3870091	CTGPL2525M16 WG	C39
3870092	CTGPR1212F11 WG	C39
3870103	CTGPR1616H11 WG	C39
3870104	CTGPR2020K11 WG	C39
3870105	CTGPR2020K16 WG	C39
3870106	CTGPR2525M16 WG	C39
3870107	CTGPR2525M22 WG	C39
3870252	STWPR12CA16 WG	C129
3870305	MSYNR25CA19 WG	C101
3870306	MSYNR16CA12 WG	C101
3870307	MSYNR12CA12 WG	C101
3870308	MSYNR10CA09 WG	C101
3870309	MSYNL10CA09 WG	C101
3870310	MSTNR16CA12 WG	C100
3870311	MSTNR12CA12 WG	C100
3870312	MSTNR10CA09 WG	C100
3870333	MSSNR20CA15 WG	C99
3870334	MSSNR16CA12 WG	C99
3870335	MSSNR12CA12 WG	C99
3870336	MSSNR10CA09 WG	C99
3870338	MSSNL16CA12 WG	C99
3870339	MSSNL12CA12 WG	C99
3870340	MSSNL10CA09 WG	C99
3870341	MSRNR20CA15 WG	C98
3870343	MSRNR12CA12 WG	C98
3870344	MSRNR10CA09 WG	C98
3870345	MSRNL20CA15 WG	C98
3870346	MSRNL16CA12 WG	C98
3870347	MSRNL12CA12 WG	C98
3870348	MSKNR25CA19 WG	C97
3870349	MSKNR20CA15 WG	C97
3870350	MSKNR16CA12 WG	C97
3870351	MSKNR12CA12 WG	C97
3870352	MSKNR10CA09 WG	C97
3870353	MSKNL20CA15 WG	C97
3870354	MSKNL16CA12 WG	C97
3870356	MSKNL10CA09 WG	C97
3870360	MDQNR20CA15 WG	C96
3870361	MDQNR16CA15 WG	C96
3870362	MDQNL20CA15 WG	C96
3870363	STWPR10CA11 WG	C129
3870364	STWPR08CA09 WG	C129
3870365	STWPL12CA16 WG	C129
3870366	STWPL10CA11 WG	C129
3870367	STTPR12CA16 WG	C128
3870368	STTPR10CA11 WG	C128
3870369	STTPR08CA09 WG	C128
3870370	STGPR12CA16 WG	C127
3870371	STGPR10CA11 WG	C127
3870372	STGPR08CA09 WG	C127
3870373	STGPL10CA11 WG	C127
3870374	STGPL08CA09 WG	C127
3870376	STFPR12CA16 WG	C126
3870377	STFPR10CA11 WG	C126
3870378	STFPR08CA09 WG	C126
3870379	STFPL12CA16 WG	C126
3870380	STFPL10CA11 WG	C126
3870381	STFPL08CA09 WG	C126
3870382	SSSPR10CA09 WG	C125
3870383	SSSPL10CA09 WG	C125
3870384	SSSCR16CA12 WG	C124
3870385	SSSCR12CA12 WG	C124
3870386	SSSCR10CA09 WG	C124
3870387	SSSCL12CA12 WG	C124
3870388	SSRPR10CA09 WG	C123
3870389	SSRPL10CA09 WG	C123
3870390	SSRCR12CA12 WG	C122
3870391	SSRCL12CA12 WG	C122
3870392	SSKPR12CA09 WG	C121
3870393	SSKPR10CA09 WG	C121
3870394	SSKPL10CA09 WG	C121
3870403	MDQNL16CA15 WG	C96
3870404	MDJNR20CA15 WG	C95
3870405	MDJNR16CA15 WG	C95
3870406	MDJNL16CA15 WG	C95
3870407	MCLNR25CA19 WG	C94
3870408	MCLNR20CA12 WG	C94
3870409	MCLNR16CA12 WG	C94
3870410	MCLNR12CA12 WG	C94
3870411	MCLNL25CA19 WG	C94
3870412	MCLNL20CA12 WG	C94
3870413	MCLNL16CA12 WG	C94
3870414	MCLNL12CA12 WG	C94
3870415	MCKNR16CA12 WG	C93
3870416	MCKNR12CA12 WG	C93
3870417	MCKNL12CA12 WG	C93
3870418	MCFNR20CA12 WG	C92
3870419	MCFNR16CA12 WG	C92
3870420	MCFNR12CA12 WG	C92
3870421	MCFNR10CA09 WG	C92
3870422	MCFNL16CA12 WG	C92
3870423	MCFNL12CA12 WG	C92
3870424	CTFPR20CA22 WG	C109
3870426	CTFPR12CA16 WG	C109
3870427	CTFPR10CA11 WG	C109
3870428	CTFPL12CA16 WG	C109
3870429	CSSPR12CA12 WG	C108
3870430	CSSPR10CA09 WG	C108
3870431	CSSPL20CA12 WG	C108
3870432	CSSPL12CA12 WG	C108
3870433	CSSPL10CA09 WG	C108
3870434	CSRPR12CA12 WG	C107
3870435	CSRPR10CA09 WG	C107
3870436	CSKPR12CA12 WG	C106
3870437	CSKPR10CA09 WG	C106
3871190	SSKCR16CA12 WG	C120
3871191	SSKCR12CA12 WG	C120
3871192	SSKCR10CA09 WG	C120
3871243	SSKCL12CA12 WG	C120
3871244	SRGCR10CA08 WG	C119
3871245	SRGCR08CA06 WG	C119
3871246	SRGCL12CA10 WG	C119
3871247	SDJPR10CA07 WG	C118
3871248	SDJPL10CA07 WG	C118
3871249	SCWPR08CA06 WG	C117
3871250	SCWPL08CA06 WG	C117
3871251	SCTPR08CA06 WG	C116
3871252	SCTPR06CA05 WG	C116
3871253	SCTPL08CA06 WG	C116
3871254	SCSPR08CA06 WG	C115
3871255	SCSPR06CA05 WG	C115
3871257	SCRPR08CA06 WG	C114
3871258	SCRPL08CA06 WG	C114
3871259	SCLPR10CA09 WG	C113
3871260	SCLPR08CA06 WG	C113
3871261	SCLPR06CA05 WG	C113
3871262	SCLPL10CA09 WG	C113
3871263	SCLPL08CA06 WG	C113
3871264	SCLPL06CA05 WG	C113
3871265	SCLCR12CA12 WG	C112
3871266	SCLCL16CA12 WG	C112
3871267	SCLCL12CA12 WG	C112
3871268	SCLCR10CA09 WG	C112
3871270	SCGPR08CA06 WG	C111
3871271	SCGPL08CA06 WG	C111
3871272	SCFPR10CA09 WG	C110
3871283	SCFPR08CA06 WG	C110
3871284	SCFPR06CA05 WG	C110
3871285	SCFPL08CA06 WG	C110
3871286	PSKNR16CA12 WG	C105
3871287	PSKNR12CA12 WG	C105
3871288	PSKNL16CA12 WG	C105
3871289	PSKNR20CA15 WG	C105
3871290	PCLNR16CA12 WG	C104
3871291	PCLNR12CA12 WG	C104
3871292	PCLNL20CA16 WG	C104
3871293	PCLNL16CA12 WG	C104
3871294	MTGNR20CA22 WG	C103
3871295	MTGNR16CA16 WG	C103
3871296	MTGNR12CA16 WG	C103
3871297	MTGNL20CA22 WG	C103
3871298	MTGNL16CA16 WG	C103
3871299	MTGNL12CA16 WG	C103
3871300	MTFNR25CA27 WG	C102
3871301	MTFNR20CA22 WG	C102
3871302	MTFNR16CA16 WG	C102
3871303	MTFNR12CA16 WG	C102
3871305	MTFNL16CA16 WG	C102
3871306	MTFNL12CA16 WG	C102
3871510	CRDPN2525M06V WG	C40
3871511	CRDPN2525M09V WG	C40
3871512	CRDPN3232P09V WG	C40
3871513	CRDPN2525M12V WG	C40
3871514	CRDPN3232P12V WG	C40
3871515	CRGPR2525M06V WG	C41
3871516	CRGPL2525M06V WG	C41
3871517	CRGPR2525M09V WG	C41
3871518	CRGPL2525M09V WG	C41
3871519	CRGPR3232P09V WG	C41
3871520	CRGPL3232P09V WG	C41
3871521	CRGPR2525M12V WG	C41
3871522	CRGPL2525M12V WG	C41
3871524	CRGPL3232P12V WG	C41
3871691	664W25008WW	Q4
3871692	660W25008WW	Q4
3871833	661W25008WW	Q4
3871834	664W32009WW	Q4
3871835	660W32009WW	Q4
3871836	661W32009WW	Q4
3871837	664W40009WW	Q4
3871838	660W40009WW	Q4
3871839	661W40009WW	Q4
3871840	664W50000WW	Q4
3871841	660W50000WW	Q4
3871842	661W50000WW	Q4
3873551	TNMM16040865 TN7125	B90
3878354	PCBNL2525M12 WG	C20
3878355	PCBNL3232P16 WG	C20
3878356	PCBNR2525M12 WG	C20
3878357	PCBNL3232P19 WG	C20

Order No.	Catalogue No.	Page(s)
3878358	PCBNR3232P19 WG	C20
3878359	PCBNL3225P16 WG	C20
3878360	PCBNL2020K12 WG	C20
3878361	PCBNR2020K12 WG	C20
3878362	PCBNL4040S19 WG	C20
3878363	PCBNR3232P16 WG	C20
3878364	PCBNR4040S19 WG	C20
3878365	PCBNL2525M16 WG	C20
3878366	PCBNR2525M16 WG	C20
3878367	PCBNR3225P16 WG	C20
3878368	PCKNL3232P19 WG	C21
3878369	PCKNL2525M12 WG	C21
3878370	PCKNR2525M12 WG	C21
3878371	PCKNR3232P19 WG	C21
3878372	PCKNR2020K12 WG	C21
3878373	PCKNL2020K12 WG	C21
3878374	PCKNR2525M16 WG	C21
3878375	PCKNR3225P16 WG	C21
3878376	PCKNL3225P16 WG	C21
3878377	PCKNL2525M16 WG	C21
3878378	PCKNL4040S19 WG	C21
3878379	PCLNL1616H12 WG	C22
3878380	PCLNL2525M16 WG	C22
3878381	PCLNL3225P19 WG	C22
3878393	PCLNL3232P19 WG	C22
3878396	PCLNR3232P16 WG	C22
3878397	PCLNL3225P12 WG	C22
3878398	PCLNL2525M12 WG	C22
3878400	PCLNR1616H12 WG	C22
3878401	PCLNR2525M16 WG	C22
3878402	PCLNR3225P12 WG	C22
3878413	PCLNR3225P19 WG	C22
3878414	PCLNR3232P19 WG	C22
3878415	PCLNL3232P16 WG	C22
3878416	PCLNL4040S19 WG	C22
3878417	PCLNR4040S19 WG	C22
3878418	PCLNL2020K12 WG	C22
3878419	PCLNR2525M12 WG	C22
3878421	PCLNR3225P16 WG	C22
3878422	PCLNR2020K12 WG	C22
3878423	PDJNL3225P15 WG	C23
3878424	PDJNR1616H11 WG	C23
3878425	PDJNR3225P15 WG	C23
3878426	PDJNR4025R15 WG	C23
3878427	PDJNL2020K11 WG	C23
3878428	PDJNL2525M11 WG	C23
3878429	PDJNR2020K11 WG	C23
3879151	PDJNR2525M11 WG	C23
3879152	PDJNR3232P15 WG	C23
3879313	PDJNL1616H11 WG	C23
3879314	PDJNL2525M15 WG	C23
3879315	PDJNL3232P15 WG	C23
3879316	PDJNL4025R15 WG	C23
3879317	PDJNL2020K15 WG	C23
3879318	PDJNR2020K15 WG	C23
3879319	PDNNR2525M15 WG	C24
3879320	PDNNL2525M15 WG	C24
3879322	PDNNR4025M15 WG	C24
3879323	PSBNL4040S19 WG	C25
3879324	PSBNR2020K12 WG	C25
3879325	PSBNL2020K12 WG	C25
3879326	PSBNL4040S25 WG	C25
3879327	PSBNR3232P19 WG	C25
3879328	PSBNL3232P19 WG	C25
3879329	PSBNL2525M15 WG	C25
3879330	PSBNR3232P15 WG	C25
3879331	PSBNR4040S25 WG	C25
3879332	PSBNL3232P15 WG	C25
3879333	PSBNR2525M15 WG	C25
3879334	PSBNR4040S19 WG	C25
3879335	PSDNN2020K12 WG	C26
3879336	PSDNN1616H09 WG	C26
3879337	PSDNN2525M12 WG	C26
3879338	PSDNN4040S25 WG	C26
3879339	PSKNL2525M12 WG	C26
3879340	PSKNR2020K12 WG	C26
3879341	PSKNR2525M12 WG	C26
3879342	PSKNR3232P19 WG	C26
3879343	PSKNL2020K12 WG	C26
3879344	PSKNL3232P19 WG	C26
3879345	PSKNL4040S19 WG	C26
3879347	PSSNL2020K12 WG	C27
3879348	PSSNR2020K12 WG	C27
3879349	PSSNR2525M15 WG	C27
3879350	PSSNR3232P19 WG	C27
3879351	PSSNR1616H09 WG	C27
3879352	PSSNR2525M12 WG	C27
3879353	PSSNL2525M12 WG	C27
3879354	PSSNR3232P15 WG	C27
3879355	PSSNL2525M15 WG	C27
3879356	PSSNL3232P19 WG	C27
3879357	PSSNL4040S19 WG	C27
3879358	PSSNL3225P12 WG	C27
3879359	PSSNR2020K09 WG	C27
3879360	PSSNR3225P12 WG	C27
3879361	PSSNR4040S19 WG	C27
3879362	PSSNR3225P15 WG	C27
3879363	PSSNL1616H09 WG	C27
3879364	PTFNR2525M16 WG	C28
3879365	PTFNL1616H16 WG	C28
3879366	PTFNL2020K16 WG	C28
3879367	PTFNR2020K16 WG	C28
3879368	PTFNL2525M16 WG	C28
3879369	PTFNR1616H16 WG	C28
3879370	PTFNR3225P22 WG	C28
3879372	PTFNR2525M22 WG	C28
3879383	PTGNL1616H16 WG	C29
3879384	PTGNL2020K16 WG	C29
3879385	PTGNR1616H16 WG	C29
3879386	PTGNL2525M22 WG	C29
3879387	PTGNR2525M22 WG	C29
3879388	PTGNL2525M16 WG	C29
3879389	PTGNR2020K16 WG	C29
3879390	PTGNR2525M16 WG	C29
3879391	PTGNR3232P22 WG	C29
3879392	PTGNL3232P22 WG	C29
3879403	PWLNL2020K08 WG	C30
3879404	PWLNL2525M08 WG	C30
3879405	PWLNR1616H06 WG	C30
3879406	PWLNL2020K06 WG	C30
3879407	PWLNR2020K06 WG	C30
3879408	PWLNR2020K08 WG	C30
3879409	PWLNR2525M08 WG	C30
3879410	PWLNL1616H06 WG	C30
3879411	SCLCL1616H09 WG	C42
3879412	SCLCL2020K09 WG	C42
3879413	SCLCL2525M12 WG	C42
3879414	SCLCR2020K12 WG	C42
3879415	SCLCL2020K12 WG	C42
3879416	SCLCR1616H09 WG	C42
3879417	SCLCR2020K09 WG	C42
3879418	SCLCR2525M12 WG	C42
3879433	SDHCL1616H11 WG	C43
3879434	SDHCL2525M15 WG	C43
3879435	SDHCR1616H11 WG	C43
3879436	SDHCR2525M15 WG	C43
3879437	SDHCR2020K11 WG	C43
3879438	SDHCL2525M11 WG	C43
3879439	SDHCL2020K11 WG	C43
3879440	SDHCR2525M11 WG	C43
3879441	SDJCL1616H07 WG	C44
3879442	SDJCL2020K07 WG	C44
3879453	SDJCL2525M11 WG	C44
3879454	SDJCL1616H11 WG	C44
3879455	SDJCL2525M15 WG	C44
3879456	SDJCR1616H07 WG	C44
3879457	SDJCR2020K15 WG	C44
3879458	SDJCR2020K07 WG	C44
3879459	SDJCR1616H11 WG	C44
3879460	SDJCR2020K11 WG	C44
3879461	SDJCR2525M11 WG	C44
3879462	SDJCL2020K11 WG	C44
3879463	SDJCR2525M15 WG	C44
3879464	SDJCR1010M07 WG	C44
3879465	SDNCN1616H11 WG	C45
3879466	SDNCN2525M15 WG	C45
3879467	SDNCN2020K11 WG	C45
3879468	SDNCN0808L07 WG	C45
3879469	SDNCN1010M07 WG	C45
3879698	CELNL2525M13MF7 WG	C33
3879699	CELNL2525M13MN7 WG	C34
3879700	CELNR2525M13MF7 WG	C33
3879701	CELNR2525M13MN7 WG	C34
3879702	SRDCN1616H08 WG	C45
3879707	PCKNR4040S19 WG	C21
3879708	PSKNR2525M15 WG	C26
3879709	PSKNL1616H09 WG	C26
3879710	PSKNR4040S19 WG	C26
3879711	PSSNL4040S25 WG	C27
3879712	PSSNL3232P15 WG	C27
3879733	SRDCN2020K08 WG	C45
3879734	SRDCN2525M10 WG	C45
3879735	SRDCN1616H06 WG	C45
3879736	SRDCN2020K10 WG	C45
3879737	SRDCN2525M08 WG	C45
3879738	SRDCN2525M12 WG	C45
3879739	SSBCL1616H09 WG	C46
3879740	SSBCR2525M12 WG	C46
3879741	SSBCR2020K12 WG	C46
3879742	SSSCL2525M12 WG	C47
3879743	SSSCL2020K12 WG	C47
3879744	SSSCR2525M12 WG	C47
3879745	SSSCL1616H09 WG	C47
3879746	SSSCR2020K12 WG	C47
3879747	SSSCR1616H09 WG	C47
3879748	STFCL2020K16 WG	C48
3879750	STFCR2525M16 WG	C48
3879751	STFCL1616H16 WG	C48
3879752	STFCL2525M16 WG	C48
3879763	STFCR2020K16 WG	C48
3879764	SVHBL2020K16 WG	C48
3879765	SVHBR2525M16 WG	C48
3879766	SVHBL2525M16 WG	C48
3879767	SVHBR2020K16 WG	C48
3879768	SVHBL3225P16 WG	C48
3879769	SVJBR1616H16 WG	C49
3879770	SVJBL2020K16 WG	C49
3879771	SVJBL3225P16 WG	C49
3879772	SVJBL1616H16 WG	C49
3879773	SVJBR3225P16 WG	C49
3879774	SVJBL2525M16 WG	C49
3879775	SVJBR2525M16 WG	C49
3879776	SVJBR2020K16 WG	C49
3879777	SVVBN2020K16 WG	C49
3879778	SVVBN2525M16 WG	C49
3879779	SVVBN3225P16 WG	C49
3879843	PSSNL3225P15 WG	C27
3879844	PSSNL2020K09 WG	C27
3879845	PTFNR3232P22 WG	C28
3879846	PTGNR3225P22 WG	C29
3879848	SDJCL2020K15 WG	C44
3879849	SDNCN2525M11 WG	C45
3879850	SSBCR1616H09 WG	C46
3879851	SSBCL2525M12 WG	C46
3879852	SSBCL2020K12 WG	C46
3879853	SVHBR3225P16 WG	C48
3881115	496905002LW TIALN-LW	O62
3881116	496906002LW TIALN-LW	O62
3881117	496908003LW TIALN-LW	O62
3881118	496910004LW TIALN-LW	O62
3881119	496912005LW TIALN-LW	O62
3881120	496914014LW TIALN-LW	O62
3881121	496916006LW TIALN-LW	O62
3881122	496918018LW TIALN-LW	O62
3881123	496920007LW TIALN-LW	O62
3881208	HSK100ARFX420080M WG	W63
3881209	HSK100ARFX550090M WG	W63
3881210	HSK100ARFX720105M WG	W63
3883122	DCMW11T304FST WDN25U	B207
3883133	CCMW060208FST WDN25U	B199
3883134	CCMW09T304FST WDN25U	B199
3883135	CCMW060204FST WDN25U	B199
3883136	CCMW09T308FST WDN25U	B199
3883137	CPMW060204FST WDN25U	B205
3883138	CPMW09T304FWST WDN25U	B205
3883139	CPMW050204FST WDN25U	B205
3883142	DCMW070204FST WDN25U	B207
3883143	DCMW11T308FST WDN25U	B207
3883144	TCMW110204FST WDN25U	B213
3883147	VCMW110304FST WDN25U	B217
3883149	A40VPTFNR22 WG	C60
3883150	A40VPTFNL22 WG	C60
3883151	A32UPTFNR16 WG	C60
3883228	TCMW110204FST WBK45U	B213
3883263	A25TPTFNR16 WG	C60
3883264	A25TPTFNL16 WG	C60
3883265	A25TSCLCR12 WG	C67
3883266	A32TSCLCR12 WG	C67
3883267	A25TSCLCL12 WG	C67
3883268	A32TSCLCL12 WG	C67
3883269	A20SSCLCR09 WG	C67
3883270	A20SSCLCL09 WG	C67
3883271	A16RSCLCR09 WG	C67
3883272	A16RSCLCL09 WG	C67
3883275	RNMN120300S02020 WBH40C	B210
3883278	CNMN090312S02020 WBK40U	B202
3883279	CNMN120408S02020 WBK40U	B202
3883280	CNMN120412S02020 WBK40U	B202
3883281	CNMA120408S02020 WBK40U	B202

Order No.	Catalogue No.	Page(s)
3883282	CNMA120412S02020 WBK40U	B202
3883283	A10KSCLCR06 WG	C67
3883284	A10KSCLCL06 WG	C67
3883285	A08JSCLCR06 WG	C67
3883286	A08JSCLCL06 WG	C67
3883287	A32TSDUCR15 WG	C73
3883288	A25TSDUCR11 WG	C73
3883289	A32TSDUCL15 WG	C73
3883290	A25TSDUCL11 WG	C73
3883291	A20SSDUCR11 WG	C73
3883292	A20SSDUCL11 WG	C73
3883293	A16RSDUCR11 WG	C73
3883294	A16RSDUCR07 WG	C73
3883295	A16RSDUCL11 WG	C73
3883296	A16RSDUCL07 WG	C73
3883297	A10KSDUCR07 WG	C73
3883298	A10KSDUCL07 WG	C73
3883313	DNMA110408S02020 WBK40U	B208
3883315	RNMN090300S02020 WBK40U	B210
3883316	RNMN120300S02020 WBK40U	B210
3883317	RNMN120400S02020 WBK40U	B210
3883320	SNMN090316S02020 WBK40U	B211
3883324	SNMN120416T02020 WBK40U	B211
3883325	SNMA120408S02020 WBK40U	B212
3883326	SNMA120412S02020 WBK40U	B212
3883327	DNGA150412EMT WBH25P	B207
3883328	SNGA120408S01025MT WBH25P	B211
3883329	TNGA160404S01025MT WBH25P	B214
3883356	CNGA120404EFWMT WBH25P	B201
3883358	DNGA150404EFWMT WBH25P	B208
3883359	DNGA150408EFWMT WBH25P	B208
3883360	DNGA150412EFWMT WBH25P	B208
3883361	TNGA160408EFWMT WBH25P	B213
3883362	TNGA160412EFWMT WBH25P	B213
3883363	CNGA120408EMT WBH25P	B200
3883364	CNGA120412EMT WBH25P	B200
3883365	DNGA150408EMT WBH25P	B207
3883382	A10KSTFCR11 WG	C76
3883434	A25TSVQBR16 WG	C80
3883435	A25TSVQBL16 WG	C80
3883436	A16RSVQBR11 WG	C80
3883438	A25TSVUBR16 WG	C81
3883439	A25TSVUBL16 WG	C81
3883440	A20SSVUBR11 WG	C81
3883442	A40VPCLNR16 WG	C60
3883443	A10KSTFCL11 WG	C76
3883444	A16RSTFPR11 WG	C78
3883445	A16RSTFPL11 WG	C78
3883446	A10KSTFPR11 WG	C78
3883447	A10KSTFPL11 WG	C78
3883449	A10KSTWPL11 WG	C80
3883450	A25RCTFPR16 WG	C65
3883451	A16RCTFPR11 WG	C65
3883452	A25RCTFPL16 WG	C65
3883453	A16RCTFPL11 WG	C65
3883454	A32SPWLNR08 WG	C61
3883455	A20SPWLNR06 WG	C61
3883456	A32SPWLNL08 WG	C61
3883457	A20SPWLNL06 WG	C61
3883458	A25RPWLNR08 WG	C61
3883459	A16RPWLNR06 WG	C61
3883461	A16RPWLNL06 WG	C61
3883462	A25TSDQCR11 WG	C71
3883463	A40VPCLNR12 WG	C60
3883464	A40VPCLNL16 WG	C60
3883465	A40VPCLNL12 WG	C60
3883466	A32UPCLNR12 WG	C60
3883467	A32UPCLNL12 WG	C60
3883468	A25TPCLNR12 WG	C60
3883469	A25TPCLNL12 WG	C60
3883473	A25TSDQCL11 WG	C71
3883474	A20SSDQCR11 WG	C71
3883475	A20SSDQCL11 WG	C71
3883476	A16RSDQCR07 WG	C71
3883477	A16RSDQCL07 WG	C71
3883505	CCGW060202S01015C WBH10P	B197
3883506	CCGW060204S01015C WBH10P	B197
3883507	CCGW09T304S01015MT WBH10P	B198
3883508	CCGW09T308S01015MT WBH10P	B198
3883509	CNGA120404S01025MT WBH10P	B201
3883510	CNGA120408S01025MT WBH10P	B201
3883511	CNGA120412S01025MT WBH10P	B201
3883523	CNGA120408S01025FWMT WBH10P	B201
3883524	CPGW060202S01015C WBH10P	B203
3883525	CPGW060204S01015C WBH10P	B203
3883526	CPGW09T304S01015MT WBH10P	B205
3883527	CPGW09T308S01015MT WBH10P	B205
3883528	DCGW070202S01015C WBH10P	B206
3883529	DCGW070204S01015C WBH10P	B206
3883530	DCGW11T304S01015MT WBH10P	B206
3883531	DCGW11T308S01015MT WBH10P	B206
3883532	DNGA150404S01025MT WBH10P	B208
3883533	DNGA150408S01025MT WBH10P	B208
3883534	TPGW110204S01015C WBH10P	B215
3883535	TPGW110208S01015C WBH10P	B215
3883536	VBGW160404S01015MT WBH10P	B216
3883537	VBGW160408S01015MT WBH10P	B216
3883538	VNGA160404S01025MT WBH10P	B217
3883539	VNGA160408S01025MT WBH10P	B217
3883560	CCGW060202EFWC WBH25P	B198
3883561	CCGW060202EC WBH25P	B197
3883562	CCGW060204EFWC WBH25P	B198
3883564	S32SCCLNL12MX7 WG	C62
3883565	S32SCCLNR12MX7 WG	C62
3883566	S40TCDQNL12MX7 WG	C63
3883567	S40TCDQNR12MX7 WG	C63
3883568	S40TCSYNL12MN7 WG	C64
3883569	S40TCSYNR12MN7 WG	C64
3883573	CCGW060204S01015C WBH25P	B197
3883574	CCGW09T304EFWC WBH25P	B198
3883575	CCGW09T304S01015C WBH25P	B197
3883576	CCGW09T308EFWC WBH25P	B198
3883577	CCGW09T308S01015C WBH25P	B197
3883578	CPGW060202EC WBH25P	B203
3883579	CPGW060204S01015C WBH25P	B203
3883580	CPGW060208S01015C WBH25P	B203
3883581	CPGW09T304S01015C WBH25P	B203
3883582	DPGW070202EC WBH25P	B209
3883583	DPGW070204S01015C WBH25P	B209
3883584	CPGW09T308S01015C WBH25P	B203
3883585	DCGW070202EC WBH25P	B206
3883586	DCGW070204S01015C WBH25P	B206
3883587	DPGW070208S01015C WBH25P	B209
3883588	TCGW110202EC WBH25P	B212
3883589	TCGW110204S01015C WBH25P	B212
3883590	TPGW110202EC WBH25P	B215
3883591	TPGW110204S01015C WBH25P	B215
3883592	TPGW110208S01015C WBH25P	B215
3883885	CNGA120404S01025MT WBH25P	B201
3883886	CNGA120408S01025MT WBH25P	B201
3883887	CNGA120412S01025MT WBH25P	B201
3883888	DNGA150404S01025MT WBH25P	B208
3883889	DNGA150408S01025MT WBH25P	B208
3883891	SNGA120412S01025MT WBH25P	B211
3883892	TNGA160408S01025MT WBH25P	B214
3883893	TNGA160412S01025MT WBH25P	B214
3883894	VNGA160404S01025MT WBH25P	B217
3883896	VNGA160408S01025MT WBH25P	B217
3883912	CNGA120408EFWMT WBH25P	B201
3883915	SNGA120404S01025MT WBH25P	B211
3883954	SNGA120408S01025MT WBH10U	B211
3883955	SNGA120412S01025MT WBH10U	B211
3883957	TCGW110204S01015C WBH10U	B212
3883959	TNGA160408S01025MT WBH10U	B214
3883960	TNGA160412S01025MT WBH10U	B214
3884731	CDHBS4T0X0 CG5	D42
3884732	CDHBS4T002 CG5	D42
3885959	MB010062L CM1	D80
3885960	MB010062L CG5	D80
3885961	MB030187L CG5	D80
3885962	MB030187L CM1	D80
3885983	MB062187L CG5	D80
3885984	MB062187L CM1	D80
3885985	MB062187R CM1	D79
3885986	MB062312L CG5	D80
3885987	MB062312L CM1	D80
3885989	MB094281L CM1	D80
3885990	MB094500L CG5	D80
3885991	MB094500L CM1	D80
3885992	MB125375L CG5	D80
3885993	MB125375L CM1	D80
3885994	MB125625L CG5	D80
3885995	MB125625L CM1	D80
3885996	MB156500L CM1	D80
3885997	MB156500R CM1	D79
3885998	MB156875L CG5	D80
3885999	MB156875L CM1	D80
3886000	MG095030L CG5	D81
3886001	MG095030L CM1	D81
3886002	MG125040L CG5	D81
3886003	MG125040L CM1	D81
3886548	GSBMW81003L WG	D23
3886549	GSBMW81003R WG	D23
3886550	QSBM101270L WG	D18
3886551	QSBM101275L WG	D18
3886552	QSBM101275R WG	D18
3886943	QSBM121520L WG	D18
3886944	QSBM1316385L WG	D19
3886945	QSBM1316385R WG	D19
3886947	QSBM1316635L WG	D19
3886948	QSBM1316635R WG	D19
3886949	QSBM15920630R WG	D19
3886950	QSBM15920635R WG	D19
3886952	QSBMW101273L WG	D24
3886967	SSBM202030L WG	D21
3886968	SSBM202030R WG	D21
3886969	SSBM202035L WG	D21
3888130	456681-001400 CERMETDCFD	W12
3888131	456681-001500 CERMETDCFD	W12
3888132	456681-001600 CERMETDCFD	W12
3888403	456681-001700 CERMETDCFD	W12
3888404	456681-001800 CERMETDCFD	W12
3888405	456681-001900 CERMETDCFD	W12
3888406	456681-002000 CERMETDCFD	W12
3888407	456680-001400 CERMETDCFD	W16
3888408	456680-001500 CERMETDCFD	W16
3888409	456680-001600 CERMETDCFD	W16
3888410	456680-001700 CERMETDCFD	W16
3888411	456680-001800 CERMETDCFD	W16

Order No.	Catalogue No.	Page(s)
3888412	456680-001900 CERMETDCFD	W16
3888413	456680-002000 CERMETDCFD	W16
3890853	CSBM4512125L WG	D11
3890854	CSBM4512255L WG	D11
3890855	CSBM6412325L WG	D11
3890856	FSBM5212125L WG	D15
3890857	FSBM5212255R WG	D15
3890858	FSBM6612320R WG	D15
3890860	FSBM6616190R WG	D15
3890861	FSBM6616320L WG	D15
3890862	FSBM6616325R WG	D15
3890864	QSBM9916295R WG	D19
3890865	QSBM9916480R WG	D19
3890866	SSOM1325385R WG	D22
3890867	SSOM1325630R WG	D22
3890868	SSOM1325635R WG	D22
3895891	SCBM162540L WG	D21
3895892	SCBM162540R WG	D21
3896002	CCBM41527L WG	D12
3896003	SCBM162545L WG	D21
3896004	SCBM162545R WG	D21
3896005	SCBM202540L WG	D21
3896006	SCBM202545R WG	D21
3896010	SDBM162540L WG	D22
3896011	SDBM162540R WG	D22
3896012	SDBM162545L WG	D22
3896013	SDBM202540L WG	D22
3896014	SDBM202540R WG	D22
3896015	CCBM4816225R WG	D13
3896017	CCBM4816485R WG	D13
3896018	CCBM6516325R WG	D13
3896019	CCBM6612635R WG	D13
3896022	CCPM81525L WG	D26
3896023	CCBM51000L WG	D12
3896024	CCBM61000L WG	D12
3896025	CCBM61000R WG	D12
3896026	CCBM61520L WG	D12
3896027	CCBM81005L WG	D12
3896028	CCBM81520L WG	D12
3896030	FCBM61520L WG	D16
3896031	FCBM61520R WG	D16
3896032	FCBM81520L WG	D16
3896035	FCBM51000L WG	D16
3896036	FCBM51000R WG	D16
3896037	FCBM51005L WG	D16
3896039	GCBMW51523L WG	D23
3896040	GCBMW51523R WG	D23
3896043	QCBM122540L WG	D20
3896044	QCBM122545L WG	D20
3896045	QCBMW102543L WG	D24
3896046	QCBMW122543L WG	D24
3896052	GSPM1316515L WG	D26
3896067	FCBM5312510L WG	D17
3896068	FCBM5312515L WG	D17
3896069	FCBM5316250R WG	D17
3896070	FCBM5316255L WG	D17
3896072	FCBM6612630R WG	D17
3896073	GCPM16254225R WG	D27
3896083	FCBM6612635R WG	D17
3896084	FCBM6616320R WG	D17
3896085	FCBM6616325L WG	D17
3896086	FCBM8216380R WG	D17
3896087	FCBM8216385L WG	D17
3896089	QSBM9916295L WG	D19
3896090	SSOM1325380R WG	D22
3896091	SCBM202545L WG	D21
3896092	SDBM202545R WG	D22
3896093	CCBM6612635L WG	D13
3896095	FCBM8216790R WG	D17
3896121	ATBM12100 WG	D62
3896193	ATBM16100 WG	D62
3896194	ATBM20102 WG	D62
3896195	ATBM25102 WG	D62
3896196	BSBM20152 WG	D62
3896198	MTMM1040 WG	D74
3896199	MTMM12100 WG	D74
3896200	MTMM1240 WG	D74
3896201	MTMM22127 WG	D74
3896202	MTMM840 WG	D74
3896204	CSBM5650L WG	D10
3896205	CSBM5650R WG	D10
3896206	CSBM5655L WG	D10
3896207	CSBM6650L WG	D10
3896208	CSBM6655L WG	D10
3896209	CSBM8760L WG	D10
3896211	FSBM61000L WG	D14
3896213	FSBM81000L WG	D14
3897011	FSBM5216125R WG	D15
3897012	GCBMW81523L WG	D23
3897084	SDBM202545L WG	D22
3897085	FCBM5316255R WG	D17
3897442	MG125040R CG5	D81
3897483	MG156050L CG5	D81
3897484	MG156050L CM1	D81
3897486	MP062187L CM1	D82
3897487	MP094281L CM1	D82
3897488	MP094281R CM1	D82
3897490	MP125375L CM1	D82
3897491	MP156500L CG5	D82
3897492	MP156500L CM1	D82
3897493	MT09560F2L CG5	D83
3897494	MT09560F2L CM1	D83
3897495	MT12560F2L CM1	D83
3897496	MT12560F2L CG5	D83
3897497	MT12560F2R CM1	D83
3897498	MT15660F2L CG5	D83
3897499	MT15660F2L CM1	D83
3897894	GSPM101638225L WG	D26
3897895	GSPM1016385L WG	D26
3897896	GSPM131651225L WG	D26
3897899	CCPM61525L WG	D26
3897903	GCPM10254225L WG	D27
3897904	GCPM102545R WG	D27
3897905	GCPM12254225L WG	D27
3897906	GCPM12254225R WG	D27
3897907	GCPM122545L WG	D27
3897908	GCPM16254225L WG	D27
3897909	GCPM162545R WG	D27
3898717	CPGN120304F WDN25U	B203
3898718	CPGN120308F WDN25U	B203
3898719	TPGN110304F WDN25U	B215
3898720	TPGN110308F WDN25U	B215
3898721	TPGN160304F WDN25U	B215
3898722	TPGN160308F WDN25U	B215
3898725	TPGN220408F WDN25U	B215
3898726	CNGA120404FST WDN25U	B200
3898727	CNGA120408FST WDN25U	B200
3898729	CNMS120408FST WDN25U	B202
3898730	DNGA150404FST WDN25U	B207
3898731	DNGA150408FST WDN25U	B207
3898732	DNMS150404FST WDN25U	B209
3898733	DNMS150408FST WDN25U	B209
3898734	TNMS160404FST WDN25U	B214
3898735	TNMS160408FST WDN25U	B214
3898736	VNGA160404FST WDN25U	B217
3898737	VNGA160408FST WDN25U	B217
3898738	VNMS160404FST WDN25U	B218
3898739	VNMS160408FST WDN25U	B218
3898740	WNGA080404FST WDN25U	B218
3898741	WNGA080408FST WDN25U	B218
3898742	SNMS120408FST WDN25U	B212
3898743	SNMS120412FST WDN25U	B212
3898744	CDHBS4T004FST WDN25U	B199
3898745	CDHBS4T002FST WDN25U	B199
3898746	CCGW060204FST WDN25U	B197
3898749	CCGW09T304FST WDN25U	B197
3898750	CCGW09T308FST WDN25U	B197
3898751	CPGW060202FST WDN25U	B204
3898752	CPGW060204FST WDN25U	B204
3898753	CPGW060208FST WDN25U	B204
3898754	CPGW09T304FST WDN25U	B204
3898755	CPGW09T308FST WDN25U	B204
3898756	CPGW120404FST WDN25U	B204
3898757	CPGW120408FST WDN25U	B204
3898758	CPGW060204FWST WDN25U	B204
3898759	CPGW09T308FWST WDN25U	B204
3898760	CPGW120408FWST WDN25U	B204
3898761	DCGW070204FST WDN25U	B206
3898762	DCGW11T304FST WDN25U	B206
3898763	DPGW070202FST WDN25U	B210
3898764	DPGW070204FST WDN25U	B210
3898765	DPGW11T304FST WDN25U	B210
3898766	DPGW070204FWST WDN25U	B210
3898767	DPGW11T304FWST WDN25U	B210
3898768	TCGW110204FST WDN25U	B213
3898769	TCGW16T304FST WDN25U	B213
3898770	TPGW110204FST WDN25U	B216
3898771	TPGW110208FST WDN25U	B216
3898772	TPGW16T304FST WDN25U	B216
3898773	TPGW16T308FST WDN25U	B216
3898774	VBGW110304FST WDN25U	B216
3898775	VBGW160404FST WDN25U	B216
3899539	TDD108Z03000 WU20PD	T112
3899540	TDD108Z03175 WU20PD	T112
3899541	TDD108Z03500 WU20PD	T112
3899542	TDD108Z03571 WU20PD	T112
3899567	TDD107Z07541 WU20PD	T110
3899568	TDD107Z07938 WU20PD	T110
3899569	TDD107Z08000 WU20PD	T110
3899571	TDD107Z08433 WU20PD	T110
3899572	TDD107Z08500 WU20PD	T111
3899573	TDD108Z03800 WU20PD	T112
3899574	TDD108Z03970 WU20PD	T112
3899575	TDD108Z04000 WU20PD	T112
3899576	TDD108Z04039 WU20PD	T112
3899577	TDD108Z04300 WU20PD	T112
3899578	TDD108Z04500 WU20PD	T112
3899579	TDD108Z04623 WU20PD	T112
3899580	TDD108Z04763 WU20PD	T112
3899581	TDD108Z05000 WU20PD	T112
3899582	TDD108Z05159 WU20PD	T112
3899583	TDD108Z05410 WU20PD	T112
3899584	TDD108Z05500 WU20PD	T112
3899585	TDD108Z05558 WU20PD	T112
3899586	TDD108Z05800 WU20PD	T112
3899587	TDD108Z06000 WU20PD	T112
3899588	TDD108Z06200 WU20PD	T112
3899589	TDD108Z06350 WU20PD	T112
3899590	TDD108Z06500 WU20PD	T112
3899591	TDD108Z06528 WU20PD	T112
3899592	TDD108Z06746 WU20PD	T112
3899593	TDD108Z06800 WU20PD	T113
3899594	TDD108Z06909 WU20PD	T113
3899595	TDD108Z07000 WU20PD	T113
3899600	TDD108Z07145 WU20PD	T113
3899601	TDD108Z07500 WU20PD	T113
3899603	TDD107Z08733 WU20PD	T111
3899604	TDD107Z09000 WU20PD	T111
3899605	TDD107Z09347 WU20PD	T111
3899606	TDD107Z09500 WU20PD	T111
3899607	TDD107Z09525 WU20PD	T111
3899610	TDD107Z10000 WU20PD	T111
3899611	TDD107Z10300 WU20PD	T111
3899612	TDD107Z10320 WU20PD	T111
3899613	TDD107Z10500 WU20PD	T111
3899614	TDD107Z10716 WU20PD	T111
3899615	TDD107Z11000 WU20PD	T111
3899616	TDD107Z11113 WU20PD	T111
3899617	TDD107Z11500 WU20PD	T111
3899619	TDD107Z12000 WU20PD	T111
3899621	TDD107Z12500 WU20PD	T111
3899622	TDD107Z12700 WU20PD	T111
3899623	TDD107Z13000 WU20PD	T111
3899626	TDD105Z03000 WU20PD	T106
3899627	TDD105Z03175 WU20PD	T106
3899628	TDD105Z03500 WU20PD	T106
3899629	TDD105Z03571 WU20PD	T106
3899630	TDD105Z03800 WU20PD	T106
3899631	TDD105Z03970 WU20PD	T106
3899632	TDD105Z04000 WU20PD	T106
3899653	TDD108Z07938 WU20PD	T113
3899654	TDD108Z08000 WU20PD	T113
3899655	TDD108Z08334 WU20PD	T113
3899657	TDD108Z08500 WU20PD	T113
3899658	TDD108Z08733 WU20PD	T113
3899659	TDD108Z09000 WU20PD	T113
3899661	TDD108Z09500 WU20PD	T113
3899662	TDD108Z09525 WU20PD	T113
3899663	TDD108Z09750 WU20PD	T113
3899665	TDD108Z10000 WU20PD	T113
3899666	TDD108Z10200 WU20PD	T113
3899667	TDD108Z10320 WU20PD	T113
3899668	TDD108Z10500 WU20PD	T113
3899670	TDD108Z11000 WU20PD	T113
3899671	TDD108Z11113 WU20PD	T113
3899672	TDD108Z11500 WU20PD	T113
3899674	TDD108Z12000 WU20PD	T113
3899675	TDD108Z12304 WU20PD	T113
3899676	TDD108Z12500 WU20PD	T113
3899677	TDD108Z12700 WU20PD	T113
3899678	TDD108Z13000 WU20PD	T113
3899683	TDD105Z04039 WU20PD	T106
3899684	TDD105Z04300 WU20PD	T106
3899685	TDD105Z04500 WU20PD	T106
3899686	TDD105Z04623 WU20PD	T106
3899687	TDD105Z04763 WU20PD	T106
3899688	TDD105Z05000 WU20PD	T106
3899689	TDD105Z05159 WU20PD	T106
3899690	TDD105Z05410 WU20PD	T106
3899691	TDD105Z05500 WU20PD	T106
3899692	TDD105Z05558 WU20PD	T106
3899693	TDD105Z05800 WU20PD	T106
3899694	TDD105Z06000 WU20PD	T106
3899695	TDD105Z06200 WU20PD	T106

Order No.	Catalogue No.	Page(s)
3899696	TDD105Z06350 WU20PD	T106
3899697	TDD105Z06500 WU20PD	T106
3899698	TDD105Z06528 WU20PD	T106
3899699	TDD105Z06746 WU20PD	T106
3899700	TDD105Z06800 WU20PD	T107
3899701	TDD105Z06909 WU20PD	T107
3899702	TDD105Z07000 WU20PD	T107
3899708	TDD107Z03000 WU20PD	T110
3899709	TDD107Z03175 WU20PD	T110
3899710	TDD107Z03500 WU20PD	T110
3899712	TDD107Z03800 WU20PD	T110
3899733	TDD107Z03970 WU20PD	T110
3899734	TDD107Z04000 WU20PD	T110
3899735	TDD107Z04039 WU20PD	T110
3899737	TDD107Z04500 WU20PD	T110
3899739	TDD107Z04763 WU20PD	T110
3899740	TDD107Z05000 WU20PD	T110
3899743	TDD107Z05500 WU20PD	T110
3899744	TDD107Z05558 WU20PD	T110
3899745	TDD107Z05800 WU20PD	T110
3899746	TDD107Z06000 WU20PD	T110
3899748	TDD107Z06350 WU20PD	T110
3899749	TDD107Z06500 WU20PD	T110
3899750	TDD107Z06528 WU20PD	T110
3899751	TDD107Z06746 WU20PD	T110
3899753	TDD107Z06909 WU20PD	T110
3899754	TDD107Z07000 WU20PD	T110
3899763	TDD106Z07145 WU20PD	T109
3899764	TDD106Z07500 WU20PD	T107
3899765	TDD106Z07541 WU20PD	T109
3899766	TDD106Z07938 WU20PD	T109
3899767	TDD106Z08000 WU20PD	T109
3899768	TDD106Z08334 WU20PD	T109
3899769	TDD106Z08433 WU20PD	T109
3899770	TDD106Z08500 WU20PD	T109
3899771	TDD106Z08733 WU20PD	T109
3899772	TDD106Z09000 WU20PD	T109
3899782	TDD106Z03000 WU20PD	T108
3899783	TDD106Z09347 WU20PD	T109
3899784	TDD106Z09500 WU20PD	T109
3899785	TDD106Z09525 WU20PD	T109
3899786	TDD106Z09750 WU20PD	T109
3899787	TDD106Z09921 WU20PD	T109
3899788	TDD106Z10000 WU20PD	T109
3899789	TDD106Z10200 WU20PD	T109
3899790	TDD106Z10320 WU20PD	T109
3899791	TDD106Z10500 WU20PD	T109
3899792	TDD106Z10716 WU20PD	T109
3899793	TDD106Z11000 WU20PD	T109
3899794	TDD106Z11113 WU20PD	T109
3899795	TDD106Z11500 WU20PD	T109
3899797	TDD106Z12000 WU20PD	T109
3899799	TDD106Z12500 WU20PD	T109
3899800	TDD106Z12700 WU20PD	T109
3899801	TDD106Z13000 WU20PD	T109
3899803	TDD106Z03175 WU20PD	T108
3899804	TDD106Z03500 WU20PD	T108
3899805	TDD106Z03571 WU20PD	T108
3899806	TDD106Z03800 WU20PD	T108
3899807	TDD106Z03970 WU20PD	T108
3899808	TDD106Z04000 WU20PD	T108
3899809	TDD106Z04039 WU20PD	T108
3899810	TDD106Z04300 WU20PD	T108
3899811	TDD106Z04500 WU20PD	T108
3899812	TDD106Z04623 WU20PD	T108
3899813	TDD106Z04763 WU20PD	T108
3899814	TDD106Z05000 WU20PD	T108
3899815	TDD106Z05159 WU20PD	T108
3899816	TDD106Z05410 WU20PD	T108
3899818	TDD106Z05500 WU20PD	T108
3899819	TDD106Z05558 WU20PD	T108
3899820	TDD106Z05800 WU20PD	T108
3899821	TDD106Z06000 WU20PD	T108
3899822	TDD106Z06200 WU20PD	T108
3899823	TDD106Z06350 WU20PD	T108
3899824	TDD106Z06500 WU20PD	T108
3899825	TDD106Z06528 WU20PD	T108
3899826	TDD106Z06746 WU20PD	T108
3899827	TDD106Z06800 WU20PD	T109
3899828	TDD106Z06909 WU20PD	T109
3899829	TDD106Z07000 WU20PD	T109
3899888	PCKNL3232P16 WG	C21
3899889	PCKNR3232P16 WG	C21
3899890	SDJCR1212F07 WG	C44
3899891	SDJCL1212F07 WG	C44
3899892	SDJCL1010E07 WG	C44
3900153	PCLNL1616H09 WG	C22
3900154	PCLNR1616H09 WG	C22
3900155	PDNNL3225P15 WG	C24
3900156	PDNNR3225P15 WG	C24
3900157	PSBNL2525M12 WG	C25
3900158	PSBNR2525M12 WG	C25
3900159	PSBNL5050T25 WG	C25
3900160	PSDNN3225P15 WG	C26
3900161	PSDNN3232P15 WG	C26
3900162	PTGNL4040T27 WG	C29
3900163	PTGNR4040T27 WG	C29
3900164	PWLNR3232P08 WG	C30
3900165	PWLNL3232P08 WG	C30
3900166	PWLNL2525M06 WG	C30
3900167	PWLNR2525M06 WG	C30
3900168	SCLCL1212F09 WG	C42
3900169	SCLCR1010E06 WG	C42
3900170	SCLCR1212F09 WG	C42
3900171	SCLCL1010E06 WG	C42
3900172	SCLCR1212F06 WG	C42
3900173	SCLCL1212F06 WG	C42
3900174	SDJCL3225P15 WG	C44
3900175	SDJCR3225P15 WG	C44
3900176	SDJCL1212F11 WG	C44
3900177	SDJCR1212F11 WG	C44
3900178	SDNCN1212F11 WG	C45
3900179	SDNCN3225P15 WG	C45
3900180	SRDCN3225P16 WG	C45
3900181	SRDCN3225P12 WG	C45
3900182	SRDCN2020K06 WG	C45
3900183	SRDCN2525M06 WG	C45
3900184	STFCR1212F11 WG	C48
3900612	TDD105Z07145 WU20PD	T107
3900633	TDD105Z07500 WU20PD	T107
3900634	TDD105Z07541 WU20PD	T107
3900635	TDD105Z07938 WU20PD	T107
3900636	TDD105Z08000 WU20PD	T107
3900637	TDD105Z08334 WU20PD	T107
3900638	TDD105Z08433 WU20PD	T107
3900639	TDD105Z08500 WU20PD	T107
3900640	TDD105Z08733 WU20PD	T107
3900641	TDD105Z09000 WU20PD	T107
3900642	TDD105Z09347 WU20PD	T107
3900643	TDD105Z09500 WU20PD	T107
3900644	TDD105Z09525 WU20PD	T107
3900645	TDD105Z09750 WU20PD	T107
3900647	TDD105Z10000 WU20PD	T107
3900648	TDD105Z10200 WU20PD	T107
3900649	TDD105Z10320 WU20PD	T107
3900650	TDD105Z10500 WU20PD	T107
3900651	TDD105Z10716 WU20PD	T107
3900652	TDD105Z11000 WU20PD	T107
3900653	TDD105Z11113 WU20PD	T107
3900654	TDD105Z11500 WU20PD	T107
3900656	TDD105Z12000 WU20PD	T107
3900657	TDD105Z12304 WU20PD	T107
3900658	TDD105Z12500 WU20PD	T107
3900659	TDD105Z12700 WU20PD	T107
3900660	TDD105Z13000 WU20PD	T107
3902132	KM40TSNEL2	F28
3902283	KM40TSNEL3	F28
3902284	KM40TSNEL4	F28
3902285	KM40TSNER2	F28
3902286	KM40TSNER3	F28
3902287	KM40TSNER4	F28
3902288	KM40TSNRL3045M	F29
3902289	KM40TSNRR3045M	F29
3902290	KM40TSNSL2	F29
3902291	KM40TSNSL3	F29
3902292	KM40TSNSL4	F29
3902293	KM40TSNSR2	F29
3902294	KM40TSNSR3	F29
3902295	KM40TSNSR4	F29
3903943	M270HF10 TN6540	M127
3903944	M270HF10 TN2505	M127
3903945	M270HF12 TN6540	M127
3903946	M270HF12 TN2505	M127
3903947	M270HF13 TN6540	M127
3903948	M270HF13 TN2505	M127
3903949	M270HF16 TN6540	M127
3903950	M270HF16 TN2505	M127
3903953	M270HF20 TN6540	M127
3903954	M270HF20 TN2505	M127
3926514	M270TD010A10L120	M119, M125
3926515	M270TD012A12L140	M119, M125
3926516	M270TD016A16L160	M119, M125
3926517	M270TD020A20L180	M119, M125
3926518	M270TD010A10L120C	M120, M126
3926519	M270TD010A10L150C	M120, M126
3926520	M270TD012A12L120C	M120, M126
3926521	M270TD012A12L160C	M120, M126
3926522	M270TD016A16L140C	M120, M126
3926543	M270TD016A16L180C	M120, M126
3926544	M270TD020A20L150C	M120, M126
3926545	M270TD020A20L200C	M120, M126
3926546	M270TD012M08	M118, M124
3926547	M270TD016M08	M118, M124
3926548	M270TD020M10	M118, M124
3926601	M170D032Z02M16RD16	M66
3926602	M170D050Z04RD16	M67
3926607	M170D015Z02M08RD07	M46
3926608	M170D016Z03M08RD07	M46
3926609	M170D020Z04M10RD07	M46
3926610	M170D025Z05M12RD07	M46
3926611	M170D030Z05M16RD07	M46
3926612	M170D035Z06M16RD07	M46
3929403	M170D015Z02B16RD07	M47
3929404	M170D015Z02A16RD07L110	M48
3929405	M170D015Z02A16RD07L150	M48
3929406	M170D016Z03A16RD07L110	M48
3929407	M170D016Z02A16RD07L150	M48
3929408	M170D020Z04A20RD07L115	M48
3929409	M170D020Z03A20RD07L140	M48
3930950	M170D024Z02M12RD12	M59
3930954	M170D035Z03M16RD12	M59
3930956	M170D035Z04M16RD12	M59
3930958	M170D042Z05M16RD12	M59
3930960	M170D032Z03B32RD12	M60
3930962	M170D032Z02A32RD12L200	M61
3930964	M170D032Z02A32RD12L300	M61
3930966	M170D035Z02A32RD12L300	M61
3930968	M170D040Z04RD12	M62
3930970	M170D050Z05RD12	M62
3930972	M170D052Z05RD12	M62
3930975	M170D063Z06RD12	M62
3930976	M170D066Z06RD12	M62
3930979	M170D080Z07RD12	M62
3930981	M170D100Z08RD12	M62
3934623	M170D052Z04RD16	M67
3934624	M170D063Z05RD16	M67
3934625	M170D066Z05RD16	M67
3934626	M170D080Z06RD16	M67
3934628	M170D100Z07RD16	M67
3934629	M170D125Z08RD16	M67
3934647	M170D020Z02M10RD10	M52
3934648	M170D025Z02M12RD10	M52
3934649	M170D025Z03M12RD10	M52
3934650	M170D030Z04M16RD10	M52
3934651	M170D035Z05M16RD10	M52
3934652	M170D042Z06M16RD10	M52
3935336	M170D012Z02M06RD07T	M42
3935337	M170D012Z02M08RD07T	M42
3935338	M170D015Z03M08RD07T	M42
3935339	M170D012Z02A12RD07TL100	M43
3935340	M170D012Z02A16RD07TL120	M43
3935341	M170D012Z02A16RD07TL140	M43
3935342	M170D015Z03A16RD07TL130	M43
3940703	M170D020Z02B20RD10	M53
3940704	M170D020Z02A20RD10L140	M54
3940705	M170D020Z02A25RD10L160	M54
3940706	M170D020Z02A25RD10L180	M54
3940707	M170D022Z02A20RD10L160	M54
3940708	M170D025Z03B25RD10	M53
3940709	M170D025Z02A25RD10L180	M54
3940710	M170D025Z02A25RD10L220	M54
3940711	M170D028Z02A25RD10L200	M54
3940712	M170D040Z05RD10	M55
3940723	M170D042Z05RD10	M55
3940724	M170D050Z06RD10	M55
3940725	M170D052Z06RD10	M55
3949807	SDMX150612RMM TN6540	J49
3949809	SDMX150612RMM TN7525	J49
3949811	SDMX150612RMH TN6540	J50
3950583	SDMX150612RMH TN7525	J50
3950584	SDMX150612RMH TN7535	J50
3950585	SDMX150616RMH TN6540	J50
3950587	SDMX150616RMH TN7535	J50
3950588	SDMX120408RMM TN6525	J45, K6
3950589	SDMX120408RMM TN6540	J45, K6
3950590	SDMX120408RMM TN7525	J45, K6
3950591	SDMX120408RMM TN7535	J45, K6
3950592	SDMX120408RMH TN6540	J46, K7
3950594	SDMX120408RMH TN7525	J46, K7
3950595	SDMX120408RMH TN7535	J46, K7
3950596	SDMX120412RMM TN6525	J45, K6
3950597	SDMX120412RMM TN6540	J45, K6
3950599	SDMX120412RMM TN7525	J45, K6
3950600	SDMX120412RMM TN7535	J45, K6

Order No.	Catalogue No.	Page(s)
3950601	SDMX120412RMH TN6525	J46, K7
3950603	SDMX120412RMH TN6540	J46, K7
3950605	SDMX120412RMH TN7525	J46, K7
3950606	SDMX120412RMH TN7535	J46, K7
3950607	SDMX120416RMH TN6540	J46, K7
3950609	SDMX120416RMH TN7535	J46, K7
3950614	SDMX120412RMH TN6520	J46, K7
3950831	KM40TSLSEL16N	F71
3950832	KM40TSLSER16N	F71
3950853	KM40TSLSEL22N	F71
3950854	KM40TSLSER22N	F71
3950855	KM40TSLSSL16	F72
3950856	KM40TSLSSL22	F72
3950857	KM40TSLSSR16	F72
3950858	KM40TSLSSR22	F72
3951835	KM40TSE16JNEL2 KWH	F35
3951836	KM40TSE16JNER2 KWH	F35
3954298	G50MTTB1026KM40	C84
3954299	G60MTTB1226KM40	C84
3954300	G80MTTB1564KM63	C84
3954301	G100MTTB2066KM63	C84
3954332	HNGJ0704ANFNLDJ THM-U	H8, H16, H21
3954414	HNGJ0704ANFNLDJ TN6501	H8, H16, H21
3954416	XNGJ0704ANFNLDJ3W TN6501	H17
3954418	HNGJ0704ANENLD TN6505	H8, H16, H21
3954419	HNGJ0704ANENLD TN6510	H8, H16, H21
3954420	HNGJ0704ANENLD TN6520	H8, H16, H21
3954421	HNGJ0704ANENLD TN6525	H8, H16, H21
3954422	HNGJ0704ANENLD TN6540	H8, H16, H21
3954424	XNGJ0704ANENLD3W TN6510	H17
3954425	XNGJ0704ANENLD3W TN6520	H17
3954426	XNGJ0704ANENLD3W TN6525	H17
3954427	XNGJ0704ANENLD3W TN6540	H17
3954428	HNGJ070432ANENLD TN6510	H8, H16, H21
3954429	HNGJ070432ANENLD TN6525	H8, H16, H21
3954430	HNGJ070432ANENLD TN6540	H8, H16, H21
3954432	HNPJ0704ANSNGD TN6510	H9, H17, H22
3954433	XNGJ0704ANFNLDJ3W THM-U	H17
3954473	HNPJ0704ANSNGD TN6520	H9, H17, H22
3954474	HNPJ0704ANSNGD TN6540	H9, H17, H22
3954475	HNPJ0704ANSNGD TN7535	H9, H17, H22
3954477	HNPJ0704ANSNHD TN6510	H9, H17, H22
3954478	HNPJ0704ANSNHD TN6520	H9, H17, H22
3954479	HNPJ0704ANSNHD TN6540	H9, H17, H22
3954480	HNPJ0704ANSNHD TN7535	H9, H17, H22
3954481	HNPJ070432ANSNHD TN6510	H9, H17, H22
3954482	HNPJ070432ANSNHD TN6520	H9, H17, H22
3954483	HNPJ070432ANSNHD TN6540	H9, H17, H22
3954484	HNPJ070432ANSNHD TN7535	H9, H17, H22
3954792	M4000CA-HN09HF	H73
3954929	GT305097 GP6520	Y20
3954930	GT305098 GP6520	Y20
3954931	GT305099 GP6520	Y20
3954932	GT305100 GP6520	Y20
3955023	GT305101 GP6520	Y20
3955024	GT305102 GP6520	Y20
3955025	GT305103 GP6520	Y20
3955026	GT305104 GP6520	Y20
3955027	GT305105 GP6520	Y20
3955028	GT305106 GP6520	Y20
3955029	GT305107 GP6520	Y20
3955030	GT305108 GP6520	Y20
3955031	GT305109 GP6520	Y20
3955032	GT305110 GP6520	Y20
3955033	GT305111 GP6520	Y20
3955034	GT305112 GP6520	Y20
3955035	GT305113 GP6520	Y20
3955036	GT305114 GP6520	Y20
3955037	GT305115 GP6520	Y20
3955038	GT215001 GM6515	Y6
3955039	GT215002 GM6515	Y6
3955040	GT215003 GM6515	Y6
3955041	GT215004 GM6515	Y6
3955042	GT215005 GM6515	Y6
3955047	GT205077 GM6515	Y4
3955048	GT205078 GM6515	Y4
3955049	GT205079 GM6515	Y4
3955050	GT205080 GM6515	Y4
3955051	GT205081 GM6515	Y4
3955052	GT205082 GM6515	Y4
3955053	GT215006 GM6515	Y6
3955054	GT215007 GP6520	Y6
3955055	GT215008 GP6520	Y6
3955056	GT215009 GP6520	Y6
3955057	GT215010 GP6520	Y6
3955058	GT215011 GP6520	Y6
3955059	GT215012 GP6520	Y6
3955073	GT205083 GM6515	Y4
3955074	GT205084 GM6515	Y4
3955075	GT205085 GM6515	Y4
3955076	GT205086 GM6515	Y4
3955077	GT205087 GM6515	Y4
3955078	GT205088 GM6515	Y4
3955079	GT205089 GM6515	Y4
3955080	GT205090 GM6515	Y4
3955081	GT205091 GM6515	Y4
3955082	GT205092 GM6515	Y4
3955083	GT205093 GM6515	Y4
3955084	GT205094 GP6520	Y4
3955085	GT205095 GP6520	Y4
3955086	GT205096 GP6520	Y4
3955087	GT205097 GP6520	Y4
3955088	GT205098 GP6520	Y4
3955089	GT205099 GP6520	Y4
3955090	GT205100 GP6520	Y4
3955091	GT205101 GP6520	Y4
3955092	GT205102 GP6520	Y4
3955098	GT305148 GM6515	Y20
3955099	GT305079 GM6515	Y20
3955100	GT305080 GM6515	Y20
3955101	GT305081 GM6515	Y20
3955102	GT305082 GM6515	Y20
3955103	GT305083 GM6515	Y20
3955104	GT305084 GM6515	Y20
3955105	GT305085 GM6515	Y20
3955106	GT305086 GM6515	Y20
3955107	GT305087 GM6515	Y20
3955108	GT305088 GM6515	Y20
3955109	GT305089 GM6515	Y20
3955110	GT305090 GM6515	Y20
3955111	GT305091 GM6515	Y20
3955112	GT305092 GM6515	Y20
3955113	GT305093 GM6515	Y20
3955114	GT305094 GM6515	Y20
3955115	GT305095 GM6515	Y20
3955116	GT305096 GM6515	Y20
3955123	GT205103 GP6520	Y4
3955124	GT205104 GP6520	Y4
3955125	GT205105 GP6520	Y4
3955126	GT205106 GP6520	Y4
3955127	GT205107 GP6520	Y4
3955128	GT205108 GP6520	Y4
3955129	GT205109 GP6520	Y4
3955130	GT205110 GP6520	Y4
3955343	GT315001 GM6515	Y22
3955344	GT315002 GM6515	Y22
3955345	GT315003 GM6515	Y22
3955346	GT315004 GM6515	Y22
3955347	GT315005 GM6515	Y22
3955348	GT315006 GM6515	Y22
3955349	GT315007 GP6520	Y22
3955350	GT315008 GP6520	Y22
3955351	GT315009 GP6520	Y22
3955352	GT315010 GP6520	Y22
3955373	GT315011 GP6520	Y22
3955374	GT315012 GP6520	Y22
3955463	KM40TSS10DLSEL11	F76–77
3955464	KM40TSS10DLSER11	F76–77
3955465	KM40TSS12ELSEL11	F76–77
3955466	KM40TSS12ELSER11	F76–77
3955467	KM40TSS16FLSEL16	F76–77
3955468	KM40TSS16FLSER16	F76–77
3955469	KM40TSS20GLSEL16	F76–77
3955470	KM40TSS20GLSER16	F76–77
3955471	KM40TSS25HLSEL16	F76–77
3955472	KM40TSS25HLSER16	F76–77
3955473	KM40TSS32JLSEL16	F76–77
3955474	KM40TSS32JLSER16	F76–77
3955475	KM40TSS32JLSEL22	F76–77
3955476	KM40TSS32JLSER22	F76–77
3955480	KM40TSS12ENEL2	F33–34
3955481	KM40TSS12ENER2	F33–34
3955482	KM40TSS16FNEL2	F33–34
3955483	KM40TSS16FNER2	F33–34
3955484	KM40TSS20GNEL2	F33–34
3955485	KM40TSS20GNER2	F33–34
3955486	KM40TSS25ENEL2	F33–34
3955487	KM40TSS25ENER2	F33–34
3955488	KM40TSS25HNEL2	F33–34
3955489	KM40TSS25HNER2	F33–34
3955490	KM40TSS25ENEL3	F33–34
3955491	KM40TSS25ENER3	F33–34
3955492	KM40TSS25HNEL3	F33–34
3955493	KM40TSS25HNER3	F33–34
3955494	KM40TSS32JNEL3	F33–34
3955495	KM40TSS32JNER3	F33–34
3955496	KM40TSS32GNEL3	F33–34
3955497	KM40TSS32GNER3	F33–34
3957839	M1200D025Z02M16HN07	H12
3957840	M1200D025Z03M16HN07	H12
3957841	M1200D032Z03M16HN07	H12
3957842	M1200D032Z04M16HN07	H12
3957963	M1200D040Z04M16HN07	H12
3957964	M1200D040Z05M16HN07	H12
3957969	M1200HF160Z12HN09	H26
3957970	M1200D040Z03HN09	H31
3957971	M1200D040Z04HN09	H31–32
3957972	M1200D200Z16HN09	H31–32
3957993	M1200D250Z20HN09	H31–32
3957994	M1200D315Z24HN09	H31–32
3957995	M1200D040Z04HN07	H15
3957996	M1200D040Z05HN07	H15
3957997	M1200D050Z04HN07	H15
3957998	M1200D050Z05HN07	H15
3957999	M1200D050Z06HN07	H15
3958000	M1200D063Z04HN07	H15
3958001	M1200D063Z06HN07	H15
3958002	M1200D063Z08HN07	H15
3958003	M1200D080Z05HN07	H15
3958004	M1200D080Z08HN07	H15
3958005	M1200D080Z10HN07	H15
3958006	M1200D100Z06HN07	H15
3958007	M1200D100Z09HN07	H15
3958008	M1200D100Z12HN07	H15
3958011	M1200D025Z02B20HN07	H13
3958012	M1200D025Z03B20HN07	H13
3958023	M1200D032Z03B25HN07	H13
3958024	M1200D032Z04B25HN07	H13
3958025	M1200D025Z02A20HN07L120	H14
3958026	M1200D025Z03A20HN07L120	H14
3958027	M1200D032Z03A25HN07L130	H14
3958028	M1200D032Z04A25HN07L130	H14
3958029	M1200D025Z02A25HN07L200	H14
3958030	M1200D025Z03A25HN07L200	H14
3959398	KM40TSLSEL27N	F71
3959399	KM40TSLSER27N	F71
3959400	KM40TSLSSL27	F72
3959401	KM40TSLSSR27	F72
3959579	RDPX1003M0SNMH TN6540	M56
3959580	RDPX1003M0SNMH TN6525	M56
3959581	RDPX1003M0SNMH TN2505	M56
3959582	RDPX1003M0SNMM TN6540	M56
3959620	RDPX12T3M0SNMH TN6540	M63
3959621	RDPX12T3M0SNMH TN6525	M63
3959622	RDPX12T3M0SNMH TN2505	M63
3959623	RDPX12T3M0SNMM TN6540	M63
3959624	RDPX12T3M0SNMM TN6525	M63
3959625	RDPX0702M0SNMH TN6540	M49
3959626	RDPX0702M0SNMH TN6525	M49
3959627	RDPX0702M0SNMH TN2505	M49
3959633	RDPX1003M0SNMM TN6525	M56
3960462	RDPX1604M0SNMH TN6540	M68
3960513	RDPX1604M0SNMH TN6525	M68
3960514	RDPX1604M0SNMH TN2505	M68
3960515	RDPX1604M0SNMM TN6540	M68
3960516	RDPX1604M0SNMM TN6525	M68
3960532	RDHX07T1M0SNMH TN6540	M44
3960573	RDHX07T1M0SNMH TN6525	M44
3960578	RDHX07T1M0SNMH TN2505	M44
3964909	12146111200	H32
3964910	12146111300	H32

Order No.	Catalogue No.	Page(s)
3964911	12146111400	H32
3964954	12146109200	H15, H20, H32
3968124	M4000CA-HN07	H73
3969291	TDM2150UPM WU25PD	U15
3992013	TDM2599UPM WU25PD	U15
3992070	TDM210R3SCF25M WG	U6
3992071	TDM220R3SCF25M WG	U6
3992072	TDM230R3SCF25M WG	U6
3992141	TDM080R8SCF12M WG	U8
3992142	TDM085R8SCF12M WG	U8
3992213	TDM090R8SCF12M WG	U8
3992214	TDM095R8SCF12M WG	U8
3992215	TDM100R8SCF16M WG	U8
3992216	TDM105R8SCF16M WG	U8
3992217	TDM110R8SCF16M WG	U8
3992218	TDM115R8SCF16M WG	U8
3992219	TDM120R8SCF16M WG	U8
3992220	TDM125R8SCF16M WG	U8
3992221	TDM130R8SCF16M WG	U8
3992222	TDM135R8SCF16M WG	U8
3992223	TDM140R8SCF16M WG	U8
3992224	TDM145R8SCF16M WG	U8
3992225	TDM150R8SCF20M WG	U8
3992226	TDM160R8SCF20M WG	U8
3992227	TDM170R8SCF20M WG	U8
3992228	TDM180R8SCF25M WG	U8
3992229	TDM190R8SCF25M WG	U8
3992230	TDM200R8SCF25M WG	U8
3992231	TDM210R8SCF25M WG	U8
3992232	TDM220R8SCF25M WG	U8
3992233	TDM230R8SCF25M WG	U8
3992234	TDM240R8SCF25M WG	U8
3992235	TDM250R8SCF25M WG	U8
3992483	TDM240R3SCF25M WG	U6
3992484	TDM250R3SCF25M WG	U6
3992485	TDM210R5SCF25M WG	U7
3992486	TDM220R5SCF25M WG	U7
3992487	TDM230R5SCF25M WG	U7
3992488	TDM240R5SCF25M WG	U7
3992489	TDM250R5SCF25M WG	U7
3998454	TDS503A07600 WU25PD	T92
3998456	TDS503A11110 WU25PD	T93
3998686	12146120500	H7, H15, H20, H26, H38, J8, M6, M12
4002444	TDM2550UPM WU25PD	U15
4003203	TDM2144UPM WU25PD	U15
4003204	TDM2223UPM WU25PD	U15
4003205	TDM2245UPM WU25PD	U15
4003206	TDM2381UPM WU25PD	U15
4003207	TDM2461UPM WU25PD	U15
4003208	TDM2540UPM WU25PD	U15
4003209	TDM2568UPM WU25PD	U15
4003210	TDM2581UPM WU25PD	U15
4003225	TDM2100UPM WU25PD	U14
4003226	TDM2200UPM WU25PD	U15
4003227	TDM2250UPM WU25PD	U15
4003228	TDM2300UPM WU25PD	U15
4003229	TDM2350UPM WU25PD	U15
4003230	TDM2400UPM WU25PD	U15
4003231	TDM2450UPM WU25PD	U15
4003232	TDM2500UPM WU25PD	U15
4004710	CM215R ASSY	C17–18, C58
4008276	M370D050Z05WO08	M6
4008277	M370D066Z06WO08	M6
4008281	M370D025Z02A25WO08L200	M5
4010625	TDM1618UPM WU25PD	U13
4033659	GT415001 GP6520	Y53
4033660	GT415002 GP6520	Y53
4033661	GT415003 GP6520	Y53
4033662	GT415004 GP6520	Y53
4033699	GT405001 GP6520	Y52
4033700	GT405002 GP6520	Y52
4033701	GT405003 GP6520	Y52
4033702	GT405004 GP6520	Y52
4033723	GT205111 GP6520	Y4
4033725	GT205113 GP6520	Y4
4033726	GT205114 GP6520	Y4
4033728	GT205116 GP6520	Y4
4033730	GT205118 GP6520	Y4
4033733	GT305161 GP6520	Y20
4033735	GT305163 GP6520	Y20
4033736	GT305164 GP6520	Y20
4033738	GT305166 GP6520	Y20
4033740	GT305168 GP6520	Y20
4033744	GT315025 GP6520	Y22
4033746	GT315027 GP6520	Y22
4033747	GT315028 GP6520	Y22
4033749	GT315030 GP6520	Y22
4033751	GT315032 GP6520	Y22
4033753	GT405005 GP6520	Y52
4033754	GT405006 GP6520	Y52
4033755	GT405007 GP6520	Y52
4033756	GT405008 GP6520	Y52
4033757	GT405009 GP6520	Y52
4033758	GT405010 GP6520	Y52
4033759	GT405011 GP6520	Y52
4033765	GT205122 GP6520	Y5
4033767	GT205124 GP6520	Y5
4033768	GT205125 GP6520	Y5
4033770	GT205127 GP6520	Y5
4033772	GT205129 GP6520	Y5
4033776	GT305151 GP6520	Y21
4033778	GT305153 GP6520	Y21
4033779	GT305154 GP6520	Y21
4033781	GT305156 GP6520	Y21
4033783	GT305158 GP6520	Y21
4033787	GT315014 GP6520	Y23
4033789	GT315016 GP6520	Y23
4033790	GT315017 GP6520	Y23
4033792	GT315019 GP6520	Y23
4033794	GT315021 GP6520	Y23
4033813	GT415005 GP6520	Y53
4033814	GT415006 GP6520	Y53
4033815	GT415007 GP6520	Y53
4033816	GT415008 GP6520	Y53
4033817	GT415009 GP6520	Y53
4033818	GT415010 GP6520	Y53
4035066	GT305116 GP6505	Y20
4035067	GT305117 GP6505	Y20
4035068	GT305118 GP6505	Y20
4035069	GT305119 GP6505	Y20
4035070	GT305120 GP6505	Y20
4035071	GT305121 GP6505	Y20
4035072	GT305122 GP6505	Y20
4035073	GT305123 GP6505	Y20
4035074	GT305124 GP6505	Y20
4051233	TDS501A03455 WU25PD	T82
4051234	TDS501A03175 WU25PD	T82
4051235	TDS501A13100 WU25PD	T85
4051236	TDS502A03455 WU25PD	T87
4051237	TDS502A03175 WU25PD	T87
4051238	TDS502A13100 WU25PD	T90
4051239	TDS503A03100 WU25PD	T91
4051240	TDS503A03175 WU25PD	T91
4051241	TDS503A03200 WU25PD	T91
4051242	TDS503A03250 WU25PD	T91
4051243	TDS503A03400 WU25PD	T91
4051244	TDS503A03455 WU25PD	T91
4051245	TDS503A03900 WU25PD	T91
4051246	TDS503A04100 WU25PD	T91
4051247	TDS503A04300 WU25PD	T91
4051248	TDS503A04400 WU25PD	T91
4051249	TDS503A04600 WU25PD	T91
4051250	TDS503A04650 WU25PD	T91
4051251	TDS503A04900 WU25PD	T92
4051252	TDS503A05100 WU25PD	T92
4051253	TDS503A05200 WU25PD	T92
4051254	TDS503A05300 WU25PD	T92
4051255	TDS503A05400 WU25PD	T92
4051256	TDS503A05550 WU25PD	T92
4051257	TDS503A05600 WU25PD	T92
4051258	TDS503A05700 WU25PD	T92
4051259	TDS503A05900 WU25PD	T92
4051260	TDS503A06100 WU25PD	T92
4051261	TDS503A06200 WU25PD	T92
4051262	TDS503A06300 WU25PD	T92
4051263	TDS503A06400 WU25PD	T92
4051264	TDS503A06600 WU25PD	T92
4051265	TDS503A06700 WU25PD	T92
4051266	TDS503A06900 WU25PD	T92
4051267	TDS503A07100 WU25PD	T92
4051268	TDS503A07200 WU25PD	T92
4051269	TDS503A07300 WU25PD	T92
4051270	TDS503A07400 WU25PD	T92
4051271	TDS503A07700 WU25PD	T92
4051272	TDS503A07900 WU25PD	T92
4051273	TDS503A08100 WU25PD	T93
4051274	TDS503A08200 WU25PD	T93
4051275	TDS503A08300 WU25PD	T93
4051276	TDS503A08400 WU25PD	T93
4051277	TDS503A08600 WU25PD	T93
4051278	TDS503A08700 WU25PD	T93
4051279	TDS503A08800 WU25PD	T93
4051280	TDS503A08900 WU25PD	T93
4051281	TDS503A09100 WU25PD	T93
4051282	TDS503A09200 WU25PD	T93
4051283	TDS503A09300 WU25PD	T93
4051284	TDS503A09400 WU25PD	T93
4051285	TDS503A09600 WU25PD	T93
4051286	TDS503A09700 WU25PD	T93
4051287	TDS503A09900 WU25PD	T93
4051288	TDS503A10100 WU25PD	T93
4051289	TDS503A10300 WU25PD	T93
4051290	TDS503A10400 WU25PD	T93
4051291	TDS503A10600 WU25PD	T93
4051292	TDS503A10700 WU25PD	T93
4051293	TDS503A10900 WU25PD	T93
4051294	TDS503A11100 WU25PD	T93
4051295	TDS503A11200 WU25PD	T93
4051296	TDS503A11300 WU25PD	T94
4051297	TDS503A11400 WU25PD	T94
4051298	TDS503A11600 WU25PD	T94
4051299	TDS503A11700 WU25PD	T94
4051300	TDS503A11900 WU25PD	T94
4051301	TDS503A13100 WU25PD	T94
4051302	TDS503A16500 WU25PD	T94
4051303	TDS503A16670 WU25PD	T94
4051304	TDS503A16800 WU25PD	T94
4051305	TDS503A17000 WU25PD	T94
4051306	TDS503A17500 WU25PD	T94
4051307	TDS503A17800 WU25PD	T94
4051308	TDS503A18000 WU25PD	T94
4051309	TDS503A18500 WU25PD	T94
4051310	TDS503A18800 WU25PD	T94
4051311	TDS503A19000 WU25PD	T94
4051312	TDS503A19050 WU25PD	T94
4051313	TDS503A19500 WU25PD	T94
4051314	TDS503A19800 WU25PD	T94
4051315	TDS503A20000 WU25PD	T94
4052411	WOEJ080412SRMH TN6525	M7
4056186	M370D025Z02M12WO08	M4
4056187	M370D032Z04M16WO08	M4
4056188	M370D042Z05M16WO08	M4
4056189	M370D025Z03A25WO08L150	M5
4056190	M370D028Z03A25WO08L200	M5
4056191	M370D032Z04A32WO08L150	M5
4056192	M370D032Z04A32WO08L200	M5
4056193	M370D040Z04WO08	M6
4056194	M370D052Z05WO08	M6
4056195	M370D063Z06WO08	M6
4067705	47N606002LW TIALN-LW	011
4067706	47N608003LW TIALN-LW	011
4067707	47N610004LW TIALN-LW	011
4067708	47N612005LW TIALN-LW	011
4067709	47N616006LW TIALN-LW	011
4067710	47N620007LW TIALN-LW	011
4068517	WOEJ080412SRMH TN7535	M7
4113563	WMTS300M3P03PT WU10PT	E19
4113564	WMTS300M3P03PT WU25PT	E19
4113565	WMTS300M3P06PT WU10PT	E19
4113566	WMTS300M3P03PT WU10HT	E19
4113567	WMTS300M3P06PT WU25PT	E19
4113568	WMTS305M3U03PT WU10PT	E18
4113569	WMTS305M3U03PT WU25PT	E18
4113570	WMTS305M3U06PT WU10PT	E18
4113571	WMTS305M3U06PT WU25PT	E18
4113572	WMTS400M4P03PT WU10PT	E19
4113573	WMTS400M4P03PT WU10HT	E19
4113574	WMTS400M4P03PT WU25PT	E19
4113575	WMTS400M4P06PT WU10PT	E20
4113576	WMTS400M4P06PT WU25PT	E20
4113577	WMTS405M4U03PT WU10PT	E18
4113578	WMTS405M4U03PT WU25PT	E18
4113579	WMTS405M4U06PT WU10PT	E18
4113580	WMTS405M4U06PT WU25PT	E18
4113892	WOEJ080412SRMM TN6525	M7
4113916	WOEJ080412SRMM TN7535	M7
4116129	WMTS200M2P02PT WU10PT	E19
4116130	WMTS200M2P02PT WU25PT	E19
4116131	WMTS205M2U02PT WU10PT	E18
4116132	WMTS205M2U02PT WU25PT	E18
4116143	WMTS500M5P03PT WU10PT	E20
4116144	WMTS500M5P03PT WU25PT	E20
4116145	WMTS500M5P03PT WU10HT	E20
4116146	WMTS500M5P06PT WU10PT	E20
4116147	WMTS500M5P06PT WU25PT	E20
4116148	WMTS505M5U03PT WU10PT	E18
4116149	WMTS505M5U03PT WU25PT	E18
4116150	WMTS505M5U06PT WU10PT	E18
4116151	WMTS505M5U06PT WU25PT	E18
4117239	WMTS600M6P03PT WU10PT	E20
4117240	WMTS600M6P03PT WU25PT	E20
4117241	WMTS600M6P06PT WU10PT	E20
4117242	WMTS600M6P06PT WU25PT	E20

Order No.	Catalogue No.	Page(s)
4117253	WMTS605M6U03PT WU10PT	E18
4117254	WMTS605M6U03PT WU25PT	E18
4117255	WMTS605M6U06PT WU10PT	E18
4117256	WMTS605M6U06PT WU25PT	E18
4117257	WMTS800M8P06PT WU10PT	E21
4117258	WMTS800M8P06PT WU25PT	E21
4117259	WMTS800M8P15PT WU10PT	E21
4117260	WMTS800M8P15PT WU25PT	E21
4117261	WMTS805M8U06PT WU10PT	E18
4117262	WMTS805M8U06PT WU25PT	E18
4117263	WMTS805M8U15PT WU10PT	E18
4117264	WMTS805M8U15PT WU25PT	E18
4118451	WMTS094I2BP02PT WU10PT	E19
4118452	WMTS094I2BP02PT WU25PT	E19
4118583	WMTS094I2BP04PT WU10PT	E19
4118584	WMTS094I2BP04PT WU25PT	E19
4118585	WMTS125I3P03PT WU10PT	E19
4118586	WMTS125I3P03PT WU25PT	E19
4118587	WMTS125I3P08PT WU10PT	E19
4118588	WMTS125I3P08PT WU25PT	E19
4118589	WMTS188I5P03PT WU10PT	E20
4118590	WMTS188I5P03PT WU25PT	E20
4118591	WMTS188I5P08PT WU10PT	E20
4118592	WMTS188I5P08PT WU25PT	E20
4118593	WMTS250I6P03PT WU10PT	E21
4118594	WMTS250I6P03PT WU25PT	E21
4118595	WMTS250I6P08PT WU10PT	E21
4118596	WMTS250I6P08PT WU25PT	E21
4124297	571810004MT ALTIN-MT	O38
4124298	571812005MT ALTIN-MT	O38
4124299	571814014MT ALTIN-MT	O38
4124300	571816006MT ALTIN-MT	O38
4124301	571818018MT ALTIN-MT	O39
4124302	571820007MT ALTIN-MT	O39
4124323	571825008MT ALTIN-MT	O39
4136343	M4000D125Z06ADJ	H72
4136344	M4000D125Z08ADJ	H72
4136345	M4000D160Z08ADJ	H72
4136346	M4000D160Z12ADJ	H72
4136347	M4000D200Z10ADJ	H72
4136348	M4000D200Z14ADJ	H72
4136349	M4000D250Z12ADJ	H72
4136350	M4000D250Z18ADJ	H72
4136351	M4000D315Z16ADJ	H72
4136352	M4000D315Z22ADJ	H72
4136480	WOEJ080412SRMH TN6520	M7
4136482	M1200HD040Z04HN07	H20
4136863	M1200HD040Z05HN07	H20
4136864	M1200HD050Z04HN07	H20
4136865	M1200HD050Z05HN07	H20
4136866	M1200HD063Z04HN07	H20
4136867	M1200HD063Z06HN07	H20
4136868	M1200HD080Z05HN07	H20
4136869	M1200HD080Z08HN07	H20
4136870	M1200HD100Z06HN07	H20
4136871	M1200HD100Z09HN07	H20
4136872	M1200HD125Z08HN07	H20
4136873	M1200HD125Z12HN07	H20
4136874	M1200HF025Z02M16HN07	H5
4136875	M1200HF025Z03M16HN07	H5
4136876	M1200HF032Z03M16HN07	H5
4136877	M1200HF032Z04M16HN07	H5
4136878	M1200HF040Z04M16HN07	H5
4136879	M1200HF040Z05M16HN07	H5
4136880	M1200HF025Z02A20HN07L120	H6
4136881	M1200HF025Z03A20HN07L120	H6
4136882	M1200HF032Z03A25HN07L130	H6
4136883	M1200HF032Z04A25HN07L130	H6
4136884	M1200HF040Z05HN07	H7
4136885	M1200HF050Z05HN07	H7
4136886	M1200HF063Z06HN07	H7
4136887	M1200HF080Z08HN07	H7
4138391	GTM115001 WU13PV	Y69
4138392	GTM115002 WU13PV	Y69
4138470	M1200D125Z08HN07	H15
4138471	M1200D125Z12HN07	H15
4138472	M1200D125Z16HN07	H15
4138493	GTM115003 WU13PV	Y69
4138494	GTM115004 WU13PV	Y69
4138495	GTM115005 WU13PV	Y69
4138496	GTM115006 WU13PV	Y69
4138497	GTM115007 WU13PV	Y69
4138498	GTM115008 WU13PV	Y69
4138499	GTM115009 WU13PV	Y69
4138500	GTM115010 WU13PV	Y69
4138501	GTM115011 WU13PV	Y69
4138502	GTM115012 WU13PV	Y69
4138503	GTM115013 WU13PV	Y69
4138504	GTM115014 WU13PV	Y69
4138505	GTM115015 WU13PV	Y69
4138506	GTM115016 WU13PV	Y69
4138507	GTM115017 WU13PV	Y69
4138508	GTM115018 WU13PV	Y69
4138509	GTM115019 WU13PV	Y69
4138510	GTM115020 WU13PV	Y69
4138511	GTM115021 WU13PV	Y69
4138512	GTM115022 WU13PV	Y69
4138513	GTM115023 WU13PV	Y69
4138514	GTM215001 WU12PV	Y71
4138515	GTM215002 WU12PV	Y71
4138516	GTM215003 WU12PV	Y71
4138517	GTM215004 WU12PV	Y71
4138518	GTM215005 WU12PV	Y71
4138519	GTM215006 WU12PV	Y71
4138520	GTM215007 WU12PV	Y71
4138521	GTM215008 WU12PV	Y71
4138522	GTM215009 WU12PV	Y71
4138523	GTM215010 WU12PV	Y71
4138524	GTM215011 WU12PV	Y71
4138525	GTM215012 WU12PV	Y71
4138526	GTM215013 WU12PV	Y71
4138527	GTM215014 WU12PV	Y71
4138528	GTM215015 WU12PV	Y71
4138529	GTM215016 WU12PV	Y71
4138530	GTM215017 WU12PV	Y70
4138531	GTM215018 WU12PV	Y70
4138532	GTM215019 WU12PV	Y70
4138533	GTM215020 WU12PV	Y70
4138534	GTM215021 WU12PV	Y70
4138535	GTM215022 WU12PV	Y70
4138536	GTM215023 WU12PV	Y70
4138537	GTM215024 WU12PV	Y70
4138538	GTM215025 WU12PV	Y70
4138539	GTM215026 WU12PV	Y70
4138540	GTM215027 WU12PV	Y70
4138541	GTM215028 WU12PV	Y70
4138542	GTM215029 WU12PV	Y70
4138543	GTM215030 WU12PV	Y70
4138544	GTM215031 WU12PV	Y70
4138545	GTM315001 WU12PV	Y73
4138546	GTM315002 WU12PV	Y73
4138547	GTM315003 WU12PV	Y73
4138548	GTM315004 WU12PV	Y73
4138549	GTM315005 WU12PV	Y73
4138550	GTM315006 WU12PV	Y73
4138551	GTM315007 WU12PV	Y73
4138552	GTM315008 WU12PV	Y73
4138553	GTM315009 WU12PV	Y73
4138554	GTM315010 WU12PV	Y73
4138555	GTM315011 WU12PV	Y73
4138556	GTM315012 WU12PV	Y73
4138557	GTM315013 WU12PV	Y73
4138558	GTM315014 WU12PV	Y73
4138559	GTM315015 WU12PV	Y73
4138560	GTM315016 WU12PV	Y73
4138561	GTM315021 WU12PV	Y72
4138562	GTM315023 WU12PV	Y72
4138563	GTM315017 WU12PV	Y72
4138564	GTM315018 WU12PV	Y72
4138565	GTM315019 WU12PV	Y72
4138566	GTM315020 WU12PV	Y72
4138567	GTM315022 WU12PV	Y72
4138568	GTM315028 WU12PV	Y72
4138569	GTM315030 WU12PV	Y72
4138570	GTM315024 WU12PV	Y72
4138571	GTM315025 WU12PV	Y72
4138572	GTM315026 WU12PV	Y72
4138573	GTM315027 WU12PV	Y72
4138574	GTM315029 WU12PV	Y72
4138575	GTM415041 WU16PV	Y76
4138576	GTM415001 WU16PV	Y75
4138577	GTM415042 WU16PV	Y76
4138578	GTM415002 WU16PV	Y75
4138579	GTM415043 WU16PV	Y76
4138580	GTM415003 WU16PV	Y75
4138581	GTM415044 WU16PV	Y76
4138582	GTM415004 WU16PV	Y75
4138583	GTM415045 WU16PV	Y76
4138584	GTM415005 WU16PV	Y75
4138585	GTM415046 WU16PV	Y76
4138586	GTM415006 WU16PV	Y75
4138587	GTM415008 WU16PV	Y75
4138588	GTM415009 WU16PV	Y75
4138589	GTM415010 WU16PV	Y75
4138590	GTM415011 WU16PV	Y75
4138591	GTM415012 WU16PV	Y75
4138592	GTM415014 WU16PV	Y75
4138593	GTM415015 WU16PV	Y75
4138594	GTM415016 WU16PV	Y75
4138595	GTM415013 WU16PV	Y75
4138596	GTM415017 WU16PV	Y75
4138597	GTM415047 WU16PV	Y76
4138598	GTM415007 WU16PV	Y75
4138599	GTM415018 WU16PV	Y75
4138600	GTM415019 WU16PV	Y75
4138601	GTM415020 WU16PV	Y75
4138602	GTM415021 WU16PV	Y75
4138603	GTM415022 WU16PV	Y75
4138604	GTM415023 WU16PV	Y75
4138605	GTM415024 WU16PV	Y75
4138606	GTM415029 WU16PV	Y74
4138607	GTM415031 WU16PV	Y74
4138608	GTM415032 WU16PV	Y74
4138609	GTM415040 WU16PV	Y74
4138610	GTM415025 WU16PV	Y74
4138611	GTM415026 WU16PV	Y74
4138612	GTM415027 WU16PV	Y74
4138613	GTM415028 WU16PV	Y74
4138614	GTM415030 WU16PV	Y74
4138615	GTM415037 WU16PV	Y74
4138616	GTM415039 WU16PV	Y74
4138617	GTM415033 WU16PV	Y74
4138618	GTM415034 WU16PV	Y74
4138619	GTM415035 WU16PV	Y74
4138620	GTM415036 WU16PV	Y74
4138621	GTM415038 WU16PV	Y74
4140001	VDS401A10000 WU25PD	T12
4140002	VDS401A10100 WU25PD	T12
4140012	VDS401F03000 WU25PD	T29
4140023	VDS401F03100 WU25PD	T29
4140024	VDS401F03200 WU25PD	T29
4140025	VDS401F03300 WU25PD	T29
4140026	VDS401F03400 WU25PD	T29
4140027	VDS401F03500 WU25PD	T29
4140028	VDS401F03600 WU25PD	T29
4140029	VDS401F03700 WU25PD	T29
4140030	VDS401F03800 WU25PD	T29
4140031	VDS401F03900 WU25PD	T29
4140032	VDS401F04000 WU25PD	T29
4140033	VDS401F04100 WU25PD	T29
4140034	VDS401F04200 WU25PD	T29
4140035	VDS401F04300 WU25PD	T29
4140036	VDS401F04400 WU25PD	T29
4140037	VDS401F04500 WU25PD	T29
4140038	VDS401F04600 WU25PD	T29
4140039	VDS401F04700 WU25PD	T29
4140040	VDS401F04800 WU25PD	T29
4140041	VDS401F04900 WU25PD	T29
4140042	VDS401F05000 WU25PD	T29
4140043	VDS401F05100 WU25PD	T29
4140044	VDS401F05200 WU25PD	T29
4140045	VDS401F05300 WU25PD	T29
4140046	VDS401F05400 WU25PD	T30
4140047	VDS401F05500 WU25PD	T30
4140048	VDS401F05600 WU25PD	T30
4140049	VDS401F05700 WU25PD	T30
4140050	VDS401F05800 WU25PD	T30
4140051	VDS401F05900 WU25PD	T30
4140052	VDS401F06000 WU25PD	T30
4140053	VDS401F06100 WU25PD	T30
4140054	VDS401F06200 WU25PD	T30
4140055	VDS401F06300 WU25PD	T30
4140056	VDS401F06400 WU25PD	T30
4140057	VDS401F06500 WU25PD	T30
4140058	VDS401F06600 WU25PD	T30
4140059	VDS401F06700 WU25PD	T30
4140060	VDS401F06800 WU25PD	T30
4140061	VDS401F06900 WU25PD	T30
4140062	VDS401F07000 WU25PD	T30
4140063	VDS401F07100 WU25PD	T30
4140064	VDS401F07200 WU25PD	T30
4140065	VDS401F07300 WU25PD	T30
4140066	VDS401F07400 WU25PD	T30
4140067	VDS401F07500 WU25PD	T30
4140068	VDS401F07600 WU25PD	T30
4140069	VDS401F07700 WU25PD	T30
4140070	VDS401F07800 WU25PD	T30
4140071	VDS401F07900 WU25PD	T30
4140072	VDS401F08000 WU25PD	T30
4140073	VDS401F08100 WU25PD	T30
4140074	VDS401F08200 WU25PD	T30
4140075	VDS401F08300 WU25PD	T30
4140076	VDS401F08400 WU25PD	T30
4140077	VDS401F08500 WU25PD	T30

Order No.	Catalogue No.	Page(s)
4140078	VDS401F08600 WU25PD	T30
4140079	VDS401F08700 WU25PD	T30
4140080	VDS401F08800 WU25PD	T30
4140081	VDS401F08900 WU25PD	T30
4140082	VDS401F09000 WU25PD	T30
4140083	VDS401F09100 WU25PD	T30
4140084	VDS401F09200 WU25PD	T30
4140085	VDS401F09300 WU25PD	T30
4140086	VDS401F09400 WU25PD	T31
4140087	VDS401F09500 WU25PD	T31
4140088	VDS401F09600 WU25PD	T31
4140089	VDS401F09700 WU25PD	T31
4140090	VDS401F09800 WU25PD	T31
4140091	VDS401F09900 WU25PD	T31
4140163	VDS401A10200 WU25PD	T12
4140164	VDS401A10300 WU25PD	T12
4140165	VDS401A10320 WU25PD	T12
4140166	VDS401A10400 WU25PD	T12
4140167	VDS401A10500 WU25PD	T12
4140168	VDS401A10600 WU25PD	T12
4140169	VDS401A10700 WU25PD	T12
4140170	VDS401A10716 WU25PD	T12
4140171	VDS401A10800 WU25PD	T12
4140172	VDS401A10900 WU25PD	T12
4140173	VDS401A11000 WU25PD	T12
4140174	VDS401A11100 WU25PD	T12
4140175	VDS401A11113 WU25PD	T12
4140176	VDS401A11200 WU25PD	T12
4140177	VDS401A11300 WU25PD	T12
4140178	VDS401A11400 WU25PD	T12
4140179	VDS401A11500 WU25PD	T12
4140180	VDS401A11509 WU25PD	T12
4140181	VDS401A11600 WU25PD	T12
4140182	VDS401A11700 WU25PD	T12
4140183	VDS401A11800 WU25PD	T12
4140184	VDS401A11900 WU25PD	T12
4140185	VDS401A11908 WU25PD	T12
4140186	VDS401A12000 WU25PD	T12
4140187	VDS401A12100 WU25PD	T12
4140188	VDS401A12200 WU25PD	T12
4140189	VDS401A12300 WU25PD	T12
4140190	VDS401A12304 WU25PD	T12
4140191	VDS401A12400 WU25PD	T12
4140192	VDS401A12500 WU25PD	T12
4140194	VDS401A12600 WU25PD	T12
4140195	VDS401A12700 WU25PD	T12
4140196	VDS401A12800 WU25PD	T12
4140197	VDS401A12900 WU25PD	T12
4140198	VDS401A13000 WU25PD	T12
4140199	VDS401A13096 WU25PD	T12
4140200	VDS401A13100 WU25PD	T12
4140201	VDS401A13200 WU25PD	T12
4140202	VDS401A13300 WU25PD	T13
4140203	VDS401A13400 WU25PD	T13
4140204	VDS401A13500 WU25PD	T13
4140205	VDS401A13600 WU25PD	T13
4140206	VDS401A13700 WU25PD	T13
4140207	VDS401A13800 WU25PD	T13
4140208	VDS401A13891 WU25PD	T13
4140209	VDS401A13900 WU25PD	T13
4140210	VDS401A14000 WU25PD	T13
4140211	VDS401A14100 WU25PD	T13
4140212	VDS401A14200 WU25PD	T13
4140213	VDS401A14288 WU25PD	T13
4140214	VDS401A14300 WU25PD	T13
4140215	VDS401A14400 WU25PD	T13
4140216	VDS401A14500 WU25PD	T13
4140217	VDS401A14600 WU25PD	T13
4140218	VDS401A14684 WU25PD	T13
4140219	VDS401A14700 WU25PD	T13
4140220	VDS401A14800 WU25PD	T13
4140221	VDS401A14900 WU25PD	T13
4140222	VDS401A15000 WU25PD	T13
4140223	VDS401A15083 WU25PD	T13
4140224	VDS401A15100 WU25PD	T13
4140225	VDS401A15200 WU25PD	T13
4140226	VDS401A15300 WU25PD	T13
4140227	VDS401A15400 WU25PD	T13
4140228	VDS401A15479 WU25PD	T13
4140229	VDS401A15500 WU25PD	T13
4140230	VDS401A15600 WU25PD	T13
4140231	VDS401A15700 WU25PD	T13
4140232	VDS401A15800 WU25PD	T13
4140233	VDS401A15875 WU25PD	T13
4140234	VDS401A15900 WU25PD	T13
4140235	VDS401A16000 WU25PD	T13
4140236	VDS401A16100 WU25PD	T13
4140237	VDS401A16200 WU25PD	T13
4140238	VDS401A16271 WU25PD	T13
4140239	VDS401A16300 WU25PD	T13
4140241	VDS401A16400 WU25PD	T13
4140242	VDS401A16500 WU25PD	T13
4140243	VDS401A16600 WU25PD	T14
4140244	VDS401A16670 WU25PD	T14
4140245	VDS401A16700 WU25PD	T14
4140246	VDS401A16800 WU25PD	T14
4140247	VDS401A16900 WU25PD	T14
4140248	VDS401A17000 WU25PD	T14
4140249	VDS401A17100 WU25PD	T14
4140250	VDS401A17200 WU25PD	T14
4140251	VDS401A17300 WU25PD	T14
4140252	VDS401A17400 WU25PD	T14
4140253	VDS401A17463 WU25PD	T14
4140254	VDS401A17500 WU25PD	T14
4140255	VDS401A17600 WU25PD	T14
4140256	VDS401A17700 WU25PD	T14
4140257	VDS401A17800 WU25PD	T14
4140258	VDS401A17859 WU25PD	T14
4140259	VDS401A17900 WU25PD	T14
4140270	VDS401A01500 WU25PD	T8
4140271	VDS401A01600 WU25PD	T8
4140272	VDS401A01700 WU25PD	T8
4140299	VDS401A03000 WU25PD	T9
4140300	VDS401A03048 WU25PD	T9
4140301	VDS401A03100 WU25PD	T9
4140302	VDS401A03175 WU25PD	T9
4140303	VDS401A03200 WU25PD	T9
4140304	VDS401A03264 WU25PD	T9
4140305	VDS401A03300 WU25PD	T9
4140306	VDS401A03400 WU25PD	T9
4140307	VDS401A03455 WU25PD	T9
4140308	VDS401A03500 WU25PD	T9
4140309	VDS401A03571 WU25PD	T9
4140310	VDS401A03600 WU25PD	T9
4140311	VDS401A03658 WU25PD	T9
4140312	VDS401A03700 WU25PD	T9
4140313	VDS401A03734 WU25PD	T9
4140314	VDS401A03800 WU25PD	T9
4140315	VDS401A03900 WU25PD	T9
4140316	VDS401A03970 WU25PD	T9
4140317	VDS401A04000 WU25PD	T9
4140318	VDS401A04039 WU25PD	T9
4140319	VDS401A04090 WU25PD	T9
4140320	VDS401A04100 WU25PD	T9
4140321	VDS401A04200 WU25PD	T9
4140322	VDS401A04217 WU25PD	T9
4140323	VDS401A04300 WU25PD	T9
4140324	VDS401A04366 WU25PD	T10
4140325	VDS401A04400 WU25PD	T10
4140326	VDS401A04500 WU25PD	T10
4140328	VDS401A04600 WU25PD	T10
4140329	VDS401A04623 WU25PD	T10
4140330	VDS401A04700 WU25PD	T10
4140331	VDS401A04763 WU25PD	T10
4140332	VDS401A04800 WU25PD	T10
4140333	VDS401A04852 WU25PD	T10
4140334	VDS401A04900 WU25PD	T10
4140335	VDS401A05000 WU25PD	T10
4140336	VDS401A05100 WU25PD	T10
4140337	VDS401A05106 WU25PD	T10
4140338	VDS401A05159 WU25PD	T10
4140339	VDS401A05200 WU25PD	T10
4140340	VDS401A05300 WU25PD	T10
4140341	VDS401A05400 WU25PD	T10
4140342	VDS401A05410 WU25PD	T10
4140343	VDS401A05500 WU25PD	T10
4140344	VDS401A05558 WU25PD	T10
4140345	VDS401A05600 WU25PD	T10
4140346	VDS401A05616 WU25PD	T10
4140347	VDS401A05700 WU25PD	T10
4140348	VDS401A05800 WU25PD	T10
4140349	VDS401A05900 WU25PD	T10
4140350	VDS401A05954 WU25PD	T10
4140351	VDS401A06000 WU25PD	T10
4140352	VDS401A06100 WU25PD	T10
4140353	VDS401A06200 WU25PD	T10
4140354	VDS401A06300 WU25PD	T10
4140355	VDS401A06350 WU25PD	T10
4140356	VDS401A06400 WU25PD	T10
4140357	VDS401A06500 WU25PD	T10
4140358	VDS401A06528 WU25PD	T10
4140359	VDS401A06600 WU25PD	T10
4140360	VDS401A06630 WU25PD	T10
4140361	VDS401A06700 WU25PD	T10
4140362	VDS401A06746 WU25PD	T10
4140363	VDS401A06800 WU25PD	T10
4140364	VDS401A06900 WU25PD	T10
4140365	VDS401A07000 WU25PD	T11
4140366	VDS401A07100 WU25PD	T11
4140367	VDS401A07145 WU25PD	T11
4140368	VDS401A07200 WU25PD	T11
4140369	VDS401A07300 WU25PD	T11
4140370	VDS401A07400 WU25PD	T11
4140371	VDS401A07500 WU25PD	T11
4140372	VDS401A07541 WU25PD	T11
4140373	VDS401A07600 WU25PD	T11
4140374	VDS401A07700 WU25PD	T11
4140375	VDS401A07800 WU25PD	T11
4140376	VDS401A07900 WU25PD	T11
4140377	VDS401A07938 WU25PD	T11
4140378	VDS401A08000 WU25PD	T11
4140379	VDS401A08100 WU25PD	T11
4140380	VDS401A08200 WU25PD	T11
4140381	VDS401A08300 WU25PD	T11
4140382	VDS401A08334 WU25PD	T11
4140383	VDS401A08400 WU25PD	T11
4140384	VDS401A08433 WU25PD	T11
4140385	VDS401A08500 WU25PD	T11
4140386	VDS401A08600 WU25PD	T11
4140387	VDS401A08700 WU25PD	T11
4140388	VDS401A08733 WU25PD	T11
4140389	VDS401A08800 WU25PD	T11
4140390	VDS401A08900 WU25PD	T11
4140391	VDS401A09000 WU25PD	T11
4140392	VDS401A09100 WU25PD	T11
4140393	VDS401A09129 WU25PD	T11
4140394	VDS401A09200 WU25PD	T11
4140395	VDS401A09300 WU25PD	T11
4140396	VDS401A09347 WU25PD	T11
4140397	VDS401A09400 WU25PD	T11
4140398	VDS401A09500 WU25PD	T11
4140399	VDS401A09525 WU25PD	T11
4140400	VDS401A09600 WU25PD	T11
4140401	VDS401A09700 WU25PD	T11
4140402	VDS401A09800 WU25PD	T11
4140403	VDS401A09900 WU25PD	T11
4140404	VDS401A09921 WU25PD	T11
4140410	VDS401F10000 WU25PD	T31
4140411	VDS401F10100 WU25PD	T31
4140412	VDS401F10200 WU25PD	T31
4140423	VDS401A01800 WU25PD	T8
4140424	VDS401A01900 WU25PD	T8
4140425	VDS401A01984 WU25PD	T8
4140426	VDS401A02000 WU25PD	T8
4140427	VDS401A02100 WU25PD	T8
4140428	VDS401A02200 WU25PD	T8
4140429	VDS401A02300 WU25PD	T8
4140430	VDS401A02383 WU25PD	T8
4140431	VDS401A02400 WU25PD	T9
4140432	VDS401A02439 WU25PD	T9
4140433	VDS401A02489 WU25PD	T9
4140434	VDS401A02500 WU25PD	T9
4140435	VDS401A02578 WU25PD	T9
4140436	VDS401A02600 WU25PD	T9
4140437	VDS401A02642 WU25PD	T9
4140438	VDS401A02700 WU25PD	T9
4140439	VDS401A02705 WU25PD	T9
4140440	VDS401A02779 WU25PD	T9
4140441	VDS401A02800 WU25PD	T9
4140442	VDS401A02820 WU25PD	T9
4140443	VDS401A02870 WU25PD	T9
4140444	VDS401A02900 WU25PD	T9
4140445	VDS401A02947 WU25PD	T9
4140449	VDS401A18000 WU25PD	T14
4140450	VDS401A18100 WU25PD	T14
4140451	VDS401A18200 WU25PD	T14
4140452	VDS401A18258 WU25PD	T14
4140463	VDS401A18300 WU25PD	T14
4140464	VDS401A18400 WU25PD	T14
4140465	VDS401A18500 WU25PD	T14
4140466	VDS401A18600 WU25PD	T14
4140467	VDS401A18654 WU25PD	T14
4140468	VDS401A18700 WU25PD	T14
4140469	VDS401A18800 WU25PD	T14
4140470	VDS401A18900 WU25PD	T14
4140471	VDS401A19000 WU25PD	T14
4140472	VDS401A19050 WU25PD	T14
4140473	VDS401A19100 WU25PD	T14
4140474	VDS401A19200 WU25PD	T14
4140475	VDS401A19300 WU25PD	T14
4140476	VDS401A19400 WU25PD	T14
4140477	VDS401A19500 WU25PD	T14
4140478	VDS401A19600 WU25PD	T14
4140479	VDS401A19700 WU25PD	T14

Order No.	Catalogue No.	Page(s)
4140480	VDS401A19800 WU25PD	T14
4140481	VDS401A19900 WU25PD	T14
4140482	VDS401A20000 WU25PD	T14
4140503	VDS401F10300 WU25PD	T31
4140504	VDS401F10400 WU25PD	T31
4140505	VDS401F10500 WU25PD	T31
4140506	VDS401F10600 WU25PD	T31
4140507	VDS401F10700 WU25PD	T31
4140508	VDS401F10800 WU25PD	T31
4140509	VDS401F10900 WU25PD	T31
4140510	VDS401F11000 WU25PD	T31
4140511	VDS401F11100 WU25PD	T31
4140512	VDS401F11200 WU25PD	T31
4140513	VDS401F11300 WU25PD	T31
4140514	VDS401F11400 WU25PD	T31
4140515	VDS401F11500 WU25PD	T31
4140516	VDS401F11600 WU25PD	T31
4140517	VDS401F11700 WU25PD	T31
4140518	VDS401F11800 WU25PD	T31
4140519	VDS401F11900 WU25PD	T31
4140520	VDS401F12000 WU25PD	T31
4140521	VDS401F12100 WU25PD	T31
4140522	VDS401F12200 WU25PD	T31
4140523	VDS401F12300 WU25PD	T31
4140524	VDS401F12400 WU25PD	T31
4140525	VDS401F12500 WU25PD	T31
4140526	VDS401F12600 WU25PD	T31
4140527	VDS401F12700 WU25PD	T31
4140528	VDS401F12800 WU25PD	T31
4140529	VDS401F12900 WU25PD	T31
4140530	VDS401F13000 WU25PD	T31
4140531	VDS401F13100 WU25PD	T31
4140532	VDS401F13200 WU25PD	T31
4140533	VDS401F13300 WU25PD	T31
4140534	VDS401F13400 WU25PD	T32
4140535	VDS401F13500 WU25PD	T32
4140536	VDS401F13600 WU25PD	T32
4140537	VDS401F13700 WU25PD	T32
4140538	VDS401F13800 WU25PD	T32
4140539	VDS401F13900 WU25PD	T32
4140540	VDS401F14000 WU25PD	T32
4140541	VDS401F14100 WU25PD	T32
4140542	VDS401F14200 WU25PD	T32
4140543	VDS401F14300 WU25PD	T32
4140544	VDS401F14400 WU25PD	T32
4140545	VDS401F14500 WU25PD	T32
4140546	VDS401F14600 WU25PD	T32
4140547	VDS401F14700 WU25PD	T32
4140548	VDS401F14800 WU25PD	T32
4140549	VDS401F14900 WU25PD	T32
4140550	VDS401F15000 WU25PD	T32
4140551	VDS401F15100 WU25PD	T32
4140552	VDS401F15200 WU25PD	T32
4140553	VDS401F15300 WU25PD	T32
4140554	VDS401F15400 WU25PD	T32
4140555	VDS401F15500 WU25PD	T32
4140556	VDS401F15600 WU25PD	T32
4140557	VDS401F15700 WU25PD	T32
4140558	VDS401F15800 WU25PD	T32
4140559	VDS401F15900 WU25PD	T32
4140560	VDS401F16000 WU25PD	T32
4140561	VDS401F16100 WU25PD	T32
4140562	VDS401F16200 WU25PD	T32
4140563	VDS401F16300 WU25PD	T32
4140564	VDS401F16400 WU25PD	T32
4140565	VDS401F16500 WU25PD	T32
4140566	VDS401F16600 WU25PD	T32
4140567	VDS401F16700 WU25PD	T32
4140568	VDS401F16800 WU25PD	T32
4140569	VDS401F16900 WU25PD	T32
4140570	VDS401F17000 WU25PD	T32
4140571	VDS401F17100 WU25PD	T32
4140572	VDS401F17200 WU25PD	T32
4140573	VDS401F17300 WU25PD	T32
4140574	VDS401F17400 WU25PD	T33
4140575	VDS401F17500 WU25PD	T33
4140576	VDS401F17600 WU25PD	T33
4140577	VDS401F17700 WU25PD	T33
4140578	VDS401F17800 WU25PD	T33
4140579	VDS401F17900 WU25PD	T33
4140580	VDS401F18000 WU25PD	T33
4140581	VDS401F18100 WU25PD	T33
4140582	VDS401F18200 WU25PD	T33
4140583	VDS401F18300 WU25PD	T33
4140584	VDS401F18400 WU25PD	T33
4140585	VDS401F18500 WU25PD	T33
4140586	VDS401F18600 WU25PD	T33
4140587	VDS401F18700 WU25PD	T33
4140588	VDS401F18800 WU25PD	T33
4140589	VDS401F18900 WU25PD	T33
4140590	VDS401F19000 WU25PD	T33
4140591	VDS401F19100 WU25PD	T33
4140592	VDS401F19200 WU25PD	T33
4140593	VDS401F19300 WU25PD	T33
4140594	VDS401F19400 WU25PD	T33
4140595	VDS401F19500 WU25PD	T33
4140596	VDS401F19600 WU25PD	T33
4140597	VDS401F19700 WU25PD	T33
4140598	VDS401F19800 WU25PD	T33
4140599	VDS401F19900 WU25PD	T33
4140600	VDS401F20000 WU25PD	T33
4141558	SSP8	H64
4142783	VDS402F03000 WU25PD	T34
4142784	VDS402F03100 WU25PD	T34
4142785	VDS402F03200 WU25PD	T34
4142786	VDS402F03300 WU25PD	T34
4142787	VDS402F03400 WU25PD	T34
4142788	VDS402F03500 WU25PD	T34
4142789	VDS402F03600 WU25PD	T34
4142790	VDS402F03700 WU25PD	T34
4142791	VDS402F03800 WU25PD	T34
4142792	VDS402F03900 WU25PD	T34
4142793	VDS402F04000 WU25PD	T34
4142794	VDS402F04100 WU25PD	T34
4142795	VDS402F04200 WU25PD	T34
4142796	VDS402F04300 WU25PD	T34
4142797	VDS402F04400 WU25PD	T34
4142798	VDS402F04500 WU25PD	T34
4142799	VDS402F04600 WU25PD	T34
4142800	VDS402F04700 WU25PD	T34
4142801	VDS402F04800 WU25PD	T34
4142802	VDS402F04900 WU25PD	T34
4142803	VDS402A18000 WU25PD	T21
4142804	VDS402A18100 WU25PD	T21
4142805	VDS402A18200 WU25PD	T21
4142806	VDS402A18258 WU25PD	T21
4142807	VDS402A18300 WU25PD	T21
4142808	VDS402A18400 WU25PD	T21
4142809	VDS402A18500 WU25PD	T21
4142810	VDS402A18600 WU25PD	T21
4142811	VDS402A18654 WU25PD	T21
4142812	VDS402A18700 WU25PD	T21
4142813	VDS402F05000 WU25PD	T34
4142814	VDS402F05100 WU25PD	T34
4142815	VDS402F05200 WU25PD	T34
4142816	VDS402F05300 WU25PD	T34
4142817	VDS402F05400 WU25PD	T35
4142818	VDS402F05500 WU25PD	T35
4142819	VDS402F05600 WU25PD	T35
4142820	VDS402F05700 WU25PD	T35
4142821	VDS402F05800 WU25PD	T35
4142822	VDS402F05900 WU25PD	T35
4142823	VDS402A10000 WU25PD	T19
4142824	VDS402A18800 WU25PD	T21
4142825	VDS402A10100 WU25PD	T19
4142826	VDS402A18900 WU25PD	T21
4142827	VDS402A10200 WU25PD	T19
4142828	VDS402A19000 WU25PD	T21
4142829	VDS402A10300 WU25PD	T19
4142830	VDS402A19050 WU25PD	T21
4142831	VDS402A10320 WU25PD	T19
4142832	VDS402A10400 WU25PD	T19
4142833	VDS402A19100 WU25PD	T21
4142834	VDS402A10500 WU25PD	T19
4142835	VDS402A19200 WU25PD	T21
4142836	VDS402A10600 WU25PD	T19
4142837	VDS402A19300 WU25PD	T21
4142838	VDS402A10700 WU25PD	T19
4142839	VDS402A19400 WU25PD	T21
4142840	VDS402A10716 WU25PD	T19
4142841	VDS402A19500 WU25PD	T21
4142842	VDS402A10800 WU25PD	T19
4142843	VDS402F06000 WU25PD	T35
4142844	VDS402A03000 WU25PD	T16
4142845	VDS402F06100 WU25PD	T35
4142846	VDS402A03048 WU25PD	T16
4142847	VDS402A03100 WU25PD	T16
4142848	VDS402F06200 WU25PD	T35
4142849	VDS402A03175 WU25PD	T16
4142850	VDS402F06300 WU25PD	T35
4142851	VDS402A03200 WU25PD	T16
4142852	VDS402F06400 WU25PD	T35
4142853	VDS402A19600 WU25PD	T21
4142854	VDS402A19700 WU25PD	T21
4142855	VDS402A10900 WU25PD	T19
4142856	VDS402A19800 WU25PD	T21
4142857	VDS402A11000 WU25PD	T19
4142858	VDS402A11100 WU25PD	T19
4142859	VDS402A19900 WU25PD	T21
4142860	VDS402A20000 WU25PD	T21
4142861	VDS402A11113 WU25PD	T19
4142862	VDS402A11200 WU25PD	T19
4142863	VDS402F06500 WU25PD	T35
4142864	VDS402A03264 WU25PD	T16
4142865	VDS402A03300 WU25PD	T16
4142866	VDS402F06600 WU25PD	T35
4142867	VDS402A03400 WU25PD	T16
4142868	VDS402F06700 WU25PD	T35
4142869	VDS402A03455 WU25PD	T16
4142870	VDS402F06800 WU25PD	T35
4142871	VDS402A01500 WU25PD	T15
4142872	VDS402A03500 WU25PD	T16
4142873	VDS402A11300 WU25PD	T19
4142874	VDS402A11400 WU25PD	T19
4142875	VDS402A11500 WU25PD	T19
4142876	VDS402A11509 WU25PD	T19
4142877	VDS402A11600 WU25PD	T19
4142878	VDS402A11700 WU25PD	T19
4142879	VDS402A11800 WU25PD	T19
4142880	VDS402A11900 WU25PD	T19
4142881	VDS402A11908 WU25PD	T19
4142882	VDS402A12000 WU25PD	T19
4142883	VDS402F06900 WU25PD	T35
4142884	VDS402A01600 WU25PD	T15
4142885	VDS402A03571 WU25PD	T16
4142886	VDS402F07000 WU25PD	T35
4142887	VDS402A01700 WU25PD	T15
4142888	VDS402A03600 WU25PD	T16
4142889	VDS402F07100 WU25PD	T35
4142890	VDS402A01800 WU25PD	T15
4142891	VDS402A03658 WU25PD	T16
4142892	VDS402F07200 WU25PD	T35
4142893	VDS402A01900 WU25PD	T15
4142894	VDS402A03700 WU25PD	T16
4142895	VDS402F07300 WU25PD	T35
4142896	VDS402A01984 WU25PD	T15
4142897	VDS402A03734 WU25PD	T16
4142898	VDS402F07400 WU25PD	T35
4142899	VDS402A02000 WU25PD	T15
4142900	VDS402A03800 WU25PD	T16
4142901	VDS402F07500 WU25PD	T35
4142902	VDS402A02100 WU25PD	T15
4142903	VDS402A03900 WU25PD	T16
4142904	VDS402F07600 WU25PD	T35
4142905	VDS402A02200 WU25PD	T15
4142906	VDS402A03970 WU25PD	T16
4142907	VDS402F07700 WU25PD	T35
4142908	VDS402A02300 WU25PD	T15
4142909	VDS402A04000 WU25PD	T16
4142910	VDS402F07800 WU25PD	T35
4142911	VDS402A02383 WU25PD	T15
4142912	VDS402A04039 WU25PD	T16
4142913	VDS402A12100 WU25PD	T19
4142914	VDS402A12200 WU25PD	T19
4142915	VDS402A12300 WU25PD	T19
4142916	VDS402A12304 WU25PD	T19
4142917	VDS402A12400 WU25PD	T19
4142918	VDS402A12500 WU25PD	T19
4142919	VDS402A12600 WU25PD	T19
4142920	VDS402A12700 WU25PD	T19
4142921	VDS402A12800 WU25PD	T19
4142922	VDS402A12900 WU25PD	T19
4142923	VDS402F07900 WU25PD	T35
4142924	VDS402A02400 WU25PD	T16
4142925	VDS402A04090 WU25PD	T16
4142926	VDS402F08000 WU25PD	T35
4142927	VDS402A02439 WU25PD	T16
4142928	VDS402A04100 WU25PD	T16
4142929	VDS402F08100 WU25PD	T35
4142930	VDS402A02489 WU25PD	T16
4142931	VDS402A04200 WU25PD	T16
4142932	VDS402F08200 WU25PD	T35
4142933	VDS402A02500 WU25PD	T16
4142934	VDS402A04217 WU25PD	T16
4142935	VDS402F08300 WU25PD	T35
4142936	VDS402A02578 WU25PD	T16
4142937	VDS402A04300 WU25PD	T16
4142938	VDS402F08400 WU25PD	T35
4142939	VDS402A02600 WU25PD	T16
4142940	VDS402A04366 WU25PD	T17
4142941	VDS402F08500 WU25PD	T35
4142942	VDS402A02642 WU25PD	T16
4142943	VDS402A04400 WU25PD	T17
4142944	VDS402F08600 WU25PD	T35

Order No.	Catalogue No.	Page(s)
4142945	VDS402A02700 WU25PD	T16
4142946	VDS402A04500 WU25PD	T17
4142947	VDS402F08700 WU25PD	T35
4142948	VDS402A02705 WU25PD	T16
4142949	VDS402A04600 WU25PD	T17
4142950	VDS402F08800 WU25PD	T35
4142951	VDS402A02779 WU25PD	T16
4142952	VDS402A04623 WU25PD	T17
4142953	VDS402A13000 WU25PD	T19
4142954	VDS402A13096 WU25PD	T19
4142955	VDS402A13100 WU25PD	T19
4142956	VDS402A13200 WU25PD	T19
4142957	VDS402A13300 WU25PD	T20
4142958	VDS402A13400 WU25PD	T20
4142959	VDS402A13500 WU25PD	T20
4142960	VDS402A13600 WU25PD	T20
4142961	VDS402A13700 WU25PD	T20
4142962	VDS402A13800 WU25PD	T20
4142963	VDS402F08900 WU25PD	T35
4142964	VDS402A02800 WU25PD	T16
4142965	VDS402A04700 WU25PD	T17
4142966	VDS402F09000 WU25PD	T35
4142967	VDS402A02820 WU25PD	T16
4142968	VDS402A04763 WU25PD	T17
4142969	VDS402F09100 WU25PD	T35
4142970	VDS402A02870 WU25PD	T16
4142971	VDS402A04800 WU25PD	T17
4142972	VDS402F09200 WU25PD	T35
4142973	VDS402A02900 WU25PD	T16
4142974	VDS402A04852 WU25PD	T17
4142975	VDS402F09300 WU25PD	T35
4142976	VDS402A02947 WU25PD	T16
4142977	VDS402A04900 WU25PD	T17
4142978	VDS402F09400 WU25PD	T36
4142979	VDS402A05000 WU25PD	T17
4142980	VDS402F09500 WU25PD	T36
4142981	VDS402A05100 WU25PD	T17
4142982	VDS402F09600 WU25PD	T36
4142983	VDS402A13891 WU25PD	T20
4142984	VDS402A13900 WU25PD	T20
4142985	VDS402A14000 WU25PD	T20
4142986	VDS402A14100 WU25PD	T20
4142987	VDS402A14200 WU25PD	T20
4142988	VDS402A14288 WU25PD	T20
4142989	VDS402A14300 WU25PD	T20
4142990	VDS402A14400 WU25PD	T20
4142991	VDS402A14500 WU25PD	T20
4142992	VDS402A14600 WU25PD	T20
4142993	VDS402F09700 WU25PD	T36
4142994	VDS402A05106 WU25PD	T17
4142995	VDS402F09800 WU25PD	T36
4142996	VDS402A05159 WU25PD	T17
4142997	VDS402A05200 WU25PD	T17
4142998	VDS402F09900 WU25PD	T36
4142999	VDS402A05300 WU25PD	T17
4143000	VDS402A05400 WU25PD	T17
4143001	VDS402A05410 WU25PD	T17
4143002	VDS402A05500 WU25PD	T17
4143003	VDS402A05558 WU25PD	T17
4143004	VDS402A05600 WU25PD	T17
4143005	VDS402A05616 WU25PD	T17
4143006	VDS402A05700 WU25PD	T17
4143007	VDS402A05800 WU25PD	T17
4143008	VDS402A05900 WU25PD	T17
4143009	VDS402A05954 WU25PD	T17
4143010	VDS402A06000 WU25PD	T17
4143011	VDS402A06100 WU25PD	T17
4143012	VDS402A06200 WU25PD	T17
4143013	VDS402A14684 WU25PD	T20
4143014	VDS402A14700 WU25PD	T20
4143015	VDS402A14800 WU25PD	T20
4143016	VDS402A14900 WU25PD	T20
4143017	VDS402A15000 WU25PD	T20
4143018	VDS402A15083 WU25PD	T20
4143019	VDS402A15100 WU25PD	T20
4143020	VDS402A15200 WU25PD	T20
4143021	VDS402A15300 WU25PD	T20
4143022	VDS402A15400 WU25PD	T20
4143023	VDS402A06300 WU25PD	T17
4143024	VDS402A06350 WU25PD	T17
4143025	VDS402A06400 WU25PD	T17
4143026	VDS402A06500 WU25PD	T17
4143027	VDS402A06528 WU25PD	T17
4143028	VDS402A06600 WU25PD	T17
4143029	VDS402A06630 WU25PD	T17
4143030	VDS402A06700 WU25PD	T17
4143031	VDS402A06746 WU25PD	T17
4143032	VDS402A06800 WU25PD	T17
4143033	VDS402A15479 WU25PD	T20
4143034	VDS402A15500 WU25PD	T20
4143035	VDS402A15600 WU25PD	T20
4143036	VDS402A15700 WU25PD	T20
4143037	VDS402A15800 WU25PD	T20
4143038	VDS402A15875 WU25PD	T20
4143039	VDS402A15900 WU25PD	T20
4143040	VDS402A16000 WU25PD	T20
4143041	VDS402A16100 WU25PD	T20
4143042	VDS402A16200 WU25PD	T20
4143043	VDS402A06900 WU25PD	T17
4143044	VDS402A07000 WU25PD	T18
4143045	VDS402A07100 WU25PD	T18
4143046	VDS402A07145 WU25PD	T18
4143047	VDS402A07200 WU25PD	T18
4143048	VDS402A07300 WU25PD	T18
4143049	VDS402A07400 WU25PD	T18
4143050	VDS402A07500 WU25PD	T18
4143051	VDS402A07541 WU25PD	T18
4143052	VDS402A07600 WU25PD	T18
4143053	VDS402A16271 WU25PD	T20
4143054	VDS402A16300 WU25PD	T20
4143055	VDS402A16400 WU25PD	T20
4143056	VDS402A16500 WU25PD	T20
4143057	VDS402A16600 WU25PD	T21
4143058	VDS402A16670 WU25PD	T21
4143059	VDS402A16700 WU25PD	T21
4143060	VDS402A16800 WU25PD	T21
4143061	VDS402A16900 WU25PD	T21
4143062	VDS402A17000 WU25PD	T21
4143063	VDS402A07700 WU25PD	T18
4143064	VDS402A07800 WU25PD	T18
4143065	VDS402A07900 WU25PD	T18
4143066	VDS402A07938 WU25PD	T18
4143067	VDS402A08000 WU25PD	T18
4143068	VDS402A08100 WU25PD	T18
4143069	VDS402A08200 WU25PD	T18
4143070	VDS402A08300 WU25PD	T18
4143071	VDS402A08334 WU25PD	T18
4143072	VDS402A08400 WU25PD	T18
4143073	VDS402A17100 WU25PD	T21
4143074	VDS402A17200 WU25PD	T21
4143075	VDS402A17300 WU25PD	T21
4143076	VDS402A17400 WU25PD	T21
4143077	VDS402A17463 WU25PD	T21
4143078	VDS402A17500 WU25PD	T21
4143079	VDS402A17600 WU25PD	T21
4143080	VDS402A17700 WU25PD	T21
4143081	VDS402A17800 WU25PD	T21
4143082	VDS402A17859 WU25PD	T21
4143083	VDS402A08433 WU25PD	T18
4143084	VDS402A08500 WU25PD	T18
4143085	VDS402A08600 WU25PD	T18
4143086	VDS402A08700 WU25PD	T18
4143087	VDS402A08733 WU25PD	T18
4143088	VDS402A08800 WU25PD	T18
4143089	VDS402A08900 WU25PD	T18
4143090	VDS402A09000 WU25PD	T18
4143091	VDS402A09100 WU25PD	T18
4143092	VDS402A09129 WU25PD	T18
4143093	VDS402A17900 WU25PD	T21
4143103	VDS402A09200 WU25PD	T18
4143104	VDS402A09300 WU25PD	T18
4143105	VDS402A09347 WU25PD	T18
4143106	VDS402A09400 WU25PD	T18
4143107	VDS402A09500 WU25PD	T18
4143108	VDS402A09525 WU25PD	T18
4143109	VDS402A09600 WU25PD	T18
4143110	VDS402A09700 WU25PD	T18
4143111	VDS402A09800 WU25PD	T18
4143112	VDS402A09900 WU25PD	T18
4143113	VDS402A09921 WU25PD	T18
4143421	VDS403A10000 WU25PD	T25
4143422	VDS403A10100 WU25PD	T25
4143473	VDS403A10200 WU25PD	T25
4143474	VDS403A10300 WU25PD	T25
4143475	VDS403A10320 WU25PD	T25
4143476	VDS403A10400 WU25PD	T25
4143477	VDS403A10500 WU25PD	T26
4143478	VDS403A10600 WU25PD	T26
4143479	VDS403A10700 WU25PD	T26
4143480	VDS403A10716 WU25PD	T26
4143481	VDS403A10800 WU25PD	T26
4143482	VDS403A10900 WU25PD	T26
4143483	VDS403A11000 WU25PD	T26
4143484	VDS403A11100 WU25PD	T26
4143485	VDS403A11113 WU25PD	T26
4143486	VDS403A11200 WU25PD	T26
4143487	VDS403A11300 WU25PD	T26
4143488	VDS403A11400 WU25PD	T26
4143489	VDS403A11500 WU25PD	T26
4143490	VDS403A11509 WU25PD	T26
4143491	VDS403A11600 WU25PD	T26
4143492	VDS403A11700 WU25PD	T26
4143493	VDS403A11800 WU25PD	T26
4143494	VDS403A11900 WU25PD	T26
4143495	VDS403A11908 WU25PD	T26
4143496	VDS403A12000 WU25PD	T26
4143497	VDS403A12100 WU25PD	T26
4143498	VDS403A12200 WU25PD	T26
4143499	VDS403A12300 WU25PD	T26
4143500	VDS403A12304 WU25PD	T26
4143501	VDS403A12400 WU25PD	T26
4143502	VDS403A12500 WU25PD	T26
4143503	VDS403A12600 WU25PD	T26
4143504	VDS403A12700 WU25PD	T26
4143505	VDS403A12800 WU25PD	T26
4143506	VDS403A12900 WU25PD	T26
4143507	VDS403A13000 WU25PD	T26
4143508	VDS403A13096 WU25PD	T26
4143509	VDS403A13100 WU25PD	T26
4143510	VDS403A13200 WU25PD	T26
4143511	VDS403A13300 WU25PD	T26
4143512	VDS403A13400 WU25PD	T26
4143513	VDS403A13500 WU25PD	T26
4143514	VDS403A13600 WU25PD	T26
4143515	VDS403A13700 WU25PD	T26
4143516	VDS403A13800 WU25PD	T26
4143517	VDS403A13891 WU25PD	T27
4143518	VDS403A13900 WU25PD	T27
4143519	VDS403A14000 WU25PD	T27
4143520	VDS403A14100 WU25PD	T27
4143521	VDS403A14200 WU25PD	T27
4143522	VDS403A14288 WU25PD	T27
4143523	VDS403A14300 WU25PD	T27
4143524	VDS403A14400 WU25PD	T27
4143525	VDS403A14500 WU25PD	T27
4143526	VDS403A14600 WU25PD	T27
4143527	VDS403A14684 WU25PD	T27
4143528	VDS403A14700 WU25PD	T27
4143529	VDS403A14800 WU25PD	T27
4143530	VDS403A14900 WU25PD	T27
4143531	VDS403A15000 WU25PD	T27
4143532	VDS403A15083 WU25PD	T27
4143533	VDS403A15100 WU25PD	T27
4143534	VDS403A15200 WU25PD	T27
4143535	VDS403A15300 WU25PD	T27
4143536	VDS403A15400 WU25PD	T27
4143537	VDS403A15479 WU25PD	T27
4143538	VDS403A15500 WU25PD	T27
4143539	VDS403A15600 WU25PD	T27
4143540	VDS403A15700 WU25PD	T27
4143541	VDS403A15800 WU25PD	T27
4143542	VDS403A15875 WU25PD	T27
4143543	VDS403A15900 WU25PD	T27
4143544	VDS403A16000 WU25PD	T27
4143545	VDS403A16100 WU25PD	T27
4143546	VDS403A16200 WU25PD	T27
4143547	VDS403A16271 WU25PD	T27
4143548	VDS403A16300 WU25PD	T27
4143549	VDS403A16400 WU25PD	T27
4143550	VDS403A16500 WU25PD	T27
4143551	VDS403A16600 WU25PD	T27
4143552	VDS403A16670 WU25PD	T27
4143553	VDS403A16700 WU25PD	T27
4143554	VDS403A16800 WU25PD	T27
4143555	VDS403A16900 WU25PD	T27
4143556	VDS403A17000 WU25PD	T27
4143557	VDS403A17100 WU25PD	T28
4143558	VDS403A17200 WU25PD	T28
4143559	VDS403A17300 WU25PD	T28
4143560	VDS403A17400 WU25PD	T28
4143561	VDS403A17463 WU25PD	T28
4143562	VDS403A17500 WU25PD	T28
4143563	VDS403A17600 WU25PD	T28
4143564	VDS403A17700 WU25PD	T28
4143565	VDS403A17800 WU25PD	T28
4143566	VDS403A17859 WU25PD	T28
4143567	VDS403A17900 WU25PD	T28
4143569	VDS402F10000 WU25PD	T36
4143570	VDS402F10100 WU25PD	T36
4143571	VDS402F10200 WU25PD	T36
4143572	VDS402F10300 WU25PD	T36
4143583	VDS402F10400 WU25PD	T36
4143584	VDS402F10500 WU25PD	T36
4143585	VDS402F10600 WU25PD	T36

Order No.	Catalogue No.	Page(s)
4143586	VDS402F10700 WU25PD	T36
4143587	VDS402F10800 WU25PD	T36
4143588	VDS402F10900 WU25PD	T36
4143589	VDS402F11000 WU25PD	T36
4143590	VDS402F11100 WU25PD	T36
4143591	VDS402F11200 WU25PD	T36
4143592	VDS402F11300 WU25PD	T36
4143593	VDS402F11400 WU25PD	T36
4143594	VDS402F11500 WU25PD	T36
4143595	VDS402F11600 WU25PD	T36
4143596	VDS402F11700 WU25PD	T36
4143597	VDS402F11800 WU25PD	T36
4143598	VDS402F11900 WU25PD	T36
4143599	VDS402F12000 WU25PD	T36
4143600	VDS402F12100 WU25PD	T36
4143601	VDS402F12200 WU25PD	T36
4143602	VDS402F12300 WU25PD	T36
4143603	VDS402F12400 WU25PD	T36
4143604	VDS402F12500 WU25PD	T36
4143605	VDS402F12600 WU25PD	T36
4143606	VDS402F12700 WU25PD	T36
4143607	VDS402F12800 WU25PD	T36
4143608	VDS402F12900 WU25PD	T36
4143609	VDS402F13000 WU25PD	T36
4143610	VDS402F13100 WU25PD	T36
4143611	VDS402F13200 WU25PD	T36
4143612	VDS402F13300 WU25PD	T36
4143613	VDS402F13400 WU25PD	T37
4143614	VDS402F13500 WU25PD	T37
4143615	VDS402F13600 WU25PD	T37
4143616	VDS402F13700 WU25PD	T37
4143617	VDS402F13800 WU25PD	T37
4143618	VDS402F13900 WU25PD	T37
4143619	VDS402F14000 WU25PD	T37
4143620	VDS402F14100 WU25PD	T37
4143621	VDS402F14200 WU25PD	T37
4143622	VDS402F14300 WU25PD	T37
4143623	VDS402F14400 WU25PD	T37
4143624	VDS402F14500 WU25PD	T37
4143625	VDS402F14600 WU25PD	T37
4143626	VDS402F14700 WU25PD	T37
4143627	VDS402F14800 WU25PD	T37
4143628	VDS402F14900 WU25PD	T37
4143629	VDS402F15000 WU25PD	T37
4143630	VDS402F15100 WU25PD	T37
4143631	VDS402F15200 WU25PD	T37
4143632	VDS402F15300 WU25PD	T37
4143633	VDS402F15400 WU25PD	T37
4143634	VDS402F15500 WU25PD	T37
4143635	VDS402F15600 WU25PD	T37
4143636	VDS402F15700 WU25PD	T37
4143637	VDS402F15800 WU25PD	T37
4143638	VDS402F15900 WU25PD	T37
4143639	VDS402F16000 WU25PD	T37
4143640	VDS402F16100 WU25PD	T37
4143641	VDS402F16200 WU25PD	T37
4143642	VDS402F16300 WU25PD	T37
4143643	VDS402F16400 WU25PD	T37
4143644	VDS402F16500 WU25PD	T37
4143645	VDS402F16600 WU25PD	T37
4143646	VDS402F16700 WU25PD	T37
4143647	VDS402F16800 WU25PD	T37
4143648	VDS402F16900 WU25PD	T37
4143649	VDS402F17000 WU25PD	T37
4143650	VDS402F17100 WU25PD	T37
4143651	VDS402F17200 WU25PD	T37
4143652	VDS402F17300 WU25PD	T37
4143653	VDS402F17400 WU25PD	T38
4143654	VDS402F17500 WU25PD	T38
4143655	VDS402F17600 WU25PD	T38
4143656	VDS402F17700 WU25PD	T38
4143657	VDS402F17800 WU25PD	T38
4143658	VDS402F17900 WU25PD	T38
4143659	VDS402F18000 WU25PD	T38
4143660	VDS402F18100 WU25PD	T38
4143661	VDS402F18200 WU25PD	T38
4143662	VDS402F18300 WU25PD	T38
4143663	VDS402F18400 WU25PD	T38
4143664	VDS402F18500 WU25PD	T38
4143665	VDS402F18600 WU25PD	T38
4143666	VDS402F18700 WU25PD	T38
4143667	VDS402F18800 WU25PD	T38
4143668	VDS402F18900 WU25PD	T38
4143669	VDS402F19000 WU25PD	T38
4143670	VDS402F19100 WU25PD	T38
4143671	VDS402F19200 WU25PD	T38
4143672	VDS402F19300 WU25PD	T38
4143673	VDS402F19400 WU25PD	T38
4143674	VDS402F19500 WU25PD	T38
4143675	VDS402F19600 WU25PD	T38
4143676	VDS402F19700 WU25PD	T38
4143677	VDS402F19800 WU25PD	T38
4143678	VDS402F19900 WU25PD	T38
4143679	VDS402F20000 WU25PD	T38
4143700	VDS403A01500 WU25PD	T22
4143701	VDS403A01600 WU25PD	T22
4143702	VDS403A01700 WU25PD	T22
4143723	VDS403A01800 WU25PD	T22
4143724	VDS403A01900 WU25PD	T22
4143725	VDS403A01984 WU25PD	T22
4143726	VDS403A02000 WU25PD	T22
4143727	VDS403A02100 WU25PD	T22
4143728	VDS403A02200 WU25PD	T22
4143729	VDS403A02300 WU25PD	T22
4143730	VDS403A02383 WU25PD	T22
4143731	VDS403A02400 WU25PD	T22
4143732	VDS403A02439 WU25PD	T22
4143733	VDS403A02489 WU25PD	T22
4143734	VDS403A02500 WU25PD	T22
4143735	VDS403A02578 WU25PD	T22
4143736	VDS403A02600 WU25PD	T22
4143737	VDS403A02642 WU25PD	T23
4143738	VDS403A02700 WU25PD	T23
4143739	VDS403A02705 WU25PD	T23
4143740	VDS403A02779 WU25PD	T23
4143741	VDS403A02800 WU25PD	T23
4143742	VDS403A02820 WU25PD	T23
4143743	VDS403A02870 WU25PD	T23
4143744	VDS403A02900 WU25PD	T23
4143745	VDS403A02947 WU25PD	T23
4143746	VDS403A03000 WU25PD	T23
4143747	VDS403A03048 WU25PD	T23
4143748	VDS403A03100 WU25PD	T23
4143749	VDS403A03175 WU25PD	T23
4143750	VDS403A03200 WU25PD	T23
4143751	VDS403A03264 WU25PD	T23
4143752	VDS403A03300 WU25PD	T23
4143753	VDS403A03400 WU25PD	T23
4143754	VDS403A03455 WU25PD	T23
4143755	VDS403A03500 WU25PD	T23
4143756	VDS403A03571 WU25PD	T23
4143757	VDS403A03600 WU25PD	T23
4143758	VDS403A03658 WU25PD	T23
4143759	VDS403A03700 WU25PD	T23
4143760	VDS403A03734 WU25PD	T23
4143761	VDS403A03800 WU25PD	T23
4143762	VDS403A03900 WU25PD	T23
4143763	VDS403A03970 WU25PD	T23
4143764	VDS403A04000 WU25PD	T23
4143765	VDS403A04039 WU25PD	T23
4143766	VDS403A04090 WU25PD	T23
4143767	VDS403A04100 WU25PD	T23
4143768	VDS403A04200 WU25PD	T23
4143769	VDS403A04217 WU25PD	T23
4143770	VDS403A04300 WU25PD	T23
4143771	VDS403A04366 WU25PD	T23
4143772	VDS403A04400 WU25PD	T23
4143773	VDS403A04500 WU25PD	T23
4143774	VDS403A04600 WU25PD	T23
4143775	VDS403A04623 WU25PD	T23
4143776	VDS403A04700 WU25PD	T23
4143777	VDS403A04763 WU25PD	T24
4143778	VDS403A04800 WU25PD	T24
4143779	VDS403A04852 WU25PD	T24
4143780	VDS403A04900 WU25PD	T24
4143781	VDS403A05000 WU25PD	T24
4143782	VDS403A05100 WU25PD	T24
4143783	VDS403A05106 WU25PD	T24
4143784	VDS403A05159 WU25PD	T24
4143785	VDS403A05200 WU25PD	T24
4143786	VDS403A05300 WU25PD	T24
4143787	VDS403A05400 WU25PD	T24
4143788	VDS403A05410 WU25PD	T24
4143789	VDS403A05500 WU25PD	T24
4143790	VDS403A05558 WU25PD	T24
4143791	VDS403A05600 WU25PD	T24
4143792	VDS403A05616 WU25PD	T24
4143793	VDS403A05700 WU25PD	T24
4143794	VDS403A05800 WU25PD	T24
4143795	VDS403A05900 WU25PD	T24
4143796	VDS403A05954 WU25PD	T24
4143797	VDS403A06000 WU25PD	T24
4143798	VDS403A06100 WU25PD	T24
4143799	VDS403A06200 WU25PD	T24
4143800	VDS403A06300 WU25PD	T24
4143801	VDS403A06350 WU25PD	T24
4143802	VDS403A06400 WU25PD	T24
4143803	VDS403A06500 WU25PD	T24
4143804	VDS403A06528 WU25PD	T24
4143805	VDS403A06600 WU25PD	T24
4143806	VDS403A06630 WU25PD	T24
4143807	VDS403A06700 WU25PD	T24
4143808	VDS403A06746 WU25PD	T24
4143809	VDS403A06800 WU25PD	T24
4143810	VDS403A06900 WU25PD	T24
4143811	VDS403A07000 WU25PD	T24
4143812	VDS403A07100 WU25PD	T24
4143813	VDS403A07145 WU25PD	T24
4143814	VDS403A07200 WU25PD	T24
4143815	VDS403A07300 WU25PD	T24
4143816	VDS403A07400 WU25PD	T24
4143817	VDS403A07500 WU25PD	T25
4143818	VDS403A07541 WU25PD	T25
4143819	VDS403A07600 WU25PD	T25
4143820	VDS403A07700 WU25PD	T25
4143821	VDS403A07800 WU25PD	T25
4143822	VDS403A07900 WU25PD	T25
4143823	VDS403A07938 WU25PD	T25
4143824	VDS403A08000 WU25PD	T25
4143825	VDS403A08100 WU25PD	T25
4143826	VDS403A08200 WU25PD	T25
4143827	VDS403A08300 WU25PD	T25
4143828	VDS403A08334 WU25PD	T25
4143829	VDS403A08400 WU25PD	T25
4143830	VDS403A08433 WU25PD	T25
4143831	VDS403A08500 WU25PD	T25
4143832	VDS403A08600 WU25PD	T25
4143833	VDS403A08700 WU25PD	T25
4143834	VDS403A08733 WU25PD	T25
4143835	VDS403A08800 WU25PD	T25
4143836	VDS403A08900 WU25PD	T25
4143837	VDS403A09000 WU25PD	T25
4143838	VDS403A09100 WU25PD	T25
4143839	VDS403A09129 WU25PD	T25
4143840	VDS403A09200 WU25PD	T25
4143841	VDS403A09300 WU25PD	T25
4143842	VDS403A09347 WU25PD	T25
4143843	VDS403A09400 WU25PD	T25
4143844	VDS403A09500 WU25PD	T25
4143845	VDS403A09525 WU25PD	T25
4143846	VDS403A09600 WU25PD	T25
4143847	VDS403A09700 WU25PD	T25
4143848	VDS403A09800 WU25PD	T25
4143849	VDS403A09900 WU25PD	T25
4143850	VDS403A09921 WU25PD	T25
4143888	VDS403F10100 WU25PD	T41
4143889	VDS403F10200 WU25PD	T41
4143890	VDS403F10300 WU25PD	T41
4143891	VDS403F10400 WU25PD	T41
4143892	VDS403F10500 WU25PD	T41
4143907	VDS201A03000 WU25PD	T9
4143908	VDS201A03048 WU25PD	T9
4143909	VDS201A03100 WU25PD	T9
4143910	VDS201A03175 WU25PD	T9
4143911	VDS201A03200 WU25PD	T9
4143912	VDS201A03264 WU25PD	T9
4143913	VDS201A03300 WU25PD	T9
4143914	VDS201A03400 WU25PD	T9
4143915	VDS201A03455 WU25PD	T9
4143916	VDS201A03500 WU25PD	T9
4143917	VDS201A03571 WU25PD	T9
4143918	VDS201A03600 WU25PD	T9
4143919	VDS201A03658 WU25PD	T9
4143920	VDS201A03700 WU25PD	T9
4143921	VDS201A03734 WU25PD	T9
4143922	VDS201A03800 WU25PD	T9
4143923	VDS201A03900 WU25PD	T9
4143924	VDS201A03970 WU25PD	T9
4143925	VDS201A04000 WU25PD	T9
4143926	VDS201A04039 WU25PD	T9
4143927	VDS201A04090 WU25PD	T9
4143928	VDS201A04100 WU25PD	T9
4143929	VDS201A04200 WU25PD	T9
4143930	VDS201A04217 WU25PD	T9
4143931	VDS201A04300 WU25PD	T9
4143932	VDS201A04366 WU25PD	T10
4143933	VDS201A04400 WU25PD	T10
4143934	VDS201A04500 WU25PD	T10
4143935	VDS201A04600 WU25PD	T10
4143936	VDS201A04623 WU25PD	T10
4143937	VDS201A04700 WU25PD	T10
4143938	VDS201A04763 WU25PD	T10
4143939	VDS201A04800 WU25PD	T10
4143940	VDS201A04852 WU25PD	T10

Order No.	Catalogue No.	Page(s)
4143941	VDS201A04900 WU25PD	T10
4143942	VDS201A05000 WU25PD	T10
4143943	VDS201A05100 WU25PD	T10
4143944	VDS201A05106 WU25PD	T10
4143945	VDS201A05159 WU25PD	T10
4143946	VDS201A05200 WU25PD	T10
4143947	VDS201A05300 WU25PD	T10
4143948	VDS201A05400 WU25PD	T10
4143949	VDS201A05410 WU25PD	T10
4143950	VDS201A05500 WU25PD	T10
4143951	VDS201A05558 WU25PD	T10
4143952	VDS201A05600 WU25PD	T10
4143953	VDS201A05616 WU25PD	T10
4143954	VDS201A05700 WU25PD	T10
4143955	VDS201A05800 WU25PD	T10
4143956	VDS201A05900 WU25PD	T10
4143957	VDS201A05954 WU25PD	T10
4143958	VDS201A06000 WU25PD	T10
4143959	VDS201A06100 WU25PD	T10
4143960	VDS201A06200 WU25PD	T10
4143961	VDS201A06300 WU25PD	T10
4143962	VDS201A06350 WU25PD	T10
4143963	VDS201A06400 WU25PD	T10
4143964	VDS201A06500 WU25PD	T10
4143965	VDS201A06528 WU25PD	T10
4143966	VDS201A06600 WU25PD	T10
4143967	VDS201A06630 WU25PD	T10
4143968	VDS201A06700 WU25PD	T10
4143969	VDS201A06746 WU25PD	T10
4143970	VDS201A06800 WU25PD	T10
4143971	VDS201A06900 WU25PD	T10
4143972	VDS201A07000 WU25PD	T11
4143973	VDS201A07100 WU25PD	T11
4143974	VDS201A07145 WU25PD	T11
4143975	VDS201A07200 WU25PD	T11
4143976	VDS201A07300 WU25PD	T11
4143977	VDS201A07400 WU25PD	T11
4143978	VDS201A07500 WU25PD	T11
4143979	VDS201A07541 WU25PD	T11
4143980	VDS201A07600 WU25PD	T11
4143981	VDS201A07700 WU25PD	T11
4143982	VDS201A07800 WU25PD	T11
4143983	VDS201A07900 WU25PD	T11
4143984	VDS201A07938 WU25PD	T11
4143985	VDS201A08000 WU25PD	T11
4143986	VDS201A08100 WU25PD	T11
4143987	VDS201A08200 WU25PD	T11
4143988	VDS201A08300 WU25PD	T11
4143989	VDS201A08334 WU25PD	T11
4143990	VDS201A08400 WU25PD	T11
4143991	VDS201A08433 WU25PD	T11
4143992	VDS201A08500 WU25PD	T11
4143993	VDS201A08600 WU25PD	T11
4143994	VDS201A08700 WU25PD	T11
4143995	VDS201A08733 WU25PD	T11
4143996	VDS201A08800 WU25PD	T11
4143997	VDS201A08900 WU25PD	T11
4143998	VDS201A09000 WU25PD	T11
4143999	VDS201A09100 WU25PD	T11
4144000	VDS201A09129 WU25PD	T11
4144001	VDS201A09200 WU25PD	T11
4144002	VDS201A09300 WU25PD	T11
4144003	VDS201A09347 WU25PD	T11
4144004	VDS201A09400 WU25PD	T11
4144005	VDS201A09500 WU25PD	T11
4144006	VDS201A09525 WU25PD	T11
4144007	VDS201A09600 WU25PD	T11
4144008	VDS201A09700 WU25PD	T11
4144009	VDS201A09800 WU25PD	T11
4144010	VDS201A09900 WU25PD	T11
4144011	VDS201A09921 WU25PD	T11
4144172	VDS201A10000 WU25PD	T12
4144195	VDS201A01000 WU25PD	T8
4144196	VDS201A01016 WU25PD	T8
4144197	VDS201A01041 WU25PD	T8
4144198	VDS201A01067 WU25PD	T8
4144199	VDS201A01092 WU25PD	T8
4144200	VDS201A01100 WU25PD	T8
4144201	VDS201A01181 WU25PD	T8
4144202	VDS201A01191 WU25PD	T8
4144207	VDS403F10000 WU25PD	T41
4144208	VDS403F03000 WU25PD	T39
4144209	VDS403A18000 WU25PD	T28
4144210	VDS403F03100 WU25PD	T39
4144211	VDS403A18100 WU25PD	T28
4144212	VDS403A18200 WU25PD	T28
4144223	VDS403F10600 WU25PD	T41
4144224	VDS403F10700 WU25PD	T41
4144225	VDS403F10800 WU25PD	T41
4144226	VDS403F10900 WU25PD	T41
4144227	VDS403F11000 WU25PD	T41
4144228	VDS403F11100 WU25PD	T41
4144229	VDS403F11200 WU25PD	T41
4144230	VDS403F11300 WU25PD	T41
4144231	VDS403F11400 WU25PD	T41
4144232	VDS403F11500 WU25PD	T41
4144233	VDS403F11600 WU25PD	T41
4144234	VDS403F11700 WU25PD	T41
4144235	VDS403F11800 WU25PD	T41
4144236	VDS403F11900 WU25PD	T41
4144237	VDS403F12000 WU25PD	T41
4144238	VDS403F12100 WU25PD	T41
4144239	VDS403F12200 WU25PD	T41
4144240	VDS403F12300 WU25PD	T41
4144241	VDS403F12400 WU25PD	T41
4144242	VDS403F12500 WU25PD	T41
4144243	VDS403F03200 WU25PD	T39
4144244	VDS403A18258 WU25PD	T28
4144245	VDS403F03300 WU25PD	T39
4144246	VDS403A18300 WU25PD	T28
4144247	VDS403F03400 WU25PD	T39
4144248	VDS403A18400 WU25PD	T28
4144249	VDS403F03500 WU25PD	T39
4144250	VDS403A18500 WU25PD	T28
4144251	VDS403F03600 WU25PD	T39
4144252	VDS403A18600 WU25PD	T28
4144253	VDS403F03700 WU25PD	T39
4144254	VDS403A18654 WU25PD	T28
4144255	VDS403F03800 WU25PD	T39
4144256	VDS403A18700 WU25PD	T28
4144257	VDS403F03900 WU25PD	T39
4144258	VDS403A18800 WU25PD	T28
4144259	VDS403F04000 WU25PD	T39
4144260	VDS403A18900 WU25PD	T28
4144261	VDS403F04100 WU25PD	T39
4144262	VDS403A19000 WU25PD	T28
4144263	VDS403F12600 WU25PD	T41
4144264	VDS403F12700 WU25PD	T41
4144265	VDS403F12800 WU25PD	T41
4144266	VDS403F12900 WU25PD	T41
4144267	VDS403F13000 WU25PD	T41
4144268	VDS403F13100 WU25PD	T41
4144269	VDS403F13200 WU25PD	T41
4144270	VDS403F13300 WU25PD	T41
4144271	VDS403F13400 WU25PD	T42
4144272	VDS403F13500 WU25PD	T42
4144273	VDS403F04200 WU25PD	T39
4144274	VDS403F04300 WU25PD	T39
4144275	VDS403A19050 WU25PD	T28
4144276	VDS403F04400 WU25PD	T39
4144277	VDS403A19100 WU25PD	T28
4144278	VDS403F04500 WU25PD	T39
4144279	VDS403A19200 WU25PD	T28
4144280	VDS403F04600 WU25PD	T39
4144281	VDS403A19300 WU25PD	T28
4144282	VDS403F04700 WU25PD	T39
4144283	VDS403A19400 WU25PD	T28
4144284	VDS403F04800 WU25PD	T39
4144285	VDS403A19500 WU25PD	T28
4144286	VDS403F04900 WU25PD	T39
4144287	VDS403A19600 WU25PD	T28
4144288	VDS403F05000 WU25PD	T39
4144289	VDS403A19700 WU25PD	T28
4144290	VDS403F05100 WU25PD	T39
4144291	VDS403A19800 WU25PD	T28
4144292	VDS403F05200 WU25PD	T39
4144293	VDS403F13600 WU25PD	T42
4144294	VDS403F13700 WU25PD	T42
4144295	VDS403F13800 WU25PD	T42
4144296	VDS403F13900 WU25PD	T42
4144297	VDS403F14000 WU25PD	T42
4144298	VDS403F14100 WU25PD	T42
4144299	VDS403F14200 WU25PD	T42
4144300	VDS403F14300 WU25PD	T42
4144301	VDS403F14400 WU25PD	T42
4144302	VDS403F14500 WU25PD	T42
4144303	VDS403A19900 WU25PD	T28
4144304	VDS403F05300 WU25PD	T39
4144305	VDS403A20000 WU25PD	T28
4144306	VDS403F05400 WU25PD	T40
4144307	VDS403F05500 WU25PD	T40
4144308	VDS403F05600 WU25PD	T40
4144309	VDS403F05700 WU25PD	T40
4144310	VDS403F05800 WU25PD	T40
4144311	VDS403F05900 WU25PD	T40
4144312	VDS403F06000 WU25PD	T40
4144313	VDS403F06100 WU25PD	T40
4144314	VDS403F06200 WU25PD	T40
4144315	VDS403F06300 WU25PD	T40
4144316	VDS403F06400 WU25PD	T40
4144317	VDS403F06500 WU25PD	T40
4144318	VDS403F06600 WU25PD	T40
4144319	VDS403F06700 WU25PD	T40
4144320	VDS403F06800 WU25PD	T40
4144321	VDS403F06900 WU25PD	T40
4144322	VDS403F07000 WU25PD	T40
4144323	VDS403F14600 WU25PD	T42
4144324	VDS403F14700 WU25PD	T42
4144325	VDS403F14800 WU25PD	T42
4144326	VDS403F14900 WU25PD	T42
4144327	VDS403F15000 WU25PD	T42
4144328	VDS403F15100 WU25PD	T42
4144329	VDS403F15200 WU25PD	T42
4144330	VDS403F15300 WU25PD	T42
4144331	VDS403F15400 WU25PD	T42
4144332	VDS403F15500 WU25PD	T42
4144333	VDS403F15600 WU25PD	T42
4144334	VDS403F15700 WU25PD	T42
4144335	VDS403F15800 WU25PD	T42
4144336	VDS403F15900 WU25PD	T42
4144337	VDS403F16000 WU25PD	T42
4144338	VDS403F16100 WU25PD	T42
4144339	VDS403F16200 WU25PD	T42
4144340	VDS403F16300 WU25PD	T42
4144341	VDS403F16400 WU25PD	T42
4144342	VDS403F16500 WU25PD	T42
4144343	VDS403F07100 WU25PD	T40
4144344	VDS403F07200 WU25PD	T40
4144345	VDS403F07300 WU25PD	T40
4144346	VDS403F07400 WU25PD	T40
4144347	VDS403F07500 WU25PD	T40
4144348	VDS403F07600 WU25PD	T40
4144349	VDS403F07700 WU25PD	T40
4144350	VDS403F07800 WU25PD	T40
4144351	VDS403F07900 WU25PD	T40
4144352	VDS403F08000 WU25PD	T40
4144353	VDS403F16600 WU25PD	T42
4144354	VDS403F16700 WU25PD	T42
4144355	VDS403F16800 WU25PD	T42
4144356	VDS403F16900 WU25PD	T42
4144357	VDS403F17000 WU25PD	T42
4144358	VDS403F17100 WU25PD	T42
4144359	VDS403F17200 WU25PD	T42
4144360	VDS403F17300 WU25PD	T42
4144361	VDS403F17400 WU25PD	T43
4144362	VDS403F17500 WU25PD	T43
4144363	VDS403F08100 WU25PD	T40
4144364	VDS403F08200 WU25PD	T40
4144365	VDS403F08300 WU25PD	T40
4144366	VDS403F08400 WU25PD	T40
4144367	VDS403F08500 WU25PD	T40
4144368	VDS403F08600 WU25PD	T40
4144369	VDS403F08700 WU25PD	T40
4144370	VDS403F08800 WU25PD	T40
4144371	VDS403F08900 WU25PD	T40
4144372	VDS403F09000 WU25PD	T40
4144373	VDS403F09100 WU25PD	T40
4144374	VDS403F09200 WU25PD	T40
4144375	VDS403F09300 WU25PD	T40
4144376	VDS403F09400 WU25PD	T41
4144377	VDS403F09500 WU25PD	T41
4144378	VDS403F09600 WU25PD	T41
4144379	VDS403F09700 WU25PD	T41
4144380	VDS403F09800 WU25PD	T41
4144381	VDS403F09900 WU25PD	T41
4144383	VDS403F17600 WU25PD	T43
4144384	VDS403F17700 WU25PD	T43
4144385	VDS403F17800 WU25PD	T43
4144386	VDS403F17900 WU25PD	T43
4144387	VDS403F18000 WU25PD	T43
4144388	VDS403F18100 WU25PD	T43
4144389	VDS403F18200 WU25PD	T43
4144390	VDS403F18300 WU25PD	T43
4144391	VDS403F18400 WU25PD	T43
4144392	VDS403F18500 WU25PD	T43
4144393	VDS403F18600 WU25PD	T43
4144394	VDS403F18700 WU25PD	T43
4144395	VDS403F18800 WU25PD	T43
4144396	VDS403F18900 WU25PD	T43
4144397	VDS403F19000 WU25PD	T43
4144398	VDS403F19100 WU25PD	T43
4144399	VDS403F19200 WU25PD	T43
4144400	VDS403F19300 WU25PD	T43
4144401	VDS403F19400 WU25PD	T43

Order No.	Catalogue No.	Page(s)
4144402	VDS403F19500 WU25PD	T43
4144403	VDS403F19600 WU25PD	T43
4144404	VDS403F19700 WU25PD	T43
4144405	VDS403F19800 WU25PD	T43
4144406	VDS403F19900 WU25PD	T43
4144407	VDS403F20000 WU25PD	T43
4144423	VDS201A10100 WU25PD	T12
4144424	VDS201A10200 WU25PD	T12
4144425	VDS201A10300 WU25PD	T12
4144426	VDS201A10320 WU25PD	T12
4144427	VDS201A10400 WU25PD	T12
4144428	VDS201A10500 WU25PD	T12
4144429	VDS201A10600 WU25PD	T12
4144430	VDS201A10700 WU25PD	T12
4144431	VDS201A10716 WU25PD	T12
4144432	VDS201A10800 WU25PD	T12
4144433	VDS201A10900 WU25PD	T12
4144434	VDS201A11000 WU25PD	T12
4144435	VDS201A11100 WU25PD	T12
4144436	VDS201A11113 WU25PD	T12
4144437	VDS201A11200 WU25PD	T12
4144438	VDS201A11300 WU25PD	T12
4144439	VDS201A11400 WU25PD	T12
4144440	VDS201A11500 WU25PD	T12
4144441	VDS201A11509 WU25PD	T12
4144442	VDS201A11600 WU25PD	T12
4144443	VDS201A11700 WU25PD	T12
4144444	VDS201A11800 WU25PD	T12
4144445	VDS201A11900 WU25PD	T12
4144446	VDS201A11908 WU25PD	T12
4144447	VDS201A12000 WU25PD	T12
4144448	VDS201A12100 WU25PD	T12
4144449	VDS201A12200 WU25PD	T12
4144450	VDS201A12300 WU25PD	T12
4144451	VDS201A12304 WU25PD	T12
4144452	VDS201A12400 WU25PD	T12
4144453	VDS201A12500 WU25PD	T12
4144454	VDS201A12600 WU25PD	T12
4144455	VDS201A12700 WU25PD	T12
4144456	VDS201A12800 WU25PD	T12
4144457	VDS201A12900 WU25PD	T12
4144458	VDS201A13000 WU25PD	T12
4144459	VDS201A13096 WU25PD	T12
4144460	VDS201A13100 WU25PD	T12
4144461	VDS201A13200 WU25PD	T12
4144462	VDS201A13300 WU25PD	T13
4144463	VDS201A13400 WU25PD	T13
4144464	VDS201A13500 WU25PD	T13
4144465	VDS201A13600 WU25PD	T13
4144466	VDS201A13700 WU25PD	T13
4144467	VDS201A13800 WU25PD	T13
4144468	VDS201A13891 WU25PD	T13
4144469	VDS201A13900 WU25PD	T13
4144470	VDS201A14000 WU25PD	T13
4144471	VDS201A14100 WU25PD	T13
4144472	VDS201A14200 WU25PD	T13
4144473	VDS201A14288 WU25PD	T13
4144474	VDS201A14300 WU25PD	T13
4144475	VDS201A14400 WU25PD	T13
4144476	VDS201A14500 WU25PD	T13
4144477	VDS201A14600 WU25PD	T13
4144478	VDS201A14684 WU25PD	T13
4144479	VDS201A14700 WU25PD	T13
4144480	VDS201A14800 WU25PD	T13
4144481	VDS201A14900 WU25PD	T13
4144482	VDS201A15000 WU25PD	T13
4144483	VDS201A15083 WU25PD	T13
4144484	VDS201A15100 WU25PD	T13
4144485	VDS201A15200 WU25PD	T13
4144486	VDS201A15300 WU25PD	T13
4144487	VDS201A15400 WU25PD	T13
4144488	VDS201A15479 WU25PD	T13
4144489	VDS201A15500 WU25PD	T13
4144490	VDS201A15600 WU25PD	T13
4144491	VDS201A15700 WU25PD	T13
4144492	VDS201A15800 WU25PD	T13
4144493	VDS201A15875 WU25PD	T13
4144494	VDS201A15900 WU25PD	T13
4144495	VDS201A16000 WU25PD	T13
4144496	VDS201A16100 WU25PD	T13
4144497	VDS201A16200 WU25PD	T13
4144498	VDS201A16271 WU25PD	T13
4144499	VDS201A16300 WU25PD	T13
4144500	VDS201A16400 WU25PD	T13
4144501	VDS201A16500 WU25PD	T13
4144503	VDS201A16600 WU25PD	T14
4144504	VDS201A16670 WU25PD	T14
4144505	VDS201A16700 WU25PD	T14
4144506	VDS201A16800 WU25PD	T14
4144507	VDS201A16900 WU25PD	T14
4144508	VDS201A17000 WU25PD	T14
4144509	VDS201A17100 WU25PD	T14
4144510	VDS201A17200 WU25PD	T14
4144511	VDS201A17300 WU25PD	T14
4144512	VDS201A17400 WU25PD	T14
4144513	VDS201A17463 WU25PD	T14
4144514	VDS201A17500 WU25PD	T14
4144515	VDS201A17600 WU25PD	T14
4144516	VDS201A17700 WU25PD	T14
4144517	VDS201A17800 WU25PD	T14
4144518	VDS201A17859 WU25PD	T14
4144519	VDS201A17900 WU25PD	T14
4144523	VDS201A01200 WU25PD	T8
4144524	VDS201A01300 WU25PD	T8
4144525	VDS201A01321 WU25PD	T8
4144526	VDS201A01397 WU25PD	T8
4144527	VDS201A01400 WU25PD	T8
4144528	VDS201A01500 WU25PD	T8
4144529	VDS201A01600 WU25PD	T8
4144530	VDS201A01700 WU25PD	T8
4144531	VDS201A01800 WU25PD	T8
4144532	VDS201A01900 WU25PD	T8
4144533	VDS201A01984 WU25PD	T8
4144534	VDS201A02000 WU25PD	T8
4144535	VDS201A02100 WU25PD	T8
4144536	VDS201A02200 WU25PD	T8
4144537	VDS201A02300 WU25PD	T8
4144538	VDS201A02383 WU25PD	T8
4144539	VDS201A02400 WU25PD	T9
4144540	VDS201A02439 WU25PD	T9
4144541	VDS201A02489 WU25PD	T9
4144542	VDS201A02500 WU25PD	T9
4144543	VDS201A02578 WU25PD	T9
4144544	VDS201A02600 WU25PD	T9
4144545	VDS201A02642 WU25PD	T9
4144546	VDS201A02700 WU25PD	T9
4144547	VDS201A02705 WU25PD	T9
4144548	VDS201A02779 WU25PD	T9
4144549	VDS201A02800 WU25PD	T9
4144550	VDS201A02820 WU25PD	T9
4144551	VDS201A02870 WU25PD	T9
4144552	VDS201A02900 WU25PD	T9
4144553	VDS201A02947 WU25PD	T9
4144590	VDS201A18000 WU25PD	T14
4144591	VDS201A18100 WU25PD	T14
4144592	VDS201A18200 WU25PD	T14
4144593	VDS201A18258 WU25PD	T14
4144594	VDS201A18300 WU25PD	T14
4144595	VDS201A18400 WU25PD	T14
4144596	VDS201A18500 WU25PD	T14
4144597	VDS201A18600 WU25PD	T14
4144598	VDS201A18654 WU25PD	T14
4144599	VDS201A18700 WU25PD	T14
4144600	VDS201A18800 WU25PD	T14
4144601	VDS201A18900 WU25PD	T14
4144602	VDS201A19000 WU25PD	T14
4144603	VDS201A19050 WU25PD	T14
4144604	VDS201A19100 WU25PD	T14
4144605	VDS201A19200 WU25PD	T14
4144606	VDS201A19300 WU25PD	T14
4144607	VDS201A19400 WU25PD	T14
4144608	VDS201A19500 WU25PD	T14
4144609	VDS201A19600 WU25PD	T14
4144610	VDS201A19700 WU25PD	T14
4144611	VDS201A19800 WU25PD	T14
4144612	VDS201A19900 WU25PD	T14
4144613	VDS201A20000 WU25PD	T14
4145063	SDMX120416RMM TN6520	J45, K6
4145064	SDMX120416RMM TN6525	J45, K6
4145065	SDMX120416RMM TN6540	J45, K6
4145072	SDMX120424RMM TN6540	J45, K6
4145093	SDMX120424RMM TN7535	J45, K6
4145094	SDMX120432RMM TN6540	J45, K6
4145095	SDMX120432RMM TN7535	J45, K6
4145110	M270HF10 TN6525	M127
4145111	M270HF12 TN6525	M127
4145112	M270HF13 TN6525	M127
4145123	M270HF16 TN6525	M127
4145125	M270HF20 TN6525	M127
4147560	M200D32Z03M16RN12	M28
4147561	M200D35Z03M16RN12	M28
4147562	M200D42Z04M16RN12	M28
4147564	M200D32Z03B32RN12	M29
4147566	M200D32Z03A32RN12L200	M30
4147567	M200D32Z02A32RN12L250	M30
4147568	M200D40Z04RN12	M31
4147569	M200D50Z04RN12	M31
4147570	M200D50Z05RN12	M31
4147571	M200D52Z05RN12	M31
4147572	M200D63Z05RN12	M31
4147573	M200D63Z07RN12	M31
4147574	M200D66Z07RN12	M31
4147575	M200D80Z06RN12	M31
4147576	M200D80Z08RN12	M31
4147577	M200D100Z07RN12	M31
4147578	M200D100Z09RN12	M31
4147921	VDS202A18000 WU25PD	T21
4147922	VDS202A18100 WU25PD	T21
4147927	VDS201F03000 WU25PD	T29
4147928	VDS201F03100 WU25PD	T29
4147929	VDS201F03200 WU25PD	T29
4147930	VDS201F03300 WU25PD	T29
4147931	VDS201F03400 WU25PD	T29
4147932	VDS201F03500 WU25PD	T29
4147933	VDS201F03600 WU25PD	T29
4147934	VDS201F03700 WU25PD	T29
4147935	VDS201F03800 WU25PD	T29
4147936	VDS201F03900 WU25PD	T29
4147937	VDS201F04000 WU25PD	T29
4147938	VDS201F04100 WU25PD	T29
4147939	VDS201F04200 WU25PD	T29
4147940	VDS201F04300 WU25PD	T29
4147941	VDS201F04400 WU25PD	T29
4147942	VDS201F04500 WU25PD	T29
4147943	VDS201F04600 WU25PD	T29
4147944	VDS201F04700 WU25PD	T29
4147945	VDS201F04800 WU25PD	T29
4147946	VDS201F04900 WU25PD	T29
4147947	VDS201F05000 WU25PD	T29
4147948	VDS201F05100 WU25PD	T29
4147949	VDS201F05200 WU25PD	T29
4147950	VDS201F05300 WU25PD	T29
4147951	VDS201F05400 WU25PD	T30
4147952	VDS201F05500 WU25PD	T30
4147953	VDS201F05600 WU25PD	T30
4147954	VDS201F05700 WU25PD	T30
4147955	VDS201F05800 WU25PD	T30
4147956	VDS201F05900 WU25PD	T30
4147957	VDS201F06000 WU25PD	T30
4147958	VDS201F06100 WU25PD	T30
4147959	VDS201F06200 WU25PD	T30
4147960	VDS201F06300 WU25PD	T30
4147961	VDS201F06400 WU25PD	T30
4147962	VDS201F06500 WU25PD	T30
4147963	VDS201F06600 WU25PD	T30
4147964	VDS201F06700 WU25PD	T30
4147965	VDS201F06800 WU25PD	T30
4147966	VDS201F06900 WU25PD	T30
4147967	VDS201F07000 WU25PD	T30
4147968	VDS201F07100 WU25PD	T30
4147969	VDS201F07200 WU25PD	T30
4147970	VDS201F07300 WU25PD	T30
4147971	VDS201F07400 WU25PD	T30
4147972	VDS201F07500 WU25PD	T30
4147973	VDS201F07600 WU25PD	T30
4147974	VDS201F07700 WU25PD	T30
4147975	VDS201F07800 WU25PD	T30
4147976	VDS201F07900 WU25PD	T30
4147977	VDS201F08000 WU25PD	T30
4147978	VDS201F08100 WU25PD	T30
4147979	VDS201F08200 WU25PD	T30
4147980	VDS201F08300 WU25PD	T30
4147981	VDS201F08400 WU25PD	T30
4147982	VDS201F08500 WU25PD	T30
4147983	VDS201F08600 WU25PD	T30
4147984	VDS201F08700 WU25PD	T30
4147985	VDS201F08800 WU25PD	T30
4147986	VDS201F08900 WU25PD	T30
4147987	VDS201F09000 WU25PD	T30
4147988	VDS201F09100 WU25PD	T30
4147989	VDS201F09200 WU25PD	T30
4147990	VDS201F09300 WU25PD	T30
4147991	VDS201F09400 WU25PD	T31
4147992	VDS201F09500 WU25PD	T31
4147993	VDS201F09600 WU25PD	T31
4147994	VDS201F09700 WU25PD	T31
4147995	VDS201F09800 WU25PD	T31
4147996	VDS201F09900 WU25PD	T31
4148000	VDS202A01000 WU25PD	T15
4148001	VDS202A01016 WU25PD	T15
4148002	VDS202A01041 WU25PD	T15
4148003	VDS202A01067 WU25PD	T15
4148004	VDS202A01092 WU25PD	T15
4148005	VDS202A01100 WU25PD	T15

Order No.	Catalogue No.	Page(s)
4148006	VDS202A01181 WU25PD	T15
4148007	VDS202A01191 WU25PD	T15
4148008	VDS202A01200 WU25PD	T15
4148009	VDS202A01300 WU25PD	T15
4148010	VDS202A01321 WU25PD	T15
4148011	VDS202A01397 WU25PD	T15
4148012	VDS202A01400 WU25PD	T15
4148013	VDS202A01500 WU25PD	T15
4148014	VDS202A01600 WU25PD	T15
4148015	VDS202A01700 WU25PD	T15
4148016	VDS202A01800 WU25PD	T15
4148017	VDS202A01900 WU25PD	T15
4148018	VDS202A01984 WU25PD	T15
4148019	VDS202A02000 WU25PD	T15
4148020	VDS202A02100 WU25PD	T15
4148021	VDS202A02200 WU25PD	T15
4148022	VDS202A02300 WU25PD	T15
4148023	VDS202A02383 WU25PD	T15
4148024	VDS202A02400 WU25PD	T16
4148025	VDS202A02439 WU25PD	T16
4148026	VDS202A02489 WU25PD	T16
4148027	VDS202A02500 WU25PD	T16
4148028	VDS202A02578 WU25PD	T16
4148029	VDS202A02600 WU25PD	T16
4148030	VDS202A02642 WU25PD	T16
4148031	VDS202A02700 WU25PD	T16
4148032	VDS202A02705 WU25PD	T16
4148033	VDS202A02779 WU25PD	T16
4148034	VDS202A02800 WU25PD	T16
4148035	VDS202A02820 WU25PD	T16
4148036	VDS202A02870 WU25PD	T16
4148037	VDS202A02900 WU25PD	T16
4148038	VDS202A02947 WU25PD	T16
4148039	VDS201F10000 WU25PD	T31
4148040	VDS201F10100 WU25PD	T31
4148041	VDS201F10200 WU25PD	T31
4148042	VDS201F10300 WU25PD	T31
4148043	VDS201F10400 WU25PD	T31
4148044	VDS201F10500 WU25PD	T31
4148045	VDS201F10600 WU25PD	T31
4148046	VDS201F10700 WU25PD	T31
4148047	VDS201F10800 WU25PD	T31
4148048	VDS201F10900 WU25PD	T31
4148049	VDS201F11000 WU25PD	T31
4148050	VDS201F11100 WU25PD	T31
4148051	VDS201F11200 WU25PD	T31
4148052	VDS201F11300 WU25PD	T31
4148053	VDS201F11400 WU25PD	T31
4148054	VDS201F11500 WU25PD	T31
4148055	VDS201F11600 WU25PD	T31
4148056	VDS201F11700 WU25PD	T31
4148057	VDS201F11800 WU25PD	T31
4148058	VDS201F11900 WU25PD	T31
4148059	VDS201F12000 WU25PD	T31
4148060	VDS201F12100 WU25PD	T31
4148061	VDS201F12200 WU25PD	T31
4148062	VDS201F12300 WU25PD	T31
4148063	VDS201F12400 WU25PD	T31
4148064	VDS201F12500 WU25PD	T31
4148065	VDS201F12600 WU25PD	T31
4148066	VDS201F12700 WU25PD	T31
4148067	VDS201F12800 WU25PD	T31
4148068	VDS201F12900 WU25PD	T31
4148069	VDS201F13000 WU25PD	T31
4148070	VDS201F13100 WU25PD	T31
4148071	VDS201F13200 WU25PD	T31
4148072	VDS201F13300 WU25PD	T31
4148073	VDS201F13400 WU25PD	T32
4148074	VDS201F13500 WU25PD	T32
4148075	VDS201F13600 WU25PD	T32
4148076	VDS201F13700 WU25PD	T32
4148077	VDS201F13800 WU25PD	T32
4148078	VDS201F13900 WU25PD	T32
4148079	VDS201F14000 WU25PD	T32
4148080	VDS201F14100 WU25PD	T32
4148081	VDS201F14200 WU25PD	T32
4148082	VDS201F14300 WU25PD	T32
4148083	VDS201F14400 WU25PD	T32
4148084	VDS201F14500 WU25PD	T32
4148085	VDS201F14600 WU25PD	T32
4148086	VDS201F14700 WU25PD	T32
4148087	VDS201F14800 WU25PD	T32
4148088	VDS201F14900 WU25PD	T32
4148089	VDS201F15000 WU25PD	T32
4148090	VDS201F15100 WU25PD	T32
4148091	VDS201F15200 WU25PD	T32
4148092	VDS201F15300 WU25PD	T32
4148093	VDS201F15400 WU25PD	T32
4148094	VDS201F15500 WU25PD	T32
4148095	VDS201F15600 WU25PD	T32
4148096	VDS201F15700 WU25PD	T32
4148097	VDS201F15800 WU25PD	T32
4148098	VDS201F15900 WU25PD	T32
4148099	VDS201F16000 WU25PD	T32
4148100	VDS201F16100 WU25PD	T32
4148101	VDS201F16200 WU25PD	T32
4148102	VDS201F16300 WU25PD	T32
4148103	VDS201F16400 WU25PD	T32
4148104	VDS201F16500 WU25PD	T32
4148105	VDS201F16600 WU25PD	T32
4148106	VDS201F16700 WU25PD	T32
4148107	VDS201F16800 WU25PD	T32
4148108	VDS201F16900 WU25PD	T32
4148109	VDS201F17000 WU25PD	T32
4148110	VDS201F17100 WU25PD	T32
4148111	VDS201F17200 WU25PD	T32
4148112	VDS201F17300 WU25PD	T32
4148113	VDS201F17400 WU25PD	T33
4148114	VDS201F17500 WU25PD	T33
4148115	VDS201F17600 WU25PD	T33
4148116	VDS201F17700 WU25PD	T33
4148117	VDS201F17800 WU25PD	T33
4148118	VDS201F17900 WU25PD	T33
4148119	VDS201F18000 WU25PD	T33
4148120	VDS201F18100 WU25PD	T33
4148121	VDS201F18200 WU25PD	T33
4148122	VDS201F18300 WU25PD	T33
4148123	VDS201F18400 WU25PD	T33
4148124	VDS201F18500 WU25PD	T33
4148125	VDS201F18600 WU25PD	T33
4148126	VDS201F18700 WU25PD	T33
4148127	VDS201F18800 WU25PD	T33
4148128	VDS201F18900 WU25PD	T33
4148129	VDS201F19000 WU25PD	T33
4148130	VDS201F19100 WU25PD	T33
4148131	VDS201F19200 WU25PD	T33
4148132	VDS201F19300 WU25PD	T33
4148133	VDS201F19400 WU25PD	T33
4148134	VDS201F19500 WU25PD	T33
4148135	VDS201F19600 WU25PD	T33
4148136	VDS201F19700 WU25PD	T33
4148137	VDS201F19800 WU25PD	T33
4148138	VDS201F19900 WU25PD	T33
4148139	VDS201F20000 WU25PD	T33
4148142	VDS202A03000 WU25PD	T16
4148143	VDS202A03048 WU25PD	T16
4148144	VDS202A03100 WU25PD	T16
4148145	VDS202A03175 WU25PD	T16
4148146	VDS202A03200 WU25PD	T16
4148147	VDS202A03264 WU25PD	T16
4148148	VDS202A03300 WU25PD	T16
4148149	VDS202A03400 WU25PD	T16
4148150	VDS202A03455 WU25PD	T16
4148151	VDS202A03500 WU25PD	T16
4148152	VDS202A03571 WU25PD	T16
4148153	VDS202A03600 WU25PD	T16
4148154	VDS202A03658 WU25PD	T16
4148155	VDS202A03700 WU25PD	T16
4148156	VDS202A03734 WU25PD	T16
4148157	VDS202A03800 WU25PD	T16
4148158	VDS202A03900 WU25PD	T16
4148159	VDS202A03970 WU25PD	T16
4148160	VDS202A04000 WU25PD	T16
4148161	VDS202A04039 WU25PD	T16
4148162	VDS202A04090 WU25PD	T16
4148163	VDS202A04100 WU25PD	T16
4148164	VDS202A04200 WU25PD	T16
4148165	VDS202A04217 WU25PD	T16
4148166	VDS202A04300 WU25PD	T16
4148167	VDS202A04366 WU25PD	T17
4148168	VDS202A04400 WU25PD	T17
4148169	VDS202A04500 WU25PD	T17
4148170	VDS202A04600 WU25PD	T17
4148171	VDS202A04623 WU25PD	T17
4148172	VDS202A04700 WU25PD	T17
4148173	VDS202A04763 WU25PD	T17
4148174	VDS202A04800 WU25PD	T17
4148175	VDS202A04852 WU25PD	T17
4148176	VDS202A04900 WU25PD	T17
4148177	VDS202A05000 WU25PD	T17
4148178	VDS202A05100 WU25PD	T17
4148179	VDS202A05106 WU25PD	T17
4148180	VDS202A05159 WU25PD	T17
4148181	VDS202A05200 WU25PD	T17
4148182	VDS202A05300 WU25PD	T17
4148183	VDS202A05400 WU25PD	T17
4148184	VDS202A05410 WU25PD	T17
4148185	VDS202A05500 WU25PD	T17
4148186	VDS202A05558 WU25PD	T17
4148187	VDS202A05600 WU25PD	T17
4148188	VDS202A05616 WU25PD	T17
4148189	VDS202A05700 WU25PD	T17
4148190	VDS202A05800 WU25PD	T17
4148191	VDS202A05900 WU25PD	T17
4148192	VDS202A05954 WU25PD	T17
4148193	VDS202A06000 WU25PD	T17
4148194	VDS202A06100 WU25PD	T17
4148195	VDS202A06200 WU25PD	T17
4148196	VDS202A06300 WU25PD	T17
4148197	VDS202A06350 WU25PD	T17
4148198	VDS202A06400 WU25PD	T17
4148199	VDS202A06500 WU25PD	T17
4148200	VDS202A06528 WU25PD	T17
4148201	VDS202A06600 WU25PD	T17
4148202	VDS202A06630 WU25PD	T17
4148203	VDS202A06700 WU25PD	T17
4148204	VDS202A06746 WU25PD	T17
4148205	VDS202A06800 WU25PD	T17
4148206	VDS202A06900 WU25PD	T17
4148207	VDS202A07000 WU25PD	T18
4148208	VDS202A07100 WU25PD	T18
4148209	VDS202A07145 WU25PD	T18
4148210	VDS202A07200 WU25PD	T18
4148211	VDS202A07300 WU25PD	T18
4148212	VDS202A07400 WU25PD	T18
4148213	VDS202A07500 WU25PD	T18
4148214	VDS202A07541 WU25PD	T18
4148215	VDS202A07600 WU25PD	T18
4148216	VDS202A07700 WU25PD	T18
4148217	VDS202A07800 WU25PD	T18
4148218	VDS202A07900 WU25PD	T18
4148219	VDS202A07938 WU25PD	T18
4148220	VDS202A08000 WU25PD	T18
4148221	VDS202A08100 WU25PD	T18
4148222	VDS202A08200 WU25PD	T18
4148223	VDS202A08300 WU25PD	T18
4148224	VDS202A08334 WU25PD	T18
4148225	VDS202A08400 WU25PD	T18
4148226	VDS202A08433 WU25PD	T18
4148227	VDS202A08500 WU25PD	T18
4148228	VDS202A08600 WU25PD	T18
4148229	VDS202A08700 WU25PD	T18
4148230	VDS202A08733 WU25PD	T18
4148231	VDS202A08800 WU25PD	T18
4148232	VDS202A08900 WU25PD	T18
4148233	VDS202A09000 WU25PD	T18
4148234	VDS202A09100 WU25PD	T18
4148235	VDS202A09129 WU25PD	T18
4148236	VDS202A09200 WU25PD	T18
4148237	VDS202A09300 WU25PD	T18
4148238	VDS202A09347 WU25PD	T18
4148239	VDS202A09400 WU25PD	T18
4148240	VDS202A09500 WU25PD	T18
4148241	VDS202A09525 WU25PD	T18
4148242	VDS202A09600 WU25PD	T18
4148243	VDS202A09700 WU25PD	T18
4148244	VDS202A09800 WU25PD	T18
4148245	VDS202A09900 WU25PD	T18
4148246	VDS202A09921 WU25PD	T18
4148258	VDS202A10000 WU25PD	T19
4148259	VDS202A10100 WU25PD	T19
4148260	VDS202A10200 WU25PD	T19
4148261	VDS202A10300 WU25PD	T19
4148262	VDS202A10320 WU25PD	T19
4148283	VDS202A10400 WU25PD	T19
4148284	VDS202A10500 WU25PD	T19
4148285	VDS202A10600 WU25PD	T19
4148286	VDS202A10700 WU25PD	T19
4148287	VDS202A10716 WU25PD	T19
4148288	VDS202A10800 WU25PD	T19
4148289	VDS202A10900 WU25PD	T19
4148290	VDS202A11000 WU25PD	T19
4148291	VDS202A11100 WU25PD	T19
4148292	VDS202A11113 WU25PD	T19
4148293	VDS202A11200 WU25PD	T19
4148294	VDS202A11300 WU25PD	T19
4148295	VDS202A11400 WU25PD	T19
4148296	VDS202A11500 WU25PD	T19
4148297	VDS202A11509 WU25PD	T19
4148298	VDS202A11600 WU25PD	T19
4148299	VDS202A11700 WU25PD	T19
4148300	VDS202A11800 WU25PD	T19
4148301	VDS202A11900 WU25PD	T19
4148302	VDS202A11908 WU25PD	T19

Order No.	Catalogue No.	Page(s)
4148303	VDS202A18200 WU25PD	T21
4148304	VDS202A18258 WU25PD	T21
4148305	VDS202A18300 WU25PD	T21
4148306	VDS202A18400 WU25PD	T21
4148307	VDS202A18500 WU25PD	T21
4148308	VDS202A18600 WU25PD	T21
4148309	VDS202A18654 WU25PD	T21
4148310	VDS202A18700 WU25PD	T21
4148311	VDS202A18800 WU25PD	T21
4148312	VDS202A18900 WU25PD	T21
4148313	VDS202A12000 WU25PD	T19
4148314	VDS202A12100 WU25PD	T19
4148315	VDS202A12200 WU25PD	T19
4148316	VDS202A12300 WU25PD	T19
4148317	VDS202A12304 WU25PD	T19
4148318	VDS202A12400 WU25PD	T19
4148319	VDS202A12500 WU25PD	T19
4148320	VDS202A12600 WU25PD	T19
4148321	VDS202A12700 WU25PD	T19
4148322	VDS202A12800 WU25PD	T19
4148323	VDS202A19000 WU25PD	T21
4148324	VDS202A19050 WU25PD	T21
4148325	VDS202A19100 WU25PD	T21
4148326	VDS202A19200 WU25PD	T21
4148327	VDS202A19300 WU25PD	T21
4148328	VDS202A19400 WU25PD	T21
4148329	VDS202A19500 WU25PD	T21
4148330	VDS202A19600 WU25PD	T21
4148331	VDS202A19700 WU25PD	T21
4148332	VDS202A19800 WU25PD	T21
4148333	VDS202A19900 WU25PD	T21
4148334	VDS202A20000 WU25PD	T21
4148335	VDS202F03000 WU25PD	T34
4148336	VDS202F03100 WU25PD	T34
4148337	VDS202F03200 WU25PD	T34
4148338	VDS202F03300 WU25PD	T34
4148339	VDS202F03400 WU25PD	T34
4148340	VDS202F03500 WU25PD	T34
4148341	VDS202F03600 WU25PD	T34
4148342	VDS202F03700 WU25PD	T34
4148343	VDS202A12900 WU25PD	T19
4148344	VDS202A13000 WU25PD	T19
4148345	VDS202A13096 WU25PD	T19
4148346	VDS202A13100 WU25PD	T19
4148347	VDS202A13200 WU25PD	T19
4148348	VDS202A13300 WU25PD	T20
4148349	VDS202A13400 WU25PD	T20
4148350	VDS202A13500 WU25PD	T20
4148351	VDS202A13600 WU25PD	T20
4148352	VDS202A13700 WU25PD	T20
4148353	VDS202A13800 WU25PD	T20
4148354	VDS202A13891 WU25PD	T20
4148355	VDS202A13900 WU25PD	T20
4148356	VDS202A14000 WU25PD	T20
4148357	VDS202A14100 WU25PD	T20
4148358	VDS202A14200 WU25PD	T20
4148359	VDS202A14288 WU25PD	T20
4148360	VDS202A14300 WU25PD	T20
4148361	VDS202A14400 WU25PD	T20
4148362	VDS202A14500 WU25PD	T20
4148363	VDS202A14600 WU25PD	T20
4148364	VDS202A14684 WU25PD	T20
4148365	VDS202A14700 WU25PD	T20
4148366	VDS202A14800 WU25PD	T20
4148367	VDS202A14900 WU25PD	T20
4148368	VDS202A15000 WU25PD	T20
4148369	VDS202A15083 WU25PD	T20
4148370	VDS202A15100 WU25PD	T20
4148371	VDS202A15200 WU25PD	T20
4148372	VDS202A15300 WU25PD	T20
4148373	VDS202A15400 WU25PD	T20
4148374	VDS202A15479 WU25PD	T20
4148375	VDS202A15500 WU25PD	T20
4148376	VDS202A15600 WU25PD	T20
4148377	VDS202A15700 WU25PD	T20
4148378	VDS202A15800 WU25PD	T20
4148379	VDS202A15875 WU25PD	T20
4148380	VDS202A15900 WU25PD	T20
4148381	VDS202A16000 WU25PD	T20
4148382	VDS202A16100 WU25PD	T20
4148383	VDS202A16200 WU25PD	T20
4148384	VDS202A16271 WU25PD	T20
4148385	VDS202A16300 WU25PD	T20
4148386	VDS202A16400 WU25PD	T20
4148387	VDS202A16500 WU25PD	T20
4148388	VDS202A16600 WU25PD	T21
4148389	VDS202A16670 WU25PD	T21
4148390	VDS202A16700 WU25PD	T21
4148391	VDS202A16800 WU25PD	T21
4148392	VDS202A16900 WU25PD	T21
4148393	VDS202A17000 WU25PD	T21
4148394	VDS202A17100 WU25PD	T21
4148395	VDS202A17200 WU25PD	T21
4148396	VDS202A17300 WU25PD	T21
4148397	VDS202A17400 WU25PD	T21
4148398	VDS202A17463 WU25PD	T21
4148399	VDS202A17500 WU25PD	T21
4148400	VDS202A17600 WU25PD	T21
4148401	VDS202A17700 WU25PD	T21
4148402	VDS202A17800 WU25PD	T21
4148403	VDS202A17859 WU25PD	T21
4148404	VDS202A17900 WU25PD	T21
4148405	VDS202F10000 WU25PD	T36
4148406	VDS202F10100 WU25PD	T36
4148407	VDS202F10200 WU25PD	T36
4148408	VDS202F10300 WU25PD	T36
4148409	VDS202F10400 WU25PD	T36
4148410	VDS202F10500 WU25PD	T36
4148411	VDS202F10600 WU25PD	T36
4148412	VDS202F10700 WU25PD	T36
4148413	VDS202F03800 WU25PD	T34
4148414	VDS202F03900 WU25PD	T34
4148415	VDS202F04000 WU25PD	T34
4148416	VDS202F04100 WU25PD	T34
4148417	VDS202F04200 WU25PD	T34
4148418	VDS202F04300 WU25PD	T34
4148419	VDS202F04400 WU25PD	T34
4148420	VDS202F04500 WU25PD	T34
4148421	VDS202F04600 WU25PD	T34
4148422	VDS202F04700 WU25PD	T34
4148423	VDS202F04800 WU25PD	T34
4148424	VDS202F04900 WU25PD	T34
4148425	VDS202F05000 WU25PD	T34
4148426	VDS202F05100 WU25PD	T34
4148427	VDS202F05200 WU25PD	T34
4148428	VDS202F05300 WU25PD	T34
4148429	VDS202F05400 WU25PD	T35
4148430	VDS202F05500 WU25PD	T35
4148431	VDS202F05600 WU25PD	T35
4148432	VDS202F05700 WU25PD	T35
4148433	VDS202F05800 WU25PD	T35
4148434	VDS202F05900 WU25PD	T35
4148435	VDS202F06000 WU25PD	T35
4148436	VDS202F06100 WU25PD	T35
4148437	VDS202F06200 WU25PD	T35
4148438	VDS202F06300 WU25PD	T35
4148439	VDS202F06400 WU25PD	T35
4148440	VDS202F06500 WU25PD	T35
4148441	VDS202F06600 WU25PD	T35
4148442	VDS202F06700 WU25PD	T35
4148443	VDS202F06800 WU25PD	T35
4148444	VDS202F06900 WU25PD	T35
4148445	VDS202F07000 WU25PD	T35
4148446	VDS202F07100 WU25PD	T35
4148447	VDS202F07200 WU25PD	T35
4148448	VDS202F07300 WU25PD	T35
4148449	VDS202F07400 WU25PD	T35
4148450	VDS202F07500 WU25PD	T35
4148451	VDS202F07600 WU25PD	T35
4148452	VDS202F07700 WU25PD	T35
4148453	VDS202F07800 WU25PD	T35
4148454	VDS202F07900 WU25PD	T35
4148455	VDS202F08000 WU25PD	T35
4148456	VDS202F08100 WU25PD	T35
4148457	VDS202F08200 WU25PD	T35
4148458	VDS202F08300 WU25PD	T35
4148459	VDS202F08400 WU25PD	T35
4148460	VDS202F08500 WU25PD	T35
4148461	VDS202F08600 WU25PD	T35
4148462	VDS202F08700 WU25PD	T35
4148463	VDS202F08800 WU25PD	T35
4148464	VDS202F08900 WU25PD	T35
4148465	VDS202F09000 WU25PD	T35
4148466	VDS202F09100 WU25PD	T35
4148467	VDS202F09200 WU25PD	T35
4148468	VDS202F09300 WU25PD	T35
4148469	VDS202F09400 WU25PD	T36
4148470	VDS202F09500 WU25PD	T36
4148471	VDS202F09600 WU25PD	T36
4148472	VDS202F09700 WU25PD	T36
4148473	VDS202F09800 WU25PD	T36
4148474	VDS202F09900 WU25PD	T36
4148483	VDS202F10800 WU25PD	T36
4148484	VDS202F10900 WU25PD	T36
4148485	VDS202F11000 WU25PD	T36
4148486	VDS202F11100 WU25PD	T36
4148487	VDS202F11200 WU25PD	T36
4148488	VDS202F11300 WU25PD	T36
4148489	VDS202F11400 WU25PD	T36
4148490	VDS202F11500 WU25PD	T36
4148491	VDS202F11600 WU25PD	T36
4148492	VDS202F11700 WU25PD	T36
4148493	VDS202F11800 WU25PD	T36
4148494	VDS202F11900 WU25PD	T36
4148495	VDS202F12000 WU25PD	T36
4148496	VDS202F12100 WU25PD	T36
4148497	VDS202F12200 WU25PD	T36
4148498	VDS202F12300 WU25PD	T36
4148499	VDS202F12400 WU25PD	T36
4148500	VDS202F12500 WU25PD	T36
4148501	VDS202F12600 WU25PD	T36
4148502	VDS202F12700 WU25PD	T36
4148503	VDS202F12800 WU25PD	T36
4148504	VDS202F12900 WU25PD	T36
4148505	VDS202F13000 WU25PD	T36
4148506	VDS202F13100 WU25PD	T36
4148507	VDS202F13200 WU25PD	T36
4148508	VDS202F13300 WU25PD	T36
4148509	VDS202F13400 WU25PD	T37
4148510	VDS202F13500 WU25PD	T37
4148511	VDS202F13600 WU25PD	T37
4148512	VDS202F13700 WU25PD	T37
4148513	VDS202F13800 WU25PD	T37
4148514	VDS202F13900 WU25PD	T37
4148515	VDS202F14000 WU25PD	T37
4148516	VDS202F14100 WU25PD	T37
4148517	VDS202F14200 WU25PD	T37
4148518	VDS202F14300 WU25PD	T37
4148519	VDS202F14400 WU25PD	T37
4148520	VDS202F14500 WU25PD	T37
4148521	VDS202F14600 WU25PD	T37
4148522	VDS202F14700 WU25PD	T37
4148523	VDS202F14800 WU25PD	T37
4148524	VDS202F14900 WU25PD	T37
4148525	VDS202F15000 WU25PD	T37
4148526	VDS202F15100 WU25PD	T37
4148527	VDS202F15200 WU25PD	T37
4148528	VDS202F15300 WU25PD	T37
4148529	VDS202F15400 WU25PD	T37
4148530	VDS202F15500 WU25PD	T37
4148531	VDS202F15600 WU25PD	T37
4148532	VDS202F15700 WU25PD	T37
4148533	VDS202F15800 WU25PD	T37
4148534	VDS202F15900 WU25PD	T37
4148535	VDS202F16000 WU25PD	T37
4148536	VDS202F16100 WU25PD	T37
4148537	VDS202F16200 WU25PD	T37
4148538	VDS202F16300 WU25PD	T37
4148539	VDS202F16400 WU25PD	T37
4148540	VDS202F16500 WU25PD	T37
4148541	VDS202F16600 WU25PD	T37
4148542	VDS202F16700 WU25PD	T37
4148543	VDS202F16800 WU25PD	T37
4148544	VDS202F16900 WU25PD	T37
4148545	VDS202F17000 WU25PD	T37
4148546	VDS202F17100 WU25PD	T37
4148547	VDS202F17200 WU25PD	T37
4148548	VDS202F17300 WU25PD	T37
4148549	VDS202F17400 WU25PD	T38
4148550	VDS202F17500 WU25PD	T38
4148551	VDS202F17600 WU25PD	T38
4148552	VDS202F17700 WU25PD	T38
4148553	VDS202F17800 WU25PD	T38
4148554	VDS202F17900 WU25PD	T38
4148555	VDS202F18000 WU25PD	T38
4148556	VDS202F18100 WU25PD	T38
4148557	VDS202F18200 WU25PD	T38
4148558	VDS202F18300 WU25PD	T38
4148559	VDS202F18400 WU25PD	T38
4148560	VDS202F18500 WU25PD	T38
4148561	VDS202F18600 WU25PD	T38
4148562	VDS202F18700 WU25PD	T38
4148563	VDS202F18800 WU25PD	T38
4148564	VDS202F18900 WU25PD	T38
4148565	VDS202F19000 WU25PD	T38
4148566	VDS202F19100 WU25PD	T38
4148567	VDS202F19200 WU25PD	T38
4148568	VDS202F19300 WU25PD	T38
4148569	VDS202F19400 WU25PD	T38
4148570	VDS202F19500 WU25PD	T38
4148571	VDS202F19600 WU25PD	T38
4148572	VDS202F19700 WU25PD	T38
4148573	VDS202F19800 WU25PD	T38
4148574	VDS202F19900 WU25PD	T38

Order No.	Catalogue No.	Page(s)
4148575	VDS202F20000 WU25PD	T38
4148906	TDS504A12500 WU20PD	T102
4148908	TDS202A06800 WP20PD	T51
4148983	TDS212A06800 WK15PD	T51
4148984	TDS413A12500 WK15PD	T71
4152113	M1200HD050Z04HN09	H38
4152114	M1200HD050Z05HN09	H38
4152115	M1200HD063Z04HN09	H38
4152116	M1200HD063Z06HN09	H38
4152117	M1200HD080Z05HN09	H38
4152118	M1200HD080Z08HN09	H38
4152119	M1200HD100Z06HN09	H38
4152120	M1200HD100Z08HN09	H38
4152121	M1200HD125Z08HN09	H38
4152122	M1200HD125Z10HN09	H38
4152123	M1200HD160Z09HN09	H38
4152124	M1200HD160Z12HN09	H38
4152638	GT025001 WP31MG	Y33
4152639	GT025002 WP31MG	Y33
4152640	GT025003 WP31MG	Y33
4152641	GT025004 WP31MG	Y33
4152642	GT025005 WP31MG	Y33
4152703	GT025006 WP31MG	Y33
4152704	GT025007 WP31MG	Y33
4152705	GT025008 WP31MG	Y33
4152706	GT025009 WP31MG	Y33
4152707	GT025010 WP31MG	Y33
4152708	GT025011 WP31MG	Y33
4152709	GT025012 WP31MG	Y33
4152710	GT025013 WP31MG	Y33
4152711	GT025014 WP31MG	Y33
4152712	GT025015 WP31MG	Y33
4152713	GT025016 WP31MG	Y33
4152714	GT025017 WP31MG	Y33
4152715	GT025018 WP31MG	Y33
4153679	GT005001 WP31MG	Y10
4153680	GT005002 WP31MG	Y10
4153681	GT005003 WP31MG	Y10
4153682	GT005004 WP31MG	Y10
4153753	GT005005 WP31MG	Y10
4153754	GT005006 WP31MG	Y10
4153755	GT005007 WP31MG	Y10
4153756	GT005008 WP31MG	Y10
4153757	GT005009 WP31MG	Y10
4153758	GT005010 WP31MG	Y10
4153759	GT005011 WP31MG	Y10
4153760	GT005012 WP31MG	Y10
4153761	GT005013 WP31MG	Y10
4153762	GT005014 WP31MG	Y10
4153763	GT005015 WP31MG	Y10
4153764	GT005016 WP31MG	Y10
4153765	GT005017 WP31MG	Y10
4153766	GT005018 WP31MG	Y10
4153906	GT325001 GP6520	Y24
4153907	GT325002 GP6520	Y24
4153908	GT325003 GP6520	Y24
4153909	GT325004 GP6520	Y24
4153910	GT325005 GP6520	Y24
4153911	GT325006 GP6520	Y24
4153912	GT325007 GP6520	Y24
4153953	GT325008 GP6520	Y24
4153954	GT325009 GP6520	Y24
4153955	GT335001 GP6520	Y25
4153956	GT335002 GP6520	Y25
4153957	GT335003 GP6520	Y25
4153958	GT335004 GP6520	Y25
4153959	GT335005 GP6520	Y25
4153960	GT335006 GP6520	Y25
4153961	GT335007 GP6520	Y25
4153962	GT335008 GP6520	Y25
4153963	GT335009 GP6520	Y25
4154254	GT505001 GP6520	Y26
4154255	GT505002 GP6520	Y26
4154256	GT505003 GP6520	Y26
4154257	GT505004 GP6520	Y26
4154258	GT505005 GP6520	Y26
4154259	GT505006 GP6520	Y27
4154260	GT505007 GP6520	Y27
4154261	GT505008 GP6520	Y27
4154262	GT505009 GP6520	Y27
4154263	GT505010 GP6520	Y27
4154264	GT515001 GP6520	Y28
4154265	GT515002 GP6520	Y28
4154266	GT515003 GP6520	Y28
4154267	GT515004 GP6520	Y28
4154268	GT515005 GP6520	Y28
4154269	GT515006 GP6520	Y29
4154270	GT515007 GP6520	Y29
4154271	GT515008 GP6520	Y29
4154272	GT515009 GP6520	Y29
4154273	GT515010 GP6520	Y29
4154274	GT425001 GP6520	Y54
4154275	GT425002 GP6520	Y54
4154276	GT425003 GP6520	Y54
4154277	GT425004 GP6520	Y54
4154278	GT425005 GP6520	Y54
4154279	GT425006 GP6520	Y54
4154280	GT425007 GP6520	Y54
4154281	GT425008 GP6520	Y54
4154282	GT425009 GP6520	Y54
4154283	GT435001 GP6520	Y55
4154284	GT435002 GP6520	Y55
4154285	GT435003 GP6520	Y55
4154286	GT435004 GP6520	Y55
4154287	GT435005 GP6520	Y55
4154288	GT435006 GP6520	Y55
4154289	GT435007 GP6520	Y55
4154290	GT435008 GP6520	Y55
4154291	GT435009 GP6520	Y55
4154671	GT225001 WN38MG	Y62
4154672	GT225002 WN38MG	Y62
4154673	GT225003 WN38MG	Y62
4154674	GT225004 WN38MG	Y62
4154675	GT225005 WN38MG	Y62
4154676	GT225006 WN38MG	Y62
4154677	GT225007 WN38MG	Y62
4154678	GT225008 WN38MG	Y62
4154679	GT225009 WN38MG	Y62
4154680	GT225010 WN38MG	Y62
4154681	GT225011 WN38MG	Y62
4154682	GT225012 WN38MG	Y62
4154683	GT225013 WN38MG	Y62
4154684	GT225014 WN38MG	Y62
4154685	GT225015 WN38MG	Y62
4156562	TDS411A10000 WK15PD	T59
4156602	TDS412A10000 WK15PD	T65
4156603	TDS411A10100 WK15PD	T59
4156604	TDS411A10200 WK15PD	T59
4156605	TDS411A10300 WK15PD	T59
4156606	TDS411A10320 WK15PD	T59
4156607	TDS411A10400 WK15PD	T59
4156608	TDS411A10500 WK15PD	T59
4156609	TDS411A10600 WK15PD	T59
4156610	TDS411A10700 WK15PD	T59
4156611	TDS411A10716 WK15PD	T59
4156612	TDS411A10800 WK15PD	T59
4156613	TDS411A10900 WK15PD	T59
4156614	TDS411A11000 WK15PD	T59
4156615	TDS411A11100 WK15PD	T59
4156616	TDS411A11113 WK15PD	T59
4156617	TDS411A11200 WK15PD	T59
4156618	TDS411A11300 WK15PD	T59
4156619	TDS411A11400 WK15PD	T59
4156620	TDS411A11500 WK15PD	T59
4156621	TDS411A11509 WK15PD	T59
4156622	TDS411A11600 WK15PD	T59
4156623	TDS411A11700 WK15PD	T59
4156624	TDS411A11800 WK15PD	T59
4156625	TDS411A11900 WK15PD	T59
4156626	TDS411A11908 WK15PD	T59
4156627	TDS411A12000 WK15PD	T59
4156628	TDS411A12100 WK15PD	T59
4156629	TDS411A12200 WK15PD	T59
4156630	TDS411A12300 WK15PD	T59
4156631	TDS411A12304 WK15PD	T59
4156632	TDS411A12400 WK15PD	T59
4156633	TDS411A12500 WK15PD	T59
4156634	TDS411A12600 WK15PD	T59
4156635	TDS411A12700 WK15PD	T59
4156636	TDS411A12800 WK15PD	T59
4156637	TDS411A12900 WK15PD	T59
4156638	TDS411A13000 WK15PD	T59
4156639	TDS411A13096 WK15PD	T59
4156640	TDS411A13100 WK15PD	T59
4156641	TDS411A13200 WK15PD	T60
4156642	TDS411A13300 WK15PD	T60
4156643	TDS411A13400 WK15PD	T60
4156644	TDS411A13500 WK15PD	T60
4156645	TDS411A13600 WK15PD	T60
4156646	TDS411A13700 WK15PD	T60
4156647	TDS411A13800 WK15PD	T60
4156648	TDS411A13891 WK15PD	T60
4156649	TDS411A13900 WK15PD	T60
4156650	TDS411A14000 WK15PD	T60
4156651	TDS411A14100 WK15PD	T60
4156652	TDS411A14200 WK15PD	T60
4156653	TDS411A14288 WK15PD	T60
4156654	TDS411A14300 WK15PD	T60
4156655	TDS411A14400 WK15PD	T60
4156656	TDS411A14500 WK15PD	T60
4156657	TDS411A14600 WK15PD	T60
4156658	TDS411A14684 WK15PD	T60
4156659	TDS411A14700 WK15PD	T60
4156660	TDS411A14800 WK15PD	T60
4156661	TDS411A14900 WK15PD	T60
4156662	TDS411A15000 WK15PD	T60
4156663	TDS411A15083 WK15PD	T60
4156664	TDS411A15100 WK15PD	T60
4156665	TDS411A15200 WK15PD	T60
4156666	TDS411A15300 WK15PD	T60
4156667	TDS411A15400 WK15PD	T60
4156668	TDS411A15479 WK15PD	T60
4156669	TDS411A15500 WK15PD	T60
4156670	TDS411A15600 WK15PD	T60
4156671	TDS411A15700 WK15PD	T60
4156672	TDS411A15800 WK15PD	T60
4156673	TDS411A15875 WK15PD	T60
4156674	TDS411A15900 WK15PD	T60
4156675	TDS411A16000 WK15PD	T60
4156676	TDS411A16100 WK15PD	T60
4156677	TDS411A16200 WK15PD	T60
4156678	TDS411A16271 WK15PD	T60
4156679	TDS411A16300 WK15PD	T60
4156680	TDS411A16400 WK15PD	T60
4156681	TDS411A16500 WK15PD	T61
4156682	TDS411A16600 WK15PD	T61
4156683	TDS411A16670 WK15PD	T61
4156684	TDS411A16700 WK15PD	T61
4156685	TDS411A16800 WK15PD	T61
4156686	TDS411A16900 WK15PD	T61
4156687	TDS411A17000 WK15PD	T61
4156688	TDS411A17100 WK15PD	T61
4156689	TDS411A17200 WK15PD	T61
4156690	TDS411A17300 WK15PD	T61
4156691	TDS411A17400 WK15PD	T61
4156692	TDS411A17463 WK15PD	T61
4156693	TDS411A17500 WK15PD	T61
4156694	TDS411A17600 WK15PD	T61
4156695	TDS411A17700 WK15PD	T61
4156696	TDS411A17800 WK15PD	T61
4156697	TDS411A17859 WK15PD	T61
4156698	TDS411A17900 WK15PD	T61
4156699	TDS411A18000 WK15PD	T61
4156700	TDS411A18100 WK15PD	T61
4156701	TDS411A18200 WK15PD	T61
4156702	TDS411A18258 WK15PD	T61
4156713	TDS411A18300 WK15PD	T61
4156714	TDS411A18400 WK15PD	T61
4156715	TDS411A18500 WK15PD	T61
4156716	TDS411A18600 WK15PD	T61
4156717	TDS411A18654 WK15PD	T61
4156718	TDS411A18700 WK15PD	T61
4156719	TDS411A18800 WK15PD	T61
4156720	TDS411A18900 WK15PD	T61
4156721	TDS411A19000 WK15PD	T61
4156722	TDS411A19050 WK15PD	T61
4156723	TDS411A19100 WK15PD	T61
4156724	TDS411A19200 WK15PD	T61
4156725	TDS411A19300 WK15PD	T61
4156726	TDS411A19400 WK15PD	T61
4156727	TDS411A19500 WK15PD	T61
4156728	TDS411A19600 WK15PD	T61
4156729	TDS411A19700 WK15PD	T61
4156730	TDS411A19800 WK15PD	T61
4156731	TDS411A19900 WK15PD	T61
4156732	TDS411A20000 WK15PD	T61
4156733	TDS412A10100 WK15PD	T65
4156734	TDS412A10200 WK15PD	T65
4156735	TDS412A10300 WK15PD	T65
4156736	TDS412A10320 WK15PD	T65
4156737	TDS412A10400 WK15PD	T65
4156738	TDS412A10500 WK15PD	T65
4156739	TDS412A10600 WK15PD	T65
4156740	TDS412A10700 WK15PD	T65
4156741	TDS412A10716 WK15PD	T65
4156742	TDS412A10800 WK15PD	T65
4156743	TDS412A10900 WK15PD	T65
4156744	TDS412A11000 WK15PD	T65
4156745	TDS412A11100 WK15PD	T65
4156746	TDS412A11113 WK15PD	T65
4156747	TDS412A11200 WK15PD	T65
4156748	TDS412A11300 WK15PD	T65
4156749	TDS412A11400 WK15PD	T65
4156750	TDS412A11500 WK15PD	T65

Order No.	Catalogue No.	Page(s)
4156751	TDS412A11509 WK15PD	T65
4156752	TDS412A11600 WK15PD	T65
4156753	TDS412A11700 WK15PD	T65
4156754	TDS412A11800 WK15PD	T65
4156755	TDS412A11900 WK15PD	T65
4156756	TDS412A11908 WK15PD	T65
4156757	TDS412A12000 WK15PD	T65
4156758	TDS412A12100 WK15PD	T65
4156759	TDS412A12200 WK15PD	T65
4156760	TDS412A12300 WK15PD	T65
4156761	TDS412A12304 WK15PD	T65
4156762	TDS412A12400 WK15PD	T65
4156763	TDS412A12500 WK15PD	T65
4156764	TDS412A12600 WK15PD	T65
4156765	TDS412A12700 WK15PD	T65
4156766	TDS412A12800 WK15PD	T65
4156767	TDS412A12900 WK15PD	T65
4156768	TDS412A13000 WK15PD	T65
4156769	TDS412A13096 WK15PD	T65
4156770	TDS412A13100 WK15PD	T65
4156771	TDS412A13200 WK15PD	T66
4156772	TDS412A13300 WK15PD	T66
4156773	TDS412A13400 WK15PD	T66
4156774	TDS412A13500 WK15PD	T66
4156775	TDS412A13600 WK15PD	T66
4156776	TDS412A13700 WK15PD	T66
4156777	TDS412A13800 WK15PD	T66
4156778	TDS412A13891 WK15PD	T66
4156779	TDS412A13900 WK15PD	T66
4156780	TDS412A14000 WK15PD	T66
4156781	TDS412A14100 WK15PD	T66
4156782	TDS412A14200 WK15PD	T66
4156783	TDS412A14288 WK15PD	T66
4156784	TDS412A14300 WK15PD	T66
4156785	TDS412A14400 WK15PD	T66
4156786	TDS412A14500 WK15PD	T66
4156787	TDS412A14600 WK15PD	T66
4156788	TDS412A14684 WK15PD	T66
4156789	TDS412A14700 WK15PD	T66
4156790	TDS412A14800 WK15PD	T66
4156791	TDS412A14900 WK15PD	T66
4156792	TDS412A15000 WK15PD	T66
4156793	TDS412A15083 WK15PD	T66
4156794	TDS412A15100 WK15PD	T66
4156795	TDS412A15200 WK15PD	T66
4156796	TDS412A15300 WK15PD	T66
4156797	TDS412A15400 WK15PD	T66
4156798	TDS412A15479 WK15PD	T66
4156799	TDS412A15500 WK15PD	T66
4156800	TDS412A15600 WK15PD	T66
4156801	TDS412A15700 WK15PD	T66
4156802	TDS412A15800 WK15PD	T66
4156803	TDS412A15875 WK15PD	T66
4156804	TDS412A15900 WK15PD	T66
4156805	TDS412A16000 WK15PD	T66
4156806	TDS412A16100 WK15PD	T66
4156807	TDS412A16200 WK15PD	T66
4156808	TDS412A16271 WK15PD	T66
4156809	TDS412A16300 WK15PD	T66
4156810	TDS412A16400 WK15PD	T66
4156811	TDS412A16500 WK15PD	T67
4156812	TDS412A16600 WK15PD	T67
4156813	TDS412A16670 WK15PD	T67
4156814	TDS412A16700 WK15PD	T67
4156815	TDS412A16800 WK15PD	T67
4156816	TDS412A16900 WK15PD	T67
4156817	TDS412A17000 WK15PD	T67
4156818	TDS412A17100 WK15PD	T67
4156819	TDS412A17200 WK15PD	T67
4156820	TDS412A17300 WK15PD	T67
4156821	TDS412A17400 WK15PD	T67
4156822	TDS412A17463 WK15PD	T67
4156823	TDS412A17500 WK15PD	T67
4156824	TDS412A17600 WK15PD	T67
4156825	TDS412A17700 WK15PD	T67
4156826	TDS412A17800 WK15PD	T67
4156827	TDS412A17859 WK15PD	T67
4156828	TDS412A17900 WK15PD	T67
4156836	TDS413A10000 WK15PD	T70
4156837	TDS413A10100 WK15PD	T70
4156838	TDS413A10200 WK15PD	T70
4156839	TDS413A10300 WK15PD	T71
4156840	TDS413A10320 WK15PD	T71
4156841	TDS413A10400 WK15PD	T71
4156842	TDS413A10500 WK15PD	T71
4156853	TDS412A18000 WK15PD	T67
4156854	TDS412A18100 WK15PD	T67
4156855	TDS412A18200 WK15PD	T67
4156856	TDS412A18258 WK15PD	T67
4156857	TDS412A18300 WK15PD	T67
4156858	TDS412A18400 WK15PD	T67
4156859	TDS412A18500 WK15PD	T67
4156860	TDS412A18600 WK15PD	T67
4156861	TDS412A18654 WK15PD	T67
4156862	TDS412A18700 WK15PD	T67
4156863	TDS412A18800 WK15PD	T67
4156864	TDS412A18900 WK15PD	T67
4156865	TDS412A19000 WK15PD	T67
4156866	TDS412A19050 WK15PD	T67
4156867	TDS412A19100 WK15PD	T67
4156868	TDS412A19200 WK15PD	T67
4156869	TDS412A19300 WK15PD	T67
4156870	TDS412A19400 WK15PD	T67
4156871	TDS412A19500 WK15PD	T67
4156872	TDS412A19600 WK15PD	T67
4156873	TDS412A19700 WK15PD	T67
4156874	TDS412A19800 WK15PD	T67
4156875	TDS412A19900 WK15PD	T67
4156876	TDS412A20000 WK15PD	T67
4156877	TDG534A18000 WN10HD	T138
4156878	TDG534A18100 WN10HD	T138
4156879	TDG534A18200 WN10HD	T138
4156880	TDG534A18258 WN10HD	T138
4156881	TDG534A18300 WN10HD	T138
4156882	TDG534A18400 WN10HD	T138
4156883	TDS413A10600 WK15PD	T71
4156884	TDS413A10700 WK15PD	T71
4156885	TDS413A10716 WK15PD	T71
4156886	TDS413A10800 WK15PD	T71
4156887	TDS413A10900 WK15PD	T71
4156888	TDS413A11000 WK15PD	T71
4156889	TDS413A11100 WK15PD	T71
4156890	TDS413A11113 WK15PD	T71
4156891	TDS413A11200 WK15PD	T71
4156892	TDS413A11300 WK15PD	T71
4156893	TDS413A11400 WK15PD	T71
4156894	TDS413A11500 WK15PD	T71
4156895	TDS413A11509 WK15PD	T71
4156896	TDS413A11600 WK15PD	T71
4156897	TDS413A11700 WK15PD	T71
4156898	TDS413A11800 WK15PD	T71
4156899	TDS413A11900 WK15PD	T71
4156900	TDS413A11908 WK15PD	T71
4156901	TDS413A12000 WK15PD	T71
4156902	TDS413A12100 WK15PD	T71
4156903	TDS413A12200 WK15PD	T71
4156904	TDS413A12300 WK15PD	T71
4156905	TDS413A12304 WK15PD	T71
4156906	TDS413A12400 WK15PD	T71
4156907	TDS413A12600 WK15PD	T71
4156908	TDS413A12700 WK15PD	T71
4156909	TDS413A12800 WK15PD	T71
4156910	TDS413A12900 WK15PD	T71
4156911	TDS413A13000 WK15PD	T71
4156912	TDS413A13096 WK15PD	T71
4156913	TDS413A13100 WK15PD	T71
4156914	TDS413A13200 WK15PD	T71
4156915	TDS413A13300 WK15PD	T71
4156916	TDS413A13400 WK15PD	T71
4156917	TDS413A13500 WK15PD	T71
4156918	TDS413A13600 WK15PD	T72
4156919	TDS413A13700 WK15PD	T72
4156920	TDS413A13800 WK15PD	T72
4156921	TDS413A13891 WK15PD	T72
4156922	TDS413A13900 WK15PD	T72
4156923	TDS413A14000 WK15PD	T72
4156924	TDS413A14100 WK15PD	T72
4156925	TDS413A14200 WK15PD	T72
4156926	TDS413A14288 WK15PD	T72
4156927	TDS413A14300 WK15PD	T72
4156928	TDS413A14400 WK15PD	T72
4156929	TDS413A14500 WK15PD	T72
4156930	TDS413A14600 WK15PD	T72
4156931	TDS413A14684 WK15PD	T72
4156932	TDS413A14700 WK15PD	T72
4156933	TDS413A14800 WK15PD	T72
4156934	TDS413A14900 WK15PD	T72
4156935	TDS413A15000 WK15PD	T72
4156936	TDS413A15083 WK15PD	T72
4156937	TDS413A15100 WK15PD	T72
4156938	TDS413A15200 WK15PD	T72
4156939	TDS413A15300 WK15PD	T72
4156940	TDS413A15400 WK15PD	T72
4156941	TDS413A15479 WK15PD	T72
4156942	TDS413A15500 WK15PD	T72
4156943	TDS413A15600 WK15PD	T72
4156944	TDS413A15700 WK15PD	T72
4156945	TDS413A15800 WK15PD	T72
4156946	TDS413A15875 WK15PD	T72
4156947	TDS413A15900 WK15PD	T72
4156948	TDS413A16000 WK15PD	T72
4156949	TDS413A16100 WK15PD	T72
4156950	TDS413A16200 WK15PD	T72
4156951	TDS413A16271 WK15PD	T72
4156952	TDS413A16300 WK15PD	T72
4156953	TDS413A16400 WK15PD	T72
4156954	TDS413A16500 WK15PD	T72
4156955	TDS413A16600 WK15PD	T72
4156956	TDS413A16670 WK15PD	T72
4156957	TDS413A16700 WK15PD	T72
4156958	TDS413A16800 WK15PD	T73
4156959	TDS413A16900 WK15PD	T73
4156960	TDS413A17000 WK15PD	T73
4156961	TDS413A17100 WK15PD	T73
4156962	TDS413A17200 WK15PD	T73
4156963	TDS413A17300 WK15PD	T73
4156964	TDS413A17400 WK15PD	T73
4156965	TDS413A17463 WK15PD	T73
4156966	TDS413A17500 WK15PD	T73
4156967	TDS413A17600 WK15PD	T73
4156968	TDS413A17700 WK15PD	T73
4156969	TDS413A17800 WK15PD	T73
4156970	TDS413A17859 WK15PD	T73
4156971	TDS413A17900 WK15PD	T73
4156972	TDS413A03000 WK15PD	T68
4156973	TDG534A18500 WN10HD	T138
4156974	TDG534A18600 WN10HD	T138
4156975	TDG534A18654 WN10HD	T138
4156976	TDG534A18700 WN10HD	T138
4156977	TDG534A18800 WN10HD	T138
4156978	TDG534A18900 WN10HD	T138
4156979	TDG534A19000 WN10HD	T138
4156980	TDG534A19050 WN10HD	T138
4156981	TDG534A19100 WN10HD	T138
4156982	TDG534A19200 WN10HD	T138
4156983	TDG534A19300 WN10HD	T138
4156984	TDG534A19400 WN10HD	T138
4156985	TDG534A19500 WN10HD	T138
4156986	TDG534A19600 WN10HD	T138
4156987	TDG534A19700 WN10HD	T138
4156988	TDG534A19800 WN10HD	T138
4156989	TDG534A19900 WN10HD	T138
4156990	TDG534A20000 WN10HD	T138
4156993	TDS413A03048 WK15PD	T68
4156994	TDS413A03100 WK15PD	T68
4156995	TDS413A03175 WK15PD	T68
4156996	TDS413A03200 WK15PD	T68
4156997	TDS413A03264 WK15PD	T68
4156998	TDS413A03300 WK15PD	T68
4156999	TDS413A03400 WK15PD	T68
4157000	TDS413A03455 WK15PD	T68
4157001	TDS413A03500 WK15PD	T68
4157002	TDS413A03571 WK15PD	T68
4157003	TDS413A03600 WK15PD	T68
4157004	TDS413A03658 WK15PD	T68
4157005	TDS413A03700 WK15PD	T68
4157006	TDS413A03734 WK15PD	T68
4157007	TDS413A03800 WK15PD	T68
4157008	TDS413A03900 WK15PD	T68
4157009	TDS413A03970 WK15PD	T68
4157010	TDS413A04000 WK15PD	T68
4157011	TDS413A04039 WK15PD	T68
4157012	TDS413A04090 WK15PD	T68
4157013	TDS413A04100 WK15PD	T68
4157014	TDS413A04200 WK15PD	T68
4157015	TDS413A04217 WK15PD	T68
4157016	TDS413A04300 WK15PD	T68
4157017	TDS413A04366 WK15PD	T68
4157018	TDS413A04400 WK15PD	T68
4157019	TDS413A04500 WK15PD	T68
4157020	TDS413A04600 WK15PD	T69
4157021	TDS413A04623 WK15PD	T69
4157022	TDS413A04700 WK15PD	T69
4157023	TDS413A04763 WK15PD	T69
4157024	TDS413A04800 WK15PD	T69
4157025	TDS413A04852 WK15PD	T69
4157026	TDS413A04900 WK15PD	T69
4157027	TDS413A05000 WK15PD	T69
4157028	TDS413A05100 WK15PD	T69
4157029	TDS413A05106 WK15PD	T69
4157030	TDS413A05159 WK15PD	T69
4157031	TDS413A05200 WK15PD	T69
4157032	TDS413A05300 WK15PD	T69
4157033	TDS413A05400 WK15PD	T69

Order No.	Catalogue No.	Page(s)
4157034	TDS413A05410 WK15PD	T69
4157035	TDS413A05500 WK15PD	T69
4157036	TDS413A05558 WK15PD	T69
4157037	TDS413A05600 WK15PD	T69
4157038	TDS413A05616 WK15PD	T69
4157039	TDS413A05700 WK15PD	T69
4157040	TDS413A05800 WK15PD	T69
4157041	TDS413A05900 WK15PD	T69
4157042	TDS413A05954 WK15PD	T69
4157043	TDS413A06000 WK15PD	T69
4157044	TDS413A06100 WK15PD	T69
4157045	TDS413A06200 WK15PD	T69
4157046	TDS413A06300 WK15PD	T69
4157047	TDS413A06350 WK15PD	T69
4157048	TDS413A06400 WK15PD	T69
4157049	TDS413A06500 WK15PD	T69
4157050	TDS413A06528 WK15PD	T69
4157051	TDS413A06600 WK15PD	T69
4157052	TDS413A06630 WK15PD	T69
4157053	TDS413A06700 WK15PD	T69
4157054	TDS413A06746 WK15PD	T69
4157055	TDS413A06800 WK15PD	T69
4157056	TDS413A06900 WK15PD	T69
4157057	TDS413A07000 WK15PD	T69
4157058	TDS413A07100 WK15PD	T69
4157059	TDS413A07145 WK15PD	T69
4157060	TDS413A07200 WK15PD	T70
4157061	TDS413A07300 WK15PD	T70
4157062	TDS413A07400 WK15PD	T70
4157063	TDS413A07500 WK15PD	T70
4157064	TDS413A07541 WK15PD	T70
4157065	TDS413A07600 WK15PD	T70
4157066	TDS413A07700 WK15PD	T70
4157067	TDS413A07800 WK15PD	T70
4157068	TDS413A07900 WK15PD	T70
4157069	TDS413A07938 WK15PD	T70
4157070	TDS413A08000 WK15PD	T70
4157071	TDS413A08100 WK15PD	T70
4157072	TDS413A08200 WK15PD	T70
4157073	TDS413A08300 WK15PD	T70
4157074	TDS413A08334 WK15PD	T70
4157075	TDS413A08400 WK15PD	T70
4157076	TDS413A08433 WK15PD	T70
4157077	TDS413A08500 WK15PD	T70
4157078	TDS413A08600 WK15PD	T70
4157079	TDS413A08700 WK15PD	T70
4157080	TDS413A08733 WK15PD	T70
4157081	TDS413A08800 WK15PD	T70
4157082	TDS413A08900 WK15PD	T70
4157083	TDS413A09000 WK15PD	T70
4157084	TDS413A09100 WK15PD	T70
4157085	TDS413A09129 WK15PD	T70
4157086	TDS413A09200 WK15PD	T70
4157087	TDS413A09300 WK15PD	T70
4157088	TDS413A09347 WK15PD	T70
4157089	TDS413A09400 WK15PD	T70
4157090	TDS413A09500 WK15PD	T70
4157091	TDS413A09525 WK15PD	T70
4157092	TDS413A09600 WK15PD	T70
4157093	TDS413A09700 WK15PD	T70
4157094	TDS413A09800 WK15PD	T70
4157095	TDS413A09900 WK15PD	T70
4157096	TDS413A09921 WK15PD	T70
4157206	TDS413A18000 WK15PD	T73
4157207	TDS413A18100 WK15PD	T73
4157208	TDS413A18200 WK15PD	T73
4157209	TDS413A18258 WK15PD	T73
4157210	TDS413A18300 WK15PD	T73
4157211	TDS413A18400 WK15PD	T73
4157212	TDS413A18500 WK15PD	T73
4157253	TDS413A18600 WK15PD	T73
4157254	TDS413A18654 WK15PD	T73
4157255	TDS413A18700 WK15PD	T73
4157256	TDS413A18800 WK15PD	T73
4157257	TDS413A18900 WK15PD	T73
4157258	TDS413A19000 WK15PD	T73
4157259	TDS413A19050 WK15PD	T73
4157260	TDS413A19100 WK15PD	T73
4157261	TDS413A19200 WK15PD	T73
4157262	TDS413A19300 WK15PD	T73
4157263	TDS413A19400 WK15PD	T73
4157264	TDS413A19500 WK15PD	T73
4157265	TDS413A19600 WK15PD	T73
4157266	TDS413A19700 WK15PD	T73
4157267	TDS413A19800 WK15PD	T73
4157268	TDS413A19900 WK15PD	T73
4157269	TDS413A20000 WK15PD	T73
4157333	TDG533A18000 WN10HD	T132
4157334	TDG533A18100 WN10HD	T132
4157335	TDG533A18200 WN10HD	T132
4157336	TDG533A18258 WN10HD	T132
4157337	TDG533A18300 WN10HD	T132
4157338	TDG533A18400 WN10HD	T132
4157339	TDG533A18500 WN10HD	T132
4157340	TDG533A18600 WN10HD	T132
4157341	TDG533A18654 WN10HD	T132
4157342	TDG533A18700 WN10HD	T132
4157343	TDG533A18800 WN10HD	T132
4157344	TDG533A18900 WN10HD	T132
4157345	TDG533A19000 WN10HD	T132
4157346	TDG533A19050 WN10HD	T132
4157347	TDG533A19100 WN10HD	T132
4157348	TDG533A19200 WN10HD	T132
4157349	TDG533A19300 WN10HD	T132
4157350	TDG533A19400 WN10HD	T132
4157351	TDG533A19500 WN10HD	T132
4157352	TDG533A19600 WN10HD	T132
4157353	TDG533A19700 WN10HD	T132
4157354	TDG533A19800 WN10HD	T132
4157355	TDG533A19900 WN10HD	T132
4157356	TDG533A20000 WN10HD	T132
4157357	TDG534A03000 WN10HD	T133
4157358	TDG534A03048 WN10HD	T133
4157359	TDG534A03100 WN10HD	T133
4157360	TDG534A03175 WN10HD	T133
4157361	TDG534A03200 WN10HD	T133
4157362	TDG534A03264 WN10HD	T133
4157363	TDG534A03300 WN10HD	T133
4157364	TDG534A03400 WN10HD	T133
4157365	TDG534A03455 WN10HD	T133
4157366	TDG534A03500 WN10HD	T133
4157367	TDG534A03571 WN10HD	T133
4157368	TDG534A03600 WN10HD	T133
4157369	TDG534A03658 WN10HD	T133
4157370	TDG534A03700 WN10HD	T133
4157371	TDG534A03734 WN10HD	T133
4157372	TDG534A03800 WN10HD	T133
4157373	TDG534A03900 WN10HD	T133
4157374	TDG534A03970 WN10HD	T133
4157375	TDG534A04000 WN10HD	T133
4157376	TDG534A04039 WN10HD	T133
4157377	TDG534A04090 WN10HD	T133
4157378	TDG534A04100 WN10HD	T133
4157379	TDG534A04200 WN10HD	T133
4157380	TDG534A04217 WN10HD	T133
4157381	TDG534A04300 WN10HD	T134
4157382	TDG534A04366 WN10HD	T134
4157383	TDG534A04400 WN10HD	T134
4157384	TDG534A04500 WN10HD	T134
4157385	TDG534A04600 WN10HD	T134
4157386	TDG534A04623 WN10HD	T134
4157387	TDG534A04700 WN10HD	T134
4157388	TDG534A04763 WN10HD	T134
4157389	TDG534A04800 WN10HD	T134
4157390	TDG534A04852 WN10HD	T134
4157391	TDG534A04900 WN10HD	T134
4157392	TDG534A05000 WN10HD	T134
4157393	TDG534A05100 WN10HD	T134
4157394	TDG534A05106 WN10HD	T134
4157395	TDG534A05159 WN10HD	T134
4157396	TDG534A05200 WN10HD	T134
4157397	TDG534A05300 WN10HD	T134
4157398	TDG534A05400 WN10HD	T134
4157399	TDG534A05410 WN10HD	T134
4157400	TDG534A05500 WN10HD	T134
4157401	TDG534A05558 WN10HD	T134
4157402	TDG534A05600 WN10HD	T134
4157403	TDG534A05616 WN10HD	T134
4157404	TDG534A05700 WN10HD	T134
4157405	TDG534A05800 WN10HD	T134
4157406	TDG534A05900 WN10HD	T134
4157407	TDG534A05954 WN10HD	T134
4157408	TDG534A06000 WN10HD	T134
4157409	TDG534A06100 WN10HD	T134
4157410	TDG534A06200 WN10HD	T134
4157411	TDG534A06300 WN10HD	T134
4157412	TDG534A06350 WN10HD	T134
4157413	TDG534A06400 WN10HD	T134
4157414	TDG534A06500 WN10HD	T134
4157415	TDG534A06528 WN10HD	T134
4157416	TDG534A06600 WN10HD	T134
4157417	TDG534A06630 WN10HD	T134
4157418	TDG534A06700 WN10HD	T134
4157419	TDG534A06746 WN10HD	T134
4157420	TDG534A06800 WN10HD	T134
4157421	TDG534A06900 WN10HD	T135
4157422	TDG534A07000 WN10HD	T135
4157423	TDG534A07100 WN10HD	T135
4157424	TDG534A07145 WN10HD	T135
4157425	TDG534A07200 WN10HD	T135
4157426	TDG534A07300 WN10HD	T135
4157427	TDG534A07400 WN10HD	T135
4157428	TDG534A07500 WN10HD	T135
4157429	TDG534A07541 WN10HD	T135
4157430	TDG534A07600 WN10HD	T135
4157431	TDG534A07700 WN10HD	T135
4157432	TDG534A07800 WN10HD	T135
4157433	TDG534A07900 WN10HD	T135
4157434	TDG534A07938 WN10HD	T135
4157435	TDG534A08000 WN10HD	T135
4157436	TDG534A08100 WN10HD	T135
4157437	TDG534A08200 WN10HD	T135
4157438	TDG534A08300 WN10HD	T135
4157439	TDG534A08334 WN10HD	T135
4157440	TDG534A08400 WN10HD	T135
4157441	TDG534A08433 WN10HD	T135
4157442	TDG534A08500 WN10HD	T135
4157443	TDG534A08600 WN10HD	T135
4157444	TDG534A08700 WN10HD	T135
4157445	TDG534A08733 WN10HD	T135
4157446	TDG534A08800 WN10HD	T135
4157447	TDG534A08900 WN10HD	T135
4157448	TDG534A09000 WN10HD	T135
4157449	TDG534A09100 WN10HD	T135
4157450	TDG534A09129 WN10HD	T135
4157451	TDG534A09200 WN10HD	T135
4157452	TDG534A09300 WN10HD	T135
4157453	TDG534A09347 WN10HD	T135
4157454	TDG534A09400 WN10HD	T135
4157455	TDG534A09500 WN10HD	T135
4157456	TDG534A09525 WN10HD	T135
4157457	TDG534A09600 WN10HD	T135
4157458	TDG534A09700 WN10HD	T135
4157459	TDG534A09800 WN10HD	T135
4157460	TDG534A09900 WN10HD	T135
4157461	TDG534A09921 WN10HD	T136
4157476	TDG534A10000 WN10HD	T136
4157555	TDG534A10100 WN10HD	T136
4157556	TDG534A10200 WN10HD	T136
4157557	TDG534A10300 WN10HD	T136
4157558	TDG534A10320 WN10HD	T136
4157559	TDG534A10400 WN10HD	T136
4157560	TDG534A10500 WN10HD	T136
4157561	TDG534A10600 WN10HD	T136
4157562	TDG534A10700 WN10HD	T136
4157583	TDG534A10716 WN10HD	T136
4157584	TDG534A10800 WN10HD	T136
4157585	TDG534A10900 WN10HD	T136
4157586	TDG534A11000 WN10HD	T136
4157587	TDG534A11100 WN10HD	T136
4157588	TDG534A11113 WN10HD	T136
4157589	TDG534A11200 WN10HD	T136
4157590	TDG534A11300 WN10HD	T136
4157591	TDG534A11400 WN10HD	T136
4157592	TDG534A11500 WN10HD	T136
4157593	TDG534A11509 WN10HD	T136
4157594	TDG534A11600 WN10HD	T136
4157595	TDG534A11700 WN10HD	T136
4157596	TDG534A11800 WN10HD	T136
4157597	TDG534A11900 WN10HD	T136
4157598	TDG534A11908 WN10HD	T136
4157599	TDG534A12000 WN10HD	T136
4157600	TDG534A12100 WN10HD	T136
4157601	TDG534A12200 WN10HD	T136
4157602	TDG534A12300 WN10HD	T136
4157603	TDG534A12304 WN10HD	T136
4157604	TDG534A12400 WN10HD	T136
4157605	TDG534A12500 WN10HD	T136
4157606	TDG534A12600 WN10HD	T136
4157607	TDG534A12700 WN10HD	T136
4157608	TDG534A12800 WN10HD	T136
4157609	TDG534A12900 WN10HD	T136
4157610	TDG534A13000 WN10HD	T136
4157611	TDG534A13096 WN10HD	T136
4157612	TDG534A13100 WN10HD	T136
4157613	TDG534A13200 WN10HD	T137
4157614	TDG534A13300 WN10HD	T137
4157615	TDG534A13400 WN10HD	T137
4157616	TDG534A13500 WN10HD	T137
4157617	TDG534A13600 WN10HD	T137
4157618	TDG534A13700 WN10HD	T137
4157619	TDG534A13800 WN10HD	T137
4157620	TDG534A13891 WN10HD	T137
4157621	TDG534A13900 WN10HD	T137

Order No.	Catalogue No.	Page(s)
4157622	TDG534A14000 WN10HD	T137
4157623	TDG534A14100 WN10HD	T137
4157624	TDG534A14200 WN10HD	T137
4157625	TDG534A14288 WN10HD	T137
4157626	TDG534A14300 WN10HD	T137
4157627	TDG534A14400 WN10HD	T137
4157628	TDG534A14500 WN10HD	T137
4157629	TDG534A14600 WN10HD	T137
4157630	TDG534A14684 WN10HD	T137
4157631	TDG534A14700 WN10HD	T137
4157632	TDG534A14800 WN10HD	T137
4157633	TDG534A14900 WN10HD	T137
4157634	TDG534A15000 WN10HD	T137
4157635	TDG534A15083 WN10HD	T137
4157636	TDG534A15100 WN10HD	T137
4157637	TDG534A15200 WN10HD	T137
4157638	TDG534A15300 WN10HD	T137
4157639	TDG534A15400 WN10HD	T137
4157640	TDG534A15479 WN10HD	T137
4157641	TDG534A15500 WN10HD	T137
4157642	TDG534A15600 WN10HD	T137
4157643	TDG534A15700 WN10HD	T137
4157644	TDG534A15800 WN10HD	T137
4157645	TDG534A15875 WN10HD	T137
4157646	TDG534A15900 WN10HD	T137
4157647	TDG534A16000 WN10HD	T137
4157648	TDG534A16100 WN10HD	T137
4157649	TDG534A16200 WN10HD	T137
4157650	TDG534A16271 WN10HD	T137
4157651	TDG534A16300 WN10HD	T137
4157652	TDG534A16400 WN10HD	T138
4157653	TDG534A16500 WN10HD	T138
4157654	TDG534A16600 WN10HD	T138
4157655	TDG534A16670 WN10HD	T138
4157656	TDG534A16700 WN10HD	T138
4157657	TDG534A16800 WN10HD	T138
4157658	TDG534A16900 WN10HD	T138
4157659	TDG534A17000 WN10HD	T138
4157660	TDG534A17100 WN10HD	T138
4157661	TDG534A17200 WN10HD	T138
4157662	TDG534A17300 WN10HD	T138
4157663	TDG534A17400 WN10HD	T138
4157664	TDG534A17463 WN10HD	T138
4157665	TDG534A17500 WN10HD	T138
4157666	TDG534A17600 WN10HD	T138
4157667	TDG534A17700 WN10HD	T138
4157668	TDG534A17800 WN10HD	T138
4157669	TDG534A17859 WN10HD	T138
4157670	TDG534A17900 WN10HD	T138
4157671	TDG534A13490 WN10HD	T137
4157799	TDS411A03000 WK15PD	T56
4157800	TDS411A03048 WK15PD	T56
4157801	TDS411A03100 WK15PD	T56
4157802	TDS411A03175 WK15PD	T56
4157803	TDS411A03200 WK15PD	T56
4157804	TDS411A03264 WK15PD	T56
4157805	TDS411A03300 WK15PD	T56
4157806	TDS411A03400 WK15PD	T56
4157807	TDS411A03455 WK15PD	T56
4157808	TDS411A03500 WK15PD	T56
4157809	TDS411A03571 WK15PD	T56
4157810	TDS411A03600 WK15PD	T56
4157811	TDS411A03658 WK15PD	T56
4157812	TDS411A03700 WK15PD	T56
4157813	TDS411A03734 WK15PD	T56
4157814	TDS411A03800 WK15PD	T56
4157815	TDS411A03900 WK15PD	T56
4157816	TDS411A03970 WK15PD	T56
4157817	TDS411A04000 WK15PD	T56
4157818	TDS411A04039 WK15PD	T56
4157819	TDS411A04090 WK15PD	T56
4157820	TDS411A04100 WK15PD	T56
4157821	TDS411A04200 WK15PD	T56
4157822	TDS411A04217 WK15PD	T56
4157823	TDS411A04300 WK15PD	T57
4157824	TDS411A04366 WK15PD	T57
4157825	TDS411A04400 WK15PD	T57
4157826	TDS411A04500 WK15PD	T57
4157827	TDS411A04600 WK15PD	T57
4157828	TDS411A04623 WK15PD	T57
4157829	TDS411A04700 WK15PD	T57
4157830	TDS411A04763 WK15PD	T57
4157831	TDS411A04800 WK15PD	T57
4157832	TDS411A04852 WK15PD	T57
4157833	TDS411A04900 WK15PD	T57
4157834	TDS411A05000 WK15PD	T57
4157835	TDS411A05100 WK15PD	T57
4157836	TDS411A05106 WK15PD	T57
4157837	TDS411A05159 WK15PD	T57
4157838	TDS411A05200 WK15PD	T57
4157839	TDS411A05300 WK15PD	T57
4157840	TDS411A05400 WK15PD	T57
4157841	TDS411A05410 WK15PD	T57
4157842	TDS411A05500 WK15PD	T57
4157843	TDS411A05558 WK15PD	T57
4157844	TDS411A05600 WK15PD	T57
4157845	TDS411A05616 WK15PD	T57
4157846	TDS411A05700 WK15PD	T57
4157847	TDS411A05800 WK15PD	T57
4157848	TDS411A05900 WK15PD	T57
4157849	TDS411A05954 WK15PD	T57
4157850	TDS411A06000 WK15PD	T57
4157851	TDS411A06100 WK15PD	T57
4157852	TDS411A06200 WK15PD	T57
4157853	TDS411A06300 WK15PD	T57
4157854	TDS411A06350 WK15PD	T57
4157855	TDS411A06400 WK15PD	T57
4157856	TDS411A06500 WK15PD	T57
4157857	TDS411A06528 WK15PD	T57
4157858	TDS411A06600 WK15PD	T57
4157859	TDS411A06630 WK15PD	T57
4157860	TDS411A06700 WK15PD	T57
4157861	TDS411A06746 WK15PD	T57
4157862	TDS411A06800 WK15PD	T57
4157863	TDS411A06900 WK15PD	T58
4157864	TDS411A07000 WK15PD	T58
4157865	TDS411A07100 WK15PD	T58
4157866	TDS411A07145 WK15PD	T58
4157867	TDS411A07200 WK15PD	T58
4157868	TDS411A07300 WK15PD	T58
4157869	TDS411A07400 WK15PD	T58
4157870	TDS411A07500 WK15PD	T58
4157871	TDS411A07541 WK15PD	T58
4157872	TDS411A07600 WK15PD	T58
4157873	TDS411A07700 WK15PD	T58
4157874	TDS411A07800 WK15PD	T58
4157875	TDS411A07900 WK15PD	T58
4157876	TDS411A07938 WK15PD	T58
4157877	TDS411A08000 WK15PD	T58
4157878	TDS411A08100 WK15PD	T58
4157879	TDS411A08200 WK15PD	T58
4157880	TDS411A08300 WK15PD	T58
4157881	TDS411A08334 WK15PD	T58
4157882	TDS411A08400 WK15PD	T58
4157883	TDS411A08433 WK15PD	T58
4157884	TDS411A08500 WK15PD	T58
4157885	TDS411A08600 WK15PD	T58
4157886	TDS411A08700 WK15PD	T58
4157887	TDS411A08733 WK15PD	T58
4157888	TDS411A08800 WK15PD	T58
4157889	TDS411A08900 WK15PD	T58
4157890	TDS411A09000 WK15PD	T58
4157891	TDS411A09100 WK15PD	T58
4157892	TDS411A09129 WK15PD	T58
4157893	TDS411A09200 WK15PD	T58
4157894	TDS411A09300 WK15PD	T58
4157895	TDS411A09347 WK15PD	T58
4157896	TDS411A09400 WK15PD	T58
4157897	TDS411A09500 WK15PD	T58
4157898	TDS411A09525 WK15PD	T58
4157899	TDS411A09600 WK15PD	T58
4157900	TDS411A09700 WK15PD	T58
4157901	TDS411A09800 WK15PD	T58
4157902	TDS411A09900 WK15PD	T58
4157903	TDS411A09921 WK15PD	T59
4157950	TDG532A03000 WN10HD	T120
4157951	TDG532A03048 WN10HD	T120
4157952	TDG532A03100 WN10HD	T120
4157973	TDG532A03175 WN10HD	T120
4157974	TDG532A03200 WN10HD	T120
4157975	TDG532A03264 WN10HD	T120
4157976	TDG532A03300 WN10HD	T120
4157977	TDG532A03400 WN10HD	T120
4157978	TDG532A03455 WN10HD	T120
4157979	TDG532A03500 WN10HD	T120
4157980	TDG532A03571 WN10HD	T120
4157981	TDG532A03600 WN10HD	T120
4157982	TDG532A03658 WN10HD	T120
4157983	TDG532A03700 WN10HD	T120
4157984	TDG532A03734 WN10HD	T120
4157985	TDG532A03800 WN10HD	T120
4157986	TDG532A03900 WN10HD	T120
4157987	TDG532A03970 WN10HD	T120
4157988	TDG532A04000 WN10HD	T120
4157989	TDG532A04039 WN10HD	T120
4157990	TDG532A04090 WN10HD	T120
4157991	TDG532A04100 WN10HD	T120
4157992	TDG532A04200 WN10HD	T120
4157993	TDG532A04217 WN10HD	T120
4157994	TDG532A04300 WN10HD	T121
4157995	TDG532A04366 WN10HD	T121
4157996	TDG532A04400 WN10HD	T121
4157997	TDG532A04500 WN10HD	T121
4157998	TDG532A04600 WN10HD	T121
4157999	TDG532A04623 WN10HD	T121
4158000	TDG532A04700 WN10HD	T121
4158001	TDG532A04763 WN10HD	T121
4158002	TDG532A04800 WN10HD	T121
4158003	TDG532A04852 WN10HD	T121
4158004	TDG532A04900 WN10HD	T121
4158005	TDG532A05000 WN10HD	T121
4158006	TDG532A05100 WN10HD	T121
4158007	TDG532A05106 WN10HD	T121
4158008	TDG532A05159 WN10HD	T121
4158009	TDG532A05200 WN10HD	T121
4158010	TDG532A05300 WN10HD	T121
4158011	TDG532A05400 WN10HD	T121
4158012	TDG532A05410 WN10HD	T121
4158013	TDG532A05500 WN10HD	T121
4158014	TDG532A05558 WN10HD	T121
4158015	TDG532A05600 WN10HD	T121
4158016	TDG532A05616 WN10HD	T121
4158017	TDG532A05700 WN10HD	T121
4158018	TDG532A05800 WN10HD	T121
4158019	TDG532A05900 WN10HD	T121
4158020	TDG532A05954 WN10HD	T121
4158021	TDG532A06000 WN10HD	T121
4158022	TDG532A06100 WN10HD	T121
4158023	TDG532A06200 WN10HD	T121
4158024	TDG532A06300 WN10HD	T121
4158025	TDG532A06350 WN10HD	T121
4158026	TDG532A06400 WN10HD	T121
4158027	TDG532A06500 WN10HD	T121
4158028	TDG532A06528 WN10HD	T121
4158029	TDG532A06600 WN10HD	T121
4158030	TDG532A06630 WN10HD	T121
4158031	TDG532A06700 WN10HD	T121
4158032	TDG532A06746 WN10HD	T121
4158033	TDG532A06800 WN10HD	T121
4158034	TDG532A06900 WN10HD	T122
4158035	TDG532A07000 WN10HD	T122
4158036	TDG532A07100 WN10HD	T122
4158037	TDG532A07145 WN10HD	T122
4158038	TDG532A07200 WN10HD	T122
4158039	TDG532A07300 WN10HD	T122
4158040	TDG532A07400 WN10HD	T122
4158041	TDG532A07500 WN10HD	T122
4158042	TDG532A07541 WN10HD	T122
4158043	TDG532A07600 WN10HD	T122
4158044	TDG532A07700 WN10HD	T122
4158045	TDG532A07800 WN10HD	T122
4158046	TDG532A07900 WN10HD	T122
4158047	TDG532A07938 WN10HD	T122
4158048	TDG532A08000 WN10HD	T122
4158049	TDG532A08100 WN10HD	T122
4158050	TDG532A08200 WN10HD	T122
4158051	TDG532A08300 WN10HD	T122
4158052	TDG532A08334 WN10HD	T122
4158053	TDG532A08400 WN10HD	T122
4158054	TDG532A08433 WN10HD	T122
4158055	TDG532A08500 WN10HD	T122
4158056	TDG532A08600 WN10HD	T122
4158057	TDG532A08700 WN10HD	T122
4158058	TDG532A08733 WN10HD	T122
4158059	TDG532A08800 WN10HD	T122
4158060	TDG532A08900 WN10HD	T122
4158061	TDG532A09000 WN10HD	T122
4158062	TDG532A09100 WN10HD	T122
4158063	TDG532A09129 WN10HD	T122
4158064	TDG532A09200 WN10HD	T122
4158065	TDG532A09300 WN10HD	T122
4158066	TDG532A09347 WN10HD	T122
4158067	TDG532A09400 WN10HD	T122
4158068	TDG532A09500 WN10HD	T122
4158069	TDG532A09525 WN10HD	T122
4158070	TDG532A09600 WN10HD	T122
4158071	TDG532A09700 WN10HD	T122
4158072	TDG532A09800 WN10HD	T122
4158073	TDG532A09900 WN10HD	T122
4158074	TDG532A09921 WN10HD	T123
4158081	TDG532A10000 WN10HD	T123
4158082	TDG532A10100 WN10HD	T123
4158323	GX105001 WH16PG	Y46
4158324	GX105002 WH16PG	Y46

Order No.	Catalogue No.	Page(s)
4158325	GX105003 WH16PG	Y46
4158326	GX105004 WH16PG	Y46
4158327	GX105005 WH16PG	Y46
4158328	GX105006 WH16PG	Y46
4158329	GX105007 WH16PG	Y46
4158330	GX105008 WH16PG	Y46
4158331	GX105009 WH16PG	Y46
4158332	GX105010 WH16PG	Y46
4158333	GX105011 WH16PG	Y46
4158334	GX105012 WH16PG	Y46
4158335	GX105013 WH16PG	Y46
4158353	TDG532A10200 WN10HD	T123
4158354	TDG532A10300 WN10HD	T123
4158355	TDG532A10320 WN10HD	T123
4158356	TDG532A10400 WN10HD	T123
4158357	TDG532A10500 WN10HD	T123
4158358	TDG532A10600 WN10HD	T123
4158359	TDG532A10700 WN10HD	T123
4158360	TDG532A10716 WN10HD	T123
4158361	TDG532A10800 WN10HD	T123
4158362	TDG532A10900 WN10HD	T123
4158363	TDG532A11000 WN10HD	T123
4158364	TDG532A11100 WN10HD	T123
4158365	TDG532A11113 WN10HD	T123
4158366	TDG532A11200 WN10HD	T123
4158367	TDG532A11300 WN10HD	T123
4158368	TDG532A11400 WN10HD	T123
4158369	TDG532A11500 WN10HD	T123
4158370	TDG532A11509 WN10HD	T123
4158371	TDG532A11600 WN10HD	T123
4158372	TDG532A11700 WN10HD	T123
4158373	TDG532A11800 WN10HD	T123
4158374	TDG532A11900 WN10HD	T123
4158375	TDG532A11908 WN10HD	T123
4158376	TDG532A12000 WN10HD	T123
4158377	TDG532A12100 WN10HD	T123
4158378	TDG532A12200 WN10HD	T123
4158379	TDG532A12300 WN10HD	T123
4158380	TDG532A12304 WN10HD	T123
4158381	TDG532A12400 WN10HD	T123
4158382	TDG532A12500 WN10HD	T123
4158383	TDG532A12600 WN10HD	T123
4158384	TDG532A12700 WN10HD	T123
4158385	TDG532A12800 WN10HD	T123
4158386	TDG532A12900 WN10HD	T123
4158387	TDG532A13000 WN10HD	T123
4158388	TDG532A13096 WN10HD	T123
4158389	TDG532A13100 WN10HD	T123
4158390	TDG532A13200 WN10HD	T124
4158391	TDG532A13300 WN10HD	T124
4158392	TDG532A13400 WN10HD	T124
4158393	TDG532A13500 WN10HD	T124
4158394	TDG532A13600 WN10HD	T124
4158395	TDG532A13700 WN10HD	T124
4158396	TDG532A13800 WN10HD	T124
4158397	TDG532A13891 WN10HD	T124
4158398	TDG532A13900 WN10HD	T124
4158399	TDG532A14000 WN10HD	T124
4158400	TDG532A14100 WN10HD	T124
4158401	TDG532A14200 WN10HD	T124
4158402	TDG532A14288 WN10HD	T124
4158403	TDG532A14300 WN10HD	T124
4158404	TDG532A14400 WN10HD	T124
4158405	TDG532A14500 WN10HD	T124
4158406	TDG532A14600 WN10HD	T124
4158407	TDG532A14684 WN10HD	T124
4158408	TDG532A14700 WN10HD	T124
4158409	TDG532A14800 WN10HD	T124
4158410	TDG532A14900 WN10HD	T124
4158411	TDG532A15000 WN10HD	T124
4158412	TDG532A15083 WN10HD	T124
4158413	TDG532A15100 WN10HD	T124
4158414	TDG532A15200 WN10HD	T124
4158415	TDG532A15300 WN10HD	T124
4158416	TDG532A15400 WN10HD	T124
4158417	TDG532A15479 WN10HD	T124
4158418	TDG532A15500 WN10HD	T124
4158419	TDG532A15600 WN10HD	T124
4158420	TDG532A15700 WN10HD	T124
4158421	TDG532A15800 WN10HD	T124
4158422	TDG532A15875 WN10HD	T124
4158423	TDG532A15900 WN10HD	T124
4158424	TDG532A16000 WN10HD	T124
4158425	TDG532A16100 WN10HD	T124
4158426	TDG532A16200 WN10HD	T124
4158427	TDG532A16271 WN10HD	T124
4158428	TDG532A16300 WN10HD	T124
4158429	TDG532A16400 WN10HD	T125
4158430	TDG532A16500 WN10HD	T125
4158431	TDG532A16600 WN10HD	T125
4158432	TDG532A16670 WN10HD	T125
4158433	TDG532A16700 WN10HD	T125
4158434	TDG532A16800 WN10HD	T125
4158435	TDG532A16900 WN10HD	T125
4158436	TDG532A17000 WN10HD	T125
4158437	TDG532A17100 WN10HD	T125
4158438	TDG532A17200 WN10HD	T125
4158439	TDG532A17300 WN10HD	T125
4158440	TDG532A17400 WN10HD	T125
4158441	TDG532A17463 WN10HD	T125
4158442	TDG532A17500 WN10HD	T125
4158443	TDG532A17600 WN10HD	T125
4158444	TDG532A17700 WN10HD	T125
4158445	TDG532A17800 WN10HD	T125
4158446	TDG532A17859 WN10HD	T125
4158447	TDG532A17900 WN10HD	T125
4158448	TDG532A13490 WN10HD	T124
4158471	GT045001 WH36MG	Y34
4158472	GT045002 WH36MG	Y34
4158475	TDG533A03000 WN10HD	T127
4158476	TDG533A03048 WN10HD	T127
4158477	TDG533A03100 WN10HD	T127
4158478	TDG533A03175 WN10HD	T127
4158479	TDG533A03200 WN10HD	T127
4158480	TDG533A03264 WN10HD	T127
4158481	TDG533A03300 WN10HD	T127
4158482	TDG533A03400 WN10HD	T127
4158495	GT225016 WP31MG	Y62
4158496	GT225017 WP31MG	Y62
4158497	GT225018 WP31MG	Y62
4158498	GT225019 WP31MG	Y62
4158499	GT225020 WP31MG	Y62
4158500	GT225021 WP31MG	Y62
4158501	GT225022 WP31MG	Y62
4158502	GT225023 WP31MG	Y62
4158513	GT225024 WP31MG	Y62
4158514	GT225025 WP31MG	Y62
4158515	GT225026 WP31MG	Y62
4158516	GT225027 WP31MG	Y62
4158517	GT225028 WP31MG	Y62
4158518	GT225029 WP31MG	Y62
4158519	GT225030 WP31MG	Y62
4158520	TDG533A10000 WN10HD	T130
4158521	TDG533A10100 WN10HD	T130
4158522	TDG533A10200 WN10HD	T130
4158533	TDG533A10300 WN10HD	T130
4158534	TDG533A10320 WN10HD	T130
4158535	TDG533A10400 WN10HD	T130
4158536	TDG533A10500 WN10HD	T130
4158537	TDG533A10600 WN10HD	T130
4158538	TDG533A10700 WN10HD	T130
4158539	TDG533A10716 WN10HD	T130
4158540	TDG533A10800 WN10HD	T130
4158541	TDG533A10900 WN10HD	T130
4158542	TDG533A11000 WN10HD	T130
4158543	TDG533A11100 WN10HD	T130
4158544	TDG533A11113 WN10HD	T130
4158545	TDG533A11200 WN10HD	T130
4158546	TDG533A11300 WN10HD	T130
4158547	TDG533A11400 WN10HD	T130
4158548	TDG533A11500 WN10HD	T130
4158549	TDG533A11509 WN10HD	T130
4158550	TDG533A11600 WN10HD	T130
4158551	TDG533A11700 WN10HD	T130
4158552	TDG533A11800 WN10HD	T130
4158553	TDG533A03455 WN10HD	T127
4158554	TDG533A03500 WN10HD	T127
4158555	TDG532A18000 WN10HD	T125
4158556	TDG533A03571 WN10HD	T127
4158557	TDG532A18100 WN10HD	T125
4158558	TDG533A03600 WN10HD	T127
4158559	TDG532A18200 WN10HD	T125
4158560	TDG533A03658 WN10HD	T127
4158561	TDG532A18258 WN10HD	T125
4158562	TDG533A03700 WN10HD	T127
4158563	TDG533A11900 WN10HD	T130
4158564	TDG533A11908 WN10HD	T130
4158565	TDG533A12000 WN10HD	T130
4158566	TDG533A12100 WN10HD	T130
4158567	TDG533A12200 WN10HD	T130
4158568	TDG533A12300 WN10HD	T130
4158569	TDG533A12304 WN10HD	T130
4158570	TDG533A12400 WN10HD	T130
4158571	TDG533A12500 WN10HD	T130
4158572	TDG533A12600 WN10HD	T130
4158573	TDG532A18300 WN10HD	T125
4158574	TDG533A03734 WN10HD	T127
4158575	TDG532A18400 WN10HD	T125
4158576	TDG533A03800 WN10HD	T127
4158577	TDG532A18500 WN10HD	T125
4158578	TDG533A03900 WN10HD	T127
4158579	TDG532A18600 WN10HD	T125
4158580	TDG533A03970 WN10HD	T127
4158581	TDG532A18654 WN10HD	T125
4158582	TDG533A04000 WN10HD	T127
4158583	TDG533A04039 WN10HD	T127
4158584	TDG532A18700 WN10HD	T125
4158585	TDG532A18800 WN10HD	T125
4158586	TDG533A04090 WN10HD	T127
4158587	TDG532A18900 WN10HD	T125
4158588	TDG533A04100 WN10HD	T127
4158589	TDG532A19000 WN10HD	T125
4158590	TDG533A04200 WN10HD	T127
4158591	TDG532A19050 WN10HD	T125
4158592	TDG533A04217 WN10HD	T127
4158593	TDG533A12700 WN10HD	T130
4158594	TDG533A12800 WN10HD	T130
4158595	TDG533A12900 WN10HD	T130
4158596	TDG533A13000 WN10HD	T130
4158597	TDG533A13096 WN10HD	T130
4158598	TDG533A13100 WN10HD	T130
4158599	TDG533A13200 WN10HD	T131
4158600	TDG533A13300 WN10HD	T131
4158601	TDG533A13400 WN10HD	T131
4158602	TDG533A13500 WN10HD	T131
4158603	TDG532A19100 WN10HD	T125
4158604	TDG533A04300 WN10HD	T128
4158605	TDG532A19200 WN10HD	T125
4158606	TDG533A04366 WN10HD	T128
4158607	TDG532A19300 WN10HD	T125
4158608	TDG533A04400 WN10HD	T128
4158609	TDG532A19400 WN10HD	T125
4158610	TDG533A04500 WN10HD	T128
4158611	TDG532A19500 WN10HD	T125
4158612	TDG533A04600 WN10HD	T128
4158613	TDG532A19600 WN10HD	T125
4158614	TDG533A04623 WN10HD	T128
4158615	TDG533A04700 WN10HD	T128
4158616	TDG532A19700 WN10HD	T125
4158617	TDG533A04763 WN10HD	T128
4158618	TDG532A19800 WN10HD	T126
4158619	TDG533A04800 WN10HD	T128
4158620	TDG532A19900 WN10HD	T126
4158621	TDG533A04852 WN10HD	T128
4158622	TDG532A20000 WN10HD	T126
4158623	TDG533A13600 WN10HD	T131
4158624	TDG533A13700 WN10HD	T131
4158625	TDG533A13800 WN10HD	T131
4158626	TDG533A13891 WN10HD	T131
4158627	TDG533A13900 WN10HD	T131
4158628	TDG533A14000 WN10HD	T131
4158629	TDG533A14100 WN10HD	T131
4158630	TDG533A14200 WN10HD	T131
4158631	TDG533A14288 WN10HD	T131
4158632	TDG533A14300 WN10HD	T131
4158633	TDG533A04900 WN10HD	T128
4158634	TDG532A21000 WN10HD	T126
4158635	TDG533A05000 WN10HD	T128
4158636	TDG532A22000 WN10HD	T126
4158637	TDG532A23000 WN10HD	T126
4158638	TDG533A05100 WN10HD	T128
4158639	TDG533A05106 WN10HD	T128
4158640	TDG533A05159 WN10HD	T128
4158641	TDG533A05200 WN10HD	T128
4158642	TDG533A05300 WN10HD	T128
4158643	TDG533A14400 WN10HD	T131
4158644	TDG533A14500 WN10HD	T131
4158645	TDG533A14600 WN10HD	T131
4158646	TDG533A14684 WN10HD	T131
4158647	TDG533A14700 WN10HD	T131
4158648	TDG533A14800 WN10HD	T131
4158649	TDG533A14900 WN10HD	T131
4158650	TDG533A15000 WN10HD	T131
4158651	TDG533A15083 WN10HD	T131
4158652	TDG533A15100 WN10HD	T131
4158653	TDG533A05400 WN10HD	T128
4158654	TDG533A05410 WN10HD	T128
4158655	TDG533A05500 WN10HD	T128
4158656	TDG533A05558 WN10HD	T128
4158657	TDG533A05600 WN10HD	T128
4158658	TDG533A05616 WN10HD	T128
4158659	TDG533A05700 WN10HD	T128
4158660	TDG533A05800 WN10HD	T128
4158661	TDG533A05900 WN10HD	T128

Order No.	Catalogue No.	Page(s)
4158662	TDG533A05954 WN10HD	T128
4158663	TDG533A15200 WN10HD	T131
4158664	TDG533A15300 WN10HD	T131
4158665	TDG533A15400 WN10HD	T131
4158666	TDG533A15479 WN10HD	T131
4158667	TDG533A15500 WN10HD	T131
4158668	TDG533A15600 WN10HD	T131
4158669	TDG533A15700 WN10HD	T131
4158670	TDG533A15800 WN10HD	T131
4158671	TDG533A15875 WN10HD	T131
4158672	TDG533A15900 WN10HD	T131
4158673	TDG533A06000 WN10HD	T128
4158674	TDG533A06100 WN10HD	T128
4158675	TDG533A06200 WN10HD	T128
4158676	TDG533A06300 WN10HD	T128
4158677	TDG533A06350 WN10HD	T128
4158678	TDG533A06400 WN10HD	T128
4158679	TDG533A06500 WN10HD	T128
4158680	TDG533A06528 WN10HD	T128
4158681	TDG533A06600 WN10HD	T128
4158682	TDG533A06630 WN10HD	T128
4158683	TDG533A16000 WN10HD	T131
4158684	TDG533A16100 WN10HD	T131
4158685	TDG533A16200 WN10HD	T131
4158686	TDG533A16271 WN10HD	T131
4158687	TDG533A16300 WN10HD	T131
4158688	TDG533A16400 WN10HD	T132
4158689	TDG533A16500 WN10HD	T132
4158690	TDG533A16600 WN10HD	T132
4158691	TDG533A16670 WN10HD	T132
4158692	TDG533A16700 WN10HD	T132
4158693	TDG533A06700 WN10HD	T128
4158694	TDG533A06746 WN10HD	T128
4158695	TDG533A06800 WN10HD	T128
4158696	TDG533A06900 WN10HD	T129
4158697	TDG533A07000 WN10HD	T129
4158698	TDG533A07100 WN10HD	T129
4158699	TDG533A07145 WN10HD	T129
4158700	TDG533A07200 WN10HD	T129
4158701	TDG533A07300 WN10HD	T129
4158702	TDG533A07400 WN10HD	T129
4158703	TDG533A16800 WN10HD	T132
4158704	TDG533A16900 WN10HD	T132
4158705	TDG533A17000 WN10HD	T132
4158706	TDG533A17100 WN10HD	T132
4158707	TDG533A17200 WN10HD	T132
4158708	TDG533A17300 WN10HD	T132
4158709	TDG533A17400 WN10HD	T132
4158710	TDG533A17463 WN10HD	T132
4158711	TDG533A17500 WN10HD	T132
4158712	TDG533A17600 WN10HD	T132
4158713	TDG533A07500 WN10HD	T129
4158714	TDG533A07541 WN10HD	T129
4158715	TDG533A07600 WN10HD	T129
4158716	TDG533A07700 WN10HD	T129
4158717	TDG533A07800 WN10HD	T129
4158718	TDG533A07900 WN10HD	T129
4158719	TDG533A07938 WN10HD	T129
4158720	TDG533A08000 WN10HD	T129
4158721	TDG533A08100 WN10HD	T129
4158722	TDG533A08200 WN10HD	T129
4158723	TDG533A17700 WN10HD	T132
4158724	TDG533A17800 WN10HD	T132
4158725	TDG533A17859 WN10HD	T132
4158726	TDG533A17900 WN10HD	T132
4158727	TDG533A13490 WN10HD	T131
4158733	TDG533A08300 WN10HD	T129
4158734	TDG533A08334 WN10HD	T129
4158735	TDG533A08400 WN10HD	T129
4158736	TDG533A08433 WN10HD	T129
4158737	TDG533A08500 WN10HD	T129
4158738	TDG533A08600 WN10HD	T129
4158739	TDG533A08700 WN10HD	T129
4158740	TDG533A08733 WN10HD	T129
4158741	TDG533A08800 WN10HD	T129
4158742	TDG533A08900 WN10HD	T129
4158743	TDG533A09000 WN10HD	T129
4158744	TDG533A09100 WN10HD	T129
4158745	TDG533A09129 WN10HD	T129
4158746	TDG533A09200 WN10HD	T129
4158747	TDG533A09300 WN10HD	T129
4158748	TDG533A09347 WN10HD	T129
4158749	TDG533A09400 WN10HD	T129
4158750	TDG533A09500 WN10HD	T129
4158751	TDG533A09525 WN10HD	T129
4158752	TDG533A09600 WN10HD	T129
4158753	TDG533A09700 WN10HD	T129
4158754	TDG533A09800 WN10HD	T129
4158755	TDG533A09900 WN10HD	T129
4158756	TDG533A09921 WN10HD	T130
4158757	TDS412A03000 WK15PD	T62
4158758	TDS412A03048 WK15PD	T62
4158759	TDS412A03100 WK15PD	T62
4158760	TDS412A03175 WK15PD	T62
4158761	TDS412A03200 WK15PD	T62
4158762	TDS412A03264 WK15PD	T62
4158763	GT045003 WH36MG	Y34
4158764	GT045004 WH36MG	Y34
4158765	GT045005 WH36MG	Y34
4158766	GT045006 WH36MG	Y34
4158767	GT045007 WH36MG	Y34
4158768	GT045008 WH36MG	Y34
4158769	GT045009 WH36MG	Y34
4158770	GT045010 WH36MG	Y34
4158771	GT045011 WH36MG	Y34
4158772	GT045012 WH36MG	Y34
4158773	GT045013 WH36MG	Y34
4158774	GT045014 WH36MG	Y34
4158775	GT045015 WH36MG	Y34
4158776	GT045016 WH36MG	Y34
4158777	GT045017 WH36MG	Y34
4158778	GT045018 WH36MG	Y34
4158793	TDS412A03300 WK15PD	T62
4158794	TDS412A03400 WK15PD	T62
4158795	TDS412A03455 WK15PD	T62
4158796	TDS412A03500 WK15PD	T62
4158797	TDS412A03571 WK15PD	T62
4158798	TDS412A03600 WK15PD	T62
4158799	TDS412A03658 WK15PD	T62
4158800	TDS412A03700 WK15PD	T62
4158801	TDS412A03734 WK15PD	T62
4158802	TDS412A03800 WK15PD	T62
4158803	TDS412A03900 WK15PD	T62
4158804	TDS412A03970 WK15PD	T62
4158805	TDS412A04000 WK15PD	T62
4158806	TDS412A04039 WK15PD	T62
4158807	TDS412A04090 WK15PD	T62
4158808	TDS412A04100 WK15PD	T62
4158809	TDS412A04200 WK15PD	T62
4158810	TDS412A04217 WK15PD	T62
4158811	TDS412A04300 WK15PD	T63
4158812	TDS412A04366 WK15PD	T63
4158813	TDS412A04400 WK15PD	T63
4158814	TDS412A04500 WK15PD	T63
4158815	TDS412A04600 WK15PD	T63
4158816	TDS412A04623 WK15PD	T63
4158817	TDS412A04700 WK15PD	T63
4158818	TDS412A04763 WK15PD	T63
4158819	TDS412A04800 WK15PD	T63
4158820	TDS412A04852 WK15PD	T63
4158821	TDS412A04900 WK15PD	T63
4158822	TDS412A05000 WK15PD	T63
4158823	TDS412A05100 WK15PD	T63
4158824	TDS412A05106 WK15PD	T63
4158825	TDS412A05159 WK15PD	T63
4158826	TDS412A05200 WK15PD	T63
4158827	TDS412A05300 WK15PD	T63
4158828	TDS412A05400 WK15PD	T63
4158829	TDS412A05410 WK15PD	T63
4158830	TDS412A05500 WK15PD	T63
4158831	TDS412A05558 WK15PD	T63
4158832	TDS412A05600 WK15PD	T63
4158833	TDS412A05616 WK15PD	T63
4158834	TDS412A05700 WK15PD	T63
4158835	TDS412A05800 WK15PD	T63
4158836	TDS412A05900 WK15PD	T63
4158837	TDS412A05954 WK15PD	T63
4158838	TDS412A06000 WK15PD	T63
4158839	TDS412A06100 WK15PD	T63
4158840	TDS412A06200 WK15PD	T63
4158841	TDS412A06300 WK15PD	T63
4158842	TDS412A06350 WK15PD	T63
4158843	TDS412A06400 WK15PD	T63
4158844	TDS412A06500 WK15PD	T63
4158845	TDS412A06528 WK15PD	T63
4158846	TDS412A06600 WK15PD	T63
4158847	TDS412A06630 WK15PD	T63
4158848	TDS412A06700 WK15PD	T63
4158849	TDS412A06746 WK15PD	T63
4158850	TDS412A06800 WK15PD	T63
4158851	TDS412A06900 WK15PD	T64
4158852	TDS412A07000 WK15PD	T64
4158853	TDS412A07100 WK15PD	T64
4158854	TDS412A07145 WK15PD	T64
4158855	TDS412A07200 WK15PD	T64
4158856	TDS412A07300 WK15PD	T64
4158857	TDS412A07400 WK15PD	T64
4158858	TDS412A07500 WK15PD	T64
4158859	TDS412A07541 WK15PD	T64
4158860	TDS412A07600 WK15PD	T64
4158861	TDS412A07700 WK15PD	T64
4158862	TDS412A07800 WK15PD	T64
4158863	TDS412A07900 WK15PD	T64
4158864	TDS412A07938 WK15PD	T64
4158865	TDS412A08000 WK15PD	T64
4158866	TDS412A08100 WK15PD	T64
4158867	TDS412A08200 WK15PD	T64
4158868	TDS412A08300 WK15PD	T64
4158869	TDS412A08334 WK15PD	T64
4158870	TDS412A08400 WK15PD	T64
4158871	TDS412A08433 WK15PD	T64
4158872	TDS412A08500 WK15PD	T64
4158873	TDS412A08600 WK15PD	T64
4158874	TDS412A08700 WK15PD	T64
4158875	TDS412A08733 WK15PD	T64
4158876	TDS412A08800 WK15PD	T64
4158877	TDS412A08900 WK15PD	T64
4158878	TDS412A09000 WK15PD	T64
4158879	TDS412A09100 WK15PD	T64
4158880	TDS412A09129 WK15PD	T64
4158881	TDS412A09200 WK15PD	T64
4158882	TDS412A09300 WK15PD	T64
4158883	TDS412A09347 WK15PD	T64
4158884	TDS412A09400 WK15PD	T64
4158885	TDS412A09500 WK15PD	T64
4158886	TDS412A09525 WK15PD	T64
4158887	TDS412A09600 WK15PD	T64
4158888	TDS412A09700 WK15PD	T64
4158889	TDS412A09800 WK15PD	T64
4158890	TDS412A09900 WK15PD	T64
4158891	TDS412A09921 WK15PD	T65
4159017	M4000CA-HN07HF	H73
4159018	M4000CA-HN07HD	H73
4159019	M4000CA-HN09HD	H73
4159020	M4000CA-AP1003	H73
4159021	M4000CA-AP1604	H73
4159022	M4000CA-AD1505	H73
4159522	GT235001 WN38MG	Y63
4159636	GT125001 WS32MG	Y30
4159637	GT125002 WS32MG	Y30
4159638	GT125003 WS32MG	Y30
4159639	GT125004 WS32MG	Y30
4159640	GT125005 WS32MG	Y30
4159641	GT125006 WS32MG	Y30
4159642	GT125007 WS32MG	Y30
4159644	GT235002 WN38MG	Y63
4159645	GT235003 WN38MG	Y63
4159646	GT235004 WN38MG	Y63
4159647	GT235005 WN38MG	Y63
4159648	GT235006 WN38MG	Y63
4159649	GT235007 WN38MG	Y63
4159650	GT235008 WN38MG	Y63
4159651	GT235009 WN38MG	Y63
4159652	GT235010 WN38MG	Y63
4159653	GT235011 WN38MG	Y63
4159663	GT125008 WS32MG	Y30
4159664	GT125009 WS32MG	Y30
4159665	GT125010 WS32MG	Y30
4159913	GT065001 WS32MG	Y56
4159914	GT065002 WS32MG	Y56
4159915	GT065003 WS32MG	Y56
4159916	GT065004 WS32MG	Y56
4159917	GT065005 WS32MG	Y56
4159918	GT065006 WS32MG	Y56
4159919	GT065007 WS32MG	Y56
4159920	GT065008 WS32MG	Y56
4159921	GT065009 WS32MG	Y56
4159922	GT065010 WS32MG	Y56
4159965	GT235012 WP31MG	Y63
4159966	GT235013 WP31MG	Y63
4159967	GT235014 WP31MG	Y63
4159968	GT235015 WP31MG	Y63
4159969	GT235016 WP31MG	Y63
4159970	GT235017 WP31MG	Y63
4159971	GT235018 WP31MG	Y63
4159972	GT235019 WP31MG	Y63
4159993	GT235020 WP31MG	Y63
4159994	GT235021 WP31MG	Y63
4159995	GT235022 WP31MG	Y63
4160036	GT705001 WN48EG	Y9
4160037	GT705002 WN48EG	Y9
4160038	GT705003 WN48EG	Y9
4160039	GT705004 WN48EG	Y9
4160040	GT705005 WN48EG	Y9

Order No.	Catalogue No.	Page(s)
4160041	GT705006 WN48EG	Y9
4160042	GT705007 WN48EG	Y9
4160054	GT805001 WN48EG	Y32
4160055	GT805002 WN48EG	Y32
4160056	GT805003 WN48EG	Y32
4160057	GT805004 WN48EG	Y32
4160058	GT805005 WN48EG	Y32
4160059	GT805006 WN48EG	Y32
4160060	GT805007 WN48EG	Y32
4160061	GT805008 WN48EG	Y32
4160062	GT805009 WN48EG	Y32
4160063	GT705008 WN48EG	Y9
4160093	GT145001 WN35MG	Y8
4160094	GT145002 WN35MG	Y8
4160095	GT145003 WN35MG	Y8
4160096	GT145004 WN35MG	Y8
4160097	GT145005 WN35MG	Y8
4160098	GT145006 WN35MG	Y8
4160099	GT145007 WN35MG	Y8
4160100	GT105001 WS32MG	Y7
4160101	GT105002 WS32MG	Y7
4160102	GT105003 WS32MG	Y7
4160103	GT105004 WS32MG	Y7
4160104	GT105005 WS32MG	Y7
4160105	GT105006 WS32MG	Y7
4160106	GT105007 WS32MG	Y7
4160107	GT105008 WS32MG	Y7
4160108	GT105009 WS32MG	Y7
4160109	GT105010 WS32MG	Y7
4160437	GT165001 WN35MG	Y31
4160438	GT165002 WN35MG	Y31
4160439	GT165003 WN35MG	Y31
4160440	GT165004 WN35MG	Y31
4160441	GT165005 WN35MG	Y31
4160442	GT165006 WN35MG	Y31
4160464	TDS212A18100 WK15PD	T55
4160465	TDS212A18200 WK15PD	T55
4160466	TDS212A18258 WK15PD	T55
4160467	TDS212A18300 WK15PD	T55
4160468	TDS212A18400 WK15PD	T55
4160469	TDS212A18500 WK15PD	T55
4160470	TDS212A18600 WK15PD	T55
4160471	TDS212A18654 WK15PD	T55
4160472	TDS212A18700 WK15PD	T55
4160523	GT165007 WN35MG	Y31
4160528	TDS212A18000 WK15PD	T55
4160583	TDS212A18800 WK15PD	T55
4160584	TDS212A18900 WK15PD	T55
4160585	TDS212A19000 WK15PD	T55
4160586	TDS212A19050 WK15PD	T55
4160587	TDS212A19100 WK15PD	T55
4160588	TDS212A19200 WK15PD	T55
4160589	TDS212A19300 WK15PD	T55
4160590	TDS212A19400 WK15PD	T55
4160591	TDS212A19500 WK15PD	T55
4160592	TDS212A19600 WK15PD	T55
4160593	TDS212A19700 WK15PD	T55
4160594	TDS212A19800 WK15PD	T55
4160595	TDS212A19900 WK15PD	T55
4160596	TDS212A20000 WK15PD	T55
4162258	TDS202A03000 WP20PD	T50
4162259	TDS202A03048 WP20PD	T50
4162260	TDS202A03100 WP20PD	T50
4162261	TDS202A03175 WP20PD	T50
4162262	TDS202A03200 WP20PD	T50
4162274	TDS402A18000 WP20PD	T67
4162275	TDS402A18100 WP20PD	T67
4162276	TDS402A18200 WP20PD	T67
4162277	TDS402A18258 WP20PD	T67
4162278	TDS402A18300 WP20PD	T67
4162279	TDS402A18400 WP20PD	T67
4162280	TDS402A18500 WP20PD	T67
4162281	TDS402A18600 WP20PD	T67
4162282	TDS402A18654 WP20PD	T67
4162283	TDS202A03264 WP20PD	T50
4162284	TDS202A03300 WP20PD	T50
4162285	TDS202A03400 WP20PD	T50
4162286	TDS202A03455 WP20PD	T50
4162287	TDS202A03500 WP20PD	T50
4162288	TDS202A03571 WP20PD	T50
4162289	TDS202A03600 WP20PD	T50
4162290	TDS202A03658 WP20PD	T50
4162291	TDS202A03700 WP20PD	T50
4162292	TDS202A03734 WP20PD	T50
4162293	TDS202A03800 WP20PD	T50
4162294	TDS202A03900 WP20PD	T50
4162295	TDS202A03970 WP20PD	T50
4162296	TDS202A04000 WP20PD	T50
4162297	TDS202A04039 WP20PD	T50
4162298	TDS202A04090 WP20PD	T50
4162299	TDS202A04100 WP20PD	T50
4162300	TDS202A04200 WP20PD	T50
4162301	TDS202A04217 WP20PD	T50
4162302	TDS202A04300 WP20PD	T51
4162303	TDS202A04366 WP20PD	T51
4162304	TDS202A04400 WP20PD	T51
4162305	TDS202A04500 WP20PD	T51
4162306	TDS202A04600 WP20PD	T51
4162307	TDS202A04623 WP20PD	T51
4162308	TDS202A04700 WP20PD	T51
4162309	TDS202A04763 WP20PD	T51
4162310	TDS202A04800 WP20PD	T51
4162311	TDS202A04852 WP20PD	T51
4162312	TDS202A04900 WP20PD	T51
4162313	TDS202A05000 WP20PD	T51
4162314	TDS202A05100 WP20PD	T51
4162315	TDS202A05106 WP20PD	T51
4162316	TDS202A05159 WP20PD	T51
4162317	TDS202A05200 WP20PD	T51
4162318	TDS202A05300 WP20PD	T51
4162319	TDS202A05400 WP20PD	T51
4162320	TDS202A05410 WP20PD	T51
4162321	TDS202A05500 WP20PD	T51
4162322	TDS202A05558 WP20PD	T51
4162323	TDS202A05600 WP20PD	T51
4162324	TDS202A05616 WP20PD	T51
4162325	TDS202A05700 WP20PD	T51
4162326	TDS202A05800 WP20PD	T51
4162327	TDS202A05900 WP20PD	T51
4162328	TDS202A05954 WP20PD	T51
4162329	TDS202A06000 WP20PD	T51
4162330	TDS202A06100 WP20PD	T51
4162331	TDS202A06200 WP20PD	T51
4162332	TDS202A06300 WP20PD	T51
4162333	TDS202A06350 WP20PD	T51
4162334	TDS202A06400 WP20PD	T51
4162335	TDS202A06500 WP20PD	T51
4162336	TDS202A06528 WP20PD	T51
4162337	TDS202A06600 WP20PD	T51
4162338	TDS202A06630 WP20PD	T51
4162339	TDS202A06700 WP20PD	T51
4162340	TDS202A06746 WP20PD	T51
4162341	TDS202A06900 WP20PD	T52
4162342	TDS202A07000 WP20PD	T52
4162343	TDS202A07100 WP20PD	T52
4162344	TDS202A07145 WP20PD	T52
4162345	TDS202A07200 WP20PD	T52
4162346	TDS202A07300 WP20PD	T52
4162347	TDS202A07400 WP20PD	T52
4162348	TDS202A07500 WP20PD	T52
4162349	TDS202A07541 WP20PD	T52
4162350	TDS202A07600 WP20PD	T52
4162351	TDS202A07700 WP20PD	T52
4162352	TDS202A07800 WP20PD	T52
4162353	TDS202A07900 WP20PD	T52
4162354	TDS202A07938 WP20PD	T52
4162355	TDS202A08000 WP20PD	T52
4162356	TDS202A08100 WP20PD	T52
4162357	TDS202A08200 WP20PD	T52
4162358	TDS202A08300 WP20PD	T52
4162359	TDS202A08334 WP20PD	T52
4162360	TDS202A08400 WP20PD	T52
4162361	TDS202A08433 WP20PD	T52
4162362	TDS202A08500 WP20PD	T52
4162363	TDS202A08600 WP20PD	T52
4162364	TDS202A08700 WP20PD	T52
4162365	TDS202A08733 WP20PD	T52
4162366	TDS202A08800 WP20PD	T52
4162367	TDS202A08900 WP20PD	T52
4162368	TDS202A09000 WP20PD	T52
4162369	TDS202A09100 WP20PD	T52
4162370	TDS202A09129 WP20PD	T52
4162371	TDS202A09200 WP20PD	T52
4162372	TDS202A09300 WP20PD	T52
4162373	TDS202A09347 WP20PD	T52
4162374	TDS202A09400 WP20PD	T52
4162375	TDS202A09500 WP20PD	T52
4162376	TDS202A09525 WP20PD	T52
4162377	TDS202A09600 WP20PD	T52
4162378	TDS202A09700 WP20PD	T52
4162379	TDS202A09800 WP20PD	T52
4162380	TDS202A09900 WP20PD	T52
4162381	TDS202A09921 WP20PD	T53
4162382	TDS403A10200 WP20PD	T70
4162393	TDS402A18700 WP20PD	T67
4162394	TDS402A18800 WP20PD	T67
4162395	TDS402A18900 WP20PD	T67
4162396	TDS402A19000 WP20PD	T67
4162397	TDS402A19050 WP20PD	T67
4162398	TDS402A19100 WP20PD	T67
4162399	TDS402A19200 WP20PD	T67
4162400	TDS402A19300 WP20PD	T67
4162401	TDS402A19400 WP20PD	T67
4162402	TDS402A19500 WP20PD	T67
4162403	TDS402A19600 WP20PD	T67
4162404	TDS402A19700 WP20PD	T67
4162405	TDS402A19800 WP20PD	T67
4162406	TDS402A19900 WP20PD	T67
4162407	TDS402A20000 WP20PD	T67
4162408	TDS212A10000 WK15PD	T53
4162409	TDS212A10100 WK15PD	T53
4162410	TDS212A10200 WK15PD	T53
4162411	TDS212A10300 WK15PD	T53
4162412	TDS212A10320 WK15PD	T53
4162417	TDS212A03000 WK15PD	T50
4162418	TDS212A03048 WK15PD	T50
4162419	TDS212A03100 WK15PD	T50
4162420	TDS212A03175 WK15PD	T50
4162421	TDS212A03200 WK15PD	T50
4162422	TDS212A03264 WK15PD	T50
4162423	TDS212A10400 WK15PD	T53
4162424	TDS212A10500 WK15PD	T53
4162425	TDS212A10600 WK15PD	T53
4162426	TDS212A10700 WK15PD	T53
4162427	TDS212A10716 WK15PD	T53
4162428	TDS212A10800 WK15PD	T53
4162429	TDS212A10900 WK15PD	T53
4162430	TDS212A11000 WK15PD	T53
4162431	TDS212A11100 WK15PD	T53
4162432	TDS212A11113 WK15PD	T53
4162433	TDS212A11200 WK15PD	T53
4162434	TDS212A11300 WK15PD	T53
4162435	TDS212A11400 WK15PD	T53
4162436	TDS212A11500 WK15PD	T53
4162437	TDS212A11509 WK15PD	T53
4162438	TDS212A11600 WK15PD	T53
4162439	TDS212A11700 WK15PD	T53
4162440	TDS212A11800 WK15PD	T53
4162441	TDS212A11900 WK15PD	T53
4162442	TDS212A11908 WK15PD	T53
4162443	TDS212A12000 WK15PD	T53
4162444	TDS212A12100 WK15PD	T53
4162445	TDS212A12200 WK15PD	T53
4162446	TDS212A12300 WK15PD	T53
4162447	TDS212A12304 WK15PD	T53
4162448	TDS212A12400 WK15PD	T53
4162449	TDS212A12500 WK15PD	T53
4162450	TDS212A12600 WK15PD	T53
4162451	TDS212A12700 WK15PD	T53
4162452	TDS212A12800 WK15PD	T53
4162453	TDS212A12900 WK15PD	T53
4162454	TDS212A13000 WK15PD	T53
4162455	TDS212A13096 WK15PD	T53
4162456	TDS212A13100 WK15PD	T53
4162457	TDS212A13200 WK15PD	T54
4162458	TDS212A13300 WK15PD	T54
4162459	TDS212A13400 WK15PD	T54
4162460	TDS212A13500 WK15PD	T54
4162461	TDS212A13600 WK15PD	T54
4162462	TDS212A13700 WK15PD	T54
4162463	TDS212A13800 WK15PD	T54
4162464	TDS212A13891 WK15PD	T54
4162465	TDS212A13900 WK15PD	T54
4162466	TDS212A14000 WK15PD	T54
4162467	TDS212A14100 WK15PD	T54
4162468	TDS212A14200 WK15PD	T54
4162469	TDS212A14288 WK15PD	T54
4162470	TDS212A14300 WK15PD	T54
4162471	TDS212A14400 WK15PD	T54
4162472	TDS212A14500 WK15PD	T54
4162473	TDS212A14600 WK15PD	T54
4162474	TDS212A14684 WK15PD	T54
4162475	TDS212A14700 WK15PD	T54
4162476	TDS212A14800 WK15PD	T54
4162477	TDS212A14900 WK15PD	T54
4162478	TDS212A15000 WK15PD	T54
4162479	TDS212A15083 WK15PD	T54
4162480	TDS212A15100 WK15PD	T54
4162481	TDS212A15200 WK15PD	T54
4162482	TDS212A15300 WK15PD	T54
4162483	TDS212A15400 WK15PD	T54
4162484	TDS212A15479 WK15PD	T54
4162485	TDS212A15500 WK15PD	T54
4162486	TDS212A15600 WK15PD	T54

Order No.	Catalogue No.	Page(s)
4162487	TDS212A15700 WK15PD	T54
4162488	TDS212A15800 WK15PD	T54
4162489	TDS212A15875 WK15PD	T54
4162490	TDS212A15900 WK15PD	T54
4162491	TDS212A16000 WK15PD	T54
4162492	TDS212A16100 WK15PD	T54
4162493	TDS212A16200 WK15PD	T54
4162494	TDS212A16271 WK15PD	T54
4162495	TDS212A16300 WK15PD	T54
4162496	TDS212A16400 WK15PD	T54
4162497	TDS212A16500 WK15PD	T55
4162498	TDS212A16600 WK15PD	T55
4162499	TDS212A16670 WK15PD	T55
4162500	TDS212A16700 WK15PD	T55
4162501	TDS212A16800 WK15PD	T55
4162502	TDS212A16900 WK15PD	T55
4162503	TDS212A17000 WK15PD	T55
4162504	TDS212A17100 WK15PD	T55
4162505	TDS212A17200 WK15PD	T55
4162506	TDS212A17300 WK15PD	T55
4162507	TDS212A17400 WK15PD	T55
4162508	TDS212A17463 WK15PD	T55
4162509	TDS212A17500 WK15PD	T55
4162510	TDS212A17600 WK15PD	T55
4162511	TDS212A17700 WK15PD	T55
4162512	TDS212A17800 WK15PD	T55
4162513	TDS212A17859 WK15PD	T55
4162514	TDS212A17900 WK15PD	T55
4162515	TDS403A18000 WP20PD	T73
4162516	TDS403A18100 WP20PD	T73
4162517	TDS403A18200 WP20PD	T73
4162518	TDS403A18258 WP20PD	T73
4162519	TDS403A18300 WP20PD	T73
4162520	TDS403A18400 WP20PD	T73
4162521	TDS403A18500 WP20PD	T73
4162522	TDS403A18600 WP20PD	T73
4162543	TDS212A03300 WK15PD	T50
4162544	TDS212A03400 WK15PD	T50
4162545	TDS212A03455 WK15PD	T50
4162546	TDS212A03500 WK15PD	T50
4162547	TDS212A03571 WK15PD	T50
4162548	TDS212A03600 WK15PD	T50
4162549	TDS212A03658 WK15PD	T50
4162550	TDS212A03700 WK15PD	T50
4162551	TDS212A03734 WK15PD	T50
4162552	TDS212A03800 WK15PD	T50
4162553	TDS212A03900 WK15PD	T50
4162554	TDS212A03970 WK15PD	T50
4162555	TDS212A04000 WK15PD	T50
4162556	TDS212A04039 WK15PD	T50
4162557	TDS212A04090 WK15PD	T50
4162558	TDS212A04100 WK15PD	T50
4162559	TDS212A04200 WK15PD	T50
4162560	TDS212A04217 WK15PD	T50
4162561	TDS212A04300 WK15PD	T51
4162562	TDS212A04366 WK15PD	T51
4162563	TDS212A04400 WK15PD	T51
4162564	TDS212A04500 WK15PD	T51
4162565	TDS212A04600 WK15PD	T51
4162566	TDS212A04623 WK15PD	T51
4162567	TDS212A04700 WK15PD	T51
4162568	TDS212A04763 WK15PD	T51
4162569	TDS212A04800 WK15PD	T51
4162570	TDS212A04852 WK15PD	T51
4162571	TDS212A04900 WK15PD	T51
4162572	TDS212A05000 WK15PD	T51
4162573	TDS212A05100 WK15PD	T51
4162574	TDS212A05106 WK15PD	T51
4162575	TDS212A05159 WK15PD	T51
4162576	TDS212A05200 WK15PD	T51
4162577	TDS212A05300 WK15PD	T51
4162578	TDS212A05400 WK15PD	T51
4162579	TDS212A05410 WK15PD	T51
4162580	TDS212A05500 WK15PD	T51
4162581	TDS212A05558 WK15PD	T51
4162582	TDS212A05600 WK15PD	T51
4162583	TDS212A05616 WK15PD	T51
4162584	TDS212A05700 WK15PD	T51
4162585	TDS212A05800 WK15PD	T51
4162586	TDS212A05900 WK15PD	T51
4162587	TDS212A05954 WK15PD	T51
4162588	TDS212A06000 WK15PD	T51
4162589	TDS212A06100 WK15PD	T51
4162590	TDS212A06200 WK15PD	T51
4162591	TDS212A06300 WK15PD	T51
4162592	TDS212A06350 WK15PD	T51
4162593	TDS212A06400 WK15PD	T51
4162594	TDS212A06500 WK15PD	T51
4162595	TDS212A06528 WK15PD	T51
4162596	TDS212A06600 WK15PD	T51
4162597	TDS212A06630 WK15PD	T51
4162598	TDS212A06700 WK15PD	T51
4162599	TDS212A06746 WK15PD	T51
4162600	TDS212A06900 WK15PD	T52
4162601	TDS212A07000 WK15PD	T52
4162602	TDS212A07100 WK15PD	T52
4162603	TDS212A07145 WK15PD	T52
4162604	TDS212A07200 WK15PD	T52
4162605	TDS212A07300 WK15PD	T52
4162606	TDS212A07400 WK15PD	T52
4162607	TDS212A07500 WK15PD	T52
4162608	TDS212A07541 WK15PD	T52
4162609	TDS212A07600 WK15PD	T52
4162610	TDS212A07700 WK15PD	T52
4162611	TDS212A07800 WK15PD	T52
4162612	TDS212A07900 WK15PD	T52
4162613	TDS212A07938 WK15PD	T52
4162614	TDS212A08000 WK15PD	T52
4162615	TDS212A08100 WK15PD	T52
4162616	TDS212A08200 WK15PD	T52
4162617	TDS212A08300 WK15PD	T52
4162618	TDS212A08334 WK15PD	T52
4162619	TDS212A08400 WK15PD	T52
4162620	TDS212A08433 WK15PD	T52
4162621	TDS212A08500 WK15PD	T52
4162622	TDS212A08600 WK15PD	T52
4162623	TDS212A08700 WK15PD	T52
4162624	TDS212A08733 WK15PD	T52
4162625	TDS212A08800 WK15PD	T52
4162626	TDS212A08900 WK15PD	T52
4162627	TDS212A09000 WK15PD	T52
4162628	TDS212A09100 WK15PD	T52
4162629	TDS212A09129 WK15PD	T52
4162630	TDS212A09200 WK15PD	T52
4162631	TDS212A09300 WK15PD	T52
4162632	TDS212A09347 WK15PD	T52
4162633	TDS212A09400 WK15PD	T52
4162634	TDS212A09500 WK15PD	T52
4162635	TDS212A09525 WK15PD	T52
4162636	TDS212A09600 WK15PD	T52
4162637	TDS212A09700 WK15PD	T52
4162638	TDS212A09800 WK15PD	T52
4162639	TDS212A09900 WK15PD	T52
4162640	TDS212A09921 WK15PD	T53
4162663	TDS403A18654 WP20PD	T73
4162664	TDS403A18700 WP20PD	T73
4162665	TDS403A18800 WP20PD	T73
4162666	TDS403A18900 WP20PD	T73
4162667	TDS403A19000 WP20PD	T73
4162668	TDS403A19050 WP20PD	T73
4162669	TDS403A19100 WP20PD	T73
4162670	TDS403A19200 WP20PD	T73
4162671	TDS403A19300 WP20PD	T73
4162672	TDS403A19400 WP20PD	T73
4162673	TDS403A19500 WP20PD	T73
4162674	TDS403A19600 WP20PD	T73
4162675	TDS403A19700 WP20PD	T73
4162676	TDS403A19800 WP20PD	T73
4162677	TDS403A19900 WP20PD	T73
4162678	TDS403A20000 WP20PD	T73
4162679	TDS403A10000 WP20PD	T70
4162680	TDS403A10100 WP20PD	T70
4162681	TDS403A12500 WP20PD	T71
4162703	TDS403A10300 WP20PD	T71
4162704	TDS403A10320 WP20PD	T71
4162705	TDS403A10400 WP20PD	T71
4162706	TDS403A10500 WP20PD	T71
4162707	TDS403A10600 WP20PD	T71
4162708	TDS403A10700 WP20PD	T71
4162709	TDS403A10716 WP20PD	T71
4162710	TDS403A10800 WP20PD	T71
4162711	TDS403A10900 WP20PD	T71
4162712	TDS403A11000 WP20PD	T71
4162713	TDS403A11100 WP20PD	T71
4162714	TDS403A11113 WP20PD	T71
4162715	TDS403A11200 WP20PD	T71
4162716	TDS403A11300 WP20PD	T71
4162717	TDS403A11400 WP20PD	T71
4162718	TDS403A11500 WP20PD	T71
4162719	TDS403A11509 WP20PD	T71
4162720	TDS403A11600 WP20PD	T71
4162721	TDS403A11700 WP20PD	T71
4162722	TDS403A11800 WP20PD	T71
4162723	TDS403A11900 WP20PD	T71
4162724	TDS403A11908 WP20PD	T71
4162725	TDS403A12000 WP20PD	T71
4162726	TDS403A12100 WP20PD	T71
4162727	TDS403A12200 WP20PD	T71
4162728	TDS403A12300 WP20PD	T71
4162729	TDS403A12304 WP20PD	T71
4162730	TDS403A12400 WP20PD	T71
4162731	TDS403A12600 WP20PD	T71
4162732	TDS403A12700 WP20PD	T71
4162733	TDS403A12800 WP20PD	T71
4162734	TDS403A12900 WP20PD	T71
4162735	TDS403A13000 WP20PD	T71
4162736	TDS403A13096 WP20PD	T71
4162737	TDS403A13100 WP20PD	T71
4162738	TDS403A13200 WP20PD	T71
4162739	TDS403A13300 WP20PD	T71
4162740	TDS403A13400 WP20PD	T71
4162741	TDS403A13500 WP20PD	T71
4162742	TDS403A13600 WP20PD	T72
4162743	TDS403A13700 WP20PD	T72
4162744	TDS403A13800 WP20PD	T72
4162745	TDS403A13891 WP20PD	T72
4162746	TDS403A13900 WP20PD	T72
4162747	TDS403A14000 WP20PD	T72
4162748	TDS403A14100 WP20PD	T72
4162749	TDS403A14200 WP20PD	T72
4162750	TDS403A14288 WP20PD	T72
4162751	TDS403A14300 WP20PD	T72
4162752	TDS403A14400 WP20PD	T72
4162753	TDS403A14500 WP20PD	T72
4162754	TDS403A14600 WP20PD	T72
4162755	TDS403A14684 WP20PD	T72
4162756	TDS403A14700 WP20PD	T72
4162757	TDS403A14800 WP20PD	T72
4162758	TDS403A14900 WP20PD	T72
4162759	TDS403A15000 WP20PD	T72
4162760	TDS403A15083 WP20PD	T72
4162761	TDS403A15100 WP20PD	T72
4162762	TDS403A15200 WP20PD	T72
4162763	TDS403A15300 WP20PD	T72
4162764	TDS403A15400 WP20PD	T72
4162765	TDS403A15479 WP20PD	T72
4162766	TDS403A15500 WP20PD	T72
4162767	TDS403A15600 WP20PD	T72
4162768	TDS403A15700 WP20PD	T72
4162769	TDS403A15800 WP20PD	T72
4162770	TDS403A15875 WP20PD	T72
4162771	TDS403A15900 WP20PD	T72
4162772	TDS403A16000 WP20PD	T72
4162773	TDS403A16100 WP20PD	T72
4162774	TDS403A16200 WP20PD	T72
4162775	TDS403A16271 WP20PD	T72
4162776	TDS403A16300 WP20PD	T72
4162777	TDS403A16400 WP20PD	T72
4162778	TDS403A16500 WP20PD	T72
4162779	TDS403A16600 WP20PD	T72
4162780	TDS403A16670 WP20PD	T72
4162781	TDS403A16700 WP20PD	T72
4162782	TDS403A16800 WP20PD	T73
4162783	TDS403A16900 WP20PD	T73
4162784	TDS403A17000 WP20PD	T73
4162785	TDS403A17100 WP20PD	T73
4162786	TDS403A17200 WP20PD	T73
4162787	TDS403A17300 WP20PD	T73
4162788	TDS403A17400 WP20PD	T73
4162789	TDS403A17463 WP20PD	T73
4162790	TDS403A17500 WP20PD	T73
4162791	TDS403A17600 WP20PD	T73
4162792	TDS403A17700 WP20PD	T73
4162793	TDS403A17800 WP20PD	T73
4162794	TDS403A17859 WP20PD	T73
4162795	TDS403A17900 WP20PD	T73
4162796	TDS403A03000 WP20PD	T68
4162797	TDS403A03048 WP20PD	T68
4162798	TDS403A03100 WP20PD	T68
4162799	TDS403A03175 WP20PD	T68
4162800	TDS403A03200 WP20PD	T68
4162801	TDS403A03264 WP20PD	T68
4162802	TDS403A03300 WP20PD	T68
4162803	TDS402A10000 WP20PD	T65
4162804	TDS402A10100 WP20PD	T65
4162805	TDS402A10200 WP20PD	T65
4162806	TDS402A10300 WP20PD	T65
4162807	TDS402A10320 WP20PD	T65
4162808	TDS402A10400 WP20PD	T65
4162809	TDS402A10500 WP20PD	T65
4162810	TDS402A10600 WP20PD	T65
4162811	TDS402A10700 WP20PD	T65
4162812	TDS402A10716 WP20PD	T65
4162813	TDS402A10800 WP20PD	T65

Order No.	Catalogue No.	Page(s)
4162814	TDS402A10900 WP20PD	T65
4162815	TDS402A11000 WP20PD	T65
4162816	TDS402A11100 WP20PD	T65
4162817	TDS402A11113 WP20PD	T65
4162818	TDS402A11200 WP20PD	T65
4162819	TDS402A11300 WP20PD	T65
4162820	TDS402A11400 WP20PD	T65
4162821	TDS402A11500 WP20PD	T65
4162822	TDS402A11509 WP20PD	T65
4162823	TDS402A11600 WP20PD	T65
4162824	TDS402A11700 WP20PD	T65
4162825	TDS402A11800 WP20PD	T65
4162826	TDS402A11900 WP20PD	T65
4162827	TDS402A11908 WP20PD	T65
4162828	TDS402A12000 WP20PD	T65
4162829	TDS402A12100 WP20PD	T65
4162830	TDS402A12200 WP20PD	T65
4162831	TDS402A12300 WP20PD	T65
4162832	TDS402A12304 WP20PD	T65
4162833	TDS402A12400 WP20PD	T65
4162834	TDS402A12500 WP20PD	T65
4162835	TDS402A12600 WP20PD	T65
4162836	TDS402A12700 WP20PD	T65
4162837	TDS402A12800 WP20PD	T65
4162838	TDS402A12900 WP20PD	T65
4162839	TDS402A13000 WP20PD	T65
4162840	TDS402A13096 WP20PD	T65
4162841	TDS402A13100 WP20PD	T65
4162842	TDS402A13200 WP20PD	T66
4162843	TDS402A13300 WP20PD	T66
4162844	TDS402A13400 WP20PD	T66
4162845	TDS402A13500 WP20PD	T66
4162846	TDS402A13600 WP20PD	T66
4162847	TDS402A13700 WP20PD	T66
4162848	TDS402A13800 WP20PD	T66
4162849	TDS402A13891 WP20PD	T66
4162850	TDS402A13900 WP20PD	T66
4162851	TDS402A14000 WP20PD	T66
4162852	TDS402A14100 WP20PD	T66
4162853	TDS402A14200 WP20PD	T66
4162854	TDS402A14288 WP20PD	T66
4162855	TDS402A14300 WP20PD	T66
4162856	TDS402A14400 WP20PD	T66
4162857	TDS402A14500 WP20PD	T66
4162858	TDS402A14600 WP20PD	T66
4162859	TDS402A14684 WP20PD	T66
4162860	TDS402A14700 WP20PD	T66
4162861	TDS402A14800 WP20PD	T66
4162862	TDS402A14900 WP20PD	T66
4162863	TDS402A15000 WP20PD	T66
4162864	TDS402A15083 WP20PD	T66
4162865	TDS402A15100 WP20PD	T66
4162866	TDS402A15200 WP20PD	T66
4162867	TDS402A15300 WP20PD	T66
4162868	TDS402A15400 WP20PD	T66
4162869	TDS402A15479 WP20PD	T66
4162870	TDS402A15500 WP20PD	T66
4162871	TDS402A15600 WP20PD	T66
4162872	TDS402A15700 WP20PD	T66
4162873	TDS402A15800 WP20PD	T66
4162874	TDS402A15875 WP20PD	T66
4162875	TDS402A15900 WP20PD	T66
4162876	TDS402A16000 WP20PD	T66
4162877	TDS402A16100 WP20PD	T66
4162878	TDS402A16200 WP20PD	T66
4162879	TDS402A16271 WP20PD	T66
4162880	TDS402A16300 WP20PD	T66
4162881	TDS402A16400 WP20PD	T66
4162882	TDS402A16500 WP20PD	T67
4162883	TDS402A16600 WP20PD	T67
4162884	TDS402A16670 WP20PD	T67
4162885	TDS402A16700 WP20PD	T67
4162886	TDS402A16800 WP20PD	T67
4162887	TDS402A16900 WP20PD	T67
4162888	TDS402A17000 WP20PD	T67
4162889	TDS402A17100 WP20PD	T67
4162890	TDS402A17200 WP20PD	T67
4162891	TDS402A17300 WP20PD	T67
4162892	TDS402A17400 WP20PD	T67
4162893	TDS402A17463 WP20PD	T67
4162894	TDS402A17500 WP20PD	T67
4162895	TDS402A17600 WP20PD	T67
4162896	TDS402A17700 WP20PD	T67
4162897	TDS402A17800 WP20PD	T67
4162898	TDS402A17859 WP20PD	T67
4162899	TDS402A17900 WP20PD	T67
4162950	TDS401A10000 WP20PD	T59
4162951	TDS401A10100 WP20PD	T59
4162952	TDS401A10200 WP20PD	T59
4162967	TDS402A03000 WP20PD	T62
4162968	TDS402A03048 WP20PD	T62
4162969	TDS402A03100 WP20PD	T62
4162970	TDS402A03175 WP20PD	T62
4162972	TDS402A03200 WP20PD	T62
4162983	TDS402A03264 WP20PD	T62
4162984	TDS402A03300 WP20PD	T62
4162985	TDS402A03400 WP20PD	T62
4162986	TDS402A03455 WP20PD	T62
4162987	TDS402A03500 WP20PD	T62
4162988	TDS402A03571 WP20PD	T62
4162989	TDS402A03600 WP20PD	T62
4162990	TDS402A03658 WP20PD	T62
4162991	TDS402A03700 WP20PD	T62
4162992	TDS402A03734 WP20PD	T62
4162993	TDS402A03800 WP20PD	T62
4162994	TDS402A03900 WP20PD	T62
4162995	TDS402A03970 WP20PD	T62
4162996	TDS402A04000 WP20PD	T62
4162997	TDS402A04039 WP20PD	T62
4162998	TDS402A04090 WP20PD	T62
4162999	TDS402A04100 WP20PD	T62
4163000	TDS402A04200 WP20PD	T62
4163001	TDS402A04217 WP20PD	T62
4163002	TDS402A04300 WP20PD	T63
4163013	TDS402A04366 WP20PD	T63
4163014	TDS402A04400 WP20PD	T63
4163015	TDS402A04500 WP20PD	T63
4163016	TDS402A04600 WP20PD	T63
4163017	TDS402A04623 WP20PD	T63
4163018	TDS402A04700 WP20PD	T63
4163019	TDS402A04763 WP20PD	T63
4163020	TDS402A04800 WP20PD	T63
4163021	TDS402A04852 WP20PD	T63
4163022	TDS402A04900 WP20PD	T63
4163023	TDS402A05000 WP20PD	T63
4163024	TDS402A05100 WP20PD	T63
4163025	TDS402A05106 WP20PD	T63
4163026	TDS402A05159 WP20PD	T63
4163027	TDS402A05200 WP20PD	T63
4163028	TDS402A05300 WP20PD	T63
4163029	TDS402A05400 WP20PD	T63
4163030	TDS402A05410 WP20PD	T63
4163031	TDS402A05500 WP20PD	T63
4163032	TDS402A05558 WP20PD	T63
4163034	TDS402A05600 WP20PD	T63
4163035	TDS402A05616 WP20PD	T63
4163036	TDS402A05700 WP20PD	T63
4163037	TDS402A05800 WP20PD	T63
4163038	TDS402A05900 WP20PD	T63
4163039	TDS402A05954 WP20PD	T63
4163040	TDS402A06000 WP20PD	T63
4163041	TDS402A06100 WP20PD	T63
4163042	TDS402A06200 WP20PD	T63
4163043	TDS402A06300 WP20PD	T63
4163044	TDS402A06350 WP20PD	T63
4163045	TDS402A06400 WP20PD	T63
4163046	TDS402A06500 WP20PD	T63
4163047	TDS402A06528 WP20PD	T63
4163048	TDS402A06600 WP20PD	T63
4163049	TDS402A06630 WP20PD	T63
4163050	TDS402A06700 WP20PD	T63
4163051	TDS402A06746 WP20PD	T63
4163052	TDS402A06800 WP20PD	T63
4163053	TDS402A06900 WP20PD	T64
4163054	TDS402A07000 WP20PD	T64
4163055	TDS402A07100 WP20PD	T64
4163056	TDS402A07145 WP20PD	T64
4163057	TDS402A07200 WP20PD	T64
4163058	TDS402A07300 WP20PD	T64
4163059	TDS402A07400 WP20PD	T64
4163060	TDS402A07500 WP20PD	T64
4163061	TDS402A07541 WP20PD	T64
4163062	TDS402A07600 WP20PD	T64
4163063	TDS402A07700 WP20PD	T64
4163064	TDS402A07800 WP20PD	T64
4163065	TDS402A07900 WP20PD	T64
4163066	TDS402A07938 WP20PD	T64
4163067	TDS402A08000 WP20PD	T64
4163068	TDS402A08100 WP20PD	T64
4163069	TDS402A08200 WP20PD	T64
4163070	TDS402A08300 WP20PD	T64
4163071	TDS402A08334 WP20PD	T64
4163072	TDS402A08400 WP20PD	T64
4163073	TDS402A08433 WP20PD	T64
4163074	TDS402A08500 WP20PD	T64
4163075	TDS402A08600 WP20PD	T64
4163077	TDS402A08700 WP20PD	T64
4163078	TDS402A08733 WP20PD	T64
4163079	TDS402A08800 WP20PD	T64
4163080	TDS402A08900 WP20PD	T64
4163081	TDS402A09000 WP20PD	T64
4163082	TDS402A09100 WP20PD	T64
4163083	TDS402A09129 WP20PD	T64
4163084	TDS402A09200 WP20PD	T64
4163085	TDS402A09300 WP20PD	T64
4163086	TDS402A09347 WP20PD	T64
4163087	TDS402A09400 WP20PD	T64
4163088	TDS402A09500 WP20PD	T64
4163089	TDS402A09525 WP20PD	T64
4163090	TDS402A09600 WP20PD	T64
4163091	TDS402A09700 WP20PD	T64
4163092	TDS402A09800 WP20PD	T64
4163093	TDS402A09900 WP20PD	T64
4163094	TDS402A09921 WP20PD	T65
4163163	TDS403A03400 WP20PD	T68
4163164	TDS403A03455 WP20PD	T68
4163165	TDS403A03500 WP20PD	T68
4163166	TDS403A03571 WP20PD	T68
4163167	TDS403A03600 WP20PD	T68
4163168	TDS403A03658 WP20PD	T68
4163169	TDS403A03700 WP20PD	T68
4163170	TDS403A03734 WP20PD	T68
4163171	TDS403A03800 WP20PD	T68
4163172	TDS403A03900 WP20PD	T68
4163173	TDS403A03970 WP20PD	T68
4163174	TDS403A04000 WP20PD	T68
4163175	TDS403A04039 WP20PD	T68
4163176	TDS403A04090 WP20PD	T68
4163177	TDS403A04100 WP20PD	T68
4163178	TDS403A04200 WP20PD	T68
4163179	TDS403A04217 WP20PD	T68
4163180	TDS403A04300 WP20PD	T68
4163181	TDS403A04366 WP20PD	T68
4163182	TDS403A04400 WP20PD	T68
4163193	TDS403A04500 WP20PD	T68
4163194	TDS403A04600 WP20PD	T69
4163195	TDS403A04623 WP20PD	T69
4163196	TDS403A04700 WP20PD	T69
4163197	TDS403A04763 WP20PD	T69
4163198	TDS403A04800 WP20PD	T69
4163199	TDS403A04852 WP20PD	T69
4163200	TDS403A04900 WP20PD	T69
4163201	TDS403A05000 WP20PD	T69
4163202	TDS403A05100 WP20PD	T69
4163203	TDS403A05106 WP20PD	T69
4163204	TDS403A05159 WP20PD	T69
4163205	TDS403A05200 WP20PD	T69
4163206	TDS403A05300 WP20PD	T69
4163207	TDS403A05400 WP20PD	T69
4163208	TDS403A05410 WP20PD	T69
4163209	TDS403A05500 WP20PD	T69
4163210	TDS403A05558 WP20PD	T69
4163211	TDS403A05600 WP20PD	T69
4163212	TDS403A05616 WP20PD	T69
4163213	TDS403A05700 WP20PD	T69
4163214	TDS403A05800 WP20PD	T69
4163215	TDS403A05900 WP20PD	T69
4163216	TDS403A05954 WP20PD	T69
4163217	TDS403A06000 WP20PD	T69
4163218	TDS403A06100 WP20PD	T69
4163219	TDS403A06200 WP20PD	T69
4163220	TDS403A06300 WP20PD	T69
4163221	TDS403A06350 WP20PD	T69
4163222	TDS403A06400 WP20PD	T69
4163223	TDS403A06500 WP20PD	T69
4163224	TDS403A06528 WP20PD	T69
4163225	TDS403A06600 WP20PD	T69
4163226	TDS403A06630 WP20PD	T69
4163227	TDS403A06700 WP20PD	T69
4163228	TDS403A06746 WP20PD	T69
4163229	TDS403A06800 WP20PD	T69
4163230	TDS403A06900 WP20PD	T69
4163231	TDS403A07000 WP20PD	T69
4163232	TDS403A07100 WP20PD	T69
4163233	TDS403A07145 WP20PD	T69
4163234	TDS403A07200 WP20PD	T70
4163235	TDS403A07300 WP20PD	T70
4163236	TDS403A07400 WP20PD	T70
4163237	TDS403A07500 WP20PD	T70
4163238	TDS403A07541 WP20PD	T70
4163239	TDS403A07600 WP20PD	T70
4163240	TDS403A07700 WP20PD	T70
4163241	TDS403A07800 WP20PD	T70
4163242	TDS403A07900 WP20PD	T70

Order No.	Catalogue No.	Page(s)
4163243	TDS403A07938 WP20PD	T70
4163244	TDS403A08000 WP20PD	T70
4163245	TDS403A08100 WP20PD	T70
4163246	TDS403A08200 WP20PD	T70
4163247	TDS403A08300 WP20PD	T70
4163248	TDS403A08334 WP20PD	T70
4163249	TDS403A08400 WP20PD	T70
4163250	TDS403A08433 WP20PD	T70
4163251	TDS403A08500 WP20PD	T70
4163252	TDS403A08600 WP20PD	T70
4163253	TDS403A08700 WP20PD	T70
4163254	TDS403A08733 WP20PD	T70
4163255	TDS403A08800 WP20PD	T70
4163256	TDS403A08900 WP20PD	T70
4163257	TDS403A09000 WP20PD	T70
4163258	TDS403A09100 WP20PD	T70
4163259	TDS403A09129 WP20PD	T70
4163260	TDS403A09200 WP20PD	T70
4163261	TDS403A09300 WP20PD	T70
4163262	TDS403A09347 WP20PD	T70
4163263	TDS403A09400 WP20PD	T70
4163264	TDS403A09500 WP20PD	T70
4163265	TDS403A09525 WP20PD	T70
4163266	TDS403A09600 WP20PD	T70
4163267	TDS403A09700 WP20PD	T70
4163268	TDS403A09800 WP20PD	T70
4163269	TDS403A09900 WP20PD	T70
4163270	TDS403A09921 WP20PD	T70
4163271	TDS401A18000 WP20PD	T61
4163272	TDS401A18100 WP20PD	T61
4163283	TDS401A18200 WP20PD	T61
4163284	TDS401A18258 WP20PD	T61
4163285	TDS401A18300 WP20PD	T61
4163286	TDS401A18400 WP20PD	T61
4163287	TDS401A18500 WP20PD	T61
4163288	TDS401A18600 WP20PD	T61
4163289	TDS401A18654 WP20PD	T61
4163290	TDS401A18700 WP20PD	T61
4163291	TDS401A18800 WP20PD	T61
4163292	TDS401A18900 WP20PD	T61
4163293	TDS401A19000 WP20PD	T61
4163294	TDS401A19050 WP20PD	T61
4163295	TDS401A19100 WP20PD	T61
4163296	TDS401A19200 WP20PD	T61
4163297	TDS401A19300 WP20PD	T61
4163298	TDS401A19400 WP20PD	T61
4163299	TDS401A19500 WP20PD	T61
4163300	TDS401A19600 WP20PD	T61
4163301	TDS401A19700 WP20PD	T61
4163302	TDS401A19800 WP20PD	T61
4163303	TDS401A19900 WP20PD	T61
4163304	TDS401A20000 WP20PD	T61
4163305	TDS202A18200 WP20PD	T55
4163306	TDS202A18258 WP20PD	T55
4163307	TDS202A18300 WP20PD	T55
4163308	TDS202A18400 WP20PD	T55
4163309	TDS202A18500 WP20PD	T55
4163310	TDS202A18600 WP20PD	T55
4163311	TDS202A18654 WP20PD	T55
4163312	TDS202A18700 WP20PD	T55
4163313	TDS202A18000 WP20PD	T55
4163314	TDS202A18100 WP20PD	T55
4163315	TDS401A03000 WP20PD	T56
4163323	TDS202A18800 WP20PD	T55
4163324	TDS202A18900 WP20PD	T55
4163325	TDS202A19000 WP20PD	T55
4163326	TDS202A19050 WP20PD	T55
4163327	TDS202A19100 WP20PD	T55
4163328	TDS202A19200 WP20PD	T55
4163329	TDS202A19300 WP20PD	T55
4163330	TDS202A19400 WP20PD	T55
4163331	TDS202A19500 WP20PD	T55
4163332	TDS202A19600 WP20PD	T55
4163333	TDS202A19700 WP20PD	T55
4163334	TDS202A19800 WP20PD	T55
4163335	TDS202A19900 WP20PD	T55
4163336	TDS202A20000 WP20PD	T55
4163337	TDS401A03048 WP20PD	T56
4163338	TDS401A03100 WP20PD	T56
4163339	TDS401A03175 WP20PD	T56
4163340	TDS401A03200 WP20PD	T56
4163341	TDS401A03264 WP20PD	T56
4163342	TDS401A03300 WP20PD	T56
4163343	TDS401A10300 WP20PD	T59
4163344	TDS401A10320 WP20PD	T59
4163345	TDS401A10400 WP20PD	T59
4163346	TDS401A10500 WP20PD	T59
4163347	TDS401A10600 WP20PD	T59
4163348	TDS401A10700 WP20PD	T59
4163349	TDS401A10716 WP20PD	T59
4163350	TDS401A10800 WP20PD	T59
4163351	TDS401A10900 WP20PD	T59
4163352	TDS401A11000 WP20PD	T59
4163353	TDS401A11100 WP20PD	T59
4163354	TDS401A11113 WP20PD	T59
4163355	TDS401A11200 WP20PD	T59
4163356	TDS401A11300 WP20PD	T59
4163357	TDS401A11400 WP20PD	T59
4163358	TDS401A11500 WP20PD	T59
4163359	TDS401A11509 WP20PD	T59
4163360	TDS401A11600 WP20PD	T59
4163361	TDS401A11700 WP20PD	T59
4163362	TDS401A11800 WP20PD	T59
4163363	TDS401A11900 WP20PD	T59
4163364	TDS401A11908 WP20PD	T59
4163365	TDS401A12000 WP20PD	T59
4163366	TDS401A12100 WP20PD	T59
4163367	TDS401A12200 WP20PD	T59
4163368	TDS401A12300 WP20PD	T59
4163369	TDS401A12304 WP20PD	T59
4163370	TDS401A12400 WP20PD	T59
4163371	TDS401A12500 WP20PD	T59
4163372	TDS401A12600 WP20PD	T59
4163373	TDS401A12700 WP20PD	T59
4163374	TDS401A12800 WP20PD	T59
4163375	TDS401A12900 WP20PD	T59
4163376	TDS401A13000 WP20PD	T59
4163377	TDS401A13096 WP20PD	T59
4163378	TDS401A13100 WP20PD	T59
4163379	TDS401A13200 WP20PD	T60
4163380	TDS401A13300 WP20PD	T60
4163381	TDS401A13400 WP20PD	T60
4163382	TDS401A13500 WP20PD	T60
4163383	TDS401A13600 WP20PD	T60
4163384	TDS401A13700 WP20PD	T60
4163385	TDS401A13800 WP20PD	T60
4163386	TDS401A13891 WP20PD	T60
4163387	TDS401A13900 WP20PD	T60
4163388	TDS401A14000 WP20PD	T60
4163389	TDS401A14100 WP20PD	T60
4163390	TDS401A14200 WP20PD	T60
4163391	TDS401A14288 WP20PD	T60
4163392	TDS401A14300 WP20PD	T60
4163393	TDS401A14400 WP20PD	T60
4163394	TDS401A14500 WP20PD	T60
4163395	TDS401A14600 WP20PD	T60
4163396	TDS401A14684 WP20PD	T60
4163397	TDS401A14700 WP20PD	T60
4163398	TDS401A14800 WP20PD	T60
4163399	TDS401A14900 WP20PD	T60
4163400	TDS401A15000 WP20PD	T60
4163401	TDS401A15083 WP20PD	T60
4163402	TDS401A15100 WP20PD	T60
4163403	TDS401A15200 WP20PD	T60
4163404	TDS401A15300 WP20PD	T60
4163405	TDS401A15400 WP20PD	T60
4163406	TDS401A15479 WP20PD	T60
4163407	TDS401A15500 WP20PD	T60
4163408	TDS401A15600 WP20PD	T60
4163409	TDS401A15700 WP20PD	T60
4163410	TDS401A15800 WP20PD	T60
4163411	TDS401A15875 WP20PD	T60
4163412	TDS401A15900 WP20PD	T60
4163413	TDS401A16000 WP20PD	T60
4163414	TDS401A16100 WP20PD	T60
4163415	TDS401A16200 WP20PD	T60
4163416	TDS401A16271 WP20PD	T60
4163417	TDS401A16300 WP20PD	T60
4163418	TDS401A16400 WP20PD	T60
4163419	TDS401A16500 WP20PD	T61
4163420	TDS401A16600 WP20PD	T61
4163421	TDS401A16670 WP20PD	T61
4163422	TDS401A16700 WP20PD	T61
4163423	TDS401A16800 WP20PD	T61
4163424	TDS401A16900 WP20PD	T61
4163425	TDS401A17000 WP20PD	T61
4163426	TDS401A17100 WP20PD	T61
4163427	TDS401A17200 WP20PD	T61
4163428	TDS401A17300 WP20PD	T61
4163429	TDS401A17400 WP20PD	T61
4163430	TDS401A17463 WP20PD	T61
4163431	TDS401A17500 WP20PD	T61
4163432	TDS401A17600 WP20PD	T61
4163433	TDS401A17700 WP20PD	T61
4163434	TDS401A17800 WP20PD	T61
4163435	TDS401A17859 WP20PD	T61
4163436	TDS401A17900 WP20PD	T61
4163463	TDS401A03400 WP20PD	T56
4163464	TDS401A03455 WP20PD	T56
4163465	TDS401A03500 WP20PD	T56
4163466	TDS401A03571 WP20PD	T56
4163467	TDS401A03600 WP20PD	T56
4163468	TDS401A03658 WP20PD	T56
4163469	TDS401A03700 WP20PD	T56
4163470	TDS401A03734 WP20PD	T56
4163471	TDS401A03800 WP20PD	T56
4163472	TDS401A03900 WP20PD	T56
4163473	TDS401A03970 WP20PD	T56
4163474	TDS401A04000 WP20PD	T56
4163475	TDS401A04039 WP20PD	T56
4163476	TDS401A04090 WP20PD	T56
4163477	TDS401A04100 WP20PD	T56
4163478	TDS401A04200 WP20PD	T56
4163479	TDS401A04217 WP20PD	T56
4163480	TDS401A04300 WP20PD	T57
4163481	TDS401A04366 WP20PD	T57
4163482	TDS401A04400 WP20PD	T57
4163483	TDS401A04500 WP20PD	T57
4163484	TDS401A04600 WP20PD	T57
4163485	TDS401A04623 WP20PD	T57
4163486	TDS401A04700 WP20PD	T57
4163487	TDS401A04763 WP20PD	T57
4163488	TDS401A04800 WP20PD	T57
4163489	TDS401A04852 WP20PD	T57
4163490	TDS401A04900 WP20PD	T57
4163491	TDS401A05000 WP20PD	T57
4163492	TDS401A05100 WP20PD	T57
4163493	TDS401A05106 WP20PD	T57
4163494	TDS401A05159 WP20PD	T57
4163495	TDS401A05200 WP20PD	T57
4163496	TDS401A05300 WP20PD	T57
4163497	TDS401A05400 WP20PD	T57
4163498	TDS401A05410 WP20PD	T57
4163499	TDS401A05500 WP20PD	T57
4163500	TDS401A05558 WP20PD	T57
4163501	TDS401A05600 WP20PD	T57
4163502	TDS401A05616 WP20PD	T57
4163503	TDS401A05700 WP20PD	T57
4163504	TDS401A05800 WP20PD	T57
4163505	TDS401A05900 WP20PD	T57
4163506	TDS401A05954 WP20PD	T57
4163507	TDS401A06000 WP20PD	T57
4163508	TDS401A06100 WP20PD	T57
4163509	TDS401A06200 WP20PD	T57
4163510	TDS401A06300 WP20PD	T57
4163511	TDS401A06350 WP20PD	T57
4163512	TDS401A06400 WP20PD	T57
4163513	TDS401A06500 WP20PD	T57
4163514	TDS401A06528 WP20PD	T57
4163515	TDS401A06600 WP20PD	T57
4163516	TDS401A06630 WP20PD	T57
4163517	TDS401A06700 WP20PD	T57
4163518	TDS401A06746 WP20PD	T57
4163519	TDS401A06800 WP20PD	T57
4163520	TDS401A06900 WP20PD	T58
4163521	TDS401A07000 WP20PD	T58
4163522	TDS401A07100 WP20PD	T58
4163523	TDS401A07145 WP20PD	T58
4163524	TDS401A07200 WP20PD	T58
4163525	TDS401A07300 WP20PD	T58
4163526	TDS401A07400 WP20PD	T58
4163527	TDS401A07500 WP20PD	T58
4163528	TDS401A07541 WP20PD	T58
4163529	TDS401A07600 WP20PD	T58
4163530	TDS401A07700 WP20PD	T58
4163531	TDS401A07800 WP20PD	T58
4163532	TDS401A07900 WP20PD	T58
4163533	TDS401A07938 WP20PD	T58
4163534	TDS401A08000 WP20PD	T58
4163535	TDS401A08100 WP20PD	T58
4163536	TDS401A08200 WP20PD	T58
4163537	TDS401A08300 WP20PD	T58
4163538	TDS401A08334 WP20PD	T58
4163539	TDS401A08400 WP20PD	T58
4163540	TDS401A08433 WP20PD	T58
4163541	TDS401A08500 WP20PD	T58
4163542	TDS401A08600 WP20PD	T58
4163543	TDS401A08700 WP20PD	T58
4163544	TDS401A08733 WP20PD	T58
4163545	TDS401A08800 WP20PD	T58
4163546	TDS401A08900 WP20PD	T58
4163547	TDS401A09000 WP20PD	T58
4163548	TDS401A09100 WP20PD	T58
4163549	TDS401A09129 WP20PD	T58

Order No.	Catalogue No.	Page(s)
4163550	TDS401A09200 WP20PD	T58
4163551	TDS401A09300 WP20PD	T58
4163552	TDS401A09347 WP20PD	T58
4163553	TDS401A09400 WP20PD	T58
4163554	TDS401A09500 WP20PD	T58
4163555	TDS401A09525 WP20PD	T58
4163556	TDS401A09600 WP20PD	T58
4163557	TDS401A09700 WP20PD	T58
4163558	TDS401A09800 WP20PD	T58
4163559	TDS401A09900 WP20PD	T58
4163560	TDS401A09921 WP20PD	T59
4163978	CCGT0602021P TN10U	B122
4163979	CCGT0602021P TN15U	B122
4163980	CCGT0602041P TN10U	B122
4163981	CCGT0602041P TN15U	B122
4163982	CCGT0602081P TN10U	B122
4164493	CCGT09T3021P TN10U	B122
4164494	CCGT09T3021P TN15U	B122
4164495	CCGT09T3011P TN10U	B122
4164496	CCGT09T3011P TN15U	B122
4164497	CCGT09T3041P TN10U	B122
4164498	CCGT09T3041P TN15U	B122
4164499	CCGT09T3081P TN10U	B122
4164500	CCGT09T3081P TN15U	B122
4164501	DCGT0702011P TN10U	B129
4164502	DCGT0702011P TN15U	B129
4164523	DCGT11T3011P TN10U	B129
4164524	DCGT11T3011P TN15U	B129
4164525	DCGT1504081P TN10U	B129
4164526	TCGT1102011P TN10U	B138
4164527	TCGT1102011P TN15U	B138
4164528	TCGT1102041P TN10U	B138
4164529	TCGT1102041P TN15U	B138
4164530	TCGT16T3021P TN10U	B138
4164531	TCGT16T3041P TN10U	B138
4164532	TCGT16T3041P TN15U	B138
4164543	TCGT16T3081P TN10U	B138
4164544	VBGT1103021P TN10U	B144
4164545	VBGT1103021P TN15U	B144
4164546	VBGT1103011P TN10U	B144
4164547	VBGT1103011P TN15U	B144
4164548	VBGT1103041P TN10U	B144
4164549	VBGT1604021P TN10U	B144
4164550	VBGT1604021P TN15U	B144
4164551	VBGT1604011P TN10U	B144
4164552	VBGT1604041P TN10U	B144
4164563	VBGT1604041P TN15U	B144
4164564	CNGP120402 TN10U	B35, B124
4164565	CNGP120401 TN10U	B35, B124
4164566	CNGP120404 TN10U	B35, B124
4164567	CNGP120404 TN15U	B124
4164568	CNGP120408 TN10U	B35, B124
4164569	CNGP120408 TN15U	B124
4164570	CNGP120412 TN10U	B124
4164571	CNGP120412 TN15U	B124
4164572	DNGP150402 TN10U	B52, B130
4164783	DNGP150402 TN15U	B130
4164784	DNGP150401 TN10U	B52, B130
4164785	DNGP150404 TN10U	B52, B130
4164786	DNGP150404 TN15U	B130
4164787	DNGP150408 TN10U	B52, B130
4164788	DNGP150408 TN15U	B130
4164789	TNGP160402 TN10U	B140
4164790	TNGP160402 TN15U	B140
4164791	TNGP160404 TN10U	B140
4164792	TNGP160404 TN15U	B140
4164793	TNGP160408 TN10U	B140
4164794	VNGP160402 TN10U	B96, B145
4164795	VNGP160401 TN10U	B96, B145
4164796	VNGP160401 TN15U	B145
4164797	VNGP220404 TN10U	B96, B145
4164798	VNGP220404 TN15U	B145
4164799	VNGP220408 TN10U	B96, B145
4164800	VNGP220408 TN15U	B145
4165244	CCMT0602021P TN10P	B123
4165245	CCMT0602021P TN20K	B123
4165470	CNMA120404 TN20K	B125
4165471	CNMA120408 TN20K	B125
4165472	CNMA120412 TN20K	B125
4165830	CNMG1204044P TN15M	B126
4165831	CNMG1204044P TN30M	B126
4165832	CNMG1204084P TN15M	B126
4165833	CNMA120416 TN20K	B36, B125
4165834	CNMA160612 TN20K	B36, B125
4165835	CNMA160616 TN20K	B36, B125
4165836	CNMA190612 TN20K	B36, B125
4165837	CNMA190616 TN20K	B36, B125
4165838	DNMA150408 TN20K	B130
4165839	DNMA150412 TN20K	B130
4165840	DNMA150608 TN20K	B130
4165841	DNMA150612 TN20K	B130
4165842	SNMA120408 TN20K	B134
4165843	SNMA120412 TN20K	B134
4165844	SNMA150612 TN20K	B71, B134
4165845	SNMA190612 TN20K	B71, B134
4165846	TNMA160408 TN20K	B140
4165847	TNMA160412 TN20K	B140
4165848	TNMA220408 TN20K	B140
4165849	VNMA160408 TN20K	B145
4165850	WNMA060408 TN20K	B147
4165851	WNMA080408 TN20K	B147
4165852	WNMA080412 TN20K	B147
4165853	CNMG1204084P TN30M	B126
4165854	CNMG1204124P TN15M	B126
4165855	CNMG1204124P TN30M	B126
4165856	CNMG1606124P TN15M	B126
4165857	CNMG1606124P TN30M	B126
4165858	CNMG1906124P TN15M	B126
4165859	CNMG1906124P TN30M	B126
4165860	DNMG1504044P TN15M	B131
4165861	DNMG1504044P TN30M	B131
4165862	DNMG1504084P TN15M	B131
4165863	DNMG1504084P TN30M	B131
4165864	DNMG1506044P TN15M	B131
4165865	DNMG1506044P TN30M	B131
4165866	DNMG1506084P TN15M	B131
4165867	DNMG1506084P TN30M	B131
4165868	DNMG1506124P TN15M	B131
4165869	DNMG1506124P TN30M	B131
4165870	SNMG1204084P TN15M	B135
4165871	SNMG1204084P TN30M	B135
4165872	SNMG1204124P TN15M	B135
4165873	SNMG1204124P TN30M	B135
4165874	TNMG1604044P TN15M	B141
4165875	TNMG1604044P TN30M	B141
4165876	TNMG1604084P TN15M	B141
4165877	TNMG1604084P TN30M	B141
4165878	TNMG1604124P TN15M	B141
4165879	TNMG1604124P TN30M	B141
4165880	TNMG2204044P TN15M	B141
4165881	TNMG2204044P TN30M	B141
4165882	TNMG2204084P TN15M	B141
4165883	TNMG2204084P TN30M	B141
4165884	VNMG1604044P TN15M	B146
4165885	VNMG1604044P TN30M	B146
4165886	VNMG1604084P TN15M	B146
4165887	VNMG1604084P TN30M	B146
4165888	WNMG0804044P TN15M	B148
4165889	WNMG0804044P TN30M	B148
4165890	WNMG0804084P TN15M	B148
4165891	WNMG0804084P TN30M	B148
4165892	WNMG0804124P TN30M	B148
4165948	CNMG0903086P TN10P	B127
4165949	CNMG0903086P TN20P	B127
4165950	CNMG0903086P TN15M	B127
4165951	CNMG0903086P TN30M	B127
4165952	CNMG1204046P TN10P	B127
4165963	CNMG1204046P TN20P	B127
4165964	CNMG1204046P TN15M	B127
4165965	CNMG1204046P TN30M	B127
4165966	CNMG1204086P TN10P	B127
4165967	CNMG1204086P TN20P	B127
4165968	CNMG1204086P TN30P	B127
4165969	CNMG1204086P TN15M	B127
4165970	CNMG1204086P TN30M	B127
4165971	CNMG1204126P TN10P	B127
4165972	CNMG1204126P TN20P	B127
4165973	CNMG1204126P TN30P	B127
4165974	CNMG1204126P TN15M	B127
4165975	CNMG1204126P TN30M	B127
4165976	CNMG1606126P TN20P	B127
4165977	CNMG1606126P TN30P	B127
4165978	CNMG1606126P TN15M	B127
4165979	CNMG1606126P TN30M	B127
4165980	CNMG1906126P TN20P	B127
4165981	CNMG1906126P TN30P	B127
4165982	CNMG1906126P TN15M	B127
4165983	CNMG1906126P TN30M	B127
4165984	DNMG1104086P TN10P	B132
4165985	DNMG1104086P TN20P	B132
4165986	DNMG1104086P TN30M	B132
4165987	DNMG1504046P TN10P	B132
4165988	DNMG1504046P TN20P	B132
4165989	DNMG1504046P TN15M	B132
4165990	DNMG1504046P TN30M	B132
4165991	DNMG1504086P TN10P	B132
4165992	DNMG1504086P TN20P	B132
4165993	DNMG1504086P TN30P	B132
4165994	DNMG1504086P TN15M	B132
4165995	DNMG1504086P TN30M	B132
4165996	DNMG1504126P TN10P	B132
4165997	DNMG1504126P TN20P	B132
4166171	CNMG1204042P TN10P	B126
4166172	CNMG1204042P TN20P	B126
4166242	CCMT0602021P TN15M	B123
4166243	CNMG1204042P TN20K	B126
4166244	CNMG1204042P TN15M	B126
4166245	CNMG1204042P TN30M	B126
4166246	CNMG1204042P TN10U	B126
4166247	CNMG1204042P TN15U	B126
4166248	CNMG1204082P TN10P	B126
4166249	CNMG1204082P TN20P	B126
4166250	CNMG1204082P TN20K	B126
4166251	CNMG1204082P TN15M	B126
4166252	CNMG1204082P TN30M	B126
4166253	CNMG1204082P TN10U	B126
4166254	CNMG1204082P TN15U	B126
4166255	CNMG1204122P TN10P	B126
4166256	CNMG1204122P TN20P	B126
4166257	CNMG1204122P TN20K	B126
4166258	CNMG1204122P TN15M	B126
4166259	CNMG1204122P TN10U	B126
4166260	DNMG1504042P TN10P	B131
4166261	DNMG1504042P TN20P	B131
4166262	DNMG1504042P TN20K	B131
4166263	DNMG1504042P TN15M	B131
4166264	DNMG1504042P TN30M	B131
4166265	DNMG1504042P TN10U	B131
4166266	DNMG1504042P TN15U	B131
4166267	DNMG1504082P TN10P	B131
4166269	DNMG1504082P TN20P	B131
4166271	DNMG1504082P TN20K	B131
4166273	DNMG1504082P TN15M	B131
4166275	DNMG1504082P TN30M	B131
4166277	DNMG1504082P TN10U	B131
4166279	DNMG1504082P TN15U	B131
4166281	VNMG1604042P TN10P	B146
4166282	VNMG1604042P TN20P	B146
4166283	VNMG1604042P TN20K	B146
4166284	VNMG1604042P TN15M	B146
4166285	VNMG1604042P TN30M	B146
4166286	VNMG1604042P TN10U	B146
4166287	VNMG1604042P TN15U	B146
4166288	VNMG1604082P TN10P	B146
4166289	VNMG1604082P TN20P	B146
4166290	VNMG1604082P TN20K	B146
4166291	VNMG1604082P TN15M	B146
4166292	VNMG1604082P TN10U	B146
4166293	VNMG1604082P TN15U	B146
4166294	WNMG0804042P TN10P	B148
4166295	WNMG0804042P TN20P	B148
4166296	WNMG0804042P TN20K	B148
4166297	WNMG0804042P TN15M	B148
4166298	WNMG0804042P TN30M	B148
4166299	WNMG0804042P TN10U	B148
4166300	WNMG0804042P TN15U	B148
4166301	WNMG0804082P TN10P	B148
4166302	WNMG0804082P TN20P	B148
4166303	WNMG0804082P TN20K	B148
4166304	WNMG0804082P TN15M	B148
4166305	WNMG0804082P TN10U	B148
4166306	WNMG0804082P TN15U	B148
4166323	CCMT0602021P TN30M	B123
4166324	CCMT0602021P TN10U	B123
4166325	CCMT0602021P TN15U	B123
4166326	CCMT0602041P TN10P	B123
4166327	CCMT0602041P TN20P	B123
4166328	CCMT0602041P TN20K	B123
4166329	CCMT0602041P TN15M	B123
4166330	CCMT0602041P TN30M	B123
4166331	CCMT0602041P TN10U	B123
4166332	CCMT0602041P TN15U	B123
4166333	CCMT0602081P TN10P	B123
4166334	CCMT0602081P TN20P	B123
4166335	CCMT0602081P TN20K	B123
4166336	CCMT0602081P TN15M	B123
4166337	CCMT0602081P TN30M	B123
4166338	CCMT0602081P TN10U	B123
4166339	CCMT09T3021P TN10U	B123
4166340	CCMT09T3021P TN15U	B123
4166341	CCMT09T3041P TN10P	B123
4166342	CCMT09T3041P TN20P	B123
4166343	CCMT09T3041P TN20K	B123
4166344	CCMT09T3041P TN15M	B123

Order No.	Catalogue No.	Page(s)
4166345	CCMT09T3041P TN30M	B123
4166346	CCMT09T3041P TN10U	B123
4166347	CCMT09T3041P TN15U	B123
4166348	CCMT09T3081P TN10P	B123
4166349	CCMT09T3081P TN20P	B123
4166350	CCMT09T3081P TN20K	B123
4166351	CCMT09T3081P TN15M	B123
4166352	CCMT09T3081P TN30M	B123
4166353	CCMT09T3081P TN10U	B123
4166354	CCMT09T3081P TN15U	B123
4166355	CCMT1204041P TN10P	B123
4166356	CCMT1204041P TN20P	B123
4166357	CCMT1204041P TN20K	B123
4166358	CCMT1204041P TN15M	B123
4166359	CCMT1204041P TN30M	B123
4166361	DCMT1504081P TN20K	B129
4166362	SCMT09T3041P TN10P	B134
4166386	CNMG1204047N TN10P	B128
4166387	CNMG1204047N TN20P	B128
4166388	CNMG1204047N TN20K	B128
4166389	CNMG1204087N TN10P	B128
4166390	CNMG1204087N TN20P	B128
4166391	CNMG1204087N TN30P	B128
4166392	CNMG1204087N TN20K	B128
4166393	SCMT09T3041P TN20P	B134
4166394	SCMT09T3041P TN20K	B134
4166395	SCMT09T3041P TN15M	B134
4166396	SCMT09T3041P TN30M	B134
4166397	SCMT09T3041P TN10U	B134
4166398	SCMT09T3081P TN10P	B134
4166399	SCMT09T3081P TN20P	B134
4166400	SCMT09T3081P TN20K	B134
4166401	SCMT09T3081P TN15M	B134
4166402	SCMT09T3081P TN30M	B134
4166403	SCMT09T3081P TN10U	B134
4166404	SCMT1204041P TN10U	B134
4166405	SCMT1204081P TN10P	B134
4166406	SCMT1204081P TN20P	B134
4166407	SCMT1204081P TN20K	B134
4166408	SCMT1204081P TN15M	B134
4166409	SCMT1204081P TN30M	B134
4166410	SCMT1204081P TN10U	B134
4166411	TCMT1102021P TN10P	B139
4166412	TCMT1102021P TN20K	B139
4166413	TCMT1102021P TN10U	B139
4166414	TCMT1102041P TN10P	B139
4166415	TCMT1102041P TN20P	B139
4166416	TCMT1102041P TN20K	B139
4166417	TCMT1102041P TN15M	B139
4166418	TCMT1102041P TN30M	B139
4166419	TCMT1102041P TN10U	B139
4166420	TCMT1102081P TN10P	B139
4166421	TCMT1102081P TN20P	B139
4166422	TCMT1102081P TN20K	B139
4166423	TCMT1102081P TN10U	B139
4166424	TCMT16T3021P TN10U	B139
4166425	TCMT16T3041P TN10P	B139
4166426	TCMT16T3041P TN20P	B139
4166427	TCMT16T3041P TN20K	B139
4166428	TCMT16T3041P TN15M	B139
4166429	TCMT16T3041P TN30M	B139
4166430	TCMT16T3041P TN10U	B139
4166432	DNMG1504127N TN30P	B133
4166433	CNMG1204127N TN10P	B128
4166434	CNMG1204127N TN20P	B128
4166435	CNMG1204127N TN30P	B128
4166436	CNMG1204127N TN20K	B128
4166437	CNMG1204167N TN10P	B128
4166438	CNMG1204167N TN20P	B128
4166439	CNMG1204167N TN20K	B128
4166440	CNMG1606127N TN10P	B128
4166441	CNMG1606127N TN20P	B128
4166442	CNMG1606127N TN30P	B128
4166443	CNMG1606127N TN20K	B128
4166444	CNMG1606167N TN10P	B128
4166445	CNMG1606167N TN20P	B128
4166446	CNMG1606167N TN20K	B128
4166447	CNMG1906087N TN10P	B128
4166448	CNMG1906087N TN20K	B128
4166449	CNMG1906127N TN10P	B128
4166450	CNMG1906127N TN20P	B128
4166451	CNMG1906127N TN30P	B128
4166452	CNMG1906127N TN20K	B128
4166453	CNMG1906167N TN10P	B128
4166454	CNMG1906167N TN20P	B128
4166455	CNMG1906167N TN30P	B128
4166456	CNMG1906167N TN20K	B128
4166457	CNMG2509247N TN30P	B128
4166458	DNMG1504047N TN10P	B133
4166459	DNMG1504047N TN20P	B133
4166460	DNMG1504087N TN10P	B133
4166461	DNMG1504087N TN20P	B133
4166462	DNMG1504087N TN30P	B133
4166463	DNMG1504087N TN20K	B133
4166464	DNMG1504127N TN10P	B133
4166465	DNMG1504127N TN20P	B133
4166469	TCMT16T3081P TN10P	B139
4166471	TCMT16T3081P TN20P	B139
4166472	TCMT16T3081P TN20K	B139
4166483	DNMG1504127N TN20K	B133
4166484	DNMG1506087N TN10P	B133
4166485	DNMG1506087N TN20P	B133
4166486	DNMG1506087N TN30P	B133
4166487	DNMG1506087N TN20K	B133
4166488	DNMG1506127N TN10P	B133
4166489	DNMG1506127N TN20P	B133
4166490	DNMG1506127N TN30P	B133
4166491	DNMG1506127N TN20K	B133
4166492	DNMG1906127N TN20P	B133
4166493	DNMG1906127N TN30P	B133
4166494	RNMG12047N TN20P	B133
4166495	RNMG12047N TN20K	B133
4166496	RNMG19067N TN10P	B133
4166497	RNMG19067N TN20P	B133
4166498	SNMG1204087N TN10P	B137
4166499	SNMG1204087N TN20P	B137
4166500	SNMG1204087N TN20K	B137
4166501	SNMG1204127N TN10P	B137
4166502	SNMG1204127N TN20P	B137
4166503	SNMG1204127N TN30P	B137
4166504	SNMG1204127N TN20K	B137
4166505	SNMG1204167N TN10P	B137
4166506	SNMG1204167N TN20P	B137
4166507	SNMG1204167N TN30P	B137
4166508	SNMG1204167N TN20K	B137
4166509	SNMG1506127N TN20P	B137
4166510	SNMG1506127N TN30P	B137
4166511	SNMG1506127N TN20K	B137
4166512	SNMG1506167N TN20P	B137
4166513	SNMG1506167N TN30P	B137
4166514	SNMG1506167N TN20K	B137
4166515	SNMG1906127N TN20P	B137
4166516	SNMG1906127N TN30P	B137
4166517	SNMG1906127N TN20K	B137
4166518	SNMG1906167N TN20P	B137
4166519	SNMG1906167N TN30P	B137
4166520	SNMG1906167N TN20K	B137
4166521	TNMG1604047N TN20P	B143
4166522	TNMG1604087N TN10P	B143
4166523	TNMG1604087N TN20P	B143
4166524	TNMG1604087N TN30P	B143
4166525	TNMG1604087N TN20K	B143
4166526	TNMG1604127N TN10P	B143
4166527	TNMG1604127N TN20P	B143
4166528	TNMG1604127N TN30P	B143
4166529	TNMG1604127N TN20K	B143
4166530	TNMG2204047N TN10P	B143
4166531	TNMG2204047N TN20P	B143
4166532	TNMG2204087N TN10P	B143
4166533	TNMG2204087N TN20P	B143
4166534	TNMG2204087N TN30P	B143
4166535	TNMG2204087N TN20K	B143
4166536	TNMG2204127N TN20P	B143
4166537	TNMG2204127N TN30P	B143
4166538	TNMG2204127N TN20K	B143
4166539	TNMG2706127N TN10P	B143
4166540	TNMG2706127N TN20P	B143
4166541	TNMG2706127N TN30P	B143
4166542	TNMG2706127N TN20K	B143
4166543	TNMG3309247N TN10P	B143
4166544	TNMG3309247N TN20P	B143
4166545	TNMG3309247N TN30P	B143
4166546	TNMG3309247N TN20K	B143
4166547	WNMG0804087N TN10P	B149
4166548	WNMG0804087N TN20P	B149
4166549	WNMG0804087N TN30P	B149
4166550	WNMG0804087N TN20K	B149
4166551	WNMG0804127N TN10P	B149
4166552	WNMG0804127N TN20P	B149
4166553	WNMG0804127N TN30P	B149
4166554	WNMG0804127N TN20K	B149
4166555	WNMG0804167N TN20P	B149
4166556	WNMG0804167N TN30P	B149
4166557	WNMG0804167N TN20K	B149
4166558	CCMT1204041P TN10U	B123
4166559	CCMT1204081P TN10P	B123
4166560	CCMT1204081P TN20P	B123
4166561	CCMT1204081P TN20K	B123
4166562	CCMT1204081P TN15M	B123
4166563	TCMT16T3081P TN15M	B139
4166564	TCMT16T3081P TN30M	B139
4166565	TCMT16T3081P TN10U	B139
4166566	TCMT16T3121P TN10U	B139
4166567	TCMT2204081P TN10P	B139
4166568	TCMT2204081P TN20P	B139
4166569	TCMT2204081P TN20K	B139
4166570	TCMT2204081P TN15M	B139
4166571	TCMT2204081P TN30M	B139
4166572	TCMT2204081P TN10U	B139
4166573	VBMT1103021P TN10U	B144
4166574	VBMT1103021P TN15U	B144
4166575	VBMT1103041P TN10P	B144
4166576	VBMT1103041P TN20P	B144
4166577	VBMT1103041P TN20K	B144
4166578	VBMT1103041P TN15M	B144
4166579	VBMT1103041P TN30M	B144
4166580	VBMT1103041P TN10U	B144
4166581	VBMT1103041P TN15U	B144
4166582	VBMT1103081P TN10P	B144
4166583	VBMT1103081P TN20P	B144
4166584	VBMT1103081P TN20K	B144
4166585	VBMT1103081P TN15M	B144
4166586	VBMT1103081P TN10U	B144
4166587	VBMT1604021P TN10P	B144
4166588	VBMT1604021P TN20K	B144
4166589	VBMT1604021P TN30M	B144
4166590	VBMT1604021P TN10U	B144
4166591	VBMT1604021P TN15U	B144
4166592	VBMT1604041P TN10P	B144
4166593	VBMT1604041P TN20P	B144
4166594	VBMT1604041P TN20K	B144
4166595	VBMT1604041P TN15M	B144
4166596	VBMT1604041P TN30M	B144
4166597	VBMT1604041P TN10U	B144
4166598	VBMT1604041P TN15U	B144
4166599	VBMT1604081P TN10P	B144
4166600	VBMT1604081P TN20P	B144
4166601	VBMT1604081P TN20K	B144
4166602	VBMT1604081P TN15M	B144
4166603	VBMT1604081P TN30M	B144
4166604	VBMT1604081P TN10U	B144
4166605	VBMT1604081P TN15U	B144
4166623	CCMT1204081P TN30M	B123
4166624	CCMT1204081P TN10U	B123
4166625	DCMT0702021P TN10U	B129
4166626	DCMT0702021P TN15U	B129
4166627	DCMT0702041P TN10P	B129
4166628	DCMT0702041P TN20P	B129
4166629	DCMT0702041P TN20K	B129
4166630	DCMT0702041P TN15M	B129
4166631	DCMT0702041P TN30M	B129
4166632	DCMT0702041P TN10U	B129
4166633	DCMT0702041P TN15U	B129
4166634	DCMT11T3021P TN10U	B129
4166635	DCMT11T3021P TN15U	B129
4166636	DCMT11T3041P TN10P	B129
4166637	DCMT11T3041P TN20P	B129
4166638	DCMT11T3041P TN20K	B129
4166639	DCMT11T3041P TN15M	B129
4166640	DCMT11T3041P TN30M	B129
4166641	DCMT11T3041P TN10U	B129
4166642	DCMT11T3041P TN15U	B129
4166643	DCMT11T3081P TN10P	B129
4166644	DCMT11T3081P TN20P	B129
4166645	DCMT11T3081P TN20K	B129
4166646	DCMT11T3081P TN15M	B129
4166647	DCMT11T3081P TN30M	B129
4166648	DCMT11T3081P TN10U	B129
4166649	DCMT11T3121P TN10P	B129
4166650	DCMT11T3121P TN20K	B129
4166651	DCMT11T3121P TN15M	B129
4166652	DCMT11T3121P TN10U	B129
4166653	DCMT1504041P TN10P	B129
4166654	DCMT1504041P TN20P	B129
4166655	DCMT1504041P TN20K	B129
4166656	DCMT1504081P TN10P	B129
4166657	DCMT1504081P TN20P	B129
4166765	DNMG1504126P TN15M	B132
4166766	DNMG1504126P TN30M	B132
4166767	DNMG1506046P TN10P	B132
4166768	DNMG1506046P TN20P	B132
4166769	DNMG1506046P TN15M	B132
4166770	DNMG1506046P TN30M	B132
4166771	DNMG1506086P TN10P	B132

Order No.	Catalogue No.	Page(s)
4166772	DNMG1506086P TN20P	B132
4166793	DNMG1506086P TN30P	B132
4166794	DNMG1506086P TN15M	B132
4166795	DNMG1506086P TN30M	B132
4166796	DNMG1506126P TN10P	B132
4166797	DNMG1506126P TN20P	B132
4166798	DNMG1506126P TN30P	B132
4166799	DNMG1506126P TN15M	B132
4166800	DNMG1506126P TN30M	B132
4166801	DNMG1906126P TN30P	B132
4166802	SNMG0903086P TN10P	B136
4166803	SNMG0903086P TN20P	B136
4166804	SNMG1204046P TN10P	B136
4166805	SNMG1204046P TN20P	B136
4166806	SNMG1204046P TN15M	B136
4166807	SNMG1204046P TN30M	B136
4166808	SNMG1204086P TN10P	B136
4166809	SNMG1204086P TN20P	B136
4166810	SNMG1204086P TN30P	B136
4166811	SNMG1204086P TN15M	B136
4166812	SNMG1204086P TN30M	B136
4166813	SNMG1204126P TN10P	B136
4166814	SNMG1204126P TN20P	B136
4166815	SNMG1204126P TN30P	B136
4166816	SNMG1204126P TN15M	B136
4166817	SNMG1204126P TN30M	B136
4166818	SNMG1906126P TN20P	B136
4166819	SNMG1906126P TN30P	B136
4166820	SNMG1906126P TN15M	B136
4166821	SNMG1906126P TN30M	B136
4166822	TNMG1604046P TN10P	B142
4166823	TNMG1604046P TN20P	B142
4166824	TNMG1604046P TN15M	B142
4166825	DNMG1506042P TN10P	B131
4166826	DNMG1506042P TN20P	B131
4166827	DNMG1506042P TN20K	B131
4166828	DNMG1506042P TN15M	B131
4166829	DNMG1506042P TN10U	B131
4166830	DNMG1506042P TN15U	B131
4166831	DNMG1506082P TN10P	B131
4166832	DNMG1506082P TN20P	B131
4166843	DNMG1506082P TN20K	B131
4166844	DNMG1506082P TN15M	B131
4166845	DNMG1506082P TN10U	B131
4166846	DNMG1506082P TN15U	B131
4166847	DNMG1506122P TN10P	B131
4166848	DNMG1506122P TN20P	B131
4166849	DNMG1506122P TN20K	B131
4166850	DNMG1506122P TN15M	B131
4166851	DNMG1506122P TN30M	B131
4166852	DNMG1506122P TN10U	B131
4166853	SNMG0903082P TN10P	B135
4166854	SNMG0903082P TN20P	B135
4166855	SNMG0903082P TN20K	B135
4166856	SNMG0903082P TN10U	B135
4166857	SNMG1204082P TN10P	B135
4166858	SNMG1204082P TN20P	B135
4166859	SNMG1204082P TN20K	B135
4166860	SNMG1204082P TN15M	B135
4166861	SNMG1204082P TN10U	B135
4166862	SNMG1204082P TN15U	B135
4166863	TNMG1604042P TN10P	B141
4166864	TNMG1604042P TN20P	B141
4166865	TNMG1604042P TN20K	B141
4166866	TNMG1604042P TN15M	B141
4166867	TNMG1604042P TN30M	B141
4166868	TNMG1604042P TN10U	B141
4166869	TNMG1604042P TN15U	B141
4166870	TNMG1604082P TN10P	B141
4166871	TNMG1604082P TN20P	B141
4166872	TNMG1604082P TN20K	B141
4166873	TNMG1604082P TN15M	B141
4166874	TNMG1604082P TN10U	B141
4166875	TNMG1604082P TN15U	B141
4166876	TNMG1604122P TN10P	B141
4166877	TNMG1604122P TN20P	B141
4166878	TNMG1604122P TN20K	B141
4166879	TNMG1604122P TN15M	B141
4166880	TNMG1604122P TN30M	B141
4166881	TNMG1604122P TN10U	B141
4166882	TNMG2204082P TN10P	B141
4166883	TNMG2204082P TN20P	B141
4166884	TNMG2204082P TN20K	B141
4166885	TNMG2204082P TN15M	B141
4166886	TNMG2204082P TN10U	B141
4166887	TNMG2204082P TN15U	B141
4167086	TNMG1604046P TN30M	B142
4167087	TNMG1604086P TN10P	B142
4167088	TNMG1604086P TN20P	B142
4167089	TNMG1604086P TN30P	B142
4167090	TNMG1604086P TN15M	B142
4167091	TNMG1604086P TN30M	B142
4167092	TNMG1604126P TN10P	B142
4167113	TNMG1604126P TN20P	B142
4167114	TNMG1604126P TN15M	B142
4167115	TNMG1604126P TN30M	B142
4167116	TNMG2204046P TN10P	B142
4167117	TNMG2204046P TN20P	B142
4167118	TNMG2204046P TN15M	B142
4167119	TNMG2204046P TN30M	B142
4167120	TNMG2204086P TN10P	B142
4167121	TNMG2204086P TN20P	B142
4167122	TNMG2204086P TN30P	B142
4167123	TNMG2204086P TN15M	B142
4167124	TNMG2204086P TN30M	B142
4167125	VNMG1604086P TN10P	B147
4167126	VNMG1604086P TN20P	B147
4167127	VNMG1604086P TN15M	B147
4167128	VNMG1604086P TN30M	B147
4167129	WNMG0604086P TN10P	B149
4167130	WNMG0604086P TN20P	B149
4167131	WNMG0604086P TN15M	B149
4167132	WNMG0604086P TN30M	B149
4167133	WNMG0804086P TN10P	B149
4167134	WNMG0804086P TN20P	B149
4167135	WNMG0804086P TN30P	B149
4167136	WNMG0804086P TN15M	B149
4167137	WNMG0804086P TN30M	B149
4167138	WNMG0804126P TN10P	B149
4167139	WNMG0804126P TN20P	B149
4167140	WNMG0804126P TN30P	B149
4167141	WNMG0804126P TN15M	B149
4167142	WNMG0804126P TN30M	B149
4167196	TDS202A10000 WP20PD	T53
4167198	TDS202A10100 WP20PD	T53
4167199	TDS202A10200 WP20PD	T53
4167200	TDS202A10300 WP20PD	T53
4167201	TDS202A10320 WP20PD	T53
4167202	TDS202A10400 WP20PD	T53
4167203	TDS202A10500 WP20PD	T53
4167204	TDS202A10600 WP20PD	T53
4167205	TDS202A10700 WP20PD	T53
4167206	TDS202A10716 WP20PD	T53
4167207	TDS202A10800 WP20PD	T53
4167208	TDS202A10900 WP20PD	T53
4167209	TDS202A11000 WP20PD	T53
4167210	TDS202A11100 WP20PD	T53
4167211	TDS202A11113 WP20PD	T53
4167212	TDS202A11200 WP20PD	T53
4167213	TDS202A11300 WP20PD	T53
4167214	TDS202A11400 WP20PD	T53
4167215	TDS202A11500 WP20PD	T53
4167216	TDS202A11509 WP20PD	T53
4167217	TDS202A11600 WP20PD	T53
4167218	TDS202A11700 WP20PD	T53
4167219	TDS202A11800 WP20PD	T53
4167220	TDS202A11900 WP20PD	T53
4167221	TDS202A11908 WP20PD	T53
4167222	TDS202A12000 WP20PD	T53
4167223	TDS202A12100 WP20PD	T53
4167224	TDS202A12200 WP20PD	T53
4167225	TDS202A12300 WP20PD	T53
4167226	TDS202A12304 WP20PD	T53
4167227	TDS202A12400 WP20PD	T53
4167228	TDS202A12500 WP20PD	T53
4167229	TDS202A12600 WP20PD	T53
4167230	TDS202A12700 WP20PD	T53
4167231	TDS202A12800 WP20PD	T53
4167232	TDS202A12900 WP20PD	T53
4167233	TDS202A13000 WP20PD	T53
4167234	TDS202A13096 WP20PD	T53
4167235	TDS202A13100 WP20PD	T53
4167236	TDS202A13200 WP20PD	T54
4167237	TDS202A13300 WP20PD	T54
4167238	TDS202A13400 WP20PD	T54
4167239	TDS202A13500 WP20PD	T54
4167240	TDS202A13600 WP20PD	T54
4167241	TDS202A13700 WP20PD	T54
4167242	TDS202A13800 WP20PD	T54
4167243	TDS202A13891 WP20PD	T54
4167244	TDS202A13900 WP20PD	T54
4167245	TDS202A14000 WP20PD	T54
4167246	TDS202A14100 WP20PD	T54
4167247	TDS202A14200 WP20PD	T54
4167248	TDS202A14288 WP20PD	T54
4167249	TDS202A14300 WP20PD	T54
4167250	TDS202A14400 WP20PD	T54
4167251	TDS202A14500 WP20PD	T54
4167252	TDS202A14600 WP20PD	T54
4167253	TDS202A14684 WP20PD	T54
4167254	TDS202A14700 WP20PD	T54
4167255	TDS202A14800 WP20PD	T54
4167256	TDS202A14900 WP20PD	T54
4167257	TDS202A15000 WP20PD	T54
4167258	TDS202A15083 WP20PD	T54
4167259	TDS202A15100 WP20PD	T54
4167260	TDS202A15200 WP20PD	T54
4167261	TDS202A15300 WP20PD	T54
4167262	TDS202A15400 WP20PD	T54
4167263	TDS202A15479 WP20PD	T54
4167264	TDS202A15500 WP20PD	T54
4167265	TDS202A15600 WP20PD	T54
4167266	TDS202A15700 WP20PD	T54
4167267	TDS202A15800 WP20PD	T54
4167268	TDS202A15875 WP20PD	T54
4167269	TDS202A15900 WP20PD	T54
4167270	TDS202A16000 WP20PD	T54
4167271	TDS202A16100 WP20PD	T54
4167272	TDS202A16200 WP20PD	T54
4167273	TDS202A16271 WP20PD	T54
4167274	TDS202A16300 WP20PD	T54
4167275	TDS202A16400 WP20PD	T54
4167276	TDS202A16500 WP20PD	T55
4167277	TDS202A16600 WP20PD	T55
4167278	TDS202A16670 WP20PD	T55
4167279	TDS202A16700 WP20PD	T55
4167280	TDS202A16800 WP20PD	T55
4167281	TDS202A16900 WP20PD	T55
4167282	TDS202A17000 WP20PD	T55
4167283	TDS202A17100 WP20PD	T55
4167284	TDS202A17200 WP20PD	T55
4167285	TDS202A17300 WP20PD	T55
4167286	TDS202A17400 WP20PD	T55
4167287	TDS202A17463 WP20PD	T55
4167288	TDS202A17500 WP20PD	T55
4167289	TDS202A17600 WP20PD	T55
4167290	TDS202A17700 WP20PD	T55
4167291	TDS202A17800 WP20PD	T55
4167292	TDS202A17859 WP20PD	T55
4167293	TDS202A17900 WP20PD	T55
4168738	CCMT060204FP WM15CT	B31
4168739	CCMT060208FP WM15CT	B31
4168740	CCMT09T304FP WM15CT	B31
4168741	CCMT09T308FP WM15CT	B31
4168742	CCMT120404FP WM15CT	B31
4168763	CCMT120408FP WM15CT	B31
4168764	DCMT070204FP WM15CT	B48
4168765	DCMT11T304FP WM15CT	B48
4168766	DCMT11T308FP WM15CT	B48
4168767	SCMT09T304FP WM15CT	B68
4168768	SCMT09T308FP WM15CT	B68
4168769	SCMT120408FP WM15CT	B68
4168770	TCMT110204FP WM15CT	B82
4168771	TCMT110208FP WM15CT	B82
4168772	TCMT16T304FP WM15CT	B82
4168773	TCMT16T308FP WM15CT	B82
4168774	VBMT110304FP WM15CT	B94
4168775	VBMT110308FP WM15CT	B94
4168776	VBMT160404FP WM15CT	B94
4168777	VBMT160408FP WM15CT	B94
4168778	CCMT060202FP WM25CT	B31
4168779	CCMT060204FP WM25CT	B31
4168780	CCMT060208FP WM25CT	B31
4168781	CCMT09T302FP WM25CT	B31
4168782	CCMT09T304FP WM25CT	B31
4168783	CCMT09T308FP WM25CT	B31
4168784	CCMT120404FP WM25CT	B31
4168785	CCMT120408FP WM25CT	B31
4168786	CCMT120412FP WM25CT	B31
4168787	DCMT070202FP WM25CT	B48
4168788	DCMT070204FP WM25CT	B48
4168789	DCMT070208FP WM25CT	B48
4168790	DCMT11T302FP WM25CT	B48
4168791	DCMT11T304FP WM25CT	B48
4168792	DCMT11T308FP WM25CT	B48
4168793	DCMT150404FP WM25CT	B48
4168794	DCMT150408FP WM25CT	B48
4168795	SCMT09T304FP WM25CT	B68
4168796	SCMT09T308FP WM25CT	B68
4168797	SCMT120404FP WM25CT	B68
4168798	SCMT120408FP WM25CT	B68
4168799	SCMT120412FP WM25CT	B68
4168800	TCMT110202FP WM25CT	B82
4168801	TCMT110204FP WM25CT	B82

Order No.	Catalogue No.	Page(s)
4168802	TCMT110208FP WM25CT	B82
4168803	TCMT16T304FP WM25CT	B82
4168804	TCMT16T308FP WM25CT	B82
4168805	TCMT16T312FP WM25CT	B82
4168806	TCMT220408FP WM25CT	B82
4168807	VBMT110304FP WM25CT	B94
4168808	VBMT110308FP WM25CT	B94
4168809	VBMT160402FP WM25CT	B94
4168810	VBMT160404FP WM25CT	B94
4168811	VBMT160408FP WM25CT	B94
4168812	CPMT060204FP WM15CT	B46
4168813	CPMT060208FP WM15CT	B46
4168814	CPMT09T304FP WM15CT	B46
4168815	CPMT09T308FP WM15CT	B46
4168816	DPMT070204FP WM15CT	B63
4168817	DPMT11T304FP WM15CT	B63
4168818	TPMT090208FP WM15CT	B92
4168819	TPMT110204FP WM15CT	B92
4168820	TPMT110208FP WM15CT	B92
4168821	WPMT06T304FP WM15CT	B105
4168822	CPMT060202FP WM25CT	B46
4168823	CPMT060204FP WM25CT	B46
4168824	CPMT060208FP WM25CT	B46
4168825	CPMT09T302FP WM25CT	B46
4168826	CPMT09T304FP WM25CT	B46
4168827	CPMT09T308FP WM25CT	B46
4168828	DPMT070204FP WM25CT	B63
4168829	DPMT11T304FP WM25CT	B63
4168830	DPMT11T308FP WM25CT	B63
4168831	SPMT09T304FP WM25CT	B79
4168832	SPMT09T308FP WM25CT	B79
4168833	TPMT090208FP WM25CT	B92
4168834	TPMT110204FP WM25CT	B92
4168835	TPMT110208FP WM25CT	B92
4168836	TPMT16T304FP WM25CT	B92
4168837	TPMT16T308FP WM25CT	B92
4168838	TPMT16T312FP WM25CT	B92
4168839	WPMT06T304FP WM25CT	B105
4168840	WPMT06T308FP WM25CT	B105
4168841	WPMTS3T104FP WM25CT	B105
4168893	CCMT060204MP WM15CT	B32
4168894	CCMT09T304MP WM15CT	B32
4168895	CCMT09T308MP WM15CT	B32
4168896	CCMT120408MP WM15CT	B32
4168897	CCMT120412MP WM15CT	B32
4168898	DCMT11T308MP WM15CT	B49
4168899	SCMT09T304MP WM15CT	B69
4168900	SCMT09T308MP WM15CT	B69
4168901	SCMT120404MP WM15CT	B69
4168902	SCMT120408MP WM15CT	B69
4168903	SCMT120412MP WM15CT	B69
4168904	TCMT16T304MP WM15CT	B82
4168905	TCMT16T308MP WM15CT	B82
4168906	CCMT060204MP WM25CT	B32
4168907	CCMT09T304MP WM25CT	B32
4168908	CCMT09T308MP WM25CT	B32
4168909	CCMT09T312MP WM25CT	B32
4168910	CCMT120408MP WM25CT	B32
4168911	CCMT120412MP WM25CT	B32
4168912	DCMT11T308MP WM25CT	B49
4168913	SCMT09T304MP WM25CT	B69
4168914	SCMT09T308MP WM25CT	B69
4168915	SCMT120404MP WM25CT	B69
4168916	SCMT120408MP WM25CT	B69
4168917	SCMT120412MP WM25CT	B69
4168918	TCMT16T304MP WM25CT	B82
4168919	TCMT16T308MP WM25CT	B82
4168920	TCMT16T312MP WM25CT	B82
4168921	VBMT160404MP WM25CT	B95
4168922	VBMT160408MP WM25CT	B95
4168923	CPMT09T308MP WM15CT	B46
4168924	CPMT09T312MP WM15CT	B46
4168925	SPMT09T308MP WM15CT	B79
4168926	CPMT09T308MP WM25CT	B46
4169353	CNMG120404UF WM15CT	B42
4169354	CNMG120408UF WM15CT	B42
4169355	CNMG120412UF WM15CT	B42
4169356	DNMG110404UF WM15CT	B60
4169357	DNMG110408UF WM15CT	B60
4169358	DNMG150404UF WM15CT	B60
4169359	DNMG150408UF WM15CT	B60
4169360	DNMG150412UF WM15CT	B60
4169361	DNMG150604UF WM15CT	B60
4169362	DNMG150608UF WM15CT	B60
4169363	DNMG150612UF WM15CT	B60
4169364	SNMG120404UF WM15CT	B74
4169365	SNMG120408UF WM15CT	B74
4169366	SNMG120412UF WM15CT	B74
4169367	TNMG160404UF WM15CT	B88
4169368	TNMG160408UF WM15CT	B88
4169369	TNMG160412UF WM15CT	B88
4169370	TNMG220404UF WM15CT	B88
4169371	TNMG220408UF WM15CT	B88
4169372	VNMG160404UF WM15CT	B98
4169373	VNMG160408UF WM15CT	B98
4169374	WNMG060404UF WM15CT	B103
4169375	WNMG060408UF WM15CT	B103
4169376	WNMG080404UF WM15CT	B103
4169377	WNMG080408UF WM15CT	B103
4169378	WNMG080412UF WM15CT	B103
4169379	CNMG120404UF WM25CT	B42
4169380	CNMG120408UF WM25CT	B42
4169381	CNMG120412UF WM25CT	B42
4169382	DNMG110404UF WM25CT	B60
4169383	DNMG110408UF WM25CT	B60
4169384	DNMG150404UF WM25CT	B60
4169385	DNMG150408UF WM25CT	B60
4169386	DNMG150412UF WM25CT	B60
4169387	DNMG150604UF WM25CT	B60
4169388	DNMG150608UF WM25CT	B60
4169389	DNMG150612UF WM25CT	B60
4169390	SNMG120404UF WM25CT	B74
4169391	SNMG120408UF WM25CT	B74
4169392	SNMG120412UF WM25CT	B74
4169393	TNMG160404UF WM25CT	B88
4169394	TNMG160408UF WM25CT	B88
4169395	TNMG160412UF WM25CT	B88
4169396	TNMG220404UF WM25CT	B88
4169397	TNMG220408UF WM25CT	B88
4169398	VNMG160404UF WM25CT	B98
4169399	VNMG160408UF WM25CT	B98
4169400	WNMG060404UF WM25CT	B103
4169401	WNMG060408UF WM25CT	B103
4169402	WNMG080404UF WM25CT	B103
4169403	WNMG080408UF WM25CT	B103
4169404	WNMG080412UF WM25CT	B103
4169406	CNMG120404UR WM15CT	B43
4169407	CNMG120408UR WM15CT	B43
4169408	CNMG120412UR WM15CT	B43
4169409	CNMG120416UR WM15CT	B43
4169410	CNMG160608UR WM15CT	B43
4169411	CNMG160612UR WM15CT	B43
4169412	CNMG190612UR WM15CT	B43
4169423	CNMG190616UR WM15CT	B43
4169424	DNMG110408UR WM15CT	B62
4169425	DNMG110412UR WM15CT	B62
4169426	DNMG150408UR WM15CT	B62
4169427	DNMG150608UR WM15CT	B62
4169428	DNMG150612UR WM15CT	B62
4169429	SNMG120408UR WM15CT	B75
4169430	SNMG120412UR WM15CT	B75
4169431	SNMG150612UR WM15CT	B75
4169432	SNMG150616UR WM15CT	B75
4169433	SNMG190616UR WM15CT	B75
4169434	TNMG160408UR WM15CT	B89
4169435	TNMG220408UR WM15CT	B89
4169436	TNMG220412UR WM15CT	B89
4169437	TNMG270612UR WM15CT	B89
4169438	TNMG270616UR WM15CT	B89
4169439	VNMG160408UR WM15CT	B99
4169440	VNMG160412UR WM15CT	B99
4169441	WNMG060408UR WM15CT	B104
4169442	WNMG080408UR WM15CT	B104
4169443	WNMG080412UR WM15CT	B104
4169444	CNMG120404UR WM25CT	B43
4169445	CNMG120408UR WM25CT	B43
4169446	CNMG120412UR WM25CT	B43
4169447	CNMG120416UR WM25CT	B43
4169448	CNMG160608UR WM25CT	B43
4169449	CNMG160612UR WM25CT	B43
4169450	CNMG160616UR WM25CT	B43
4169451	CNMG190612UR WM25CT	B43
4169452	CNMG190616UR WM25CT	B43
4169453	DNMG110408UR WM25CT	B62
4169454	DNMG150408UR WM25CT	B62
4169455	DNMG150412UR WM25CT	B62
4169456	DNMG150608UR WM25CT	B62
4169457	DNMG150612UR WM25CT	B62
4169458	SNMG120408UR WM25CT	B75
4169459	SNMG120412UR WM25CT	B75
4169460	SNMG120416UR WM25CT	B75
4169461	SNMG150612UR WM25CT	B75
4169462	SNMG150616UR WM25CT	B75
4169463	SNMG190612UR WM25CT	B75
4169464	SNMG190616UR WM25CT	B75
4169465	TNMG160408UR WM25CT	B89
4169466	TNMG160412UR WM25CT	B89
4169467	TNMG160416UR WM25CT	B89
4169468	TNMG220408UR WM25CT	B89
4169469	TNMG220412UR WM25CT	B89
4169470	TNMG220416UR WM25CT	B89
4169471	TNMG270612UR WM25CT	B89
4169472	TNMG270616UR WM25CT	B89
4169473	VNMG160408UR WM25CT	B99
4169474	VNMG160412UR WM25CT	B99
4169475	WNMG060408UR WM25CT	B104
4169476	WNMG080408UR WM25CT	B104
4169477	WNMG080412UR WM25CT	B104
4169478	WNMG080416UR WM25CT	B104
4169479	CNMG120404UR WM35CT	B43
4169480	CNMG120408UR WM35CT	B43
4169481	CNMG120412UR WM35CT	B43
4169482	CNMG120416UR WM35CT	B43
4169483	CNMG160608UR WM35CT	B43
4169484	CNMG160612UR WM35CT	B43
4169485	CNMG160616UR WM35CT	B43
4169486	CNMG190612UR WM35CT	B43
4169487	CNMG190616UR WM35CT	B43
4169488	DNMG110408UR WM35CT	B62
4169489	DNMG150408UR WM35CT	B62
4169490	DNMG150412UR WM35CT	B62
4169491	DNMG150416UR WM35CT	B62
4169492	DNMG150608UR WM35CT	B62
4169493	DNMG150612UR WM35CT	B62
4169494	DNMG150616UR WM35CT	B62
4169495	SNMG120408UR WM35CT	B75
4169496	SNMG120412UR WM35CT	B75
4169497	SNMG120416UR WM35CT	B75
4169498	SNMG150612UR WM35CT	B75
4169499	SNMG150616UR WM35CT	B75
4169500	SNMG190612UR WM35CT	B75
4169501	SNMG190616UR WM35CT	B75
4169502	TNMG160412UR WM35CT	B89
4169503	TNMG220408UR WM35CT	B89
4169504	TNMG220412UR WM35CT	B89
4169505	TNMG220416UR WM35CT	B89
4169506	TNMG270612UR WM35CT	B89
4169507	TNMG270616UR WM35CT	B89
4169508	VNMG160408UR WM35CT	B99
4169509	WNMG080408UR WM35CT	B104
4169510	WNMG080412UR WM35CT	B104
4169511	WNMG080416UR WM35CT	B104
4169554	WMTS205M2U02PT WP10CT	E18
4169555	WMTS205M2U02PT WP25CT	E18
4169556	WMTS305M3U03PT WP10CT	E18
4169557	WMTS305M3U03PT WP25CT	E18
4169558	WMTS305M3U06PT WP10CT	E18
4169559	WMTS305M3U06PT WP25CT	E18
4169560	WMTS405M4U03PT WP10CT	E18
4169561	WMTS405M4U03PT WP25CT	E18
4169562	WMTS405M4U06PT WP10CT	E18
4169563	WMTS405M4U06PT WP25CT	E18
4169564	WMTS505M5U03PT WP10CT	E18
4169565	WMTS505M5U03PT WP25CT	E18
4169566	WMTS505M5U06PT WP10CT	E18
4169567	WMTS505M5U06PT WP25CT	E18
4169568	WMTS605M6U03PT WP10CT	E18
4169569	WMTS605M6U03PT WP25CT	E18
4169570	WMTS605M6U06PT WP10CT	E18
4169571	WMTS605M6U06PT WP25CT	E18
4169572	WMTS805M8U06PT WP10CT	E18
4169573	WMTS805M8U06PT WP25CT	E18
4169574	WMTS805M8U15PT WP10CT	E18
4169575	WMTS805M8U15PT WP25CT	E18
4169576	WMTC094N00CM13 WU25PT	E14
4169577	WMTC094N00CMW13 WU25PT	E16
4169578	WMTC094R05CM13 WU25PT	E15
4169579	WMTC094R05CMW13 WU25PT	E17
4169580	WMTC094R12CM13 WU25PT	E15
4169581	WMTC094R12CMW13 WU25PT	E17
4169582	WMTC125N00CM17 WU25PT	E14
4169663	WMTC125N00CMW17 WU25PT	E16
4169664	WMTC125R05CM17 WU25PT	E15
4169665	WMTC125R05CMW17 WU25PT	E17
4169666	WMTC125R12CM17 WU25PT	E15
4169667	WMTC125R12CMW17 WU25PT	E17
4169668	WMTC015N00CM08 WU25PT	E14
4169669	WMTC015N00CMW08 WU25PT	E16
4169670	WMTC015R05CM08 WU25PT	E15
4169671	WMTC015L05CM08 WU25PT	E14
4169672	WMTC015R12CM08 WU25PT	E15
4169673	WMTC020N00CM08 WU25PT	E14
4169674	WMTC020N00CMW08 WU25PT	E16
4169675	WMTC020R05CM08 WU25PT	E15

Order No.	Catalogue No.	Page(s)
4169676	WMTC020R05CMW08 WU25PT	E17
4169677	WMTC020L05CM08 WU25PT	E14
4169678	WMTC020R12CM08 WU25PT	E15
4169679	WMTC020R12CMW08 WU25PT	E17
4169680	WMTC020L12CM08 WU25PT	E14
4169681	WMTC020L12CMW08 WU25PT	E16
4169682	WMTC030N00CM17 WU25PT	E14
4169683	WMTC030N00CMW17 WU25PT	E16
4169684	WMTC030R05CM17 WU25PT	E15
4169685	WMTC030R05CMW17 WU25PT	E17
4169686	WMTC030L05CM17 WU25PT	E14
4169687	WMTC030L05CMW17 WU25PT	E16
4169688	WMTC030R12CM17 WU25PT	E15
4169689	WMTC030R12CMW17 WU25PT	E17
4169690	WMTC030L12CM17 WU25PT	E14
4169691	WMTC030L12CMW17 WU25PT	E16
4169692	WMTC040N00CM17 WU25PT	E14
4169693	WMTC040N00CMW17 WU25PT	E16
4169694	WMTC040R05CM17 WU25PT	E15
4169695	WMTC040L05CM17 WU25PT	E14
4169696	WMTC040R12CM17 WU25PT	E15
4169697	WMTC040L12CM17 WU25PT	E14
4169857	CCMT060202FP WP15CT	B31
4169858	CCMT060204FP WP15CT	B31
4169859	CCMT060208FP WP15CT	B31
4169860	CCMT09T304FP WP15CT	B31
4169861	CCMT09T308FP WP15CT	B31
4169862	CCMT120404FP WP15CT	B31
4169960	CNMG120408UR WP35CT	B43
4169961	CNMG120412UR WP35CT	B43
4169962	CNMG160612UR WP35CT	B43
4169963	CNMG160616UR WP35CT	B43
4169964	CNMG190612UR WP35CT	B43
4169965	CNMG190616UR WP35CT	B43
4169966	DNMG110408UR WP35CT	B62
4169967	DNMG150408UR WP35CT	B62
4169968	DNMG150412UR WP35CT	B62
4169969	DNMG150608UR WP35CT	B62
4169970	DNMG150612UR WP35CT	B62
4169971	DNMG150616UR WP35CT	B62
4169975	RCMT0602M0 WP15CT	B65
4169976	RCMT0803M0 WP15CT	B65
4169977	RCMT10T3M0 WP15CT	B65
4169978	RCMT1204M0 WP15CT	B65
4169979	RCMT1606M0 WP15CT	B65
4169980	RCMX2006M0T WP15CT	B66
4169981	RCMX2507M0T WP15CT	B66
4169982	RCMX3209M0T WP15CT	B66
4169983	VBMT160404 WP15CT	B94
4169984	VBMT160408 WP15CT	B94
4169985	VBMT160412 WP15CT	B94
4169989	SNMG120408UR WP35CT	B75
4169990	SNMG120412UR WP35CT	B75
4169991	SNMG150612UR WP35CT	B75
4169992	SNMG150616UR WP35CT	B75
4169993	CCMT120408FP WP15CT	B31
4169994	CCMT120412FP WP15CT	B31
4169995	DCMT070204FP WP15CT	B48
4169996	DCMT11T302FP WP15CT	B48
4169997	DCMT11T304FP WP15CT	B48
4169998	DCMT11T308FP WP15CT	B48
4169999	DCMT11T312FP WP15CT	B48
4170000	DCMT150404FP WP15CT	B48
4170001	DCMT150408FP WP15CT	B48
4170002	SCMT09T304FP WP15CT	B68
4170003	SCMT09T308FP WP15CT	B68
4170004	SCMT120408FP WP15CT	B68
4170005	SCMT120412FP WP15CT	B68
4170006	TCMT110204FP WP15CT	B82
4170007	TCMT110208FP WP15CT	B82
4170008	TCMT16T304FP WP15CT	B82
4170009	TCMT16T308FP WP15CT	B82
4170010	TCMT16T312FP WP15CT	B82
4170011	TCMT220408FP WP15CT	B82
4170012	VBMT110304FP WP15CT	B94
4170013	VBMT160404FP WP15CT	B94
4170014	VBMT160408FP WP15CT	B94
4170015	CPMT060202FP WP15CT	B46
4170016	CPMT060204FP WP15CT	B46
4170017	CPMT060208FP WP15CT	B46
4170018	CPMT09T304FP WP15CT	B46
4170019	CPMT09T308FP WP15CT	B46
4170020	DPMT070204FP WP15CT	B63
4170021	DPMT11T304FP WP15CT	B63
4170022	DPMT11T308FP WP15CT	B63
4170023	SPMT09T304FP WP15CT	B79
4170024	SPMT09T308FP WP15CT	B79
4170025	TPMT090208FP WP15CT	B92
4170026	TPMT110204FP WP15CT	B92
4170027	TPMT110208FP WP15CT	B92
4170028	TPMT16T304FP WP15CT	B92
4170029	TPMT16T308FP WP15CT	B92
4170030	WPMT06T304FP WP15CT	B105
4170031	WPMT06T308FP WP15CT	B105
4170032	CCMT060204FP WK20CT	B31
4170033	SNMG190612UR WP35CT	B75
4170034	SNMG190616UR WP35CT	B75
4170035	TNMG160408UR WP35CT	B89
4170036	TNMG220408UR WP35CT	B89
4170037	TNMG220412UR WP35CT	B89
4170038	VNMG160408UR WP35CT	B99
4170039	WNMG060408UR WP35CT	B104
4170040	WNMG080408UR WP35CT	B104
4170041	WNMG080412UR WP35CT	B104
4170042	WNMG080416UR WP35CT	B104
4170043	CNMG120404MR WP35CT	B39
4170044	CNMG120408MR WP35CT	B39
4170045	CNMG120412MR WP35CT	B39
4170046	CNMG160612MR WP35CT	B39
4170047	CNMG160616MR WP35CT	B39
4170048	CNMG190612MR WP35CT	B39
4170049	CNMG190616MR WP35CT	B39
4170050	DNMG110408MR WP35CT	B57
4170051	DNMG150404MR WP35CT	B57
4170052	DNMG150408MR WP35CT	B57
4170053	DNMG150412MR WP35CT	B57
4170054	DNMG150604MR WP35CT	B57
4170055	DNMG150608MR WP35CT	B57
4170056	DNMG150612MR WP35CT	B57
4170057	SNMG120408MR WP35CT	B73
4170058	SNMG190612MR WP35CT	B73
4170059	TNMG160404MR WP35CT	B86
4170060	TNMG160408MR WP35CT	B86
4170061	TNMG160412MR WP35CT	B86
4170062	TNMG220404MR WP35CT	B86
4170063	TNMG220408MR WP35CT	B86
4170064	TNMG220412MR WP35CT	B86
4170065	TNMG220416MR WP35CT	B86
4170066	VNMG160408MR WP35CT	B97
4170067	WNMG080408MR WP35CT	B102
4170068	WNMG080412MR WP35CT	B102
4170083	CCMT060208FP WK20CT	B31
4170084	CCMT09T304FP WK20CT	B31
4170085	CCMT09T308FP WK20CT	B31
4170086	CCMT120404FP WK20CT	B31
4170087	CCMT120408FP WK20CT	B31
4170088	CCMT120412FP WK20CT	B31
4170089	DCMT070204FP WK20CT	B48
4170090	DCMT11T304FP WK20CT	B48
4170091	DCMT11T308FP WK20CT	B48
4170092	DCMT150408FP WK20CT	B48
4170093	SCMT09T304FP WK20CT	B68
4170094	SCMT09T308FP WK20CT	B68
4170095	SCMT120408FP WK20CT	B68
4170096	SCMT120412FP WK20CT	B68
4170097	TCMT110204FP WK20CT	B82
4170098	TCMT110208FP WK20CT	B82
4170099	TCMT16T304FP WK20CT	B82
4170100	TCMT16T308FP WK20CT	B82
4170101	TCMT16T312FP WK20CT	B82
4170102	TCMT220408FP WK20CT	B82
4170103	VBMT160404FP WK20CT	B94
4170104	VBMT160408FP WK20CT	B94
4170105	CPMT060204FP WK20CT	B46
4170106	CPMT060208FP WK20CT	B46
4170107	CPMT09T304FP WK20CT	B46
4170108	CPMT09T308FP WK20CT	B46
4170109	DPMT11T308FP WK20CT	B63
4170110	SPMT09T304FP WK20CT	B79
4170111	SPMT09T308FP WK20CT	B79
4170112	TPMT090208FP WK20CT	B92
4170113	TPMT110204FP WK20CT	B92
4170114	TPMT110208FP WK20CT	B92
4170115	TPMT16T304FP WK20CT	B92
4170116	TPMT16T308FP WK20CT	B92
4170119	WMTR188I5PPC WU10PT	E26
4170120	WMTR188I5PPC WU25PT	E26
4170121	WMTR250I6PPC WU10PT	E26
4170122	WMTR250I6PPC WU25PT	E26
4170140	CCMT060202FP WP25CT	B31
4170141	CCMT060204FP WP25CT	B31
4170142	CCMT060208FP WP25CT	B31
4170163	WMTR312I8PPC WU10PT	E26
4170164	WMTR312I8PPC WU25PT	E26
4170170	WMTR300M3PPC WU10PT	E26
4170171	WMTR300M3PPC WU25PT	E26
4170172	WMTR305M3UPC WU10PT	E25
4170173	WMTR305M3UPC WU25PT	E25
4170174	WMTR305M3UPC WP10CT	E25
4170175	WMTR400M4PPC WU10PT	E26
4170176	WMTR400M4PPC WU25PT	E26
4170177	WMTR405M4UPC WU10PT	E25
4170178	WMTR405M4UPC WU25PT	E25
4170179	WMTR405M4UPC WP10CT	E25
4170180	WMTR500M5PPC WU10PT	E26
4170181	WMTR500M5PPC WU25PT	E26
4170182	WMTR505M5UPC WU10PT	E25
4170183	WMTR505M5UPC WU25PT	E25
4170184	WMTR505M5UPC WP10CT	E25
4170185	WMTR600M6PPC WU10PT	E26
4170186	WMTR600M6PPC WU25PT	E26
4170187	WMTR605M6UPC WU10PT	E25
4170188	WMTR605M6UPC WU25PT	E25
4170189	WMTR605M6UPC WP10CT	E25
4170190	WMTR800M8PPC WU10PT	E26
4170191	WMTR800M8PPC WU25PT	E26
4170192	WMTR805M8UPC WU10PT	E25
4170193	WMTR805M8UPC WU25PT	E25
4170194	WMTR805M8UPC WP10CT	E25
4170195	WMTR300M3PPC WU10HT	E26
4170196	WMTR400M4PPC WU10HT	E26
4170197	CCMT060204MP WP15CT	B32
4170198	CCMT09T304MP WP15CT	B32
4170199	CCMT09T308MP WP15CT	B32
4170200	CCMT120408MP WP15CT	B32
4170201	DCMT11T304MP WP15CT	B49
4170202	DCMT11T308MP WP15CT	B49
4170213	DCMT11T312MP WP15CT	B49
4170214	SCMT09T308MP WP15CT	B69
4170215	SCMT120408MP WP15CT	B69
4170216	TCMT16T308MP WP15CT	B82
4170217	CCMT060204MP WP25CT	B32
4170218	CCMT09T304MP WP25CT	B32
4170219	CCMT09T308MP WP25CT	B32
4170220	CCMT09T312MP WP25CT	B32
4170221	CCMT120408MP WP25CT	B32
4170222	CCMT120412MP WP25CT	B32
4170223	DCMT11T304MP WP25CT	B49
4170224	DCMT11T308MP WP25CT	B49
4170225	DCMT11T312MP WP25CT	B49
4170226	SCMT09T304MP WP25CT	B69
4170227	SCMT09T308MP WP25CT	B69
4170228	SCMT120404MP WP25CT	B69
4170229	SCMT120408MP WP25CT	B69
4170230	SCMT120412MP WP25CT	B69
4170231	TCMT110208MP WP25CT	B82
4170232	TCMT16T304MP WP25CT	B82
4170233	TCMT16T308MP WP25CT	B82
4170234	TCMT16T312MP WP25CT	B82
4170235	VBMT160404MP WP25CT	B95
4170236	VBMT160408MP WP25CT	B95
4170237	CCMT060204MP WK20CT	B32
4170238	CCMT09T304MP WK20CT	B32
4170239	CCMT09T308MP WK20CT	B32
4170240	CCMT120408MP WK20CT	B32
4170241	CCMT120412MP WK20CT	B32
4170242	DCMT11T304MP WK20CT	B49
4170243	DCMT11T308MP WK20CT	B49
4170244	SCMT09T304MP WK20CT	B69
4170245	SCMT09T308MP WK20CT	B69
4170246	SCMT120404MP WK20CT	B69
4170247	SCMT120408MP WK20CT	B69
4170248	SCMT120412MP WK20CT	B69
4170249	TCMT110208MP WK20CT	B82
4170250	TCMT16T304MP WK20CT	B82
4170251	TCMT16T308MP WK20CT	B82
4170252	TCMT16T312MP WK20CT	B82
4170253	VBMT160404MP WK20CT	B95
4170254	VBMT160408MP WK20CT	B95
4170255	CPMT060208MP WP15CT	B46
4170256	CPMT09T308MP WP15CT	B46
4170257	CPMT060208MP WP25CT	B46
4170258	CPMT09T308MP WP25CT	B46
4170259	CPMT09T312MP WP25CT	B46
4170260	DPMT11T308MP WP25CT	B64
4170261	SPMT09T308MP WP25CT	B79
4170262	SPMT120408MP WP25CT	B79
4170263	TPMT110208MP WP25CT	B93
4170264	TPMT16T308MP WP25CT	B93
4170265	TPMT16T312MP WP25CT	B93
4170266	CPMT09T308MP WK20CT	B46
4170267	CPMT09T312MP WK20CT	B46
4170268	DPMT11T308MP WK20CT	B64
4170269	SPMT09T308MP WK20CT	B79

Order No.	Catalogue No.	Page(s)
4170270	SPMT120408MP WK20CT	B79
4170271	TPMT110208MP WK20CT	B93
4170272	TPMT16T308MP WK20CT	B93
4170273	TPMT16T312MP WK20CT	B93
4170293	CCMT09T302FP WP25CT	B31
4170294	CCMT09T304FP WP25CT	B31
4170295	CCMT09T308FP WP25CT	B31
4170296	CCMT120404FP WP25CT	B31
4170297	CCMT120408FP WP25CT	B31
4170298	CCMT120412FP WP25CT	B31
4170299	DCMT070202FP WP25CT	B48
4170300	DCMT070204FP WP25CT	B48
4170301	DCMT070208FP WP25CT	B48
4170302	DCMT11T302FP WP25CT	B48
4170303	DCMT11T304FP WP25CT	B48
4170304	DCMT11T308FP WP25CT	B48
4170305	DCMT11T312FP WP25CT	B48
4170306	DCMT150404FP WP25CT	B48
4170307	DCMT150408FP WP25CT	B48
4170308	SCMT09T304FP WP25CT	B68
4170309	SCMT09T308FP WP25CT	B68
4170310	SCMT120404FP WP25CT	B68
4170311	SCMT120408FP WP25CT	B68
4170312	SCMT120412FP WP25CT	B68
4170313	TCMT110204FP WP25CT	B82
4170314	TCMT110208FP WP25CT	B82
4170315	TCMT16T304FP WP25CT	B82
4170316	TCMT16T308FP WP25CT	B82
4170317	TCMT220408FP WP25CT	B82
4170318	VBMT110302FP WP25CT	B94
4170319	VBMT110304FP WP25CT	B94
4170320	VBMT110308FP WP25CT	B94
4170321	VBMT160402FP WP25CT	B94
4170322	VBMT160404FP WP25CT	B94
4170323	VBMT160408FP WP25CT	B94
4170324	VBMT160412FP WP25CT	B94
4170325	CPMT060202FP WP25CT	B46
4170326	CPMT060204FP WP25CT	B46
4170327	CPMT060208FP WP25CT	B46
4170328	CPMT09T304FP WP25CT	B46
4170329	CPMT09T308FP WP25CT	B46
4170330	DPMT070204FP WP25CT	B63
4170331	DPMT11T304FP WP25CT	B63
4170332	DPMT11T308FP WP25CT	B63
4170333	SPMT09T304FP WP25CT	B79
4170334	SPMT09T308FP WP25CT	B79
4170335	TPMT090208FP WP25CT	B92
4170336	TPMT110204FP WP25CT	B92
4170337	TPMT110208FP WP25CT	B92
4170338	TPMT16T304FP WP25CT	B92
4170339	TPMT16T308FP WP25CT	B92
4170340	TPMT220408FP WP25CT	B92
4170341	WPMT040204FP WP25CT	B105
4170342	WPMT06T308FP WP25CT	B105
4170343	WPMTS3T104FP WP25CT	B105
4170368	CCMW060204 WK20CT	B34
4170369	CCMW090304 WK20CT	B34
4170370	CCMW090308 WK20CT	B34
4170371	CCMW09T304 WK20CT	B34
4170372	CCMW09T308 WK20CT	B34
4170373	CCMW120404 WK20CT	B34
4170374	CCMW120408 WK20CT	B34
4170375	DCMW070204 WK20CT	B50
4170376	DCMW11T304 WK20CT	B50
4170377	DCMW150408 WK20CT	B50
4170378	SCMW090304 WK20CT	B70
4170379	SCMW09T308 WK20CT	B70
4170380	SCMW120408 WK20CT	B70
4170381	TCMW110204 WK20CT	B83
4170382	TCMW16T304 WK20CT	B83
4170385	CM209R ASSY	C8–10, C12–16, C56
4170386	CM210R ASSY	C8–10, C12–15
4170387	CM236R ASSY	C9, C12, C14
4170388	CM235R ASSY	C17
4170389	CM234RLP ASSY	C56–59
4170458	CNMG120404ML WP25CT	B38
4170459	CNMG120408ML WP25CT	B38
4170460	CNMG120412ML WP25CT	B38
4170461	DNMG110404ML WP25CT	B56
4170462	DNMG110408ML WP25CT	B56
4170464	CCMW060204 WK05CT	B34
4170465	CCMW090304 WK05CT	B34
4170466	CCMW090308 WK05CT	B34
4170467	CCMW09T304 WK05CT	B34
4170468	CCMW09T308 WK05CT	B34
4170469	CCMW120404 WK05CT	B34
4170470	CCMW120408 WK05CT	B34
4170471	DCMW070204 WK05CT	B50
4170472	DCMW11T304 WK05CT	B50
4170473	DCMW150408 WK05CT	B50
4170474	SCMW090304 WK05CT	B70
4170475	SCMW120408 WK05CT	B70
4170476	TCMW110204 WK05CT	B83
4170477	TCMW16T304 WK05CT	B83
4170478	RCMT0602M0 WK20CT	B65
4170479	RCMT0803M0 WK20CT	B65
4170480	RCMT10T3M0 WK20CT	B65
4170481	RCMT1204M0 WK20CT	B65
4170482	RCMT1606M0 WK20CT	B65
4170483	DNMG150404ML WP25CT	B56
4170484	DNMG150408ML WP25CT	B56
4170485	DNMG150604ML WP25CT	B56
4170486	DNMG150608ML WP25CT	B56
4170487	DNMG150612ML WP25CT	B56
4170488	SNMG090308ML WP25CT	B72
4170489	SNMG120408ML WP25CT	B72
4170490	SNMG120412ML WP25CT	B72
4170491	TNMG160404ML WP25CT	B85
4170492	TNMG160408ML WP25CT	B85
4170493	TNMG160412ML WP25CT	B85
4170494	TNMG220408ML WP25CT	B85
4170495	VNMG160404ML WP25CT	B97
4170496	VNMG160408ML WP25CT	B97
4170497	WNMG060408ML WP25CT	B101
4170498	WNMG080404ML WP25CT	B101
4170499	WNMG080408ML WP25CT	B101
4170500	CNMG120404UR WP25CT	B43
4170501	CNMG120408UR WP25CT	B43
4170502	CNMG120412UR WP25CT	B43
4170503	CNMG120416UR WP25CT	B43
4170504	CNMG160608UR WP25CT	B43
4170505	CNMG160612UR WP25CT	B43
4170506	CNMG160616UR WP25CT	B43
4170507	CNMG190612UR WP25CT	B43
4170508	CNMG190616UR WP25CT	B43
4170509	DNMG110408UR WP25CT	B62
4170510	DNMG110412UR WP25CT	B62
4170511	DNMG150408UR WP25CT	B62
4170512	DNMG150412UR WP25CT	B62
4170513	DNMG150608UR WP25CT	B62
4170514	DNMG150612UR WP25CT	B62
4170515	DNMG150616UR WP25CT	B62
4170516	SNMG120408UR WP25CT	B75
4170517	SNMG120412UR WP25CT	B75
4170518	SNMG150612UR WP25CT	B75
4170519	SNMG150616UR WP25CT	B75
4170520	SNMG190612UR WP25CT	B75
4170521	SNMG190616UR WP25CT	B75
4170522	TNMG160408UR WP25CT	B89
4170523	TNMG160412UR WP25CT	B89
4170524	TNMG220408UR WP25CT	B89
4170525	TNMG220412UR WP25CT	B89
4170526	TNMG220416UR WP25CT	B89
4170527	TNMG270612UR WP25CT	B89
4170528	TNMG270616UR WP25CT	B89
4170529	VNMG160408UR WP25CT	B99
4170530	VNMG160412UR WP25CT	B99
4170531	WNMG060408UR WP25CT	B104
4170532	WNMG060412UR WP25CT	B104
4170533	WNMG080408UR WP25CT	B104
4170534	WNMG080412UR WP25CT	B104
4170535	WNMG080416UR WP25CT	B104
4170536	RCMT0602M0 WP25CT	B65
4170537	RCMT0803M0 WP25CT	B65
4170538	RCMT10T3M0 WP25CT	B65
4170539	RCMT1204M0 WP25CT	B65
4170540	RCMT1606M0T WP25CT	B66
4170541	RCMX2006M0T WP25CT	B66
4170542	RCMX2507M0T WP25CT	B66
4170543	RCMX2006M0T WK20CT	B66
4170544	RCMX2507M0T WK20CT	B66
4170546	CNMG120404MR WP25CT	B39
4170547	CNMG120408MR WP25CT	B39
4170548	CNMG120412MR WP25CT	B39
4170549	CNMG160608MR WP25CT	B39
4170550	CNMG160612MR WP25CT	B39
4170551	CNMG160616MR WP25CT	B39
4170552	CNMG190612MR WP25CT	B39
4170553	VBMT160404 WP25CT	B94
4170554	VBMT160408 WP25CT	B94
4170555	VBMT160412 WP25CT	B94
4170563	CNMG190616MR WP25CT	B39
4170564	DNMG110408MR WP25CT	B57
4170565	DNMG150404MR WP25CT	B57
4170566	DNMG150408MR WP25CT	B57
4170567	DNMG150412MR WP25CT	B57
4170568	DNMG150604MR WP25CT	B57
4170569	DNMG150608MR WP25CT	B57
4170570	DNMG150612MR WP25CT	B57
4170571	SNMG120408MR WP25CT	B73
4170572	SNMG190612MR WP25CT	B73
4170573	TNMG160404MR WP25CT	B86
4170574	TNMG160408MR WP25CT	B86
4170575	TNMG160412MR WP25CT	B86
4170576	TNMG220404MR WP25CT	B86
4170577	TNMG220408MR WP25CT	B86
4170578	TNMG220412MR WP25CT	B86
4170579	TNMG220416MR WP25CT	B86
4170580	VNMG160408MR WP25CT	B97
4170581	WNMG080408MR WP25CT	B102
4170582	WNMG080412MR WP25CT	B102
4170583	WNMG080416MR WP25CT	B102
4170645	TPUN160304 WP25CT	B93
4170646	TPUN160308 WP25CT	B93
4170647	TPUN160312 WP25CT	B93
4170648	TPUN220408 WP25CT	B93
4170649	TPUN220412 WP25CT	B93
4170650	SPMR090308 WP35CT	B78
4170651	SPMR120304 WP35CT	B78
4170652	SPMR120308 WP35CT	B78
4170752	RCMT10T3M0 WP35CT	B65
4170783	SPMR120312 WP35CT	B78
4170784	TPMR110304 WP35CT	B92
4170785	TPMR110308 WP35CT	B92
4170786	TPMR160304 WP35CT	B92
4170787	TPMR160308 WP35CT	B92
4170788	TPMR160312 WP35CT	B92
4170789	TPUN110304 WP35CT	B93
4170790	TPUN220408 WP35CT	B93
4170791	TPUN220412 WP35CT	B93
4170803	RCMT1204M0 WP35CT	B65
4170804	RCMT1606M0 WP35CT	B65
4170805	RCMX2006M0T WP35CT	B66
4170806	RCMX2507M0T WP35CT	B66
4170807	VBMT160404 WP35CT	B94
4170808	VBMT160408 WP35CT	B94
4170809	VBMT160412 WP35CT	B94
4170853	SPMR120304 WP15CT	B78
4170854	SPMR120308 WP15CT	B78
4170856	SPUN120304 WP15CT	B80
4170857	SPUN120308 WP15CT	B80
4170858	SPUN250620T WP15CT	B80
4170859	TPMR110304 WP15CT	B92
4170860	TPMR110308 WP15CT	B92
4170861	TPMR160304 WP15CT	B92
4170862	TPMR160308 WP15CT	B92
4170863	TPMR160312 WP15CT	B92
4170864	TPUN110304 WP15CT	B93
4170865	TPUN110308 WP15CT	B93
4170866	TPUN160304 WP15CT	B93
4170867	TPUN160308 WP15CT	B93
4170868	TPUN220408 WP15CT	B93
4170918	M370D025Z03M12WO08	M4
4170919	M370D025Z03A25WO08L200	M5
4170920	M370D025Z02A25WO08L300	M5
4170921	M370D032Z03A32WO08L300	M5
4170922	M370D040Z05WO08	M6
4170943	SPGN090308 WK20CT	B78
4170944	SPGN120308 WK20CT	B78
4170945	SPGN120312 WK20CT	B78
4170946	SPMR090308 WK20CT	B78
4170947	SPMR120304 WK20CT	B78
4170948	SPMR120308 WK20CT	B78
4170949	SPMR120312 WK20CT	B78
4170950	SPUN120308 WK20CT	B80
4170951	SPUN120312 WK20CT	B80
4170952	TPGN110308 WK20CT	B91
4170953	TPGN160308 WK20CT	B91
4170954	TPMR110308 WK20CT	B92
4170955	TPMR160304 WK20CT	B92
4170956	TPMR160308 WK20CT	B92
4170957	TPMR160312 WK20CT	B92
4170958	TPUN160304 WK20CT	B93
4170959	TPUN160308 WK20CT	B93
4170960	TPUN160312 WK20CT	B93
4170961	TPUN220412 WK20CT	B93
4170962	SNUN120408 WK20CT	B77
4170963	SNUN120412 WK20CT	B77
4170964	TNUN160408 WK20CT	B91
4170965	VNMG12T308 WK20CT	B96
4170966	LNUX19194013 WK20CT	B64
4170967	LNUX191940T WK20CT	B65
4170968	LNUX30194013 WK20CT	B64

Order No.	Catalogue No.	Page(s)
4170969	LNUX301940T WK20CT	B65
4170979	CNMG120408RH WP15CT	B41
4170980	CNMG120412RH WP15CT	B41
4170981	CNMG120416RH WP15CT	B41
4170982	CNMG160608RH WP15CT	B41
4170983	CNMG160612RH WP15CT	B41
4170984	CNMG160616RH WP15CT	B41
4170985	CNMG190608RH WP15CT	B41
4170986	CNMG190612RH WP15CT	B41
4170987	CNMG190616RH WP15CT	B41
4170988	CNMG190624RH WP15CT	B41
4170989	DNMG150408RH WP15CT	B59
4170990	DNMG150412RH WP15CT	B59
4170991	DNMG150608RH WP15CT	B59
4170992	DNMG150612RH WP15CT	B59
4170993	DNMG150616RH WP15CT	B59
4170994	DNMG190612RH WP15CT	B59
4170995	RNMG090300RH WP15CT	B67
4170996	RNMG120400RH WP15CT	B67
4170997	RNMG190600RH WP15CT	B67
4170998	SNMG120408RH WP15CT	B74
4170999	SNMG120412RH WP15CT	B74
4171000	SNMG120416RH WP15CT	B74
4171001	SNMG150608RH WP15CT	B74
4171002	SNMG150612RH WP15CT	B74
4171003	SNMG150616RH WP15CT	B74
4171004	SNMG190608RH WP15CT	B74
4171005	SNMG190612RH WP15CT	B74
4171006	SNMG190616RH WP15CT	B74
4171007	TNMG160408RH WP15CT	B87
4171008	TNMG160412RH WP15CT	B87
4171009	TNMG220408RH WP15CT	B87
4171010	TNMG220412RH WP15CT	B87
4171011	TNMG220416RH WP15CT	B87
4171012	TNMG270612RH WP15CT	B87
4171013	TNMG270616RH WP15CT	B87
4171014	TNMG330924RH WP15CT	B87
4171015	VNMG160408RH WP15CT	B98
4171016	VNMG220408RH WP15CT	B98
4171017	VNMG220412RH WP15CT	B98
4171018	WNMG060408RH WP15CT	B103
4171019	WNMG080408RH WP15CT	B103
4171020	WNMG080412RH WP15CT	B103
4171021	WNMG080416RH WP15CT	B103
4171022	CNMG120404UR WP15CT	B43
4171025	CNMG120404FF WP15CT	B37
4171026	CNMG120408FF WP15CT	B37
4171027	CNMG120412FF WP15CT	B37
4171028	DNMG110404FF WP15CT	B54
4171029	DNMG110408FF WP15CT	B54
4171030	DNMG150404FF WP15CT	B54
4171031	DNMG150408FF WP15CT	B54
4171032	DNMG150604FF WP15CT	B54
4171043	DNMG150608FF WP15CT	B54
4171044	DNMG150612FF WP15CT	B54
4171045	SNMG090304FF WP15CT	B72
4171046	SNMG090308FF WP15CT	B72
4171047	SNMG120404FF WP15CT	B72
4171048	SNMG120408FF WP15CT	B72
4171049	SNMG120412FF WP15CT	B72
4171050	TNMG160404FF WP15CT	B84
4171051	TNMG160408FF WP15CT	B84
4171052	TNMG160412FF WP15CT	B84
4171053	VNMG160404FF WP15CT	B97
4171054	VNMG160408FF WP15CT	B97
4171055	WNMG060404FF WP15CT	B100
4171056	WNMG060408FF WP15CT	B100
4171057	WNMG080404FF WP15CT	B100
4171058	WNMG080408FF WP15CT	B100
4171059	CNMG120404ML WP15CT	B38
4171060	CNMG120408ML WP15CT	B38
4171062	DNMG110404ML WP15CT	B56
4171063	DNMG110408ML WP15CT	B56
4171064	DNMG110412ML WP15CT	B56
4171065	DNMG150404ML WP15CT	B56
4171066	DNMG150408ML WP15CT	B56
4171067	DNMG150412ML WP15CT	B56
4171068	DNMG150604ML WP15CT	B56
4171069	DNMG150608ML WP15CT	B56
4171070	DNMG150612ML WP15CT	B56
4171071	SNMG090304ML WP15CT	B72
4171072	SNMG090308ML WP15CT	B72
4171073	SNMG120408ML WP15CT	B72
4171074	SNMG120412ML WP15CT	B72
4171075	TNMG160404ML WP15CT	B85
4171076	TNMG160408ML WP15CT	B85
4171077	TNMG160412ML WP15CT	B85
4171078	TNMG220408ML WP15CT	B85
4171079	VNMG160404ML WP15CT	B97
4171080	VNMG160408ML WP15CT	B97
4171081	WNMG060404ML WP15CT	B101
4171082	WNMG060408ML WP15CT	B101
4171083	WNMG080404ML WP15CT	B101
4171084	WNMG080408ML WP15CT	B101
4171093	CNMG120408UR WP15CT	B43
4171094	CNMG120412UR WP15CT	B43
4171095	CNMG120416UR WP15CT	B43
4171096	CNMG160608UR WP15CT	B43
4171097	CNMG160612UR WP15CT	B43
4171098	CNMG160616UR WP15CT	B43
4171099	CNMG190612UR WP15CT	B43
4171100	CNMG190616UR WP15CT	B43
4171101	DNMG110408UR WP15CT	B62
4171102	DNMG110412UR WP15CT	B62
4171103	DNMG150408UR WP15CT	B62
4171104	DNMG150412UR WP15CT	B62
4171105	DNMG150608UR WP15CT	B62
4171106	DNMG150612UR WP15CT	B62
4171107	DNMG150616UR WP15CT	B62
4171108	SNMG120408UR WP15CT	B75
4171109	SNMG120412UR WP15CT	B75
4171110	SNMG120416UR WP15CT	B75
4171111	SNMG150612UR WP15CT	B75
4171112	SNMG150616UR WP15CT	B75
4171113	SNMG190612UR WP15CT	B75
4171114	SNMG190616UR WP15CT	B75
4171115	TNMG160408UR WP15CT	B89
4171116	TNMG160412UR WP15CT	B89
4171117	TNMG160416UR WP15CT	B89
4171118	TNMG220408UR WP15CT	B89
4171119	TNMG220412UR WP15CT	B89
4171120	TNMG220416UR WP15CT	B89
4171121	TNMG270612UR WP15CT	B89
4171122	TNMG270616UR WP15CT	B89
4171123	VNMG160408UR WP15CT	B99
4171124	VNMG160412UR WP15CT	B99
4171125	WNMG060408UR WP15CT	B104
4171126	WNMG060412UR WP15CT	B104
4171127	WNMG080408UR WP15CT	B104
4171128	WNMG080412UR WP15CT	B104
4171129	WNMG080416UR WP15CT	B104
4171130	CNMG120404MR WP15CT	B39
4171131	CNMG120408MR WP15CT	B39
4171132	CNMG120412MR WP15CT	B39
4171133	CNMG120416MR WP15CT	B39
4171134	CNMG160608MR WP15CT	B39
4171135	CNMG160612MR WP15CT	B39
4171136	CNMG160616MR WP15CT	B39
4171137	CNMG190612MR WP15CT	B39
4171138	CNMG190616MR WP15CT	B39
4171139	DNMG110408MR WP15CT	B57
4171140	DNMG150404MR WP15CT	B57
4171141	DNMG150408MR WP15CT	B57
4171142	DNMG150412MR WP15CT	B57
4171143	DNMG150604MR WP15CT	B57
4171144	DNMG150608MR WP15CT	B57
4171145	DNMG150612MR WP15CT	B57
4171146	SNMG120408MR WP15CT	B73
4171147	SNMG150612MR WP15CT	B73
4171148	SNMG190612MR WP15CT	B73
4171149	SNMG190616MR WP15CT	B73
4171150	TNMG160404MR WP15CT	B86
4171151	TNMG160408MR WP15CT	B86
4171152	TNMG160412MR WP15CT	B86
4171153	TNMG220404MR WP15CT	B86
4171154	TNMG220408MR WP15CT	B86
4171155	TNMG220412MR WP15CT	B86
4171156	TNMG220416MR WP15CT	B86
4171157	VNMG160408MR WP15CT	B97
4171158	WNMG080408MR WP15CT	B102
4171159	WNMG080412MR WP15CT	B102
4171160	WNMG080416MR WP15CT	B102
4171223	M370D050Z06WO08	M6
4171224	M370D052Z06WO08	M6
4171225	M370D080Z07WO08	M6
4171318	CNMG120404FF WK20CT	B37
4171319	CNMG120408FF WK20CT	B37
4171320	CNMG120412FF WK20CT	B37
4171321	DNMG110404FF WK20CT	B54
4171322	DNMG110408FF WK20CT	B54
4171348	CNMG120412ML WP15CT	B38
4171373	DNMG150408FF WK20CT	B54
4171374	DNMG150412FF WK20CT	B54
4171375	DNMG150604FF WK20CT	B54
4171376	DNMG150608FF WK20CT	B54
4171377	DNMG150612FF WK20CT	B54
4171378	SNMG090304FF WK20CT	B72
4171379	SNMG090308FF WK20CT	B72
4171380	SNMG120404FF WK20CT	B72
4171381	SNMG120408FF WK20CT	B72
4171382	SNMG120412FF WK20CT	B72
4171383	TNMG110304FF WK20CT	B84
4171384	TNMG110308FF WK20CT	B84
4171385	TNMG160404FF WK20CT	B84
4171386	TNMG160408FF WK20CT	B84
4171387	TNMG160412FF WK20CT	B84
4171388	WNMG060404FF WK20CT	B100
4171389	WNMG060408FF WK20CT	B100
4171390	CNMG120404ML WK20CT	B38
4171391	CNMG120408ML WK20CT	B38
4171392	CNMG120412ML WK20CT	B38
4171393	CNMG120416ML WK20CT	B38
4171394	DNMG110404ML WK20CT	B56
4171395	DNMG110408ML WK20CT	B56
4171396	DNMG150404ML WK20CT	B56
4171397	DNMG150408ML WK20CT	B56
4171398	DNMG150412ML WK20CT	B56
4171399	DNMG150604ML WK20CT	B56
4171400	DNMG150608ML WK20CT	B56
4171401	DNMG150612ML WK20CT	B56
4171402	SNMG090308ML WK20CT	B72
4171403	SNMG120404ML WK20CT	B72
4171404	SNMG120408ML WK20CT	B72
4171405	SNMG120412ML WK20CT	B72
4171406	SNMG120416ML WK20CT	B72
4171407	TNMG110304ML WK20CT	B85
4171408	TNMG110308ML WK20CT	B85
4171409	TNMG160404ML WK20CT	B85
4171410	TNMG160408ML WK20CT	B85
4171411	TNMG160412ML WK20CT	B85
4171412	TNMG220404ML WK20CT	B85
4171413	VNMG160404ML WK20CT	B97
4171414	VNMG160408ML WK20CT	B97
4171415	WNMG060404ML WK20CT	B101
4171416	WNMG060408ML WK20CT	B101
4171417	WNMG080404ML WK20CT	B101
4171418	WNMG080408ML WK20CT	B101
4171419	CNMG120412UR WK20CT	B43
4171420	CNMG120416UR WK20CT	B43
4171421	CNMG160608UR WK20CT	B43
4171422	CNMG160612UR WK20CT	B43
4171423	CNMG160616UR WK20CT	B43
4171424	CNMG190612UR WK20CT	B43
4171425	CNMG190616UR WK20CT	B43
4171426	DNMG110408UR WK20CT	B62
4171427	DNMG110412UR WK20CT	B62
4171428	DNMG150408UR WK20CT	B62
4171429	DNMG150412UR WK20CT	B62
4171430	DNMG150416UR WK20CT	B62
4171431	DNMG150608UR WK20CT	B62
4171432	DNMG150612UR WK20CT	B62
4171433	DNMG150616UR WK20CT	B62
4171434	SNMG120408UR WK20CT	B75
4171435	SNMG120412UR WK20CT	B75
4171436	SNMG120416UR WK20CT	B75
4171437	SNMG150612UR WK20CT	B75
4171438	SNMG150616UR WK20CT	B75
4171439	SNMG190612UR WK20CT	B75
4171440	SNMG190616UR WK20CT	B75
4171441	TNMG160408UR WK20CT	B89
4171442	TNMG160412UR WK20CT	B89
4171443	TNMG160416UR WK20CT	B89
4171444	TNMG220408UR WK20CT	B89
4171445	TNMG220412UR WK20CT	B89
4171446	TNMG220416UR WK20CT	B89
4171447	TNMG270612UR WK20CT	B89
4171448	TNMG270616UR WK20CT	B89
4171449	VNMG160408UR WK20CT	B99
4171450	VNMG160412UR WK20CT	B99
4171451	WNMG060408UR WK20CT	B104
4171452	WNMG060412UR WK20CT	B104
4171453	WNMG080408UR WK20CT	B104
4171454	WNMG080412UR WK20CT	B104
4171455	WNMG080416UR WK20CT	B104
4171504	CNMG120408RH WP25CT	B41
4171505	CNMG120412RH WP25CT	B41
4171506	CNMG120416RH WP25CT	B41
4171507	CNMG160608RH WP25CT	B41
4171508	CNMG160612RH WP25CT	B41
4171509	CNMG160616RH WP25CT	B41
4171510	CNMG190608RH WP25CT	B41
4171511	CNMG190612RH WP25CT	B41
4171512	CNMG190616RH WP25CT	B41
4171523	CNMG190624RH WP25CT	B41

Order No.	Catalogue No.	Page(s)
4171524	DNMG150408RH WP25CT	B59
4171525	DNMG150412RH WP25CT	B59
4171526	DNMG150608RH WP25CT	B59
4171527	DNMG150612RH WP25CT	B59
4171528	DNMG150616RH WP25CT	B59
4171529	DNMG190612RH WP25CT	B59
4171530	RNMG090300RH WP25CT	B67
4171531	RNMG120400RH WP25CT	B67
4171532	RNMG190600RH WP25CT	B67
4171533	SNMG120408RH WP25CT	B74
4171534	SNMG120412RH WP25CT	B74
4171535	SNMG120416RH WP25CT	B74
4171536	SNMG150608RH WP25CT	B74
4171537	SNMG150612RH WP25CT	B74
4171538	SNMG150616RH WP25CT	B74
4171539	SNMG190608RH WP25CT	B74
4171540	SNMG190612RH WP25CT	B74
4171541	SNMG190616RH WP25CT	B74
4171542	TNMG160408RH WP25CT	B87
4171543	TNMG160412RH WP25CT	B87
4171544	TNMG220408RH WP25CT	B87
4171545	TNMG220412RH WP25CT	B87
4171546	TNMG220416RH WP25CT	B87
4171547	TNMG270612RH WP25CT	B87
4171548	TNMG270616RH WP25CT	B87
4171549	TNMG330924RH WP25CT	B87
4171550	VNMG160408RH WP25CT	B98
4171551	VNMG220408RH WP25CT	B98
4171552	VNMG220412RH WP25CT	B98
4171553	WNMG060408RH WP25CT	B103
4171554	WNMG080408RH WP25CT	B103
4171555	WNMG080412RH WP25CT	B103
4171556	WNMG080416RH WP25CT	B103
4171585	CNMP120404 WM15CT	B45
4171586	CNMP120408 WM15CT	B45
4171587	CNMP120412 WM15CT	B45
4171588	CNMP160608 WM15CT	B45
4171589	CNMP160612 WM15CT	B45
4171590	CNMP190616 WM15CT	B45
4171591	DNMP150404 WM15CT	B63
4171592	DNMP150408 WM15CT	B63
4171595	CNMA120404 WK05CT	B36
4171596	CNMA120408 WK05CT	B36
4171597	CNMA120412 WK05CT	B36
4171598	CNMA120416 WK05CT	B36
4171599	CNMA160612 WK05CT	B36
4171600	CNMA160616 WK05CT	B36
4171601	CNMA190608 WK05CT	B36
4171602	CNMA190612 WK05CT	B36
4171633	CNMA190616 WK05CT	B36
4171634	DNMA110408 WK05CT	B52
4171635	DNMA150408 WK05CT	B52
4171636	DNMA150412 WK05CT	B52
4171637	DNMA150608 WK05CT	B52
4171638	DNMA150612 WK05CT	B52
4171639	RNMA120400 WK05CT	B67
4171640	SNMA120408 WK05CT	B71
4171641	SNMA120412 WK05CT	B71
4171642	SNMA120416 WK05CT	B71
4171643	SNMA150612 WK05CT	B71
4171644	SNMA150616 WK05CT	B71
4171645	SNMA190612 WK05CT	B71
4171646	SNMA190616 WK05CT	B71
4171647	TNMA160408 WK05CT	B84
4171648	TNMA160412 WK05CT	B84
4171649	TNMA220408 WK05CT	B84
4171651	TNMA220416 WK05CT	B84
4171652	VNMA160408 WK05CT	B96
4171653	WNMA060408 WK05CT	B100
4171654	WNMA080408 WK05CT	B100
4171655	WNMA080412 WK05CT	B100
4171656	WNMA080416 WK05CT	B100
4171657	CNMG120404ML WK05CT	B38
4171658	CNMG120408ML WK05CT	B38
4171659	CNMG120412ML WK05CT	B38
4171660	DNMG110404ML WK05CT	B56
4171661	DNMG110408ML WK05CT	B56
4171662	DNMG150404ML WK05CT	B56
4171663	DNMG150408ML WK05CT	B56
4171664	DNMG150412ML WK05CT	B56
4171665	DNMG150604ML WK05CT	B56
4171666	DNMG150608ML WK05CT	B56
4171667	DNMG150612ML WK05CT	B56
4171668	SNMG090308ML WK05CT	B72
4171669	SNMG120408ML WK05CT	B72
4171670	SNMG120412ML WK05CT	B72
4171671	TNMG160404ML WK05CT	B85
4171672	TNMG160408ML WK05CT	B85
4171673	TNMG160412ML WK05CT	B85
4171674	VNMG160404ML WK05CT	B97
4171675	VNMG160408ML WK05CT	B97
4171676	WNMG060404ML WK05CT	B101
4171677	WNMG060408ML WK05CT	B101
4171678	WNMG080404ML WK05CT	B101
4171679	WNMG080408ML WK05CT	B101
4171680	CNMG120404FW WK05CT	B38
4171681	CNMG120408FW WK05CT	B38
4171682	CNMG120408MW WK05CT	B40
4171683	CNMG120412FW WK05CT	B38
4171684	CNMG120412MW WK05CT	B40
4171685	DNMG150404FW WK05CT	B55
4171686	DNMG150408FW WK05CT	B55
4171687	DNMG150408MW WK05CT	B58
4171688	DNMG150412MW WK05CT	B58
4171689	DNMG150604FW WK05CT	B55
4171690	DNMG150608FW WK05CT	B55
4171691	DNMG150608MW WK05CT	B58
4171692	DNMG150612MW WK05CT	B58
4171693	WNMG080404FW WK05CT	B101
4171694	WNMG080408FW WK05CT	B101
4171695	WNMG080408MW WK05CT	B102
4171696	WNMG080412FW WK05CT	B101
4171697	WNMG080412MW WK05CT	B102
4171698	CNMG120412RH WP35CT	B41
4171699	CNMG120416RH WP35CT	B41
4171700	CNMG160608RH WP35CT	B41
4171701	CNMG160612RH WP35CT	B41
4171702	CNMG160616RH WP35CT	B41
4171703	CNMG190608RH WP35CT	B41
4171704	CNMG190612RH WP35CT	B41
4171705	CNMG190616RH WP35CT	B41
4171706	CNMG190624RH WP35CT	B41
4171707	DNMG150408RH WP35CT	B59
4171708	DNMG150412RH WP35CT	B59
4171709	DNMG150608RH WP35CT	B59
4171710	DNMG150612RH WP35CT	B59
4171711	DNMG150616RH WP35CT	B59
4171712	DNMG190612RH WP35CT	B59
4171713	RNMG120400RH WP35CT	B67
4171714	RNMG190600RH WP35CT	B67
4171715	SNMG120408RH WP35CT	B74
4171716	SNMG120412RH WP35CT	B74
4171717	SNMG120416RH WP35CT	B74
4171718	SNMG150608RH WP35CT	B74
4171719	SNMG150612RH WP35CT	B74
4171720	SNMG150616RH WP35CT	B74
4171721	SNMG190608RH WP35CT	B74
4171722	SNMG190612RH WP35CT	B74
4171723	SNMG190616RH WP35CT	B74
4171724	TNMG160408RH WP35CT	B87
4171725	TNMG160412RH WP35CT	B87
4171726	TNMG220408RH WP35CT	B87
4171727	TNMG220412RH WP35CT	B87
4171728	TNMG220416RH WP35CT	B87
4171729	TNMG270612RH WP35CT	B87
4171730	TNMG270616RH WP35CT	B87
4171731	TNMG330924RH WP35CT	B87
4171732	VNMG160408RH WP35CT	B98
4171733	VNMG220408RH WP35CT	B98
4171734	VNMG220412RH WP35CT	B98
4171735	WNMG060408RH WP35CT	B103
4171736	WNMG080408RH WP35CT	B103
4171737	WNMG080412RH WP35CT	B103
4171738	WNMG080416RH WP35CT	B103
4171742	DNMG150604CT WM15CT	B53
4171753	DNMG150608CT WM15CT	B53
4171754	DNMG150612CT WM15CT	B53
4171755	CNMG120404FW WM15CT	B38
4171756	CNMG120408FW WM15CT	B38
4171757	CNMG120412FW WM15CT	B38
4171758	DNMG150404FW WM15CT	B55
4171759	DNMG150408FW WM15CT	B55
4171760	DNMG150604FW WM15CT	B55
4171761	DNMG150608FW WM15CT	B55
4171762	WNMG080404FW WM15CT	B101
4171763	WNMG080408FW WM15CT	B101
4171764	WNMG080412FW WM15CT	B101
4171863	CNMA120404 WK20CT	B36
4171864	CNMA120408 WK20CT	B36
4171865	CNMA120412 WK20CT	B36
4171866	CNMA120416 WK20CT	B36
4171867	CNMA160608 WK20CT	B36
4171868	CNMA160612 WK20CT	B36
4171869	CNMA160616 WK20CT	B36
4171870	CNMA190608 WK20CT	B36
4171871	CNMA190612 WK20CT	B36
4171872	CNMA190616 WK20CT	B36
4171873	DNMA110408 WK20CT	B52
4171874	DNMA110412 WK20CT	B52
4171875	DNMA150408 WK20CT	B52
4171876	DNMA150412 WK20CT	B52
4171877	DNMA150416 WK20CT	B52
4171878	DNMA150608 WK20CT	B52
4171879	DNMA150612 WK20CT	B52
4171880	DNMA150616 WK20CT	B52
4171881	RNMA120400 WK20CT	B67
4171882	SNMA120408 WK20CT	B71
4171883	SNMA120412 WK20CT	B71
4171884	SNMA120416 WK20CT	B71
4171885	SNMA150608 WK20CT	B71
4171886	SNMA150612 WK20CT	B71
4171887	SNMA150616 WK20CT	B71
4171888	SNMA190612 WK20CT	B71
4171889	SNMA190616 WK20CT	B71
4171890	TNMA160408 WK20CT	B84
4171891	TNMA160412 WK20CT	B84
4171892	TNMA160416 WK20CT	B84
4171893	TNMA220408 WK20CT	B84
4171894	TNMA220412 WK20CT	B84
4171895	TNMA220416 WK20CT	B84
4171896	TNMA270616 WK20CT	B84
4171897	VNMA160408 WK20CT	B96
4171898	WNMA060408 WK20CT	B100
4171899	WNMA060412 WK20CT	B100
4171900	WNMA080408 WK20CT	B100
4171901	WNMA080412 WK20CT	B100
4171902	WNMA080416 WK20CT	B100
4171903	CNMG120408RH WK20CT	B41
4171904	CNMG120412RH WK20CT	B41
4171905	CNMG120416RH WK20CT	B41
4171906	CNMG160608RH WK20CT	B41
4171907	CNMG160612RH WK20CT	B41
4171908	CNMG160616RH WK20CT	B41
4171909	CNMG190608RH WK20CT	B41
4171910	CNMG190612RH WK20CT	B41
4171911	CNMG190616RH WK20CT	B41
4171912	DNMG150408RH WK20CT	B59
4171913	DNMG150412RH WK20CT	B59
4171914	DNMG150608RH WK20CT	B59
4171915	DNMG150612RH WK20CT	B59
4171916	DNMG150616RH WK20CT	B59
4171917	RNMG190600RH WK20CT	B67
4171918	SNMG120408RH WK20CT	B74
4171919	SNMG120412RH WK20CT	B74
4171920	SNMG120416RH WK20CT	B74
4171921	SNMG150608RH WK20CT	B74
4171922	SNMG150612RH WK20CT	B74
4171923	SNMG150616RH WK20CT	B74
4171924	SNMG190608RH WK20CT	B74
4171925	SNMG190612RH WK20CT	B74
4171926	SNMG190616RH WK20CT	B74
4171927	TNMG160408RH WK20CT	B87
4171928	TNMG160412RH WK20CT	B87
4171929	TNMG220408RH WK20CT	B87
4171930	TNMG220412RH WK20CT	B87
4171931	TNMG220416RH WK20CT	B87
4171932	WNMG080408RH WK20CT	B103
4171933	WNMG080412RH WK20CT	B103
4171934	WNMG080416RH WK20CT	B103
4172133	DNMP150412 WM15CT	B63
4172134	DNMP150604 WM15CT	B63
4172135	DNMP150608 WM15CT	B63
4172136	DNMP150612 WM15CT	B63
4172137	SNMP120408 WM15CT	B77
4172138	SNMP120412 WM15CT	B77
4172139	SNMP150608 WM15CT	B77
4172140	SNMP150612 WM15CT	B77
4172141	SNMP150616 WM15CT	B77
4172142	SNMP190616 WM15CT	B77
4172143	TNMP160404 WM15CT	B90
4172144	TNMP160408 WM15CT	B90
4172145	TNMP160412 WM15CT	B90
4172146	TNMP220404 WM15CT	B90
4172147	TNMP220408 WM15CT	B90
4172148	TNMP220412 WM15CT	B90
4172230	TNMA220412 WK05CT	B84
4172334	CNMG120404UM WM15CT	B42
4172335	CNMG120408UM WM15CT	B42
4172336	CNMG120412UM WM15CT	B42
4172337	DNMG110404UM WM15CT	B61
4172338	DNMG110408UM WM15CT	B61
4172339	DNMG110412UM WM15CT	B61
4172340	DNMG150404UM WM15CT	B61
4172341	DNMG150408UM WM15CT	B61

Order No.	Catalogue No.	Page(s)
4172342	DNMG150412UM WM15CT	B61
4172345	CNMG120404FF WM25CT	B37
4172346	CNMG120408FF WM25CT	B37
4172347	CNMG120412FF WM25CT	B37
4172348	DNMG110404FF WM25CT	B54
4172349	DNMG110408FF WM25CT	B54
4172350	DNMG110412FF WM25CT	B54
4172351	DNMG150404FF WM25CT	B54
4172352	DNMG150408FF WM25CT	B54
4172363	DNMG150604UM WM15CT	B61
4172364	DNMG150608UM WM15CT	B61
4172365	DNMG150612UM WM15CT	B61
4172366	SNMG120404UM WM15CT	B75
4172367	SNMG120408UM WM15CT	B75
4172368	SNMG120412UM WM15CT	B75
4172369	TNMG160404UM WM15CT	B88
4172370	TNMG160408UM WM15CT	B88
4172371	TNMG160412UM WM15CT	B88
4172372	TNMG220404UM WM15CT	B88
4172373	TNMG220408UM WM15CT	B88
4172374	TNMG220412UM WM15CT	B88
4172375	WNMG060404UM WM15CT	B104
4172376	WNMG060408UM WM15CT	B104
4172377	WNMG080404UM WM15CT	B104
4172378	WNMG080408UM WM15CT	B104
4172379	WNMG080412UM WM15CT	B104
4172380	CNMG120404UM WM25CT	B42
4172381	CNMG120408UM WM25CT	B42
4172382	CNMG120412UM WM25CT	B42
4172383	DNMG110404UM WM25CT	B61
4172384	DNMG110408UM WM25CT	B61
4172385	DNMG110412UM WM25CT	B61
4172386	DNMG150404UM WM25CT	B61
4172387	DNMG150408UM WM25CT	B61
4172388	DNMG150412UM WM25CT	B61
4172389	DNMG150604UM WM25CT	B61
4172390	DNMG150608UM WM25CT	B61
4172391	DNMG150612UM WM25CT	B61
4172392	DNMG150616UM WM25CT	B61
4172393	SNMG120404UM WM25CT	B75
4172394	SNMG120408UM WM25CT	B75
4172395	SNMG120412UM WM25CT	B75
4172396	TNMG160404UM WM25CT	B88
4172397	TNMG160408UM WM25CT	B88
4172398	TNMG160412UM WM25CT	B88
4172399	TNMG160416UM WM25CT	B88
4172400	TNMG220404UM WM25CT	B88
4172401	TNMG220408UM WM25CT	B88
4172402	TNMG220412UM WM25CT	B88
4172403	WNMG060404UM WM25CT	B104
4172404	WNMG060408UM WM25CT	B104
4172405	WNMG060412UM WM25CT	B104
4172406	WNMG080404UM WM25CT	B104
4172407	WNMG080408UM WM25CT	B104
4172408	WNMG080412UM WM25CT	B104
4172409	WNMG080416UM WM25CT	B104
4172410	CNMG120404UM WM35CT	B42
4172411	CNMG120408UM WM35CT	B42
4172412	CNMG120412UM WM35CT	B42
4172413	DNMG110404UM WM35CT	B61
4172414	DNMG110408UM WM35CT	B61
4172415	DNMG110412UM WM35CT	B61
4172416	DNMG150404UM WM35CT	B61
4172417	DNMG150408UM WM35CT	B61
4172418	DNMG150412UM WM35CT	B61
4172419	DNMG150604UM WM35CT	B61
4172420	DNMG150608UM WM35CT	B61
4172421	DNMG150612UM WM35CT	B61
4172422	DNMG150616UM WM35CT	B61
4172423	SNMG120404UM WM35CT	B75
4172424	SNMG120408UM WM35CT	B75
4172425	SNMG120412UM WM35CT	B75
4172426	TNMG160404UM WM35CT	B88
4172427	TNMG160408UM WM35CT	B88
4172428	TNMG160412UM WM35CT	B88
4172429	TNMG160416UM WM35CT	B88
4172430	TNMG220404UM WM35CT	B88
4172431	TNMG220408UM WM35CT	B88
4172432	WNMG060404UM WM35CT	B104
4172433	WNMG060408UM WM35CT	B104
4172434	WNMG060412UM WM35CT	B104
4172435	WNMG080404UM WM35CT	B104
4172436	WNMG080408UM WM35CT	B104
4172437	WNMG080412UM WM35CT	B104
4172438	WNMG080416UM WM35CT	B104
4172439	CNMP120404 WS10PT	B45
4172440	CNMP120408 WS10PT	B45
4172441	CNMP120412 WS10PT	B45
4172442	CNMP160612 WS10PT	B45
4172483	CNMP190612 WS10PT	B45
4172484	DNMP150404 WS10PT	B63
4172485	DNMP150408 WS10PT	B63
4172486	DNMP150604 WS10PT	B63
4172487	DNMP150608 WS10PT	B63
4172488	DNMP150612 WS10PT	B63
4172489	SNMP120408 WS10PT	B77
4172490	SNMP120412 WS10PT	B77
4172491	TNMP160404 WS10PT	B90
4172492	TNMP160408 WS10PT	B90
4172493	TNMP160412 WS10PT	B90
4172494	TNMP220404 WS10PT	B90
4172495	TNMP220408 WS10PT	B90
4172496	TNMP220412 WS10PT	B90
4172497	VNMP160404 WS10PT	B99
4172498	VNMP160408 WS10PT	B99
4172499	WNMP080408 WS10PT	B105
4172500	WNMP080412 WS10PT	B105
4172614	CNMP120408 WS25PT	B45
4172615	CNMP120412 WS25PT	B45
4172616	DNMP150608 WS25PT	B63
4172617	DNMP150612 WS25PT	B63
4172618	SNMP120408 WS25PT	B77
4172619	SNMP120412 WS25PT	B77
4172620	SNMP150608 WS25PT	B77
4172621	SNMP150612 WS25PT	B77
4172622	SNMP150616 WS25PT	B77
4172623	TNMP160408 WS25PT	B90
4172624	TNMP160412 WS25PT	B90
4172625	TNMP220408 WS25PT	B90
4172626	TNMP220412 WS25PT	B90
4172683	DNMG150604FF WM25CT	B54
4172684	DNMG150608FF WM25CT	B54
4172685	DNMG150612FF WM25CT	B54
4172686	SNMG090308FF WM25CT	B72
4172687	SNMG120404FF WM25CT	B72
4172688	SNMG120408FF WM25CT	B72
4172689	SNMG120412FF WM25CT	B72
4172690	SNMG120416FF WM25CT	B72
4172691	TNMG160404FF WM25CT	B84
4172692	TNMG160408FF WM25CT	B84
4172693	TNMG160412FF WM25CT	B84
4172694	VNMG160404FF WM25CT	B97
4172695	VNMG160408FF WM25CT	B97
4172696	WNMG060404FF WM25CT	B100
4172697	WNMG080404FF WM25CT	B100
4172698	WNMG080408FF WM25CT	B100
4172699	DNMG150604CT WM25CT	B53
4172700	DNMG150608CT WM25CT	B53
4172701	DNMG150612CT WM25CT	B53
4172702	CNMG120404FW WM25CT	B38
4172955	CNMG120408MR WM25CT	B39
4172956	CNMG120412MR WM25CT	B39
4172957	CNMG120416MR WM25CT	B39
4172958	CNMG160608MR WM25CT	B39
4172959	CNMG160612MR WM25CT	B39
4172960	CNMG160616MR WM25CT	B39
4172961	CNMG190612MR WM25CT	B39
4172962	CNMG190616MR WM25CT	B39
4173023	DNMG150608MR WM25CT	B57
4173024	DNMG150612MR WM25CT	B57
4173025	SNMG120408MR WM25CT	B73
4173026	SNMG120412MR WM25CT	B73
4173027	SNMG120416MR WM25CT	B73
4173028	SNMG150608MR WM25CT	B73
4173029	SNMG150612MR WM25CT	B73
4173030	SNMG150616MR WM25CT	B73
4173031	SNMG190612MR WM25CT	B73
4173032	SNMG190616MR WM25CT	B73
4173033	WNMG080408MR WM25CT	B102
4173034	WNMG080412MR WM25CT	B102
4173035	CNMG120408RH WM25CT	B41
4173036	CNMG120412RH WM25CT	B41
4173037	CNMG120416RH WM25CT	B41
4173038	CNMG160608RH WM25CT	B41
4173039	CNMG160612RH WM25CT	B41
4173040	CNMG160616RH WM25CT	B41
4173041	CNMG190608RH WM25CT	B41
4173042	CNMG190612RH WM25CT	B41
4173043	CNMG190616RH WM25CT	B41
4173044	CNMG190624RH WM25CT	B41
4173045	DNMG150408RH WM25CT	B59
4173046	DNMG150608RH WM25CT	B59
4173047	DNMG150612RH WM25CT	B59
4173048	DNMG150616RH WM25CT	B59
4173049	SNMG120408RH WM25CT	B74
4173050	SNMG120412RH WM25CT	B74
4173051	SNMG120416RH WM25CT	B74
4173052	SNMG150608RH WM25CT	B74
4173053	SNMG150612RH WM25CT	B74
4173054	SNMG150616RH WM25CT	B74
4173055	SNMG190608RH WM25CT	B74
4173056	SNMG190612RH WM25CT	B74
4173057	SNMG190616RH WM25CT	B74
4173058	TNMG160408RH WM25CT	B87
4173059	TNMG160412RH WM25CT	B87
4173060	TNMG220408RH WM25CT	B87
4173061	TNMG220412RH WM25CT	B87
4173062	TNMG220416RH WM25CT	B87
4173063	WNMG060408RH WM25CT	B103
4173064	WNMG080408RH WM25CT	B103
4173065	WNMG080412RH WM25CT	B103
4173066	WNMG080416RH WM25CT	B103
4173103	CNMG120408FW WM25CT	B38
4173104	CNMG120412FW WM25CT	B38
4173105	DNMG150404FW WM25CT	B55
4173106	DNMG150408FW WM25CT	B55
4173107	DNMG150604FW WM25CT	B55
4173108	DNMG150608FW WM25CT	B55
4173109	WNMG080404FW WM25CT	B101
4173110	WNMG080408FW WM25CT	B101
4173111	WNMG080412FW WM25CT	B101
4173112	CNMG120408MW WM25CT	B40
4173113	CNMG120412MW WM25CT	B40
4173114	DNMG150408MW WM25CT	B58
4173115	DNMG150412MW WM25CT	B58
4173116	DNMG150608MW WM25CT	B58
4173117	DNMG150612MW WM25CT	B58
4173118	WNMG080408MW WM25CT	B102
4173119	WNMG080412MW WM25CT	B102
4173120	CNMG120408MR WM35CT	B39
4173121	CNMG120412MR WM35CT	B39
4173122	CNMG120416MR WM35CT	B39
4173133	CNMG160608MR WM35CT	B39
4173134	CNMG160612MR WM35CT	B39
4173135	CNMG160616MR WM35CT	B39
4173136	CNMG190612MR WM35CT	B39
4173137	CNMG190616MR WM35CT	B39
4173138	DNMG150608MR WM35CT	B57
4173139	DNMG150612MR WM35CT	B57
4173140	SNMG120408MR WM35CT	B73
4173141	SNMG120412MR WM35CT	B73
4173142	SNMG120416MR WM35CT	B73
4173143	SNMG150608MR WM35CT	B73
4173144	SNMG150612MR WM35CT	B73
4173145	SNMG150616MR WM35CT	B73
4173146	SNMG190612MR WM35CT	B73
4173147	SNMG190616MR WM35CT	B73
4173148	WNMG080408MR WM35CT	B102
4173149	WNMG080412MR WM35CT	B102
4173459	TDS504A03000 WU20PD	T100
4173460	TDS504A03175 WU20PD	T100
4173461	TDS504A03264 WU20PD	T100
4173462	TDS504A03500 WU20PD	T100
4173463	TDS504A03970 WU20PD	T100
4173464	TDS504A04000 WU20PD	T100
4173465	TDS504A04500 WU20PD	T100
4173466	TDS504A04600 WU20PD	T100
4173467	TDS504A04763 WU20PD	T100
4173468	TDS504A04800 WU20PD	T100
4173469	TDS504A05000 WU20PD	T100
4173470	TDS504A05100 WU20PD	T100
4173471	TDS504A05200 WU20PD	T100
4173472	TDS504A05300 WU20PD	T100
4173473	TDS504A05410 WU20PD	T100
4173474	TDS504A05500 WU20PD	T100
4173475	TDS504A05558 WU20PD	T100
4173476	TDS504A05600 WU20PD	T100
4173477	TDS504A05700 WU20PD	T100
4173478	TDS504A05800 WU20PD	T100
4173479	TDS504A06000 WU20PD	T100
4173480	TDS504A06200 WU20PD	T100
4173481	TDS504A06350 WU20PD	T101
4173482	TDS504A06500 WU20PD	T101
4173483	TDS504A06528 WU20PD	T101
4173484	TDS504A06600 WU20PD	T101
4173485	TDS504A06746 WU20PD	T101
4173486	TDS504A06800 WU20PD	T101
4173487	TDS504A06909 WU20PD	T101
4173488	TDS504A07000 WU20PD	T101
4173489	TDS504A07145 WU20PD	T101
4173490	TDS504A07500 WU20PD	T101
4173491	TDS504A07541 WU20PD	T101
4173492	TDS504A07700 WU20PD	T101
4173493	TDS504A07800 WU20PD	T101

Order No.	Catalogue No.	Page(s)
4173494	TDS504A07938 WU20PD	T101
4173495	TDS504A08000 WU20PD	T101
4173496	TDS504A08100 WU20PD	T101
4173497	TDS504A08334 WU20PD	T101
4173498	TDS504A08433 WU20PD	T101
4173499	TDS504A08500 WU20PD	T101
4173500	TDS504A08700 WU20PD	T101
4173501	TDS504A08733 WU20PD	T101
4173502	TDS504A09000 WU20PD	T101
4173503	TDS504A09100 WU20PD	T101
4173504	TDS504A09129 WU20PD	T101
4173505	TDS504A09500 WU20PD	T101
4173506	TDS504A09525 WU20PD	T101
4173507	TDS504A09921 WU20PD	T101
4173508	TDS504A10000 WU20PD	T101
4173509	TDS504A10200 WU20PD	T101
4173510	TDS504A10300 WU20PD	T101
4173511	TDS504A10320 WU20PD	T101
4173512	TDS504A10500 WU20PD	T101
4173513	TDS504A10716 WU20PD	T101
4173514	TDS504A10800 WU20PD	T101
4173515	TDS504A11000 WU20PD	T101
4173516	TDS504A11113 WU20PD	T101
4173517	TDS504A11500 WU20PD	T101
4173518	TDS504A11800 WU20PD	T101
4173519	TDS504A12000 WU20PD	T101
4173520	TDS504A12100 WU20PD	T102
4173521	TDS504A12304 WU20PD	T102
4173522	TDS504A12700 WU20PD	T102
4173523	TDS504A13000 WU20PD	T102
4173524	TDS504A13100 WU20PD	T102
4173525	TDS504A13500 WU20PD	T102
4173526	TDS504A14000 WU20PD	T102
4173527	TDS504A14100 WU20PD	T102
4173528	TDS504A14288 WU20PD	T102
4173529	TDS504A14500 WU20PD	T102
4173530	TDS504A14684 WU20PD	T102
4173531	TDS504A15000 WU20PD	T102
4173532	TDS504A15500 WU20PD	T102
4173533	TDS504A15875 WU20PD	T102
4173534	TDS504A16000 WU20PD	T102
4173535	TDS504A16500 WU20PD	T102
4173536	TDS504A17000 WU20PD	T102
4173537	TDS504A17463 WU20PD	T102
4173538	TDS504A17500 WU20PD	T102
4173539	TDS504A18000 WU20PD	T102
4173540	TDS504A18500 WU20PD	T102
4173541	TDS504A19000 WU20PD	T102
4173542	TDS504A19050 WU20PD	T102
4173543	TDS504A19500 WU20PD	T102
4173544	TDS504A20000 WU20PD	T102
4173545	TDS504A03455 WU20PD	T100
4173546	TDS504A03734 WU20PD	T100
4173547	TDS504A09347 WU20PD	T101
4173552	CNMP120404 WM25CT	B45
4173653	CNMP120408 WM25CT	B45
4173654	CNMP120412 WM25CT	B45
4173655	CNMP160608 WM25CT	B45
4173656	CNMP160612 WM25CT	B45
4173657	CNMP190616 WM25CT	B45
4173658	DNMP150404 WM25CT	B63
4173659	DNMP150408 WM25CT	B63
4173660	DNMP150412 WM25CT	B63
4173661	DNMP150604 WM25CT	B63
4173662	DNMP150608 WM25CT	B63
4173663	DNMP150612 WM25CT	B63
4173664	SNMP120408 WM25CT	B77
4173665	SNMP120412 WM25CT	B77
4173666	SNMP150608 WM25CT	B77
4173667	SNMP150612 WM25CT	B77
4173668	SNMP150616 WM25CT	B77
4173669	SNMP190616 WM25CT	B77
4173670	TNMP160404 WM25CT	B90
4173671	TNMP160408 WM25CT	B90
4173672	TNMP160412 WM25CT	B90
4173673	TNMP220404 WM25CT	B90
4173674	TNMP220408 WM25CT	B90
4173675	TNMP220412 WM25CT	B90
4173681	CNMP120404 WM35CT	B45
4173682	CNMP120408 WM35CT	B45
4173693	CNMP120412 WM35CT	B45
4173694	CNMP160608 WM35CT	B45
4173695	CNMP160612 WM35CT	B45
4173696	CNMP190616 WM35CT	B45
4173697	DNMP150404 WM35CT	B63
4173698	DNMP150408 WM35CT	B63
4173699	DNMP150412 WM35CT	B63
4173700	DNMP150604 WM35CT	B63
4173701	DNMP150608 WM35CT	B63
4173702	DNMP150612 WM35CT	B63
4173703	SNMP120408 WM35CT	B77
4173704	SNMP120412 WM35CT	B77
4173705	SNMP150608 WM35CT	B77
4173706	SNMP150612 WM35CT	B77
4173707	SNMP150616 WM35CT	B77
4173708	SNMP190616 WM35CT	B77
4173709	TNMP160404 WM35CT	B90
4173710	TNMP160408 WM35CT	B90
4173711	TNMP160412 WM35CT	B90
4173712	TNMP220404 WM35CT	B90
4173713	TNMP220408 WM35CT	B90
4173714	TNMP220412 WM35CT	B90
5077441	A08JSCFPL06 WG	C66
5077442	A08JSCFPR06 WG	C66
5077447	A10KSCFPL06 WG	C66
5077449	A10KSCFPR06 WG	C66
5077496	A12MSCFPL06 WG	C66
5077497	A12MSCFPR06 WG	C66
5077550	A16RSCFPL06 WG	C66
5077551	A16RSCFPL09 WG	C66
5077552	A16RSCFPR06 WG	C66
5077553	A16RSCFPR09 WG	C66
5077556	A20SSCFPL06 WG	C66
5077557	A20SSCFPL09 WG	C66
5077614	A20SSCFPR06 WG	C66
5077615	A20SSCFPR09 WG	C66
5077619	A08JSCLPL06 WG	C69
5077640	A08JSCLPR06 WG	C69
5077644	A10KSCLPL06 WG	C69
5077645	A10KSCLPR06 WG	C69
5077680	A12MSCLPL06 WG	C69
5077681	A12MSCLPR06 WG	C69
5077688	A16RSCLPL06 WG	C69
5077692	A16RSCLPL09 WG	C69
5077694	A16RSCLPR06 WG	C69
5077695	A16RSCLPR09 WG	C69
5077721	A20SSCLPL09 WG	C69
5077722	A20SSCLPR09 WG	C69
5078291	A12MSDQPL07 WG	C72
5078292	A12MSDQPR07 WG	C72
5078293	A16RSDQPL07 WG	C72
5078295	A16RSDQPR07 WG	C72
5078296	A20SSDQPL11 WG	C72
5078298	A20SSDQPR11 WG	C72
5078299	A25TSDQPL11 WG	C72
5078320	A25TSDQPR11 WG	C72
5078329	A12MSDUPL07 WG	C75
5078360	A12MSDUPR07 WG	C75
5078363	A16RSDUPL07 WG	C75
5078364	A16RSDUPR07 WG	C75
5078367	A20SSDUPL11 WG	C75
5078368	A20SSDUPR11 WG	C75
5078375	A25TSDUPL11 WG	C75
5078376	A25TSDUPR11 WG	C75
5078400	A12MSDXPL07	C76
5078401	A12MSDXPR07	C76
5078404	A16RSDXPL07	C76
5078405	A16RSDXPR07	C76
5078409	A20SSDXPL11	C76
5078430	A20SSDXPR11	C76
5086724	A08JSTFPL09 WG	C78
5086726	A08JSTFPR09 WG	C78
5086800	A12MSTFPL11 WG	C78
5086802	A12MSTFPR11 WG	C78
5086806	A20SSTFPL16 WG	C78
5086807	A20SSTFPR16 WG	C78
5086808	A25TSTFPL16 WG	C78
5086809	A25TSTFPR16 WG	C78
5086810	A12MSTWPL11 WG	C80
5086811	A12MSTWPR11 WG	C80
5086812	A16RSTWPL11 WG	C80
5086813	A16RSTWPR11 WG	C80
5091303	SNMG250924 WP35CT	B71
5092757	E08KSCFPL06A WG	C67
5092759	E08KSCFPR06A WG	C67
5092920	E10MSCFPL06A WG	C67
5092921	E10MSCFPR06A WG	C67
5092922	E12QSCFPL06 WG	C67
5092923	E12QSCFPR06 WG	C67
5093093	E08KSCLPL06A WG	C70
5093094	E08KSCLPR06A WG	C70
5093097	E10MSCLPL06A WG	C70
5093098	E10MSCLPR06A WG	C70
5093143	E12QSCLPL06 WG	C70
5093144	E12QSCLPR06 WG	C70
5093149	E16RSCLPL09 WG	C70
5093181	E16RSCLPR09 WG	C70
5093184	E20SSCLPL09 WG	C70
5093185	E20SSCLPR09 WG	C70
5093429	E12QSDUPL07 WG	C75
5093591	E12QSDUPR07 WG	C75
5093633	E16RSDUPL07 WG	C75
5093634	E16RSDUPR07 WG	C75
5093638	E20SSDUPL11 WG	C75
5093639	E20SSDUPR11 WG	C75
5093694	E08KSTFPL09A WG	C79
5093696	E08KSTFPR09A WG	C79
5093699	E10MSTFPL11A WG	C79
5093750	E10MSTFPR11A WG	C79
5093754	E12QSTFPL11 WG	C79
5093755	E12QSTFPR11 WG	C79
5093758	E16RSTFPL11 WG	C79
5093759	E16RSTFPR11 WG	C79
5093772	E20SSTFPL16 WG	C79
5093773	E20SSTFPR16 WG	C79
5094162	SCDPL1212H06 WG	C42
5094163	SCDPR1212H06 WG	C42
5094212	SCLPL1212M06 WG	C43
5094217	SCLPR1010M06 WG	C43
5094218	SCLPR1212M06 WG	C43
5095163	VNMG12T304 WS10PT	B96
5095164	VNMG12T304 WS25PT	B96
5095165	VNMG12T308 WS10PT	B96
5095166	VNMG12T308 WS25PT	B96
5096566	571806002MT ALTIN-MT	038
5096567	571806012MT ALTIN-MT	038
5096568	571806022MT ALTIN-MT	038
5096569	571808003MT ALTIN-MT	038
5096660	571808013MT ALTIN-MT	038
5096661	571808023MT ALTIN-MT	038
5096662	571810014MT ALTIN-MT	038
5096664	571810034MT ALTIN-MT	038
5096665	571810044MT ALTIN-MT	038
5096667	571812025MT ALTIN-MT	038
5096668	571812035MT ALTIN-MT	038
5096669	571812045MT ALTIN-MT	038
5096752	571814024MT ALTIN-MT	038
5096753	571814034MT ALTIN-MT	038
5096754	571814044MT ALTIN-MT	038
5096755	571814054MT ALTIN-MT	038
5096756	571816016MT ALTIN-MT	039
5096757	571816026MT ALTIN-MT	039
5096758	571816036MT ALTIN-MT	039
5096759	571816046MT ALTIN-MT	039
5096800	571816056MT ALTIN-MT	039
5096801	571818028MT ALTIN-MT	039
5096802	571818038MT ALTIN-MT	039
5096803	571818048MT ALTIN-MT	039
5096804	571818058MT ALTIN-MT	039
5096805	571820017MT ALTIN-MT	039
5096806	571820027MT ALTIN-MT	039
5096807	571820037MT ALTIN-MT	039
5096808	571820047MT ALTIN-MT	039
5096809	571820057MT ALTIN-MT	039
5096860	571825018MT ALTIN-MT	039
5096861	571825028MT ALTIN-MT	039
5096862	571825038MT ALTIN-MT	039
5096863	571825048MT ALTIN-MT	039
5096864	571825058MT ALTIN-MT	039
5123863	RNGJ1204M0EML WP25PM	M32
5123864	RNGJ1204M0EML WU35PM	M32
5123865	RNGJ1204M0EML WP35CM	M32
5123866	RNGJ1204M0SMM WK15PM	M32
5123867	RNGJ1204M0SMM WP25PM	M32
5123868	RNGJ1204M0SMM WU35PM	M32
5123869	RNGJ1204M0SMM WP35CM	M32
5123900	RNGJ1204M0SMH WK15PM	M33
5123901	RNGJ1204M0SMH WP25PM	M33
5123902	RNGJ1204M0SMH WU35PM	M33
5123903	RNGJ1204M0SMH WP35CM	M33
5143530	GT315033 GP6520	Y22
5143531	GT315034 GP6520	Y22
5143532	GT315035 GP6520	Y22
5176974	RDPT1204M0SMMX TN6540	M87
5176975	RDPT1204M0SMMX TN7535	M87
5201462	DSM550	H65
5201476	HDWM5EU4DD	H64
5201486	HDWM5S	H65
5201519	LS103	H64
5202232	SALS063	H64
5202233	SALS080	H64
5202234	SALS100	H64
5202235	SALS125	H64
5202236	SALS160	H64

Order No.	Catalogue No.	Page(s)
5202514	SWSM515	H64
5202515	SWSM5155	H65
5209989	M200D50Z04RN16	M36
5210210	M200D52Z04RN16	M36
5210211	M200D63Z04RN16	M36
5210212	M200D63Z06RN16	M36
5210213	M200D66Z05RN16	M36
5210214	M200D80Z05RN16	M36
5210215	M200D80Z07RN16	M36
5210216	M200D100Z06RN16	M36
5210217	M200D100Z08RN16	M36
5210218	M200D125Z08RN16	M36
5210273	M200D25Z03M12RN10	M20
5210274	M200D32Z04M16RN10	M20
5210275	M200D35Z05M16RN10	M20
5210276	M200D42Z06M16RN10	M20
5210277	M200D25Z03B25RN10	M21
5210278	M200D32Z04B32RN10	M21
5210279	M200D25Z03A25RN10L150	M22
5210300	M200D25Z03A25RN10L200	M22
5210301	M200D25Z03A32RN10L250	M22
5210302	M200D28Z03A25RN10L200	M22
5210303	M200D32Z04A32RN10L150	M22
5210304	M200D32Z03A32RN10L200	M22
5210305	M200D40Z04RN10	M23
5210306	M200D40Z06RN10	M23
5210307	M200D50Z05RN10	M23
5210308	M200D50Z06RN10	M23
5210309	M200D52Z06RN10	M23
5274455	RNGJ10T3M0EML WP35CM	M24
5274456	RNGJ10T3M0EML WP25PM	M24
5274457	RNGJ10T3M0EML WU35PM	M24
5274511	RNGJ10T3M0SMM WP25PM	M24
5274512	RNGJ10T3M0SMM WU35PM	M24
5274560	RNGJ1605M0EML WP35CM	M37
5274561	RNGJ1605M0EML WP25PM	M37
5274562	RNGJ1605M0EML WU35PM	M37
5276196	RNPJ10T3M0SMM WP35CM	M25
5276197	RNPJ10T3M0SMM WP25PM	M25
5276198	RNPJ10T3M0SMM WP20CM	M25
5276199	RNPJ10T3M0SMH WP35CM	M25
5276240	RNPJ10T3M0SMH WP25PM	M25
5276241	RNPJ10T3M0SMH WP20CM	M25
5276243	RNPJ10T3M0SMH WK15CM	M25
5276360	RNPJ1204M0SMM WP35CM	M33
5276361	RNPJ1204M0SMM WP25PM	M33
5276362	RNPJ1204M0SMM WP20CM	M33
5276363	RNPJ1204M0SMH WP35CM	M33
5276364	RNPJ1204M0SMH WP25PM	M33
5276365	RNPJ1204M0SMH WP20CM	M33
5276366	RNPJ1204M0SMH WK15CM	M33
5276470	RNPJ1605M0SMM WP35CM	M38
5276471	RNPJ1605M0SMM WP25PM	M38
5276472	RNPJ1605M0SMM WP20CM	M38
5276473	RNPJ1605M0SMH WP35CM	M38
5276474	RNPJ1605M0SMH WP25PM	M38
5276475	RNPJ1605M0SMH WP20CM	M38
5276476	RNPJ1605M0SMH WK15CM	M38
5281790	SDEX120408FRALP THM-U	J46
5291300	WMTS125I3P03PH WU25PT	E19, E23
5301400	CNMG120408UR WS10PT	B43
5301402	CNMG120408UR WS25PT	B43
5301413	CNMG120412UR WS10PT	B43
5301414	CNMG120412UM WS10PT	B42
5301416	CNMG120412UR WS25PT	B43
5308173	SNMG1906166P TN30P	B136
5323588	8S0SS	U42
5323612	8S1SL	U43
5323613	8S1SM	U42
5323614	8S1SS	U42
5323618	8S2SE	U43
5323619	8S2SL	U43
5323620	8S2SM	U42
5323624	8S2SS	U42
5324155	8S0SM	U42
5324156	8S0SL	U43
5324190	8S3SM	U42
5324191	8S4SS	U42
5327620	WMTS250I6P03PH WU25PT	E21, E24
5327621	WMTS250I6P08PH WU25PT	E20, E24
5331093	WMTS125I3P08PH WU25PT	E19, E23
5331095	WMTS188I5P03PH WU25PT	E20, E23
5331097	WMTS188I5P08PH WU25PT	E20, E23
5338818	WOEJ120712SRMH WP25PM	M13
5338819	WOEJ120712SRMH WU35PM	M13
5338860	WOEJ120712SRMH WK15CM	M13
5338861	WOEJ120712SRMH WP20CM	M13
5338862	WOEJ120712SRMH WP35CM	M13
5338912	M370D42Z03M16WO12	M11
5338913	M370D50Z04WO12	M12
5338914	M370D52Z04WO12	M12
5338915	M370D63Z04WO12	M12
5338916	M370D63Z05WO12	M12
5338917	M370D66Z05WO12	M12
5338918	M370D80Z05WO12	M12
5338919	M370D80Z06WO12	M12
5338920	M370D100Z06WO12	M12
5338921	M370D100Z07WO12	M12
5338922	M370D125Z07WO12	M12
5338923	M370D125Z09WO12	M12
5345183	CNMG190616UR WS10PT	B43
5345914	WMTS125I3P03PH WU10PT	E19, E23
5345915	WMTS125I3P08PH WU10PT	E19, E23
5345916	WMTS156I4P03PH WU10PT	E19, E23
5345917	WMTS156I4P03PH WU25PT	E19, E23
5345918	WMTS156I4P08PH WU10PT	E19, E23
5345919	WMTS156I4P08PH WU25PT	E19, E23
5345980	WMTS188I5P03PH WU10PT	E20, E23
5345981	WMTS188I5P08PH WU10PT	E20, E23
5345983	WMTS250I6P03PH WU10PT	E21, E24
5345984	WMTS250I6P08PH WU10PT	E20, E24
5345985	WMTS312I8P03PH WU10PT	E21, E24
5345986	WMTS312I8P03PH WU25PT	E21, E24
5345987	WMTS312I8P08PH WU10PT	E21, E24
5345988	WMTS312I8P08PH WU25PT	E21, E24
5346392	WMTS305M3U03PH WU10PT	E22
5346393	WMTS305M3U03PH WU25PT	E22
5346394	WMTS305M3U06PH WU10PT	E22
5346395	WMTS305M3U06PH WU25PT	E22
5346396	WMTS405M4U03PH WU10PT	E22
5346397	WMTS405M4U03PH WU25PT	E22
5346398	WMTS405M4U06PH WU10PT	E22
5346399	WMTS405M4U06PH WU25PT	E22
5346400	WMTS505M5U03PH WU10PT	E22
5346401	WMTS505M5U03PH WU25PT	E22
5346402	WMTS505M5U06PH WU10PT	E22
5346403	WMTS505M5U06PH WU25PT	E22
5346404	WMTS605M6U03PH WU10PT	E22
5346405	WMTS605M6U03PH WU25PT	E22
5346406	WMTS605M6U06PH WU10PT	E22
5346407	WMTS605M6U06PH WU25PT	E22
5346408	WMTS805M8U06PH WU10PT	E22
5346409	WMTS805M8U06PH WU25PT	E22
5346410	WMTS805M8U03PH WU10PT	E22
5346411	WMTS805M8U03PH WU25PT	E22
5346412	WMTS300M3P03PH WU10PT	E19, E23
5346413	WMTS300M3P03PH WU25PT	E19, E23
5346414	WMTS300M3P03PH WU10HT	E19, E23
5346415	WMTS300M3P06PH WU10PT	E19, E23
5346416	WMTS300M3P06PH WU25PT	E19, E23
5346417	WMTS300M3P06PH WU10HT	E19, E23
5346418	WMTS400M4P03PH WU10PT	E19, E23
5346419	WMTS400M4P03PH WU25PT	E19, E23
5346420	WMTS400M4P03PH WU10HT	E19, E23
5346421	WMTS400M4P06PH WU10PT	E19, E23
5346422	WMTS400M4P06PH WU25PT	E19, E23
5346423	WMTS400M4P06PH WU10HT	E19, E23
5346424	WMTS500M5P03PH WU10PT	E20, E24
5346425	WMTS500M5P03PH WU25PT	E20, E24
5346426	WMTS500M5P03PH WU10HT	E20, E24
5346427	WMTS500M5P06PH WU10PT	E20, E24
5346428	WMTS500M5P06PH WU25PT	E20, E24
5346429	WMTS500M5P06PH WU10HT	E20, E24
5346430	WMTS600M6P03PH WU10PT	E20, E24
5346431	WMTS600M6P03PH WU25PT	E20, E24
5346432	WMTS600M6P06PH WU10PT	E20, E24
5346433	WMTS600M6P06PH WU25PT	E20, E24
5346434	WMTS800M8P06PH WU10PT	E21, E24
5346435	WMTS800M8P06PH WU25PT	E21, E24
5346436	WMTS800M8P03PH WU10PT	E21, E24
5346437	WMTS800M8P03PH WU25PT	E21, E24
5349625	WGMSL1620 W	E36
5349626	WGMSL2020 W	E36
5349627	WGMSL2525 W	E36
5349628	WGMSR2020 W	E36
5349629	WGMSR2525 W	E36
5349640	WGMSL3232 W	E36
5349641	WGMSR3232 W	E36
5358407	SDR100031E0W4 WDN00U	H66
5358408	SDR100031E1W4 WDN00U	H66
5358409	SDR100093E1W4 WDN00U	H66
5358450	SDR100031E0NW WDN00U	H66
5358451	SDR102 WDN00U	H66
5358452	EDR100031E1W4 WDN00U	H66
5359116	CNMG1204044P TN20P	B126
5359117	CNMG1204044P TN10U	B126
5359118	CNMG1204084P TN20P	B126
5359119	CNMG1204084P TN10U	B126
5359120	WMTWGML114S W	E38
5359121	WMTWGML213S W	E38
5359122	WMTWGML2B16S W	E38
5359123	WMTWGML319S W	E38
5359124	WMTWGML419S W	E38
5359125	WMTWGML522S W	E38
5359126	WMTWGML622S W	E38
5359127	WMTWGMR114S W	E38
5359128	WMTWGMR213S W	E38
5359129	WMTWGMR2B16S W	E38
5359130	WMTWGMR319S W	E38
5359131	WMTWGMR419S W	E38
5359132	WMTWGMR522S W	E38
5359133	WMTWGMR622S W	E38
5359134	WMTWGML313B038-052 W	E39
5359135	WMTWGML316B052-070 W	E39
5359136	WMTWGML316B070-100 W	E39
5359137	WMTWGML319100-205 W	E39
5359138	WMTWGML413B038-052 W	E39
5359139	WMTWGML416B052-070 W	E39
5359140	WMTWGML416B070-100 W	E39
5359141	WMTWGML419B100-205 W	E39
5359142	WMTWGML516B038-052 W	E39
5359143	WMTWGML519B052-070 W	E39
5359144	WMTWGML519B070-100 W	E39
5359145	WMTWGML522B100-205 W	E39
5359146	WMTWGML616B030-052 W	E39
5359147	WMTWGML619B052-070 W	E39
5359148	WMTWGML619B070-100 W	E39
5359149	WMTWGML622B100-205 W	E39
5359150	WMTWGMR313B038-052 W	E39
5359151	WMTWGMR316B052-070 W	E39
5359152	WMTWGMR316B070-100 W	E39
5359153	WMTWGMR319B100-205 W	E39
5359154	WMTWGMR416B052-070 W	E39
5359155	WMTWGMR416B070-100 W	E39
5359156	WMTWGMR419B100-205 W	E39
5359157	WMTWGMR522B100-205 W	E39
5359158	WMTWGMR622B100-205 W	E39

Order No.	Catalogue No.	Page(s)
5359240	CNMG1204124P TN20P	B126
5359241	CNMG1204124P TN10U	B126
5359242	DNMG1504084P TN20P	B131
5359243	DNMG1504084P TN10U	B131
5359244	DNMG1506044P TN20P	B131
5359245	DNMG1506084P TN20P	B131
5359246	TNMG1604044P TN20P	B141
5359247	TNMG1604084P TN20P	B141
5359248	TNMG2204044P TN20P	B141
5359249	TNMG2204084P TN20P	B141
5359250	TNMG2204124P TN20P	B141
5359251	VNMG1604044P TN20P	B146
5359252	VNMG1604044P TN10U	B146
5359253	VNMG1604084P TN20P	B146
5359254	VNMG1604084P TN10U	B146
5359255	WNMG0804084P TN20P	B148
5359256	WNMG0804084P TN10U	B148
5363208	SF06306RH W	H64
5363209	SF08008RH W	H64
5363220	SF10012RH W	H64
5363221	SF12515RH W	H64
5363222	SF16018RH W	H64
5363223	SF20024RH W	H64
5363252	WSSEM02502RH W	H65
5363253	WSSEM03203RH W	H65
5363254	WSSEM04004RH W	H65
5363255	WSSEM05005RH W	H65
5366646	VTSPO6505 WU41EG	Y14
5366647	VTSPO6505 WP42EG	Y14
5366648	VTSPO6505 WP49EG	Y14
5366649	VTSPO6505 WU40EG	Y14
5366660	VTSPO6506 WP49EG	Y14
5366661	VTSPO6507 WP49EG	Y14
5366662	VTSPO6508 WU41EG	Y14
5366663	VTSPO6508 WP49EG	Y14
5366664	VTSPO6508 WU40EG	Y14
5366665	VTSPO6509 WP49EG	Y14
5366666	VTSPO6510 WU41EG	Y14
5366667	VTSPO6510 WP42EG	Y14
5366668	VTSPO6510 WP49EG	Y14
5366669	VTSPO6510 WU40EG	Y14
5366670	VTSPO6511 WP49EG	Y14
5366671	VTSPO6512 WU41EG	Y14
5366673	VTSPO6512 WP49EG	Y14
5366674	VTSPO6512 WU40EG	Y14
5366675	VTSPO6513 WU41EG	Y14
5366676	VTSPO6513 WP42EG	Y14
5366677	VTSPO6513 WP49EG	Y14
5366678	VTSPO6513 WU40EG	Y14
5366679	VTSPO6514 WP49EG	Y14
5366680	VTSPO6515 WU41EG	Y14
5366681	VTSPO6515 WP42EG	Y14
5366682	VTSPO6515 WP49EG	Y14
5366684	VTSPO6515 WU40EG	Y14
5366685	VTSPO6516 WP49EG	Y14
5366686	VTSPO6517 WU41EG	Y14
5366687	VTSPO6517 WP42EG	Y14
5366688	VTSPO6517 WP49EG	Y14
5366689	VTSPO6517 WU40EG	Y14
5366690	VTSPO6518 WP49EG	Y14
5366692	VTSPO6519 WU41EG	Y15
5366693	VTSPO6519 WP42EG	Y15
5366695	VTSPO6519 WP49EG	Y15
5366696	VTSPO6519 WU40EG	Y15
5366697	VTSPO6520 WP49EG	Y15
5366698	VTSPO6521 WU41EG	Y15
5366700	VTSPO6521 WP42EG	Y15
5366701	VTSPO6521 WP49EG	Y15
5366703	VTSPO6521 WU40EG	Y15
5366704	VTSPO6522 WP49EG	Y15
5366705	VTSPO6523 WU41EG	Y15
5366706	VTSPO6523 WP42EG	Y15
5366707	VTSPO6523 WP49EG	Y15
5366708	VTSPO6523 WU40EG	Y15
5366709	VTSPO6524 WP49EG	Y15
5368514	VTSPO6525 WU41EG	Y14
5368515	VTSPO6525 WP49EG	Y14
5368516	VTSPO6525 WU40EG	Y14
5368517	VTSPO6526 WU41EG	Y14
5368518	VTSPO6526 WP49EG	Y14
5368519	VTSPO6526 WU40EG	Y14
5368540	VTSPO6527 WU41EG	Y14
5368541	VTSPO6527 WP49EG	Y14
5368542	VTSPO6527 WU40EG	Y14
5368543	VTSPO6528 WU41EG	Y14
5368544	VTSPO6528 WP49EG	Y14
5368545	VTSPO6528 WU40EG	Y14
5368546	VTSPO6529 WU41EG	Y15
5368547	VTSPO6529 WP49EG	Y15
5368548	VTSPO6529 WU40EG	Y15
5368549	VTSPO6530 WU41EG	Y15
5368550	VTSPO6530 WP49EG	Y15
5368551	VTSPO6530 WU40EG	Y15
5368552	VTSPO6531 WU41EG	Y15
5368553	VTSPO6531 WP42EG	Y15
5368554	VTSPO6531 WP49EG	Y15
5368555	VTSPO6531 WU40EG	Y15
5368556	VTSPO6532 WP49EG	Y15
5368557	VTSPO6533 WU41EG	Y15
5368558	VTSPO6533 WP42EG	Y15
5368559	VTSPO6533 WP49EG	Y15
5368560	VTSPO6533 WU40EG	Y15
5368561	VTSPO6534 WP49EG	Y15
5368562	VTSPO6535 WU41EG	Y15
5368563	VTSPO6535 WP42EG	Y15
5368565	VTSPO6535 WP49EG	Y15
5368566	VTSPO6535 WU40EG	Y15
5368567	VTSPO6536 WP49EG	Y15
5368568	VTSPO6537 WU41EG	Y15
5368569	VTSPO6537 WP42EG	Y15
5368570	VTSPO6537 WP49EG	Y15
5368571	VTSPO6537 WU40EG	Y15
5368572	VTSPO6538 WU41EG	Y15
5368573	VTSPO6538 WP42EG	Y15
5368574	VTSPO6538 WP49EG	Y15
5368575	VTSPO6538 WU40EG	Y15
5368576	VTSPO6539 WU41EG	Y16
5368577	VTSPO6539 WP42EG	Y16
5368578	VTSPO6539 WP49EG	Y16
5368579	VTSPO6539 WU40EG	Y16
5368580	VTSPO6540 WU41EG	Y16
5368581	VTSPO6540 WP42EG	Y16
5368582	VTSPO6540 WP49EG	Y16
5368583	VTSPO6540 WU40EG	Y16
5368584	VTSPO6541 WU41EG	Y16
5368585	VTSPO6541 WP49EG	Y16
5368586	VTSPO6541 WU40EG	Y16
5368587	VTSPO6542 WU41EG	Y16
5368588	VTSPO6542 WP49EG	Y16
5368589	VTSPO6542 WU40EG	Y16
5368600	VTSPO6543 WP49EG	Y16
5368601	VTSPO6544 WP49EG	Y16
5368602	VTSPO6545 WP49EG	Y14
5368603	VTSPO6545 WU40EG	Y14
5368604	VTSPO6546 WP49EG	Y14
5368605	VTSPO6546 WU40EG	Y14
5368606	VTSPO6547 WP49EG	Y14
5368607	VTSPO6547 WU40EG	Y14
5368608	VTSPO6548 WP49EG	Y14
5368609	VTSPO6548 WU40EG	Y14
5368610	VTSPO6549 WP49EG	Y14
5368611	VTSPO6549 WU40EG	Y14
5368612	VTSPO6550 WP49EG	Y14
5368613	VTSPO6550 WU40EG	Y14
5368614	VTSPO6551 WP49EG	Y15
5368615	VTSPO6551 WU40EG	Y15
5368616	VTSPO6552 WP49EG	Y15
5368617	VTSPO6552 WU40EG	Y15
5368618	VTSPO6553 WP49EG	Y15
5368619	VTSPO6553 WU40EG	Y15
5368620	VTSPO6554 WP49EG	Y15
5368621	VTSPO6554 WU40EG	Y15
5368622	VTSPO6555 WP49EG	Y15
5368623	VTSPO6555 WU40EG	Y15
5368624	VTSPO6556 WP49EG	Y15
5368625	VTSPO6556 WU40EG	Y15
5368626	VTSPO6557 WP49EG	Y15
5368627	VTSPO6557 WU40EG	Y15
5368628	VTSPO6558 WP49EG	Y15
5368629	VTSPO6558 WU40EG	Y15
5368630	VTSPO6559 WP49EG	Y15
5368631	VTSPO6559 WU40EG	Y15
5368632	VTSPO6560 WP49EG	Y15
5368633	VTSPO6560 WU40EG	Y15
5368634	VTSPO6561 WP49EG	Y15
5368635	VTSPO6561 WU40EG	Y15
5368636	VTSPO6562 WP49EG	Y15
5368637	VTSPO6562 WU40EG	Y15
5368638	VTSPO6563 WP49EG	Y15
5368639	VTSPO6563 WU40EG	Y15
5368640	VTSPO6564 WP49EG	Y15
5368641	VTSPO6564 WU40EG	Y15
5368642	VTSPO6565 WP49EG	Y15
5368643	VTSPO6565 WU40EG	Y15
5368683	VTSPO6566 WP49EG	Y15
5368684	VTSPO6566 WU40EG	Y15
5368685	VTSPO6567 WP49EG	Y15
5368686	VTSPO6567 WU40EG	Y15
5368687	VTSPO6568 WP49EG	Y15
5368688	VTSPO6568 WU40EG	Y15
5368689	VTSPO6569 WP49EG	Y15
5368690	VTSPO6569 WU40EG	Y15
5368691	VTSPO6570 WP49EG	Y15
5368692	VTSPO6570 WU40EG	Y15
5368693	VTSPO6571 WP49EG	Y16
5368694	VTSPO6571 WU40EG	Y16
5368695	VTSPO6572 WU40EG	Y16
5368696	VTSPO6573 WP49EG	Y16
5368697	VTSPO6573 WU40EG	Y16
5368698	VTSPO6574 WU40EG	Y16
5368699	VTSPO6575 WU40EG	Y16
5368702	VTSFT6506 WU41EG	Y38
5368703	VTSFT6506 WP42EG	Y38
5368704	VTSFT6506 WP49EG	Y38
5368705	VTSFT6506 WU40EG	Y38
5368706	VTSFT6507 WP49EG	Y38
5368707	VTSFT6508 WP49EG	Y38
5368708	VTSFT6509 WU41EG	Y38
5368709	VTSFT6509 WP49EG	Y38
5368720	VTSFT6509 WU40EG	Y38
5368721	VTSFT6510 WP49EG	Y38
5368722	VTSFT6511 WU41EG	Y38
5368723	VTSFT6511 WP42EG	Y38
5368724	VTSFT6511 WP49EG	Y38
5368725	VTSFT6511 WU40EG	Y38
5368726	VTSFT6512 WP49EG	Y38
5368727	VTSFT6513 WU41EG	Y38
5368728	VTSFT6513 WP49EG	Y38
5368729	VTSFT6513 WU40EG	Y38
5368730	VTSFT6514 WU41EG	Y38
5368731	VTSFT6514 WP42EG	Y38
5368732	VTSFT6514 WP49EG	Y38
5368733	VTSFT6514 WU40EG	Y38
5368734	VTSFT6515 WP49EG	Y38
5368735	VTSFT6516 WU41EG	Y38
5368736	VTSFT6516 WP42EG	Y38
5368737	VTSFT6516 WP49EG	Y38
5368738	VTSFT6516 WU40EG	Y38
5368739	VTSFT6517 WP49EG	Y38
5368740	VTSFT6518 WU41EG	Y39
5368741	VTSFT6518 WP42EG	Y39
5368742	VTSFT6518 WP49EG	Y39
5368743	VTSFT6518 WU40EG	Y39
5368744	VTSFT6519 WP49EG	Y39
5368745	VTSFT6520 WP49EG	Y39
5368746	VTSFT6520 WU40EG	Y39
5368748	VTSFT6521 WU41EG	Y39
5368749	VTSFT6521 WP42EG	Y39
5368750	VTSFT6521 WP49EG	Y39
5368751	VTSFT6521 WU40EG	Y39
5368752	VTSFT6522 WP49EG	Y39
5368753	VTSFT6523 WU41EG	Y39
5368754	VTSFT6523 WP42EG	Y39
5368755	VTSFT6523 WP49EG	Y39
5368756	VTSFT6523 WU40EG	Y39
5368757	VTSFT6524 WP49EG	Y39
5387434	VTSFT6574 WP42EG	Y41
5387435	VTSFT6574 WP49EG	Y41
5387436	VTSFT6575 WP42EG	Y41
5387437	VTSFT6575 WP49EG	Y41
5387438	VTSFT6576 WP42EG	Y41
5387439	VTSFT6576 WP49EG	Y41
5387460	VTSFT6577 WP42EG	Y41
5387461	VTSFT6577 WP49EG	Y41
5387462	VTSFT6578 WP42EG	Y41
5387463	VTSFT6578 WP49EG	Y41
5387464	VTSFT6579 WP42EG	Y41
5387465	VTSFT6579 WP49EG	Y41
5387466	VTSFT6580 WP42EG	Y41
5387467	VTSFT6580 WP49EG	Y41
5387468	VTSFT6581 WP42EG	Y41
5387469	VTSFT6581 WP49EG	Y41
5387470	VTSFT6582 WP49EG	Y41
5387471	VTSFT6583 WP42EG	Y41
5387472	VTSFT6583 WP49EG	Y41
5387473	VTSFT6584 WP42EG	Y41
5387474	VTSFT6584 WP49EG	Y41
5387475	VTSFT6585 WP42EG	Y41
5387476	VTSFT6585 WP49EG	Y41
5387477	VTSFT6586 WP42EG	Y41
5387478	VTSFT6586 WP49EG	Y41
5387479	VTSFT6587 WP42EG	Y41
5387481	VTSFT6587 WP49EG	Y41
5387482	VTSFT6588 WP42EG	Y41

Order No.	Catalogue No.	Page(s)
5387483	VTSFT6588 WP49EG	Y41
5387487	VTSFT6005 WP49EG	Y35
5387488	VTSFT6006 WP49EG	Y37
5387489	VTSFT6007 WP49EG	Y35
5387640	VTSFT6008 WP49EG	Y35
5387641	VTSFT6009 WP49EG	Y37
5387642	VTSFT6010 WP49EG	Y35
5387643	VTSFT6011 WP49EG	Y35
5387644	VTSFT6012 WP49EG	Y37
5387645	VTSFT6013 WP49EG	Y35
5387646	VTSFT6014 WP49EG	Y35
5387647	VTSFT6015 WP49EG	Y37
5387648	VTSFT6016 WP49EG	Y35
5387649	VTSFT6017 WP49EG	Y35
5387650	VTSFT6018 WP49EG	Y37
5387651	VTSFT6019 WP49EG	Y35
5387652	VTSFT6020 WP49EG	Y35
5387653	VTSFT6021 WP49EG	Y37
5387654	VTSFT6022 WP49EG	Y35
5387655	VTSFT6023 WP49EG	Y35
5387656	VTSFT6024 WP49EG	Y37
5387657	VTSFT6025 WP49EG	Y35
5387658	VTSFT6026 WP49EG	Y35
5387659	VTSFT6027 WP49EG	Y37
5387670	VTSFT6028 WP49EG	Y35
5387671	VTSFT6029 WP49EG	Y35
5387672	VTSFT6030 WP49EG	Y37
5387673	VTSFT6031 WP49EG	Y35
5387674	VTSFT6032 WP49EG	Y35
5387675	VTSFT6033 WP49EG	Y35
5387676	VTSFT6034 WP49EG	Y36
5387677	VTSFT6035 WP49EG	Y36
5387678	VTSFT6036 WP49EG	Y36
5387679	VTSFT6037 WP49EG	Y36
5387700	VTSFT6038 WP49EG	Y36
5387701	VTSFT6039 WP49EG	Y36
5387702	VTSFT6040 WP49EG	Y36
5387704	VTSP06005 WP49EG	Y11
5387705	VTSP06006 WP49EG	Y13
5387707	VTSP06007 WP49EG	Y11
5387708	VTSP06008 WP49EG	Y11
5387709	VTSP06009 WP49EG	Y13
5387760	VTSP06010 WP49EG	Y11
5387761	VTSP06011 WP49EG	Y11
5387762	VTSP06012 WP49EG	Y13
5387763	VTSP06013 WP49EG	Y11
5387764	VTSP06014 WP49EG	Y11
5387765	VTSP06015 WP49EG	Y13
5387766	VTSP06016 WP49EG	Y11
5387767	VTSP06017 WP49EG	Y11
5387768	VTSP06018 WP49EG	Y13
5387769	VTSP06019 WP49EG	Y11
5387770	VTSP06020 WP49EG	Y11
5387771	VTSP06021 WP49EG	Y13
5387772	VTSP06022 WP49EG	Y11
5387773	VTSP06023 WP49EG	Y11
5387774	VTSP06024 WP49EG	Y13
5387776	VTSP06025 WP49EG	Y11
5387777	VTSP06026 WP49EG	Y11
5387778	VTSP06027 WP49EG	Y13
5387779	VTSP06028 WP49EG	Y11
5387780	VTSP06029 WP49EG	Y11
5387781	VTSP06030 WP49EG	Y13
5387782	VTSP06031 WP49EG	Y11
5387783	VTSP06032 WP49EG	Y11
5387784	VTSP06033 WP49EG	Y11
5387785	VTSP06034 WP49EG	Y12
5387786	VTSP06035 WP49EG	Y12
5387787	VTSP06036 WP49EG	Y12
5387788	VTSP06037 WP49EG	Y12
5387789	VTSP06038 WP49EG	Y12
5387790	VTSP06039 WP49EG	Y12
5387791	VTSP06040 WP49EG	Y12
5387859	VTSP07505 WU40EG	Y17
5387861	VTSP07505 WU41EG	Y17
5387863	VTSP07506 WU40EG	Y17
5387865	VTSP07506 WU41EG	Y17
5387867	VTSP07507 WU40EG	Y17
5387869	VTSP07507 WU41EG	Y17
5387871	VTSP07508 WU40EG	Y17
5387873	VTSP07508 WU41EG	Y17
5387875	VTSP07509 WU40EG	Y17
5387877	VTSP07509 WU41EG	Y17
5387879	VTSP07510 WU40EG	Y17
5387881	VTSP07510 WU41EG	Y17
5387883	VTSP07511 WU40EG	Y17
5387885	VTSP07512 WU40EG	Y17
5387887	VTSP07513 WU40EG	Y17
5387889	VTSP07514 WU40EG	Y17
5387891	VTSP07515 WU40EG	Y17
5387893	VTSP07516 WU40EG	Y17
5387895	VTSP07517 WU40EG	Y17
5387898	VTSP07518 WU40EG	Y17
5387900	VTSP07519 WU40EG	Y17
5398708	VTSFT7505 WU40EG	Y42
5398709	VTSFT7505 WU41EG	Y42
5398790	VTSFT7506 WU40EG	Y42
5398791	VTSFT7506 WU41EG	Y42
5398792	VTSFT7507 WU40EG	Y42
5398793	VTSFT7507 WU41EG	Y42
5398794	VTSFT7508 WU40EG	Y42
5398795	VTSFT7508 WU41EG	Y42
5398796	VTSFT7509 WU40EG	Y42
5398797	VTSFT7509 WU41EG	Y42
5398798	VTSFT7510 WU40EG	Y42
5398799	VTSFT7510 WU41EG	Y42
5398800	VTSFT7511 WU40EG	Y42
5398801	VTSFT7512 WU40EG	Y42
5398802	VTSFT7513 WU40EG	Y42
5398803	VTSFT7514 WU40EG	Y42
5398804	VTSFT7515 WU40EG	Y42
5398805	VTSFT7516 WU40EG	Y42
5398806	VTSFT7517 WU40EG	Y42
5398807	VTSFT7518 WU40EG	Y42
5398808	VTSFT7519 WU40EG	Y42
5402138	VTSFT6545 WP49EG	Y38
5402139	VTSFT6546 WP49EG	Y38
5402180	VTSFT6546 WU40EG	Y38
5402181	VTSFT6547 WP49EG	Y38
5402182	VTSFT6547 WU40EG	Y38
5402183	VTSFT6548 WP49EG	Y38
5402184	VTSFT6549 WU40EG	Y38
5402185	VTSFT6549 WP49EG	Y38
5402186	VTSFT6550 WP49EG	Y39
5402187	VTSFT6550 WU40EG	Y39
5402188	VTSFT6551 WP42EG	Y39
5402189	VTSFT6551 WP49EG	Y39
5402190	VTSFT6551 WU40EG	Y39
5402191	VTSFT6552 WU40EG	Y39
5402192	VTSFT6553 WP49EG	Y39
5402193	VTSFT6553 WU40EG	Y39
5402194	VTSFT6554 WP42EG	Y39
5402195	VTSFT6554 WP49EG	Y39
5402196	VTSFT6554 WU40EG	Y39
5402197	VTSFT6555 WP49EG	Y39
5402198	VTSFT6555 WU40EG	Y39
5402199	VTSFT6556 WP49EG	Y39
5402200	VTSFT6556 WU40EG	Y39
5402201	VTSFT6557 WP42EG	Y39
5402202	VTSFT6557 WP49EG	Y39
5402203	VTSFT6557 WU40EG	Y39
5402204	VTSFT6558 WU40EG	Y39
5402205	VTSFT6559 WU40EG	Y39
5402206	VTSFT6560 WP42EG	Y39
5402207	VTSFT6560 WP49EG	Y39
5402208	VTSFT6560 WU40EG	Y39
5402209	VTSFT6561 WU40EG	Y39
5402210	VTSFT6562 WP49EG	Y39
5402211	VTSFT6562 WU40EG	Y39
5402212	VTSFT6563 WU40EG	Y39
5402213	VTSFT6564 WU40EG	Y39
5402214	VTSFT6564 WP49EG	Y39
5402215	VTSFT6565 WU40EG	Y39
5402216	VTSFT6566 WU40EG	Y39
5402217	VTSFT6567 WP49EG	Y39
5402218	VTSFT6567 WU40EG	Y39
5402219	VTSFT6568 WU40EG	Y39
5402220	VTSFT6569 WP49EG	Y39
5402221	VTSFT6569 WU40EG	Y39
5402222	VTSFT6570 WU40EG	Y39
5402223	VTSFT6571 WP49EG	Y40
5402224	VTSFT6571 WU40EG	Y40
5402225	VTSFT6572 WU40EG	Y40
5402226	VTSFT6573 WU40EG	Y40
5402227	VTSFT6525 WP49EG	Y38
5402228	VTSFT6525 WU40EG	Y38
5402229	VTSFT6526 WP49EG	Y38
5402250	VTSFT6526 WU40EG	Y38
5402251	VTSFT6527 WP49EG	Y38
5402252	VTSFT6527 WU40EG	Y38
5402253	VTSFT6528 WP49EG	Y39
5402254	VTSFT6528 WU40EG	Y39
5402255	VTSFT6529 WP49EG	Y39
5402256	VTSFT6529 WU40EG	Y39
5402257	VTSFT6530 WP49EG	Y39
5402258	VTSFT6530 WU40EG	Y39
5402259	VTSFT6531 WU41EG	Y39
5402260	VTSFT6531 WP42EG	Y39
5402261	VTSFT6531 WP49EG	Y39
5402262	VTSFT6531 WU40EG	Y39
5402263	VTSFT6532 WP49EG	Y39
5402264	VTSFT6533 WU41EG	Y39
5402265	VTSFT6533 WP42EG	Y39
5402266	VTSFT6533 WP49EG	Y39
5402267	VTSFT6533 WU40EG	Y39
5402268	VTSFT6534 WP49EG	Y39
5402269	VTSFT6535 WU41EG	Y39
5402270	VTSFT6535 WP49EG	Y39
5402271	VTSFT6535 WU40EG	Y39
5402272	VTSFT6536 WP49EG	Y39
5402273	VTSFT6537 WU41EG	Y39
5402274	VTSFT6537 WP49EG	Y39
5402275	VTSFT6537 WU40EG	Y39
5402276	VTSFT6538 WU41EG	Y39
5402277	VTSFT6538 WP49EG	Y39
5402278	VTSFT6538 WU40EG	Y39
5402279	VTSFT6539 WU41EG	Y39
5402280	VTSFT6539 WP49EG	Y39
5402281	VTSFT6539 WU40EG	Y39
5402282	VTSFT6540 WU41EG	Y40
5402283	VTSFT6540 WP49EG	Y40
5402284	VTSFT6540 WU40EG	Y40
5402285	VTSFT6541 WU41EG	Y40
5402286	VTSFT6541 WP49EG	Y40
5402287	VTSFT6541 WU40EG	Y40
5402288	VTSFT6542 WU41EG	Y40
5402289	VTSFT6542 WP49EG	Y40
5402290	VTSFT6542 WU40EG	Y40
5402291	VTSFT6543 WP49EG	Y40
5402292	VTSFT6543 WU40EG	Y40
5402293	VTSFT6544 WP49EG	Y40
5402294	VTSFT6544 WU40EG	Y40
5408066	GT405057 GP6520	Y52
5408067	GT405058 GP6520	Y52
5408068	GT405059 GP6520	Y52
5408069	GT415021 GP6520	Y53
5408400	GT415022 GP6520	Y53
5408401	GT415023 GP6520	Y53
5408402	GT425010 GP6520	Y54
5408403	GT425011 GP6520	Y54
5408404	GT425012 GP6520	Y54
5408405	GT435010 GP6520	Y55
5408406	GT435011 GP6520	Y55
5408407	GT435012 GP6520	Y55
5415250	XDPT110416PDSRMM WK15CM	J10
5415253	XDPT110416PDSRMM WP35CM	J10
5415254	XDPT110416PDSRMM WP25PM	J10
5415255	XDPT110408PDSRMH WK15CM	J10
5415256	XDPT110408PDSRMH WU35PM	J10
5415257	XDPT110408PDSRMH WP35CM	J10
5415310	XDPT110412PDSRMM WK15CM	J10
5415312	XDPT110412PDSRMM WU35PM	J10
5415313	XDPT110412PDSRMM WP35CM	J10
5415314	XDPT110412PDSRMM WP25PM	J10
5415315	XDPT110408PDSRMM WK15CM	J10
5415317	XDPT110408PDSRMM WU35PM	J10
5415318	XDPT110408PDSRMM WP35CM	J10
5415319	XDPT110408PDSRMM WP25PM	J10
5415360	XDPT110412PDSRMH WK15CM	J10
5415362	XDPT110412PDSRMH WP35CM	J10
5415364	XDPT110416PDSRMH WK15CM	J10
5415366	XDPT110416PDSRMH WP35CM	J10
5415420	XDCW110404PDFRPCD WDN10U	
		J11
5415421	XDCW110408PDFRPCD WDN10U	
		J11
5415422	XDPT110431PDSRMM WK15CM	J10
5415425	XDPT110431PDSRMM WP35CM	J10
5415426	XDPT110431PDSRMM WP25PM	J10
5415428	XDPT110404PDSRMM WK15CM	J10
5415450	XDPT110404PDSRMM WP35CM	J10
5415546	XDCT110408PDERML WU35PM	J9
5415547	XDCT110408PDERML WP35CM	J9
5415548	XDCT110408PDERML WP25PM	J9
5415549	XDCT110408PDERML WK15CM	J9
5416316	VSM11D040Z04S016XD11	J8, J15
5416317	VSM11D040Z06S016XD11	J8, J15
5416318	VSM11D050Z05S022XD11	J8, J15
5416319	VSM11D050Z08S022XD11	J8, J15
5416340	VSM11D063Z06S022XD11	J8, J15
5416341	VSM11D063Z09S022XD11	J8, J15
5416342	VSM11D080Z08S027XD11	J8, J15
5416345	VSM11D100Z09S032XD11	J8, J15
5416347	VSM11D125Z011S040XD11	J8, J15

Order No.	Catalogue No.	Page(s)
5416454	VSM11D012Z01B16XD11	J5, J15
5416455	VSM11D016Z02B16XD11	J5, J15
5416457	VSM11D020Z02B20XD11	J5, J15
5416458	VSM11D020Z03B20XD11	J5, J15
5416459	VSM11D025Z03B25XD11	J5, J15
5416480	VSM11D025Z04B25XD11	J5, J15
5416481	VSM11D030Z04B25XD11	J5, J15
5416482	VSM11D032Z04B32XD11	J5, J15
5416483	VSM11D032Z05B32XD11	J5, J15
5416632	VSM11D012Z01A16XD11L100	J6, J15
5416633	VSM11D016Z02A16XD11L100	J6, J15
5416634	VSM11D020Z02A20XD11L110	J6, J15
5416635	VSM11D020Z03A20XD11L110	J6, J15
5416636	VSM11D025Z03A25XD11L120	J6, J15
5416637	VSM11D025Z04A25XD11L120	J6, J15
5416638	VSM11D032Z03A32XD11L130	J6, J15
5416639	VSM11D032Z05A32XD11L130	J6, J15
5416700	VSM11D016Z02A16XD11L170	J7, J15
5416701	VSM11D018Z02A16XD11L170	J7, J15
5416702	VSM11D020Z02A20XD11L170	J7, J15
5416703	VSM11D020Z03A20XD11L170	J7, J15
5416704	VSM11D022Z03A20XD11L170	J7, J15
5416705	VSM11D025Z03A25XD11L210	J7, J15
5416706	VSM11D025Z04A25XD11L21	J7, J15
5416707	VSM11D032Z03A32XD11L250	J7, J15
5417011	VSM11D016Z02M08XD11	J4, J15
5417013	VSM11D020Z03M10XD11	J4, J15
5417015	VSM11D025Z04M12XD11	J4, J15
5417017	VSM11D032Z04M16XD11	J4, J15
5417019	VSM11D040Z06M16XD11	J4, J15
5417053	XDCT110408PDFRALP WN25PM	J11
5417054	XDCT110404PDFRALP WN25PM	J11
5419648	WOEJ120712SRMM WP25PM	M13
5419649	WOEJ120712SRMM WU35PM	M13
5419790	WOEJ120712SRMM WP20CM	M13
5419791	WOEJ120712SRMM WP35CM	M13
5423874	A25RWMTER0316M W	E35
5423875	A32SWMTER0319M W	E35
5423876	A25RWMTER0416M W	E35
5423877	A32SWMTER0419M W	E35
5423878	A32SWMTER0519M W	E35
5423879	A40TWMTER0522M W	E35
5423880	A32SWMTER0619M W	E35
5423881	A40TWMTER0622M W	E35
5423882	A25RWMTEL0316M W	E35
5423883	A32SWMTEL0319M W	E35
5423884	A25RWMTEL0416M W	E35
5423885	A32SWMTEL0419M W	E35
5423886	A32SWMTEL0519M W	E35
5423887	A40TWMTEL0522M W	E35
5423888	A32SWMTEL0619M W	E35
5423889	A40TWMTEL0622M W	E35
5427370	HNGJ0905ANSNGD WK15CM	H28, H34, H40
5427371	HNPJ0905ANSNHD WK15CM	H28, H34, H40
5427372	HNPJ0905ANSNGD WK15CM	H27, H34, H40
5427373	XNGJ0704ANENLD3W WK15CM	H17
5427374	HNPJ0704ANSNGD WK15CM	H9, H17, H22
5427375	HNPJ0704ANSNHD WK15CM	H9, H17, H22
5427380	SPMW120408 WK15CM	I9
5427381	XNKT1205AZER11 WK15CM	H55
5427382	SNMT1205AZR31 WK15CM	H55
5427383	SNKT1205AZR21 WK15CM	H54
5427384	SNKT1205AZR31 WK15CM	H55
5427385	SNKT1505AZR31 WK15CM	H59
5427386	SNMT1505AZR31 WK15CM	H59
5427387	HPGT06T3DZENGD WK15CM	H47
5427388	HPGT06T3DZERGD3W WK15CM	H47
5427422	SDMT1204PDRMH WK15CM	J46, K7
5427423	SDMT1204PDRML WK15CM	J45, K6
5427424	SDMT1506PDRMH WK15CM	J50
5427425	SDMT1506PDRML WK15CM	J49
5427426	SDMX150612RMH WK15CM	J50
5427427	SDMX120408RMH WK15CM	J46, K7
5427428	SDMX120412RMH WK15CM	J46, K7
5427441	RDMW1204M0TX WK15CM	M87
5427443	WOEJ080412SRMH WK15CM	M7
5432605	TNMG160404UF WS10PT	B88
5432606	TNMG160408UF WS10PT	B88
5472587	VTSFT6005 WU41EG	Y35
5472589	VTSFT6007 WU41EG	Y35
5472600	VTSFT6008 WU41EG	Y35
5472602	VTSFT6010 WU41EG	Y35
5472603	VTSFT6011 WU41EG	Y35
5472605	VTSFT6013 WU41EG	Y35
5472606	VTSFT6014 WU41EG	Y35
5472608	VTSFT6016 WU41EG	Y35
5472609	VTSFT6017 WU41EG	Y35
5472611	VTSFT6019 WU41EG	Y35
5472612	VTSFT6020 WU41EG	Y35
5472614	VTSFT6022 WU41EG	Y35
5472615	VTSFT6023 WU41EG	Y35
5472617	VTSFT6025 WU41EG	Y35
5472618	VTSFT6026 WU41EG	Y35
5472620	VTSFT6028 WU41EG	Y35
5472621	VTSFT6029 WU41EG	Y35
5472623	VTSFT6031 WU41EG	Y35
5472624	VTSFT6032 WU41EG	Y35
5472625	VTSFT6033 WU41EG	Y35
5472626	VTSFT6034 WU41EG	Y36
5472627	VTSFT6035 WU41EG	Y36
5472628	VTSFT6036 WU41EG	Y36
5472629	VTSFT6037 WU41EG	Y36
5472630	VTSFT6038 WU41EG	Y36
5472631	VTSFT6039 WU41EG	Y36
5472632	VTSFT6040 WU41EG	Y36
5472633	VTSP06005 WU41EG	Y11
5472634	VTSP06006 WU41EG	Y13
5472635	VTSP06007 WU41EG	Y11
5472636	VTSP06008 WU41EG	Y11
5472637	VTSP06009 WU41EG	Y13
5472638	VTSP06010 WU41EG	Y11
5472639	VTSP06011 WU41EG	Y11
5472640	VTSP06012 WU41EG	Y13
5472641	VTSP06013 WU41EG	Y11
5472644	VTSP06014 WU41EG	Y11
5472645	VTSP06015 WU41EG	Y13
5472646	VTSP06016 WU41EG	Y11
5472647	VTSP06017 WU41EG	Y11
5472648	VTSP06018 WU41EG	Y13
5472649	VTSP06019 WU41EG	Y11
5472650	VTSP06020 WU41EG	Y11
5472651	VTSP06021 WU41EG	Y13
5472652	VTSP06022 WU41EG	Y11
5472653	VTSP06023 WU41EG	Y11
5472654	VTSP06024 WU41EG	Y13
5472655	VTSP06025 WU41EG	Y11
5472656	VTSP06026 WU41EG	Y11
5472657	VTSP06027 WU41EG	Y13
5472658	VTSP06028 WU41EG	Y11
5472659	VTSP06029 WU41EG	Y11
5472660	VTSP06030 WU41EG	Y13
5472661	VTSP06031 WU41EG	Y11
5472662	VTSP06032 WU41EG	Y11
5472663	VTSP06033 WU41EG	Y11
5472664	VTSP06034 WU41EG	Y12
5472665	VTSP06035 WU41EG	Y12
5472666	VTSP06036 WU41EG	Y12
5472667	VTSP06037 WU41EG	Y12
5472668	VTSP06038 WU41EG	Y12
5472669	VTSP06039 WU41EG	Y12
5472670	VTSP06040 WU41EG	Y12
5473198	TNMG220412UR WS25PT	B89
5473222	TNMG220412UM WS10PT	B88
5476633	RNPJ10T3M0SMH WU35PM	M25
5476634	RNPJ1204M0SMM WU35PM	M33
5476635	RNPJ1204M0SMH WU35PM	M33
5476636	RNPJ1605M0SMH WU35PM	M38
5476637	RNPJ1605M0SMM WU35PM	M38
5512536	CNMG190612UR WS25PT	B43
5512538	SNMG190612UR WS25PT	B75
5514978	WGMEL2525 W	E37
5514979	WGMER2525 W	E37
5515020	WGMEL3232 W	E37
5515021	WGMER3232 W	E37
5517826	XDCT110408PDERML WS30PM	J9
5517827	XDPT110431PDSRMM WS30PM	J10
5519572	SDMX120412RMM WS30PM	J45, K6
5519921	XDPT110408PDSRMM WS30PM	J10
5520247	RDMT1204M0TX WS30PM	M87
5520248	WOEJ080412SRMM WS30PM	M7
5520249	WOEJ120712SRMM WS30PM	M13
5520350	RNGJ1204M0EML WS30PM	M32
5520351	RNGJ1204M0SMM WS30PM	M32
5520352	RNGJ10T3M0EML WS30PM	M24
5520353	RNGJ10T3M0SMM WS30PM	M24
5520354	RNGJ1605M0EML WS30PM	M37
5520817	GX505004 WK12PG	Y51
5520818	GX505005 WK12PG	Y51
5520819	GX505006 WK12PG	Y51
5520820	GX505008 WK12PG	Y51
5520822	GX505010 WK12PG	Y51
5520823	GX505012 WK12PG	Y51
5520824	GX505014 WK12PG	Y51
5520825	GX355006 WK12PG	Y48
5520826	GX355007 WK12PG	Y48
5520827	GX355008 WK12PG	Y48
5520828	GX355009 WK12PG	Y48
5520829	GX355010 WK12PG	Y48
5520830	GX355101 WK12PG	Y48
5520831	GX355102 WK12PG	Y48
5520833	GX355012 WK12PG	Y48
5520834	GX355121 WK12PG	Y48
5520835	GX355122 WK12PG	Y48
5520836	GX355014 WK12PG	Y48
5520837	GX355141 WK12PG	Y48
5520838	GX355142 WK12PG	Y48
5520839	GX475006 WN14PG	Y49
5520840	GX475008 WN14PG	Y49
5520841	GX475010 WN14PG	Y49
5520842	GX495006 WN14PG	Y60
5520843	GX495008 WN14PG	Y60
5520844	GX495010 WN14PG	Y60
5522490	SDMX120408RMM WS30PM	J45, K6
5528973	HNGJ0905ANENLD WS30PM	H33, H39
5528974	HNGJ0905ANSNGD WS30PM	H28, H34, H40
5528975	HNGJ0704ANENLD WS30PM	H8, H16, H21
5528976	HNPJ0704ANSNGD WS30PM	H9, H17, H22
5528978	HPGT06T3DZENGD WS30PM	H47
5536670	XDCT110404PDERML WP35CM	J9
5536671	XDCT110404PDERML WP25PM	J9
5537167	TCF240R2SL25MD	V8, V10
5537168	TCF250R2SL32MD	V8
5537169	TCF260R2SL32MD	V8
5537778	TCF120R2SL20MA	V8
5537779	TCF125R2SL20MA	V8
5537820	TCF265R2SL32MD	V8
5537821	TCF270R2SL32MD	V8
5537822	TCF280R2SL32MD	V8
5537823	TCF290R2SL32MD	V8, V10
5537824	TCF240R3SL25MD	V11, V13
5537825	TCF250R3SL32MD	V11
5537826	TCF260R3SL32MD	V11
5537827	TCF265R3SL32MD	V11
5537828	TCF270R3SL32MD	V11
5537829	TCF280R3SL32MD	V11
5537830	TCF290R3SL32MD	V11, V13
5537831	TCF240R4SL25MD	V14, V16
5537832	TCF250R4SL32MD	V14
5537833	TCF260R4SL32MD	V14
5537834	TCF265R4SL32MD	V14
5537835	TCF270R4SL32MD	V14
5537836	TCF280R4SL32MD	V14
5537837	TCF290R4SL32MD	V14, V16
5537838	TCF240R5SL25MD	V17, V19
5537839	TCF250R5SL32MD	V17
5537840	TCF260R5SL32MD	V17
5537841	TCF265R5SL32MD	V17
5537842	TCF270R5SL32MD	V17
5537843	TCF280R5SL32MD	V17
5537844	TCF290R5SL32MD	V17, V19
5537860	TCF127R2SL20MA	V8
5537861	TCF130R2SL20MA	V8
5537862	TCF135R2SL20MA	V8, V10
5537863	TCF120R3SL20MA	V11
5537864	TCF125R3SL20MA	V11
5537866	TCF127R3SL20MA	V11
5537867	TCF130R3SL20MA	V11
5537868	TCF135R3SL20MA	V11, V13
5537869	TCF120R4SL20MA	V14

Order No.	Catalogue No.	Page(s)
5537870	TCF125R4SL20MA	V14
5537871	TCF127R4SL20MA	V14
5537872	TCF130R4SL20MA	V14
5537873	TCF135R4SL20MA	V14, V16
5537874	TCF120R5SL20MA	V17
5537875	TCF125R5SL20MA	V17
5537876	TCF127R5SL20MA	V17
5537877	TCF130R5SL20MA	V17
5537878	TCF135R5SL20MA	V17, V19
5537937	TCF300R2SL32ME	V8
5537938	TCF310R2SL32ME	V8
5537939	TCF320R2SL32ME	V9–10
5537940	TCF330R2SL40ME	V9
5537941	TCF340R2SL40ME	V9
5537942	TCF350R2SL40ME	V9
5537943	TCF360R2SL40ME	V9–10
5537944	TCF300R3SL32ME	V11
5537945	TCF310R3SL32ME	V11
5537946	TCF320R3SL32ME	V12–13
5537947	TCF330R3SL40ME	V12
5537948	TCF340R3SL40ME	V12
5537949	TCF350R3SL40ME	V12
5537950	TCF360R3SL40ME	V12–13
5537951	TCF300R4SL32ME	V14
5537952	TCF310R4SL32ME	V14
5537953	TCF320R4SL32ME	V15–16
5537954	TCF330R4SL40ME	V15
5537955	TCF340R4SL40ME	V15
5537956	TCF350R4SL40ME	V15
5537957	TCF360R4SL40ME	V15–16
5537958	TCF300R5SL32ME	V17
5537959	TCF310R5SL32ME	V17
5537960	TCF320R5SL32ME	V18–19
5537961	TCF330R5SL40ME	V18
5537962	TCF340R5SL40ME	V18
5537963	TCF350R5SL40ME	V18
5537964	TCF360R5SL40ME	V18–19
5538204	CNGG120404FS WS25PT	B35
5538205	CNGG120408FS WS25PT	B35
5538206	DNGG110402FS WS25PT	B51
5538207	DNGG150404FS WS25PT	B51
5538208	DNGG150408FS WS25PT	B51
5538209	DNGG150604FS WS25PT	B51
5538230	DNGG150608FS WS25PT	B51
5538231	TNGG160404FS WS25PT	B83
5538232	VNGG160404FS WS25PT	B95
5538233	VNGG160408FS WS25PT	B95
5538234	WNGG080404FS WS25PT	B99
5538235	WNGG080408FS WS25PT	B99
5538554	TCF090305DCV34 WU25CH	V20
5538555	TCF090305DCV34 WU40PH	V20
5538556	TCF090305DCV36 WU25CH	V21
5538557	TCF090305DCV36 WU40PH	V21
5538558	TCF080308DPV34 WU25CH	V22
5538559	TCF080308DPV34 WU40PH	V22
5538600	TCF080308DPV34 WPK10CH	V22
5538601	TCF080308DPV36 WU25CH	V23
5538602	TCF080308DPV36 WU40PH	V23
5538603	TCF120405ECV34 WU25CH	V20
5538604	TCF120405ECV34 WU40PH	V20
5538606	TCF120405ECV36 WU25CH	V21
5538607	TCF120405ECV36 WU40PH	V21
5538608	TCF100408EPV34 WU25CH	V22
5538609	TCF100408EPV34 WU40PH	V22
5538610	TCF100408EPV34 WPK10CH	V22
5538611	TCF100408EPV36 WU25CH	V23
5538612	TCF100408EPV36 WU40PH	V23
5538613	TCF570R2SL50MH	V9
5538614	TCF580R2SL50MH	V9
5538615	TCF590R2SL50MH	V9
5538616	TCF600R2SL50MH	V9
5538617	TCF610R2SL50MH	V9
5538618	TCF620R2SL50MH	V9
5538619	TCF630R2SL50MH	V9
5538630	TCF640R2SL50MH	V9
5538631	TCF650R2SL50MH	V9
5538632	TCF660R2SL50MH	V9
5538633	TCF670R2SL50MH	V9
5538634	TCF680R2SL50MH	V9–10
5538635	TCF570R3SL50MH	V12
5538636	TCF580R3SL50MH	V12
5538637	TCF590R3SL50MH	V12
5538638	TCF600R3SL50MH	V12
5538639	TCF610R3SL50MH	V12
5538640	TCF620R3SL50MH	V12
5538641	TCF630R3SL50MH	V12
5538642	TCF640R3SL50MH	V12
5538643	TCF650R3SL50MH	V12
5538644	TCF660R3SL50MH	V12
5538645	TCF670R3SL50MH	V12
5538646	TCF680R3SL50MH	V12–13
5538647	TCF570R4SL50MH	V15
5538648	TCF580R4SL50MH	V15
5538649	TCF590R4SL50MH	V15
5538650	TCF600R4SL50MH	V15
5538651	TCF610R4SL50MH	V15
5538652	TCF620R4SL50MH	V15
5538653	TCF630R4SL50MH	V15
5538654	TCF640R4SL50MH	V15
5538655	TCF650R4SL50MH	V15
5538656	TCF660R4SL50MH	V15
5538657	TCF670R4SL50MH	V15
5538658	TCF680R4SL50MH	V15–16
5538659	TCF570R5SL50MH	V18
5538680	TCF580R5SL50MH	V18
5538681	TCF590R5SL50MH	V18
5538682	TCF600R5SL50MH	V18
5538683	TCF610R5SL50MH	V18
5538684	TCF620R5SL50MH	V18
5538685	TCF630R5SL50MH	V18
5538686	TCF640R5SL50MH	V18
5538687	TCF650R5SL50MH	V18
5538688	TCF660R5SL50MH	V18
5538689	TCF670R5SL50MH	V18
5538700	TCF680R5SL50MH	V18–19
5541817	TCF040203ACV34 WU25CH	V20
5541818	TCF040203ACV34 WU40PH	V20
5541819	TCF040203ACV36 WU25CH	V21
5541840	TCF040203ACV36 WU40PH	V21
5541841	TCF040204APV34 WU25CH	V22
5541842	TCF040204APV34 WU40PH	V22
5541843	TCF040204APV34 WPK10CH	V22
5541844	TCF040204APV36 WU25CH	V23
5541845	TCF040204APV36 WU40PH	V23
5542002	TCF210608HCV34 WU25CH	V20
5542003	TCF210608HCV34 WU40PH	V20
5542004	TCF210608HCV36 WU25CH	V21
5542005	TCF210608HCV36 WU40PH	V21
5542006	TCF180614HPV34 WU25CH	V22
5542007	TCF180614HPV34 WU40PH	V22
5542008	TCF180614HPV34 WPK10CH	V22
5542009	TCF180614HPV36 WU25CH	V23
5542020	TCF180614HPV36 WU40PH	V23
5542327	RNPJ10T3M0SMM WP40PM	M25
5542328	RNPJ10T3M0SMH WP40PM	M25
5542329	RNPJ1204M0SMM WP40PM	M33
5542340	RNPJ1204M0SMH WP40PM	M33
5542341	RNPJ1605M0SMM WP40PM	M38
5542342	RNPJ1605M0SMH WP40PM	M38
5542346	WOEJ120712SRMM WP40PM	M13
5542347	WOEJ120712SRMH WP40PM	M13
5542475	TCF180508GCV34 WU25CH	V20
5542476	TCF180508GCV34 WU40PH	V20
5542477	TCF180508GCV36 WU25CH	V21
5542478	TCF180508GCV36 WU40PH	V21
5542479	TCF150512GPV34 WU25CH	V22
5542600	TCF150512GPV34 WU40PH	V22
5542601	TCF150512GPV34 WPK10CH	V22
5542602	TCF060203BCV34 WU25CH	V20
5542603	TCF150512GPV36 WU25CH	V23
5542604	TCF060203BCV34 WU40PH	V20
5542605	TCF150512GPV36 WU40PH	V23
5542606	TCF060203BCV36 WU25CH	V21
5542607	TCF060203BCV36 WU40PH	V21
5542608	TCF050204BPV34 WU25CH	V22
5542609	TCF050204BPV34 WU40PH	V22
5542620	TCF050204BPV34 WPK10CH	V22
5542621	TCF050204BPV36 WU25CH	V23
5542622	TCF050204BPV36 WU40PH	V23
5542623	TCF150406FCV34 WU25CH	V20
5542624	TCF150406FCV34 WU40PH	V20
5542625	TCF150406FCV36 WU25CH	V21
5542626	TCF150406FCV36 WU40PH	V21
5542627	TCF120412FPV34 WU25CH	V22
5542628	TCF120412FPV34 WU40PH	V22
5542629	TCF120412FPV34 WPK10CH	V22
5542640	TCF120412FPV36 WU25CH	V23
5542641	TCF120412FPV36 WU40PH	V23
5542642	TCF070304CCV34 WU25CH	V20
5542643	TCF070304CCV34 WU40PH	V20
5542644	TCF070304CCV36 WU25CH	V21
5542645	TCF070304CCV36 WU40PH	V21
5542646	TCF070306CPV34 WU25CH	V22
5542647	TCF070306CPV34 WU40PH	V22
5542648	TCF070306CPV34 WPK10CH	V22
5542649	TCF070306CPV36 WU25CH	V23
5542650	TCF070306CPV36 WU40PH	V23
5544752	WOEJ080412SRMH WP40PM	M7
5544753	WOEJ080412SRMM WP40PM	M7
5545063	XDPT110408PDSRMM WP40PM	J10
5545064	XDPT110408PDSRMH WP40PM	J10
5545065	XDCT110408PDERML WP40PM	J9
5548575	CNGG120402FS WS10PT	B35
5548576	CNGG120401FS WS10PT	B35
5548577	CNGG120404FS WS10PT	B35
5548578	CNGG120408FS WS10PT	B35
5548579	CNGG120412FS WS10PT	B35
5548670	DNGG110402FS WS10PT	B51
5548671	DNGG110404FS WS10PT	B51
5548672	DNGG110408FS WS10PT	B51
5548673	DNGG150402FS WS10PT	B51
5548674	DNGG150401FS WS10PT	B51
5548675	DNGG150404FS WS10PT	B51
5548676	DNGG150408FS WS10PT	B51
5548677	DNGG150412FS WS10PT	B51
5548678	DNGG150604FS WS10PT	B51
5548679	DNGG150608FS WS10PT	B51
5548680	SNGG120408FS WS10PT	B70
5548681	TNGG160404FS WS10PT	B83
5548682	TNGG220408FS WS10PT	B83
5548683	VNGG160402FS WS10PT	B95
5548684	VNGG160401FS WS10PT	B95
5548685	VNGG160404FS WS10PT	B95
5548686	VNGG160408FS WS10PT	B95
5548687	WNGG080404FS WS10PT	B99
5548688	WNGG080408FS WS10PT	B99
5549137	CNGP120401 WS10PT	B35
5549138	CNGP120402 WS10PT	B35
5549139	CNGP120404 WS10PT	B35
5549190	CNGP120408 WS10PT	B35
5549191	DNGP150401 WS10PT	B52
5549192	DNGP150402 WS10PT	B52
5549193	DNGP150404 WS10PT	B52
5549194	DNGP150408 WS10PT	B52
5549195	VNGP160401 WS10PT	B96
5549196	VNGP160402 WS10PT	B96
5549197	VNGP220404 WS10PT	B96
5549198	VNGP220408 WS10PT	B96
5549206	CNGP120402 WU10HT	B35
5549207	CNGP120404 WU10HT	B35
5549208	CNGP120408 WU10HT	B35
5549209	DNGP150404 WU10HT	B52
5549210	DNGP150408 WU10HT	B52
5549211	VNGP160401 WU10HT	B96
5549212	VNGP220408 WU10HT	B96
5549945	CNGG120404FS WU10HT	B35
5549946	CNGG120408FS WU10HT	B35
5549947	DNGG110402FS WU10HT	B51
5549948	DNGG110404FS WU10HT	B51
5549949	DNGG110408FS WU10HT	B51
5549990	DNGG150402FS WU10HT	B51
5549991	DNGG150401FS WU10HT	B51
5549992	DNGG150404FS WU10HT	B51
5549993	DNGG150408FS WU10HT	B51
5549994	DNGG150412FS WU10HT	B51
5549995	DNGG150604FS WU10HT	B51
5549996	DNGG150608FS WU10HT	B51
5549997	SNGG120408FS WU10HT	B70
5549998	TNGG160404FS WU10HT	B83
5549999	VNGG160402FS WU10HT	B95
5550000	VNGG160401FS WU10HT	B95
5550001	VNGG160404FS WU10HT	B95
5550002	VNGG160408FS WU10HT	B95
5550003	WNGG080404FS WU10HT	B99
5550004	WNGG080408FS WU10HT	B99
5550226	TNMG160404UM WS10PT	B88
5550228	TNMG160408UM WS10PT	B88
5550905	HNGJ0704ANENLD WP40PM	H8, H16, H21
5550906	HNPJ0704ANSNGD WP40PM	H9, H17, H22
5550907	HNPJ0704ANSNHD WP40PM	H9, H17, H22
5550908	HNPJ0905ANSNGD WP40PM	H27, H34, H40
5550909	HNPJ0905ANSNHD WP40PM	H28, H34, H40
5551088	SNMT1205AZR31 WP40PM	H55
5551152	GX352733 WK12PG	Y47
5551153	GX352734 WK12PG	Y47
5551154	GX352735 WK12PG	Y47
5551155	GX352737 WK12PG	Y47
5551156	GX352738 WK12PG	Y47
5551157	GX352739 WK12PG	Y47

Order No.	Catalogue No.	Page(s)
5551159	GX352740 WK12PG	Y47
5551160	GX352741 WK12PG	Y47
5551161	GX472866 WN14PG	Y50
5551162	GX472867 WN14PG	Y50
5551163	GX472868 WN14PG	Y50
5551164	GX472872 WN14PG	Y50
5551165	GX472870 WN14PG	Y50
5551166	GX472874 WN14PG	Y50
5551167	GX472873 WN14PG	Y50
5551168	GX472875 WN14PG	Y50
5551169	GX492908 WN14PG	Y61
5551170	GX492909 WN14PG	Y61
5551171	GX492911 WN14PG	Y61
5551172	GX492914 WN14PG	Y61
5551173	GX492915 WN14PG	Y61
5559100	D50706002W WP15PE	092
5559101	D50708003W WP15PE	092
5559102	D50710004W WP15PE	092
5559103	D50712005W WP15PE	092
5559104	D50714014W WP15PE	092
5559105	D50716006W WP15PE	092
5559106	D50718018W WP15PE	092
5559107	D50720007W WP15PE	092
5559108	D51706002W WP15PE	092
5559109	D51708003W WP15PE	092
5559110	D51710004W WP15PE	092
5559111	D51712005W WP15PE	092
5559112	D51714014W WP15PE	092
5559113	D51716006W WP15PE	092
5559114	D51718018W WP15PE	092
5559115	D51720007W WP15PE	092
5559116	D51804002W WP15PE	095
5559117	D51805002W WP15PE	095
5559118	D51806002W WP15PE	095
5559119	D51807003W WP15PE	095
5559120	D51808003W WP15PE	095
5559121	D51809004W WP15PE	095
5559122	D51810004W WP15PE	095
5559123	D51812005W WP15PE	095
5559124	D51814014W WP15PE	095
5559125	D51816006W WP15PE	095
5559126	D51818018W WP15PE	095
5559127	D51820007W WP15PE	095
5559128	D51825008W WP15PE	095
5559146	400101001T WP15PE	084
5559147	400101501T WP15PE	084
5559148	400102001T WP15PE	084
5559149	400103002T WP15PE	084
5559160	400104002T WP15PE	084
5559161	400105002T WP15PE	084
5559162	400106002T WP15PE	084
5559163	400108003T WP15PE	084
5559164	400110004T WP15PE	084
5559165	400112005T WP15PE	084
5559166	400114005T WP15PE	084
5559167	400116006T WP15PE	084
5559168	400118006T WP15PE	084
5559169	400120007T WP15PE	084
5559170	450301001T WP15PE	087
5559171	450301501T WP15PE	087
5559172	450302001T WP15PE	087
5559173	450302501T WP15PE	087
5559174	450302511T WP15PE	087
5559175	450303002T WP15PE	087
5559176	450303502T WP15PE	087
5559177	450304002T WP15PE	087
5559178	450304502T WP15PE	087
5559179	450305002T WP15PE	087
5559180	450306002T WP15PE	087
5559181	450308003T WP15PE	087
5559182	450310004T WP15PE	087
5559183	450312005T WP15PE	087
5559184	450316006T WP15PE	087
5559185	450320007T WP15PE	087
5560534	DQ1303002T WP15PE	054
5560535	DQ1304002T WP15PE	054
5560536	DQ1303002W WP15PE	054
5560537	DQ1304002W WP15PE	054
5560538	DQ1305002W WP15PE	054
5560539	DQ1306002W WP15PE	054
5560700	DQ1307003W WP15PE	054
5560701	DQ1308003W WP15PE	054
5560702	DQ1310004W WP15PE	054
5560703	DQ1312005W WP15PE	054
5560704	DQ1314014W WP15PE	054
5560705	DQ1316006W WP15PE	054
5560706	DQ1318018W WP15PE	054
5560707	DQ1320007W WP15PE	054
5560708	497604002T WP15PE	057
5560709	497605002T WP15PE	057
5560710	497606002T WP15PE	057
5560711	497608003T WP15PE	057
5560712	497610004T WP15PE	057
5560713	497612005T WP15PE	057
5560714	497614014T WP15PE	057
5560715	497616006T WP15PE	057
5560716	497618018T WP15PE	057
5560717	497620007T WP15PE	057
5560718	497625008T WP15PE	057
5564335	DDJNL3232P15KC06 WG	C11
5564336	DDJNR3232P15KC06 WG	C11
5564596	WOEJ080412SRMH WP25PM	M7
5564597	WOEJ080412SRMM WP25PM	M7
5576751	477704002T WP15PE	04
5576752	477704002W WP15PE	04
5576753	477704001T WP15PE	04
5576754	4777040Z2T WP15PE	04
5576755	477705002T WP15PE	04
5576756	477705002W WP15PE	04
5576757	477705012T WP15PE	04
5576758	4777050Z2T WP15PE	04
5576759	477706002T WP15PE	04
5576760	477706002W WP15PE	04
5576761	477706012T WP15PE	04
5576762	4777060Z2T WP15PE	04
5576763	477707003T WP15PE	04
5576764	477707003W WP15PE	04
5576765	477707013T WP15PE	04
5576766	4777070Z3T WP15PE	04
5576767	477708003T WP15PE	04
5576768	477708003W WP15PE	04
5576769	477708013T WP15PE	04
5576770	4777080Z3T WP15PE	04
5576771	477709004T WP15PE	04
5576772	477709004W WP15PE	04
5576773	477709014T WP15PE	04
5576774	4777090Z4T WP15PE	04
5576775	477710004T WP15PE	04
5576776	477710004W WP15PE	04
5576777	477710024T WP15PE	04
5576778	4777100Z4T WP15PE	05
5576779	4777110Z5T WP15PE	05
5576790	477712005T WP15PE	05
5576791	477712005W WP15PE	05
5576792	477712025T WP15PE	05
5576793	4777120Z5T WP15PE	05
5576794	477714015T WP15PE	05
5576795	477714014W WP15PE	05
5576796	477716006T WP15PE	05
5576797	477716006W WP15PE	05
5576798	477716026T WP15PE	05
5576799	4777160Z6T WP15PE	05
5576810	477718018T WP15PE	05
5576811	477718018W WP15PE	05
5576812	477720007T WP15PE	05
5576813	477720007W WP15PE	05
5576814	47772002T WP15PE	05
5576816	477725008T WP15PE	05
5576817	477725008W WP15PE	05
5576818	47N005002T WP15PE	012
5576819	47N006002T WP15PE	012
5576820	47N008003T WP15PE	012
5576821	47N010004T WP15PE	012
5576822	47N012005T WP15PE	012
5576823	47N016006T WP15PE	012
5576824	47N020007T WP15PE	012
5577828	TCF140R2SL25MB	V8
5577829	TCF145R2SL25MB	V8
5577920	TCF150R2SL25MB	V8
5577921	TCF155R2SL25MB	V8
5577922	TCF160R2SL25MB	V8
5577923	TCF165R2SL25MB	V8
5577924	TCF170R2SL25MB	V8
5577925	TCF175R2SL25MB	V8
5577926	TCF180R2SL25MB	V8
5577927	TCF185R2SL25MB	V8, V10
5577928	TCF140R3SL25MB	V11
5577929	TCF145R3SL25MB	V11
5577930	TCF150R3SL25MB	V11
5577931	TCF155R3SL25MB	V11
5577932	TCF160R3SL25MB	V11
5577933	TCF165R3SL25MB	V11
5577934	TCF170R3SL25MB	V11
5577935	TCF175R3SL25MB	V11
5577936	TCF180R3SL25MB	V11
5577937	TCF185R3SL25MB	V11, V13
5577938	TCF140R4SL25MB	V14
5577939	TCF145R4SL25MB	V14
5577940	TCF150R4SL25MB	V14
5577941	TCF155R4SL25MB	V14
5577942	TCF160R4SL25MB	V14
5577943	TCF165R4SL25MB	V14
5577944	TCF170R4SL25MB	V14
5577945	TCF175R4SL25MB	V14
5577946	TCF180R4SL25MB	V14
5577947	TCF185R4SL25MB	V14, V16
5577948	TCF140R5SL25MB	V17
5577949	TCF145R5SL25MB	V17
5577950	TCF150R5SL25MB	V17
5577951	TCF155R5SL25MB	V17
5577952	TCF160R5SL25MB	V17
5577953	TCF165R5SL25MB	V17
5577954	TCF170R5SL25MB	V17
5577955	TCF175R5SL25MB	V17
5577956	TCF180R5SL25MB	V17
5577957	TCF185R5SL25MB	V17, V19
5578222	CPNT060204T WP40PM	L5
5578539	TCF370R2SL40MF	V9
5578600	TCF375R2SL40MF	V9
5578601	TCF380R2SL40MF	V9
5578602	TCF390R2SL40MF	V9
5578603	TCF400R2SL40MF	V9
5578604	TCF410R2SL40MF	V9
5578605	TCF420R2SL40MF	V9
5578606	TCF430R2SL40MF	V9
5578607	TCF440R2SL40MF	V9–10
5578608	TCF450R2SL50MF	V9–10
5578609	TCF370R3SL40MF	V12
5578610	TCF375R3SL40MF	V12
5578611	TCF380R3SL40MF	V12
5578612	TCF390R3SL40MF	V12
5578613	TCF400R3SL40MF	V12
5578614	TCF410R3SL40MF	V12
5578615	TCF420R3SL40MF	V12
5578616	TCF430R3SL40MF	V12
5578617	TCF440R3SL40MF	V12–13
5578618	TCF450R3SL50MF	V12–13
5578619	TCF370R4SL40MF	V15
5578620	TCF375R4SL40MF	V15
5578621	TCF380R4SL40MF	V15
5578622	TCF390R4SL40MF	V15
5578623	TCF400R4SL40MF	V15
5578624	TCF410R4SL40MF	V15
5578625	TCF420R4SL40MF	V15
5578626	TCF430R4SL40MF	V15
5578627	TCF440R4SL40MF	V15–16
5578628	TCF450R4SL50MF	V15–16
5578629	TCF370R5SL40MF	V18
5578640	TCF375R5SL40MF	V18
5578641	TCF380R5SL40MF	V18
5578642	TCF390R5SL40MF	V18
5578643	TCF400R5SL40MF	V18
5578644	TCF410R5SL40MF	V18
5578645	TCF420R5SL40MF	V18
5578646	TCF430R5SL40MF	V18
5578647	TCF440R5SL40MF	V18–19
5578648	TCF450R5SL50MF	V18–19
5578694	TCF460R2SL50MG	V9
5578695	TCF470R2SL50MG	V9
5578696	TCF480R2SL50MG	V9
5578697	TCF490R2SL50MG	V9
5578698	TCF500R2SL50MG	V9
5578699	TCF505R2SL50MG	V9
5578710	TCF510R2SL50MG	V9
5578711	TCF520R2SL50MG	V9
5578712	TCF530R2SL50MG	V9
5578713	TCF540R2SL50MG	V9
5578714	TCF550R2SL50MG	V9
5578715	TCF560R2SL50MG	V9–10
5578716	TCF460R3SL50MG	V12
5578717	TCF470R3SL50MG	V12
5578718	TCF480R3SL50MG	V12
5578719	TCF490R3SL50MG	V12
5578720	TCF500R3SL50MG	V12
5578721	TCF505R3SL50MG	V12
5578722	TCF510R3SL50MG	V12
5578723	TCF520R3SL50MG	V12
5578724	TCF530R3SL50MG	V12
5578726	TCF540R3SL50MG	V12
5578727	TCF550R3SL50MG	V12
5578728	TCF560R3SL50MG	V12–13
5578729	TCF460R4SL50MG	V15
5578730	TCF470R4SL50MG	V15
5578731	TCF480R4SL50MG	V15

Order No.	Catalogue No.	Page(s)
5578732	TCF490R4SL50MG	V15
5578733	TCF500R4SL50MG	V15
5578734	TCF505R4SL50MG	V15
5578735	TCF510R4SL50MG	V15
5578736	TCF520R4SL50MG	V15
5578737	TCF530R4SL50MG	V15
5578738	TCF540R4SL50MG	V15
5578739	TCF550R4SL50MG	V15
5578750	TCF560R4SL50MG	V15–16
5578751	TCF460R5SL50MG	V18
5578752	TCF470R5SL50MG	V18
5578753	TCF480R5SL50MG	V18
5578754	TCF490R5SL50MG	V18
5578755	TCF500R5SL50MG	V18
5578756	TCF505R5SL50MG	V18
5578757	TCF510R5SL50MG	V18
5578758	TCF520R5SL50MG	V18
5578759	TCF530R5SL50MG	V18
5578760	TCF540R5SL50MG	V18
5578761	TCF550R5SL50MG	V18
5578762	TCF560R5SL50MG	V18–19
5578820	TCF190R2SL25MC	V8
5578821	TCF195R2SL25MC	V8
5578822	TCF200R2SL25MC	V8
5578823	TCF205R2SL25MC	V8
5578824	TCF210R2SL25MC	V8
5578825	TCF220R2SL25MC	V8
5578826	TCF225R2SL25MC	V8
5578827	TCF230R2SL25MC	V8, V10
5578828	TCF190R3SL25MC	V11
5578829	TCF195R3SL25MC	V11
5578830	TCF200R3SL25MC	V11
5578831	TCF205R3SL25MC	V11
5578832	TCF210R3SL25MC	V11
5578833	TCF220R3SL25MC	V11
5578834	TCF225R3SL25MC	V11
5578835	TCF230R3SL25MC	V11, V13
5578836	TCF190R4SL25MC	V14
5578837	TCF195R4SL25MC	V14
5578838	TCF200R4SL25MC	V14
5578839	TCF205R4SL25MC	V14
5578840	TCF210R4SL25MC	V14
5578841	TCF220R4SL25MC	V14
5578842	TCF225R4SL25MC	V14
5578843	TCF230R4SL25MC	V14, V16
5578844	TCF190R5SL25MC	V17
5578845	TCF195R5SL25MC	V17
5578846	TCF200R5SL25MC	V17
5578847	TCF205R5SL25MC	V17
5578848	TCF210R5SL25MC	V17
5578849	TCF220R5SL25MC	V17
5578850	TCF225R5SL25MC	V17
5578851	TCF230R5SL25MC	V17, V19
5578866	577C04002T WP15PE	O24
5578867	577C04002W WP15PE	O24
5578868	577C04012T WP15PE	O24
5578894	CNMG120404UR WS10PT	B43
5578895	CNMG120404UR WS25PT	B43
5578896	CNMG160608UR WS10PT	B43
5578897	CNMG160608UR WS25PT	B43
5578898	CNMG160612UR WS10PT	B43
5578900	CNMG160616UR WS10PT	B43
5578901	CNMG160616UR WS25PT	B43
5578902	CNMG190612UR WS10PT	B43
5578990	577C05002T WP15PE	O24
5578991	577C05002W WP15PE	O24
5578992	577C06002T WP15PE	O24
5578993	577C06002W WP15PE	O24
5578994	577C06012T WP15PE	O24
5578995	577C07003T WP15PE	O24
5578996	577C07003W WP15PE	O24
5578997	577C08003T WP15PE	O24
5578998	577C08003W WP15PE	O24
5578999	577C08013T WP15PE	O24
5579021	577C09004T WP15PE	O24
5579022	577C09004W WP15PE	O24
5579023	577C10004T WP15PE	O24
5579024	577C10004W WP15PE	O24
5579025	577C10014T WP15PE	O24
5579026	577C12005T WP15PE	O24
5579027	577C12005W WP15PE	O24
5579028	577C12015T WP15PE	O24
5579029	577C14004T WP15PE	O24
5579040	577C14004W WP15PE	O24
5579041	577C14014T WP15PE	O24
5579042	577C16006T WP15PE	O24
5579043	577C16006W WP15PE	O24
5579044	577C16016T WP15PE	O24
5579045	577C18008T WP15PE	O24
5579046	577C18008W WP15PE	O24
5579047	577C20007T WP15PE	O24
5579048	577C20007W WP15PE	O24
5579049	577C20017T WP15PE	O24
5579060	577C25008T WP15PE	O24
5579061	577C25008W WP15PE	O24
5579234	CNMG190616UR WS25PT	B43
5579271	DNMG150408UR WS25PT	B62
5579276	DNMG150608UR WS25PT	B62
5579292	DNMG150412UR WS25PT	B62
5579350	SNMG120412UR WS25PT	B75
5579352	SNMG150612UR WS25PT	B75
5579357	SNMG190616UR WS25PT	B75
5579395	TNMG160408UR WS25PT	B89
5579397	TNMG220408UR WS25PT	B89
5579405	TNMG270612UR WS25PT	B89
5579416	VNMG160408UR WS25PT	B99
5579420	WNMG080412UR WS10PT	B104
5583159	4U4006002T WP15PE	059
5583420	4U4008003T WP15PE	059
5583421	4U4010004T WP15PE	059
5583422	4U4012005T WP15PE	059
5583423	4U4016006T WP15PE	059
5583424	4U4020007T WP15PE	059
5583425	4U4025008T WP15PE	059
5583426	4U7006002T WP15PE	060
5583427	4U7008003T WP15PE	060
5583428	4U7010004T WP15PE	060
5583429	4U7012005T WP15PE	060
5583430	4U7016006T WP15PE	060
5583431	4U7016046T WP15PE	060
5583432	4U7020007T WP15PE	060
5583433	4U7020047T WP15PE	060
5583434	4U7025008T WP15PE	060
5583435	4U7025048T WP15PE	060
5583436	4U7006002W WP15PE	060
5583437	4U7008003W WP15PE	060
5583438	4U7010004W WP15PE	060
5583439	4U7012005W WP15PE	060
5583440	4U7016006W WP15PE	060
5583441	4U7020007W WP15PE	060
5583442	4U7025008W WP15PE	060
5598905	57NC16026W WS15PE	025
5598906	57NC06002T WS15PE	025
5598907	57NC06022T WS15PE	025
5598908	57NC06022W WS15PE	025
5598909	57NC06032T WS15PE	025
5599070	57NC06032W WS15PE	025
5599071	57NC06042W WS15PE	025
5599072	57NC08003T WS15PE	025
5599073	57NC08023T WS15PE	025
5599074	57NC08023W WS15PE	025
5599075	57NC08033T WS15PE	025
5599076	57NC08033W WS15PE	025
5599077	57NC08053W WS15PE	025
5599078	57NC10004T WS15PE	025
5599079	57NC10024T WS15PE	025
5599080	57NC10024W WS15PE	025
5599081	57NC10034T WS15PE	025
5599082	57NC10034W WS15PE	025
5599083	57NC10054T WS15PE	025
5599084	57NC10054W WS15PE	025
5599085	57NC12005T WS15PE	025
5599086	57NC12025T WS15PE	025
5599087	57NC12025W WS15PE	025
5599088	57NC12035T WS15PE	025
5599089	57NC12035W WS15PE	025
5599090	57NC12055T WS15PE	025
5599091	57NC12055W WS15PE	025
5599092	57NC16006T WS15PE	025
5599093	57NC16026T WS15PE	025
5599094	57NC16036T WS15PE	025
5599095	57NC16036W WS15PE	025
5599096	57NC16056T WS15PE	025
5599097	57NC16056W WS15PE	025
5599098	57NC16076T WS15PE	026
5599099	57NC16076W WS15PE	026
5599100	57NC20007T WS15PE	026
5599101	57NC20027T WS15PE	026
5599102	57NC20027W WS15PE	026
5599103	57NC20037T WS15PE	026
5599104	57NC20037W WS15PE	026
5599105	57NC20057T WS15PE	026
5599106	57NC20057W WS15PE	026
5599107	57NC20077T WS15PE	026
5599108	57NC20077W WS15PE	026
5599109	57NC20087T WS15PE	026
5599110	57NC20087W WS15PE	026
5599111	57NC25008T WS15PE	026
5599112	57NC25028T WS15PE	026
5599113	57NC25028W WS15PE	026
5599114	57NC25038T WS15PE	026
5599115	57NC25038W WS15PE	026
5599116	57NC25058T WS15PE	026
5599117	57NC25058W WS15PE	026
5599118	57NC25078T WS15PE	026
5599119	57NC25078W WS15PE	026
5599120	57NC25088T WS15PE	026
5599121	57NC25088W WS15PE	026
5599122	57NE10004T WS15PE	033
5599123	57NE10024T WS15PE	033
5599124	57NE10024W WS15PE	033
5599125	57NE10034T WS15PE	033
5599126	57NE10034W WS15PE	033
5599127	57NE10054T WS15PE	033
5599128	57NE10054W WS15PE	033
5599129	57NE12005V WS15PE	033
5599130	57NE12025V WS15PE	033
5599131	57NE12025W WS15PE	033
5599132	57NE12035V WS15PE	033
5599133	57NE12035W WS15PE	033
5599134	57NE12055V WS15PE	033
5599135	57NE12055W WS15PE	033
5599136	57NE16006V WS15PE	033
5599137	57NE16026V WS15PE	033
5599138	57NE16026W WS15PE	033
5599139	57NE16036V WS15PE	033
5599140	57NE16036W WS15PE	033
5599141	57NE16056V WS15PE	033
5599142	57NE16056W WS15PE	033
5599143	57NE20007V WS15PE	033
5599144	57NE20027V WS15PE	033
5599145	57NE20027W WS15PE	033
5599146	57NE20037V WS15PE	033
5599147	57NE20037W WS15PE	033
5599148	57NE20057V WS15PE	033
5599149	57NE20057W WS15PE	033
5599160	57NE20087V WS15PE	033
5599161	57NE20087W WS15PE	033
5599162	57NE25008V WS15PE	033
5599163	57NE25028V WS15PE	033
5599164	57NE25028W WS15PE	033
5599165	57NE25038V WS15PE	033
5599166	57NE25038W WS15PE	033
5599167	57NE25058V WS15PE	033
5599168	57NE25058W WS15PE	033
5599169	57NE25088V WS15PE	033
5599170	57NE25088W WS15PE	033
5599171	577E10004T WS15PE	032
5599172	577E10024T WS15PE	032
5599173	577E10024W WS15PE	032
5599174	577E12005V WS15PE	032
5599175	577E12015V WS15PE	032
5599176	577E12015W WS15PE	032
5599177	577E16006V WS15PE	032
5599178	577E16016V WS15PE	032
5599179	577E16016W WS15PE	032
5599180	577E20007V WS15PE	032
5599181	577E20017V WS15PE	032
5599182	577E20017W WS15PE	032
5599183	577E25018V WS15PE	032
5599184	577E25018W WS15PE	032
5622622	XNGJ0905ANSNGD3W WK15CM	
		H35
5623158	CCMT060208MU WK20CT	B33
5623159	CCMT060208MU WM25CT	B33
5623344	CCMT060202FW WP15CT	B32
5623345	CCMT060204FW WP15CT	B32
5623346	CCMT060204FW WM15CT	B32
5623347	CCMT060208FW WP15CT	B32
5623348	CCMT060208FW WM15CT	B32
5623349	CCMT09T304FW WP15CT	B32
5623420	CCMT090304MU WP25CT	B33
5623421	CCMT090304MU WM25CT	B33
5623423	CCMT090308MU WM25CT	B33
5623424	CCMT090308MU WP25CT	B33
5623425	CCMT090308MU WP15CT	B33
5623426	CCMT09T304MU WS25PT	B33
5623427	CCMT09T304MU WM25CT	B33
5623428	CCMT09T304MU WS10PT	B33
5623429	CCMT09T304MU WK05CT	B33
5623430	CCMT09T304MU WP25CT	B33
5623431	CCMT09T304MU WP15CT	B33
5623432	CCMT09T304MU WK20CT	B33
5623433	CCMT09T308MU WK20CT	B33

Order No.	Catalogue No.	Page(s)
5623434	CCMT09T308MU WP15CT	B33
5623435	CCMT09T308MU WM25CT	B33
5623436	CCMT09T308MU WP25CT	B33
5623437	CCMT09T308MU WS25PT	B33
5623438	CCMT09T308MU WS10PT	B33
5623439	CCMT09T308MU WP35CT	B33
5623440	CCMT120408MU WP15CT	B33
5623441	CCMT120408MU WK20CT	B33
5623442	CCMT120408MU WM25CT	B33
5623443	CCMT120408MU WP25CT	B33
5623444	CCMT120408MU WS25PT	B33
5623445	SCMT090308MU WK20CT	B69
5623446	SCMT090308MU WP15CT	B69
5623447	SCMT09T304MU WM25CT	B69
5623448	SCMT09T308MU WM25CT	B69
5623449	SCMT09T308MU WK20CT	B69
5623460	SCMT09T308MU WS10PT	B69
5623461	SCMT09T308MU WP15CT	B69
5623462	SCMT09T308MU WP35CT	B69
5623464	SCMT09T308MU WP25CT	B69
5623470	CCMT09T304FW WM15CT	B32
5623471	CCMT09T304MW WP15CT	B33
5623472	CCMT09T304MW WP25CT	B33
5623473	CCMT09T308FW WP15CT	B32
5623474	CCMT09T308MW WP15CT	B33
5623475	CCMT09T308MW WP25CT	B33
5623476	CCMT120404MW WP15CT	B33
5623477	CCMT120404MW WP25CT	B33
5623478	CCMT120408MW WP15CT	B33
5623479	CCMT120408MW WP25CT	B33
5623480	CNMG120408FW WP15CT	B38
5623481	CNMG120412FW WP15CT	B38
5623482	DCMT11T304FW WP15CT	B48
5623483	DCMT11T304FW WM15CT	B48
5623484	DCMT11T304MW WP15CT	B50
5623485	DCMT11T304MW WP25CT	B50
5623486	DCMT11T308FW WP15CT	B48
5623487	DCMT11T308FW WM15CT	B48
5623488	DCMT11T308MW WP15CT	B50
5623489	DCMT11T308MW WP25CT	B50
5623490	DNMG110404FW WP15CT	B55
5623491	DNMG110408FW WP15CT	B55
5623492	DNMG150404FW WP15CT	B55
5623493	DNMG150408FW WP15CT	B55
5623494	DNMG150408MW WP15CT	B58
5623495	DNMG150408MW WP25CT	B58
5623496	DNMG150604FW WP15CT	B55
5623497	DNMG150608FW WP15CT	B55
5623498	DNMG150608MW WP15CT	B58
5623499	DNMG150608MW WP25CT	B58
5623510	WNMG060404FW WP15CT	B101
5623511	WNMG060408FW WP15CT	B101
5623512	WNMG060408MW WP15CT	B102
5623513	WNMG060408MW WP25CT	B102
5623514	WNMG080404FW WP15CT	B101
5623515	WNMG080408FW WP15CT	B101
5623516	WNMG080408MW WP15CT	B102
5623517	WNMG080408MW WP25CT	B102
5623581	DCMT11T304MU WM25CT	B49
5623582	DCMT11T304MU WS10PT	B49
5623583	DCMT11T304MU WP25CT	B49
5623584	DCMT11T304MU WS25PT	B49
5623585	DCMT11T304MU WP15CT	B49
5623586	DCMT11T304MU WK05CT	B49
5623587	DCMT11T304MU WK20CT	B49
5623588	DCMT11T308MU WM25CT	B49
5623589	DCMT11T308MU WK20CT	B49
5623600	DCMT11T308MU WP15CT	B49
5623601	DCMT11T308MU WS10PT	B49
5623602	DCMT11T308MU WK05CT	B49
5623603	DCMT11T308MU WS25PT	B49
5623604	DCMT150408MU WM25CT	B49
5623605	DCMT150408MU WK05CT	B49
5623606	DCMT150408MU WP15CT	B49
5623607	DCMT150408MU WK20CT	B49
5623608	DCMT150408MU WP25CT	B49
5623609	DCMT150408MU WS10PT	B49
5623610	DCMT150408MU WS25PT	B49
5623611	DCMT150412MU WK05CT	B49
5623612	DCMT150412MU WK20CT	B49
5623613	TCMT16T304MU WM25CT	B83
5623614	TCMT16T304MU WP15CT	B83
5623615	TCMT16T304MU WP25CT	B83
5623616	TCMT16T304MU WK20CT	B83
5623617	TCMT16T304MU WS25PT	B83
5623618	TCMT16T308MU WK20CT	B83
5623619	TCMT16T308MU WM25CT	B83
5623620	TCMT16T308MU WP25CT	B83
5623621	TCMT16T308MU WP15CT	B83
5623622	TCMT16T308MU WS10PT	B83
5642230	XDCT110404PDERML WP40PM	J9
5642231	XDPT110404PDSRMM WP40PM	J10
5642232	XDPT110412PDSRMM WP40PM	J10
5642233	XDPT110416PDSRMM WP40PM	J10
5642234	XDPT110431PDSRMM WP40PM	J10
5642235	XDPT110412PDSRMH WP40PM	J10
5642236	XDPT110416PDSRMH WP40PM	J10
5642237	XDPT110404PDSRMM WP25PM	J10
5645217	CNMG120404UM WS10PT	B42
5645219	CNMG120408UM WP25CT	B42
5645250	CNMG120408UM WP15CT	B42
5645251	DNMG150408UM WS10PT	B61
5645253	DNMG150608UM WS10PT	B61
5645254	DNMG150404UM WS10PT	B61
5645255	DNMG150604UM WS10PT	B61
5645256	DNMG110408UM WS10PT	B61
5645257	DNMG150612UM WS25PT	B61
5645258	DNMG150612UM WS10PT	B61
5645259	DNMG150412UM WS10PT	B61
5645260	DNMG150408UM WP15CT	B61
5645261	DNMG150408UM WP25CT	B61
5645262	DNMG150608UM WP25CT	B61
5645264	DNMG150608UM WS25PT	B61
5645265	TNMG220408UM WS10PT	B88
5645266	TNMG220408UM WP15CT	B88
5645267	WNMG060408UM WS10PT	B104
5645268	WNMG060404UM WS10PT	B104
5645269	WNMG080412UM WS10PT	B104
5645270	WNMG080408UM WP25CT	B104
5645271	WNMG080412UM WP15CT	B104
5645588	CNMG120408UF WS10PT	B42
5645589	CNMG120404UF WP15CT	B42
5645600	CNMG120404UF WS10PT	B42
5645601	DNMG150404UF WS10PT	B60
5645602	DNMG150408UF WS10PT	B60
5645603	DNMG110404UF WS10PT	B60
5645604	DNMG110408UF WS10PT	B60
5645605	DNMG150408UF WP25CT	B60
5645606	DNMG150408UF WP15CT	B60
5645607	DNMG150608UF WS10PT	B60
5645608	DNMG150604UF WS10PT	B60
5645609	DNMG150608UF WP25CT	B60
5645610	SNMG120404UF WS10PT	B74
5645611	SNMG120408UF WS10PT	B74
5645612	TNMG220404UF WS10PT	B88
5645613	TNMG160412UF WS10PT	B88
5645614	TNMG220408UF WS10PT	B88
5645615	TNMG160408UF WP15CT	B88
5645616	VNMG160404UF WS10PT	B98
5645617	VNMG160408UF WS10PT	B98
5645618	VNMG160408UF WP15CT	B98
5645619	WNMG080404UF WS10PT	B103
5645621	WNMG060404UF WS10PT	B103
5645622	WNMG060408UF WS10PT	B103
5645623	WNMG080408UF WS10PT	B103
5645624	WNMG080412UF WS10PT	B103
5661464	TDS501A03571 WU25PD	T82
5661502	TDS501A04623 WU25PD	T82
5661503	TDS501A04763 WU25PD	T83
5661504	TDS501A05410 WU25PD	T83
5661505	TDS501A05558 WU25PD	T83
5661506	TDS501A06528 WU25PD	T83
5661507	TDS501A06746 WU25PD	T83
5661509	TDS501A07145 WU25PD	T83
5661540	TDS501A07938 WU25PD	T84
5661541	TDS501A08334 WU25PD	T84
5661542	TDS501A08433 WU25PD	T84
5661543	TDS501A08733 WU25PD	T84
5661544	TDS501A09347 WU25PD	T84
5661546	TDS501A09750 WU25PD	T84
5661547	TDS501A10716 WU25PD	T85
5661548	TDS501A12304 WU25PD	T85
5680085	CNMG120408UR WK20CT	B43
5680086	CNMG120408UR WK05CT	B43
5680087	CNMG120412UR WK05CT	B43
5680088	CNMG190612UR WK05CT	B43
5680089	CNMG120416UR WS10PT	B43
5680170	CNMG120416UR WS25PT	B43
5680171	DNMG150416UR WS10PT	B62
5680172	DNMG150612UR WK05CT	B62
5680173	SNMG120416UR WS25PT	B75
5680174	SNMG120416UR WS10PT	B75
5680175	TNMG160412UR WS25PT	B89
5680176	VNMG160412UR WS10PT	B99
5680177	WNMG060408UR WS25PT	B104
5680178	WNMG060408UR WS10PT	B104
5680179	WNMG080408UR WK05CT	B104
5684271	CNMG120404FF WS10PT	B37
5684272	CNMG120408FF WS10PT	B37
5684273	DNMG110404FF WS10PT	B54
5684274	DNMG150404FF WS10PT	B54
5684275	DNMG150408FF WS10PT	B54
5684276	DNMG150604FF WS10PT	B54
5684277	SNMG090308FF WS10PT	B72
5684278	SNMG120408FF WS10PT	B72
5684279	SNMG090304FF WS10PT	B72
5684330	SNMG120404FF WS10PT	B72
5684331	TNMG110304FF WS10PT	B84
5684332	TNMG110308FF WS10PT	B84
5684333	VNMG160408FF WS10PT	B97
5684334	VNMG160404FF WS10PT	B97
5684335	WNMG080408FF WS10PT	B100
5684336	WNMG080404FF WS10PT	B100
5684337	CCMT060204FP WS10PT	B31
5684338	CCMT09T308FP WS25PT	B31
5684340	CCMT060204FP WS25PT	B31
5684341	CCMT09T304FP WS10PT	B31
5684342	CCMT060208FP WS10PT	B31
5684343	CCMT09T304FP WS25PT	B31
5684344	CCMT060208FP WS25PT	B31
5684346	CNMG120416ML WP25CT	B38
5684347	TNMG110304ML WP25CT	B85
5684348	TNMG220404ML WP15CT	B85
5684349	CCMT120408MP WS10PT	B32
5684350	CCMT09T308MP WS10PT	B32
5684351	CCMT060204MP WS10PT	B32
5684352	CCMT09T304MP WS10PT	B32
5684353	CNMG120416MR WP25CT	B39
5684354	SNMG120412MR WP15CT	B73
5684355	SNMG120412MR WP25CT	B73
5684356	CNMG120408RH WP35CT	B41
5696071	A25RDCLNR12KC04 WG	C56
5696072	A25RDCLNL12KC04 WG	C56
5696073	A32SDCLNR12KC04 WG	C56
5696074	A32SDCLNL12KC04 WG	C56
5696075	A40TDCLNR12KC04 WG	C56
5696076	A40TDCLNL12KC04 WG	C56
5696077	A40TDCLNR16KC06 WG	C56
5696078	A40TDCLNL16KC06 WG	C56
5696079	A25RDDPNR11KC04 WG	C56
5696080	A32SDDPNR15KC06 WG	C56
5696081	A32SDDPNL15KC06 WG	C56
5696082	A40TDDPNR15KC06 WG	C56
5696083	A40TDDPNL15KC06 WG	C56
5696085	A32SDDQNR15KC06 WG	C57
5696086	A32SDDQNL15KC06 WG	C57
5696087	A40TDDQNR15KC06 WG	C57
5696088	A40TDDQNL15KC06 WG	C57
5696089	A25RDDUNR11KC04 WG	C57
5696210	A25RDDUNL11KC04 WG	C57
5696211	A32SDDUNR11KC04 WG	C57
5696212	A32SDDUNL11KC04 WG	C57
5696213	A32SDDUNR15KC06 WG	C57
5696214	A32SDDUNL15KC06 WG	C57
5696215	A40TDDUNR15KC06 WG	C57
5696216	A40TDDUNL15KC06 WG	C57
5696217	A50UDDUNR15KC06 WG	C57
5696218	A50UDDUNL15KC06 WG	C57
5696219	A25RDTFNR16KC04 WG	C58
5696260	A25RDTFNL16KC04 WG	C58
5696261	A32SDTFNR16KC04 WG	C58
5696262	A32SDTFNL16KC04 WG	C58
5696263	A32SDVUNR16KC04 WG	C58
5696264	A32SDVUNL16KC04 WG	C58
5696265	A40TDVUNR16KC04 WG	C58
5696266	A40TDVUNL16KC04 WG	C58
5696267	A25RDWLNR06KC04 WG	C59
5696268	A25RDWLNL06KC04 WG	C59
5696269	A25RDWLNR08KC04 WG	C59
5696280	A25RDWLNL08KC04 WG	C59
5696281	A32SDWLNR08KC04 WG	C59
5696282	A32SDWLNL08KC04 WG	C59
5696283	A40TDWLNR08KC04 WG	C59
5696284	A40TDWLNL08KC04 WG	C59
5696553	SNMM12040865 WM25CT	B76
5696554	SNMM12040865 WP25CT	B76
5696555	SNMM12040865 WP35CT	B76
5696556	SNMM12041265 WM25CT	B76
5696557	SNMM12041265 WP25CT	B76
5696558	SNMM15061665 WM25CT	B76
5696559	SNMM15061665 WP25CT	B76
5696610	SNMM19061265 WM25CT	B76
5696611	SNMM19061265 WP15CT	B76
5696612	SNMM19061265 WP25CT	B76

Order No.	Catalogue No.	Page(s)
5696613	SNMM19061265 WP35CT	B76
5696614	SNMM19061665 WM25CT	B76
5696615	SNMM19061665 WP15CT	B76
5696616	SNMM19062465 WM25CT	B76
5696617	SNMM19062465 WP25CT	B76
5696618	TNMM16040865 WP25CT	B90
5696619	TNMM16040865 WP35CT	B90
5696620	TNMM16041265 WP35CT	B90
5696621	TNMM22040865 WP15CT	B90
5696622	TNMM22040865 WP25CT	B90
5696623	TNMM22040865 WP35CT	B90
5696624	TNMM22041265 WM25CT	B90
5696625	TNMM22041265 WP25CT	B90
5696626	TNMM22041265 WP35CT	B90
5696627	TNMM22041665 WM25CT	B90
5696628	TNMM22041665 WP15CT	B90
5696629	TNMM22041665 WP25CT	B90
5696642	CNMM190616SR WM25CT	B44
5696643	CNMM190616SR WP15CT	B44
5696644	CNMM190624SR WP35CT	B44
5696645	CNMM250924SR WP15CT	B44
5696646	CNMM250924SR WP25CT	B44
5696647	CNMM250924SR WP35CT	B44
5696648	SNMM190616SR WM25CT	B76
5696649	SNMM190624SR WM25CT	B76
5696680	SNMM190624SR WP15CT	B76
5696681	SNMM190624SR WP25CT	B76
5696682	DSKNL2525M12KC04 WG	C13
5696683	DSKNL3225P12KC04 WG	C13
5696684	DSKNL3232P15KC06 WG	C13
5696685	DSKNR2020K12KC04 WG	C13
5696686	DSKNR2525M12KC04 WG	C13
5696687	DSKNR3225P12KC04 WG	C13
5696688	DSKNR3232P15KC06 WG	C13
5696689	DSKNR3232P19KC06 WG	C13
5696700	DSRNL2525M12KC04 WG	C14
5696701	DSRNL3232P15KC06 WG	C14
5696702	DSRNL4040S25KC09 WG	C14
5696703	DSRNR2020K12KC04 WG	C14
5696704	DSRNR2525M12KC04 WG	C14
5696705	DSRNR3232P15KC06 WG	C14
5696706	DSRNR3232P19KC06 WG	C14
5696707	DSRNR4040S25KC09 WG	C14
5696708	DSSNL2020K12KC04 WG	C15
5696709	DSSNL2525M12KC04 WG	C15
5696710	DSSNL3225P12KC04 WG	C15
5696711	DSSNL3232P15KC06 WG	C15
5696712	DSSNL3232P19KC06 WG	C15
5696713	DSSNR2020K12KC04 WG	C15
5696714	DSSNR2525M12KC04 WG	C15
5696715	DSSNR2525M15KC06 WG	C15
5696716	DSSNR3225P12KC04 WG	C15
5696717	DSSNR3232P15KC06 WG	C15
5696718	DSSNR3232P19KC06 WG	C15
5696719	DTFNL2020K16KC04 WG	C16
5696720	DTFNL2525M16KC04 WG	C16
5696721	DTFNL2525M22KC04 WG	C16
5696722	DTFNL3225P16KC04 WG	C16
5696723	DTFNL3225P22KC04 WG	C16
5696724	DTFNR2020K16KC04 WG	C16
5696725	DTFNR2525M16KC04 WG	C16
5696726	DTFNR3232P27KC06 WG	C16
5696727	DTGNL2020K16KC04 WG	C16
5696728	DTGNL2525M16KC04 WG	C16
5696729	DTGNR2020K16KC04 WG	C16
5696730	DTGNR2525M16KC04 WG	C16
5696731	DTGNR2525M22KC04 WG	C16
5696732	DVJNL2020K16KC04 WG	C17
5696733	DVJNL2525M16KC04 WG	C17
5696734	DVJNL2525M22KC04 WG	C17
5696735	DVJNL3225P16KC04 WG	C17
5696736	DVJNL3225P22KC04 WG	C17
5696737	DVJNR2020K16KC04 WG	C17
5696738	DVJNR2525M16KC04 WG	C17
5696739	DVJNR2525M22KC04 WG	C17
5696740	DVJNR3225P16KC04 WG	C17
5696741	DVJNR3225P22KC04 WG	C17
5696742	DVONL2020K16KC04 WG	C18
5696743	DVONL2525M16KC04 WG	C18
5696744	DVONL3225P16KC04 WG	C18
5696745	DVONR2020K16KC04 WG	C18
5696746	DVONR2525M16KC04 WG	C18
5696747	DVONR3225P16KC04 WG	C18
5696748	DVVNN2020K16KC04 WG	C18
5696749	DVVNN2525M16KC04 WG	C18
5696750	DVVNN3225P16KC04 WG	C18
5696751	DWLNL2020K06KC04 WG	C19
5696752	DWLNL2020K08KC04 WG	C19
5696753	DWLNL2525M06KC04 WG	C19
5696754	DWLNL2525M08KC04 WG	C19
5696755	DWLNL3225P08KC04 WG	C19
5696756	DWLNL3232P08KC04 WG	C19
5696757	DWLNR2020K06KC04 WG	C19
5696758	DWLNR2020K08KC04 WG	C19
5696759	DWLNR2525M06KC04 WG	C19
5696760	DWLNR2525M08KC04 WG	C19
5696761	DWLNR3225P08KC04 WG	C19
5696762	DWLNR3232P08KC04 WG	C19
5697853	DCKNL2020K12KC04 WG	C8
5697854	DCKNL2525M12KC04 WG	C8
5697855	DCKNL3225P12KC04 WG	C8
5697856	DCKNR2020K12KC04 WG	C8
5697857	DCKNR2525M12KC04 WG	C8
5697858	DCKNR3225P12KC04 WG	C8
5697859	DCKNR3232P16KC06 WG	C8
5697880	DCKNR3232P19KC06 WG	C8
5697881	DCLNL1616H09KC03 WG	C9
5697882	DCLNL2020K09KC03 WG	C9
5697883	DCLNL2020K12KC04 WG	C9
5697884	DCLNL2525M12KC04 WG	C9
5697885	DCLNL2525M16KC06 WG	C9
5697886	DCLNL3232P16KC06 WG	C9
5697887	DCLNL3232P19KC06 WG	C9
5697888	DCLNL4040S19KC06 WG	C9
5697889	DCLNL4040S25KC09 WG	C9
5697890	DCLNR1616H09KC03 WG	C9
5697891	DCLNR2020K09KC03 WG	C9
5697892	DCLNR2020K12KC04 WG	C9
5697893	DCLNR2525M12KC04 WG	C9
5697894	DCLNR2525M16KC06 WG	C9
5697895	DCLNR3232P16KC06 WG	C9
5697896	DCLNR3232P19KC06 WG	C9
5697897	DCLNR4040S19KC06 WG	C9
5697898	DCLNR4040S25KC09 WG	C9
5697899	DCRNL2020K12KC04 WG	C10
5697900	DCRNL2525M12KC04 WG	C10
5697901	DCRNL3225P12KC04 WG	C10
5697902	DCRNL3232P16KC06 WG	C10
5697903	DCRNR2020K12KC04 WG	C10
5697904	DCRNR2525M12KC04 WG	C10
5697905	DCRNR3225P12KC04 WG	C10
5697906	DCRNR3232P16KC06 WG	C10
5697907	DCRNR3232P19KC06 WG	C10
5697908	DCSNL2020K12KC04 WG	C10
5697909	DCSNL2525M12KC04 WG	C10
5697911	DCSNR2020K12KC04 WG	C10
5697913	DCSNR2525M12KC04 WG	C10
5697915	DDJNL2020K11KC04 WG	C11
5697916	DDJNL2020K15KC06 WG	C11
5697918	DDJNL2525M11KC04 WG	C11
5697920	DDJNL2525M15KC06 WG	C11
5697922	DDJNL3225P15KC06 WG	C11
5697924	DDJNR2020K11KC04 WG	C11
5697926	DDJNR2020K15KC06 WG	C11
5697928	DDJNR2525M11KC04 WG	C11
5697930	DDJNR2525M15KC06 WG	C11
5697932	DDJNR3225P15KC06 WG	C11
5697934	DDNNL2020K15KC06 WG	C11
5697936	DDNNL2525M15KC06 WG	C11
5697938	DDNNL3225P15KC06 WG	C11
5697940	DDNNR2020K15KC06 WG	C11
5697942	DDNNR2525M15KC06 WG	C11
5697944	DRGNL3225P12KC04 WG	C12
5697946	DRGNL4040S25KC09 WG	C12
5697948	DRGNR2525M12KC04 WG	C12
5697950	DRGNR3225P12KC04 WG	C12
5697952	DRGNR4040S25KC09 WG	C12
5697954	DSDNN2020K12KC04 WG	C12
5697955	DSDNN2525M12KC04 WG	C12
5697957	DSDNN2525M15KC06 WG	C12
5697959	DSDNN3225P12KC04 WG	C12
5697961	DSDNN3232P19KC06 WG	C12
5697963	DSDNN4040S25KC09 WG	C12
5698342	WOEJ120712SRMR WP40PM	M14
5698343	WOEJ120712SRMR WP25PM	M14
5698347	CNMM12040865 WM25CT	B44
5698348	CNMM12040865 WP15CT	B44
5698349	CNMM12040865 WP25CT	B44
5698360	CNMM12040865 WP35CT	B44
5698361	CNMM12041265 WM25CT	B44
5698362	CNMM12041265 WP15CT	B44
5698363	CNMM12041265 WP25CT	B44
5698364	CNMM12041665 WM25CT	B44
5698365	CNMM12041665 WP25CT	B44
5698366	CNMM16060865 WP25CT	B44
5698367	CNMM16060865 WP35CT	B44
5698368	CNMM16061265 WM25CT	B44
5698369	CNMM16061265 WP15CT	B44
5698370	CNMM16061265 WP25CT	B44
5698371	CNMM16061265 WP35CT	B44
5698372	CNMM16061665 WP15CT	B44
5698373	CNMM16061665 WP25CT	B44
5698374	CNMM19061265 WM25CT	B44
5698376	CNMM19061265 WP35CT	B44
5698377	CNMM19061665 WM25CT	B44
5698378	CNMM19061665 WP15CT	B44
5698379	CNMM19062465 WM25CT	B44
5698410	CNMM19062465 WP15CT	B44
5698411	CNMM19062465 WP25CT	B44
5698412	DNMM15060865 WM25CT	B62
5698413	DNMM15060865 WP15CT	B62
5698414	DNMM15060865 WP25CT	B62
5698415	DNMM15060865 WP35CT	B62
5698416	DNMM15061265 WM25CT	B62
5698417	DNMM15061265 WP15CT	B62
5698418	DNMM15061665 WP15CT	B62
5698419	DNMM15061665 WP25CT	B62
5710285	VSM490D025Z02B25XN15	J33
5710286	VSM490D032Z03B32XN15	J33
5710287	VSM490D025Z02A25XN15L170	J34
5710288	VSM490D032Z03A32XN15L200	J34
5710289	VSM490D040Z04S16XN15	J35
5710520	VSM490D040Z05S16XN15	J35
5710521	VSM490D050Z05S22XN15	J35
5710522	VSM490D050Z06S22XN15	J35
5710523	VSM490D063Z06S22XN15	J35
5710524	VSM490D063Z07S22XN15	J35
5710525	VSM490D080Z07S27XN15	J35
5710526	VSM490D100Z08S32XN15	J35
5710527	XNGU15T608SRMM WP25PM	J37
5710528	XNGU15T608SRMM WP40PM	J37
5710529	XNGU15T608SRMM WU35PM	J37
5825527	D0100300T008 TIALN	P37
5825528	D0100400T011 TIALN	P37
5825529	D0100500T013 TIALN	P37
5825530	D0100600T013 TIALN	P37
5825531	D0100800T019 TIALN	P37
5825532	D0101000T022 TIALN	P37
5825533	D0101200T026 TIALN	P37
5825534	D0101400T026 TIALN	P37
5825536	D0101600T032 TIALN	P37
5825538	D0101800T032 TIALN	P37
5825539	D0102000T038 TIALN	P37
5825540	D0101200W026 TIALN	P37
5825541	D0101400W026 TIALN	P37
5825542	D0101600W032 TIALN	P37
5825543	D0101800W032 TIALN	P37
5825544	D0102000W038 TIALN	P37
5825545	28480400T011 TIALN	P38
5825546	28480500T013 TIALN	P38
5825547	28480600T013 TIALN	P38
5825548	28480800T019 TIALN	P38
5825549	28481000T022 TIALN	P38
5825550	28481200T026 TIALN	P38
5825551	28481400T026 TIALN	P38
5825552	28481600T032 TIALN	P38
5825553	28481800T032 TIALN	P38
5825554	28482000T038 TIALN	P38
5825555	40000200T006 TIALN	P39
5825556	40000300T020 TIALN	P39
5825557	40000400T014 TIALN	P39
5825558	40100400T025 TIALN	P39
5825559	40000500T016 TIALN	P39
5825560	40100500T030 TIALN	P39
5825573	40000600T016 TIALN	P39
5825574	40100600T019 TIALN	P39
5825575	40100600T030 TIALN	P39
5825576	40000800T019 TIALN	P39
5825577	40100800T040 TIALN	P39
5825578	40001000T022 TIALN	P39
5825579	40101000T040 TIALN	P39
5825580	40001200T025 TIALN	P39
5825581	40101200T045 TIALN	P39
5825583	40001400T032 TIALN	P39
5825584	40101400T050 TIALN	P39
5825585	40001600T032 TIALN	P39
5825586	40101600T065 TIALN	P39
5825587	40001800T038 TIALN	P39
5825588	40102000T056 TIALN	P39
5825589	D0101200W026 UNCOATED	P37
5825590	D0101400W026 UNCOATED	P37
5825591	D0101600W032 UNCOATED	P37
5825592	D0101800W032 UNCOATED	P37
5825593	D0102000W038 UNCOATED	P37

Order No.	Catalogue No.	Page(s)
5825594	28480400T011 UNCOATED	P38
5825595	28480500T013 UNCOATED	P38
5825596	28480600T013 UNCOATED	P38
5825597	28480800T019 UNCOATED	P38
5825598	28481000T022 UNCOATED	P38
5825599	28481200T026 UNCOATED	P38
5825600	28481400T026 UNCOATED	P38
5825601	28481600T032 UNCOATED	P38
5825602	28481800T032 UNCOATED	P38
5825603	28482000T038 UNCOATED	P38
5825604	D0100300T008 UNCOATED	P37
5825605	D0100400T011 UNCOATED	P37
5825606	D0100500T013 UNCOATED	P37
5825607	D0100600T013 UNCOATED	P37
5825608	D0100800T019 UNCOATED	P37
5825609	D0101000T022 UNCOATED	P37
5825610	D0101200T026 UNCOATED	P37
5825611	D0101400T026 UNCOATED	P37
5825612	D0101600T032 UNCOATED	P37
5825613	D0101800T032 UNCOATED	P37
5825614	D0102000T038 UNCOATED	P37
5825894	D0040200T004 TIALN	P32
5825895	D0140200T007 TIALN	P32
5825896	D0140250T008 TIALN	P32
5825897	D0040300T005 TIALN	P32
5825898	D0140300T008 TIALN	P32
5825899	D0140350T010 TIALN	P32
5825900	D0040400T008 TIALN	P32
5825931	D0140400T011 TIALN	P32
5825932	D0140450T011 TIALN	P32
5825933	D0040500T009 TIALN	P32
5825934	D0140500T013 TIALN	P32
5825935	D0140550T013 TIALN	P32
5825936	D0040600T010 TIALN	P32
5825937	D0140600T013 TIALN	P32
5825938	D0140650T016 TIALN	P32
5825939	D0040700T011 TIALN	P32
5825940	D0140700T016 TIALN	P32
5825941	D0140750T019 TIALN	P32
5825942	D0040800T012 TIALN	P32
5825943	D0140800T019 TIALN	P32
5825944	D0040900T013 TIALN	P33
5825945	D0140900T019 TIALN	P33
5825946	D0041000T014 TIALN	P33
5825947	D0141000T022 TIALN	P33
5825948	D0041200T016 TIALN	P33
5825949	D0141200T026 TIALN	P33
5825950	D0041400T018 TIALN	P33
5825951	D0141400T026 TIALN	P33
5825952	D0041600T022 TIALN	P33
5825953	D0141600T032 TIALN	P33
5825954	D0041800T024 TIALN	P33
5825955	D0141800T032 TIALN	P33
5825956	D0042000T026 TIALN	P33
5825957	D0142000T038 TIALN	P33
5825958	D0041200W016 TIALN	P33
5825959	D0141200W026 TIALN	P33
5825960	D0041400W018 TIALN	P33
5825961	D0141400W026 TIALN	P33
5825962	D0041600W022 TIALN	P33
5825963	D0141600W032 TIALN	P33
5825964	D0041800W024 TIALN	P33
5825965	D0141800W032 TIALN	P33
5825966	D0042000W026 TIALN	P33
5825967	D0142000W038 TIALN	P33
5825968	D0041200W016 UNCOATED	P33
5825969	D0141200W026 UNCOATED	P33
5825970	D0041400W018 UNCOATED	P33
5825971	D0141400W026 UNCOATED	P33
5825972	D0041600W022 UNCOATED	P33
5825973	D0141600W032 UNCOATED	P33
5825974	D0041800W024 UNCOATED	P33
5825975	D0141800W032 UNCOATED	P33
5825976	D0042000W026 UNCOATED	P33
5825977	D0142000W038 UNCOATED	P33
5825978	25280400T011 TIALN	P34
5825979	25280500T013 TIALN	P34
5825980	25280600T013 TIALN	P34
5825981	25280800T019 TIALN	P34
5825982	25281000T022 TIALN	P34
5825983	25281200T026 TIALN	P34
5825984	25281400T026 TIALN	P34
5825985	25281600T032 TIALN	P34
5825986	25281800T032 TIALN	P34
5825987	25282000T038 TIALN	P34
5825988	25281200T026 UNCOATED	P34
5825989	25281400T026 UNCOATED	P34
5825990	25281600T032 UNCOATED	P34
5825991	25281800T032 UNCOATED	P34
5825992	25282000T038 UNCOATED	P34
5825993	25280400T011 UNCOATED	P34
5825994	25280500T013 UNCOATED	P34
5825995	25280600T013 UNCOATED	P34
5825996	25280800T019 UNCOATED	P34
5825997	25281000T022 UNCOATED	P34
5826016	40040100T004 TIALN	P35
5826017	40040150T004 TIALN	P35
5826018	40040200T006 TIALN	P35
5826019	40040250T006 TIALN	P35
5826020	40040300T009 TIALN	P35
5826021	40140300T019 TIALN	P35
5826022	40240300T025 TIALN	P35
5826023	40040350T012 TIALN	P35
5826024	40040400T011 TIALN	P35
5826025	40140400T019 TIALN	P35
5826026	40240400T031 TIALN	P35
5826027	40040450T014 TIALN	P35
5826028	40040500T013 TIALN	P35
5826029	40040500T020 TIALN	P35
5826030	40140500T030 TIALN	P35
5826031	40240500T031 TIALN	P35
5826032	40040600T016 TIALN	P35
5826033	40140600T028 TIALN	P35
5826034	40240600T038 TIALN	P35
5826035	40040700T020 TIALN	P35
5826036	40040800T020 TIALN	P36
5826037	40140800T028 TIALN	P36
5826038	40240800T041 TIALN	P36
5826039	40040900T020 TIALN	P36
5826040	40041000T022 TIALN	P36
5826041	40141000T032 TIALN	P36
5826042	40241000T045 TIALN	P36
5826043	40041200T025 TIALN	P36
5826044	40141200T045 TIALN	P36
5826045	40241200T075 TIALN	P36
5826046	40041400T032 TIALN	P36
5826047	40141400T050 TIALN	P36
5826049	40241400T075 TIALN	P36
5826061	40041600T032 TIALN	P36
5826062	40141600T056 TIALN	P36
5826063	40241600T075 TIALN	P36
5826064	40041800T038 TIALN	P36
5826065	40141800T060 TIALN	P36
5826066	40241800T075 TIALN	P36
5826067	40042000T038 TIALN	P36
5826068	40142000T056 TIALN	P36
5826069	40242000T075 TIALN	P36
5826070	40041200W025 TIALN	P36
5826071	40141200W045 TIALN	P36
5826072	40241200W075 TIALN	P36
5826073	40041400W032 TIALN	P36
5826074	40141400W050 TIALN	P36
5826075	40241400W075 TIALN	P36
5826076	40041600W032 TIALN	P36
5826077	40141600W056 TIALN	P36
5826078	40241600W075 TIALN	P36
5826079	40041800W038 TIALN	P36
5826080	40141800W060 TIALN	P36
5826081	40241800W075 TIALN	P36
5826082	40042000W038 TIALN	P36
5826083	40142000W056 TIALN	P36
5826084	40242000W075 TIALN	P36
5826085	40040100T004 UNCOATED	P35
5826086	40040150T004 UNCOATED	P35
5826087	40040200T006 UNCOATED	P35
5826088	40040250T006 UNCOATED	P35
5826089	40040300T009 UNCOATED	P35
5826090	40140300T019 UNCOATED	P35
5826101	40240300T025 UNCOATED	P35
5826102	40040350T012 UNCOATED	P35
5826103	40040400T011 UNCOATED	P35
5826104	40040450T014 UNCOATED	P35
5826105	40040500T020 UNCOATED	P35
5826106	40040600T016 UNCOATED	P35
5826107	40140600T028 UNCOATED	P35
5826108	40240600T038 UNCOATED	P35
5826109	40040800T020 UNCOATED	P36
5826110	40140800T028 UNCOATED	P36
5826111	40240800T041 UNCOATED	P36
5826113	40041000T022 UNCOATED	P36
5826114	40141000T032 UNCOATED	P36
5826115	40241000T045 UNCOATED	P36
5826116	40041200T025 UNCOATED	P36
5826117	40141200T045 UNCOATED	P36
5826118	40241200T075 UNCOATED	P36
5826119	40041400T032 UNCOATED	P36
5826120	40141400T050 UNCOATED	P36
5826121	40241400T075 UNCOATED	P36
5826122	40041600T032 UNCOATED	P36
5826123	40141600T056 UNCOATED	P36
5826124	40241600T075 UNCOATED	P36
5826125	40041800T038 UNCOATED	P36
5826126	40141800T060 UNCOATED	P36
5826127	40241800T075 UNCOATED	P36
5826128	40042000T038 UNCOATED	P36
5826129	40142000T056 UNCOATED	P36
5826130	40242000T075 UNCOATED	P36
5826141	40041200W025 UNCOATED	P36
5826142	40141200W045 UNCOATED	P36
5826143	40241200W075 UNCOATED	P36
5826144	40041400W032 UNCOATED	P36
5826146	40141400W050 UNCOATED	P36
5826147	40241400W075 UNCOATED	P36
5826148	40041600W032 UNCOATED	P36
5826149	40141600W056 UNCOATED	P36
5826150	40241600W075 UNCOATED	P36
5826151	40041800W038 UNCOATED	P36
5826152	40141800W060 UNCOATED	P36
5826153	40241800W075 UNCOATED	P36
5826154	40042000W038 UNCOATED	P36
5826155	40142000W056 UNCOATED	P36
5826156	40242000W075 UNCOATED	P36
5873211	VSM490D025Z02M12XN15	J32
5873212	VSM490D032Z03M16XN15	J32
5873213	VSM490D032Z04M16XN15	J32
5873214	VSM490D035Z04M16XN15	J32
5873215	VSM490D040Z03B32XN15	J33
5873216	VSM490D025Z02A25XN15L100	J34
5873217	VSM490D032Z03A32XN15L110	J34
5873218	VSM490D032Z04A32XN15L110	J34
5873219	VSM490D032Z04A32XN15L200	J34
5873221	VSM490D050Z04S22XN15	J35
5873222	VSM490D063Z05S22XN15	J35
5873223	VSM490D080Z05S27XN15	J35
5873224	VSM490D080Z09S27XN15	J35
5873225	VSM490D100Z11S32XN15	J35
5873226	VSM490D125Z09S40XN15	J35
5873227	VSM490D125Z12S40XN15	J35
5873228	VSM490D160Z12S40XN15	J35
5873415	XNPU15T608SRMM WP25PM	J37
5873416	XNPU15T608SRMM WP40PM	J37
5873417	XNPU15T608SRMM WU35PM	J37
5873418	XNPU15T608SRMM WP35CM	J37
5873419	XNPU15T608SRMM WK15PM	J37
5873420	XNPU15T608SRMM WK15CM	J37
5873481	XNGU15T608ERML WP25PM	J36
5873482	XNGU15T608ERML WP40PM	J36
5873483	XNGU15T608ERML WU35PM	J36
5873484	40020100T004 TIALN	P17
5873485	40020150T004 TIALN	P17
5873486	40020180T004 TIALN	P17
5873487	40020200T006 TIALN	P17
5873488	40020250T006 TIALN	P17
5873489	40020300T009 TIALN	P17
5873490	40020300T019 TIALN	P17
5873491	40120300T025 TIALN	P17
5873492	40020350T012 TIALN	P17
5873493	40020400T012 TIALN	P17
5873494	40020400T019 TIALN	P17
5873495	40120400T031 TIALN	P17
5873496	40020450T014 TIALN	P17
5873497	40020480T014 TIALN	P17
5873498	40020500T014 TIALN	P17
5873499	40020500T020 TIALN	P17
5873500	40120500T031 TIALN	P17
5873501	40020550T014 TIALN	P17
5873502	40020600T016 TIALN	P17
5873503	40020600T028 TIALN	P17
5873504	40120600T038 TIALN	P18
5873505	40020700T020 TIALN	P18
5873506	40020800T020 TIALN	P18
5873507	40020800T028 TIALN	P18
5873508	40120800T041 TIALN	P18
5873509	40020900T020 TIALN	P18
5873510	40021000T022 TIALN	P18
5873511	40021000T032 TIALN	P18
5873512	40121000T045 TIALN	P18
5873513	40021100T025 TIALN	P18
5873514	40021200T025 TIALN	P18
5873515	40021200T045 TIALN	P18
5873516	40121200T075 TIALN	P18
5873517	40021400T032 TIALN	P18
5873518	40021400T050 TIALN	P18
5873519	40121400T075 TIALN	P18

Order No.	Catalogue No.	Page(s)
5873520	40021600T032 TIALN	P18
5873531	40021600T056 TIALN	P18
5873532	40121600T075 TIALN	P18
5873533	40021800T038 TIALN	P18
5873534	40021800T060 TIALN	P18
5873535	40121800T075 TIALN	P18
5873536	40022000T038 TIALN	P18
5873537	40022000T056 TIALN	P18
5873538	40122000T075 TIALN	P18
5877330	D0020200T003 TIALN	P14
5877501	D0020250T003 TIALN	P14
5877502	D0120250T007 TIALN	P14
5877503	D0020300T004 TIALN	P14
5877504	D0120300T007 TIALN	P14
5877505	D0020350T004 TIALN	P14
5877506	D0020400T005 TIALN	P14
5877507	D0120400T008 TIALN	P14
5877509	D0020450T005 TIALN	P14
5877510	D0120450T008 TIALN	P14
5877511	D0020500T006 TIALN	P14
5877512	D0120500T010 TIALN	P14
5877513	D0020600T007 TIALN	P14
5877514	D0120600T010 TIALN	P14
5877515	D0020700T008 TIALN	P14
5877516	D0120700T013 TIALN	P14
5877517	D0020800T009 TIALN	P14
5877518	D0120800T016 TIALN	P14
5877520	D0020900T010 TIALN	P14
5877521	D0120900T016 TIALN	P14
5877522	D0021000T011 TIALN	P15
5877523	D0121000T019 TIALN	P15
5877524	D0021200T012 TIALN	P15
5877525	D0121200T022 TIALN	P15
5877526	D0021400T014 TIALN	P15
5877527	D0121400T022 TIALN	P15
5877529	D0021600T016 TIALN	P15
5877530	D0121600T026 TIALN	P15
5877531	D0021800T018 TIALN	P15
5877532	D0121800T026 TIALN	P15
5877533	D0022000T020 TIALN	P15
5877534	D0122000T032 TIALN	P15
5877535	D0021200W012 TIALN	P15
5877537	D0121200W022 TIALN	P15
5877538	D0021400W014 TIALN	P15
5877539	D0121400W022 TIALN	P15
5877540	D0021600W016 TIALN	P15
5877551	D0121600W026 TIALN	P15
5877552	D0021800W018 TIALN	P15
5877553	D0121800W026 TIALN	P15
5877554	D0022000W020 TIALN	P15
5877555	D0122000W032 TIALN	P15
5877556	D0021200W012 UNCOATED	P15
5877557	D0121200W022 UNCOATED	P15
5877558	D0021400W014 UNCOATED	P15
5877559	D0121400W022 UNCOATED	P15
5877560	D0021600W016 UNCOATED	P15
5877561	D0121600W026 UNCOATED	P15
5877563	D0021800W018 UNCOATED	P15
5877564	D0121800W026 UNCOATED	P15
5877565	D0022000W020 UNCOATED	P15
5877566	D0122000W032 UNCOATED	P15
5877567	D0020200T003 UNCOATED	P14
5877568	D0020250T003 UNCOATED	P14
5877569	D0120250T007 UNCOATED	P14
5877571	D0020300T004 UNCOATED	P14
5877572	D0120300T007 UNCOATED	P14
5877573	D0020350T004 UNCOATED	P14
5877574	D0020400T005 UNCOATED	P14
5877575	D0120400T008 UNCOATED	P14
5877576	D0020450T005 UNCOATED	P14
5877577	D0120450T008 UNCOATED	P14
5877578	D0020500T006 UNCOATED	P14
5877579	D0120500T010 UNCOATED	P14
5877581	D0020600T007 UNCOATED	P14
5877582	D0120600T010 UNCOATED	P14
5877583	D0020700T008 UNCOATED	P14
5877584	D0120700T013 UNCOATED	P14
5877585	D0020800T009 UNCOATED	P14
5877586	D0120800T016 UNCOATED	P14
5877588	D0020900T010 UNCOATED	P14
5877589	D0120900T016 UNCOATED	P14
5877590	D0021000T011 UNCOATED	P15
5877591	D0121000T019 UNCOATED	P15
5877592	D0021200T012 UNCOATED	P15
5877593	D0121200T022 UNCOATED	P15
5877594	D0021400T014 UNCOATED	P15
5877595	D0121400T022 UNCOATED	P15
5877596	D0021600T016 UNCOATED	P15
5877597	D0121600T026 UNCOATED	P15
5877598	D0021800T018 UNCOATED	P15
5877599	D0121800T026 UNCOATED	P15
5877601	D0022000T020 UNCOATED	P15
5877602	D0122000T032 UNCOATED	P15
5877603	28190300T007 TIALN	P16
5877604	28190400T008 TIALN	P16
5877605	28190500T010 TIALN	P16
5877606	28190600T010 TIALN	P16
5877607	28190700T013 TIALN	P16
5877608	28190800T016 TIALN	P16
5877609	28190900T016 TIALN	P16
5877610	28191000T019 TIALN	P16
5877611	28191200T022 TIALN	P16
5877612	28191400T022 TIALN	P16
5877613	28191500T026 TIALN	P16
5877614	28191600T026 TIALN	P16
5877615	28191800T026 TIALN	P16
5877616	28192000T032 TIALN	P16
5877617	28190300T007 UNCOATED	P16
5877618	28190400T008 UNCOATED	P16
5877619	28190500T010 UNCOATED	P16
5877620	28190600T010 UNCOATED	P16
5877621	28190700T013 UNCOATED	P16
5877622	28190800T016 UNCOATED	P16
5877623	28190900T016 UNCOATED	P16
5877624	28191000T019 UNCOATED	P16
5877625	28191200T022 UNCOATED	P16
5877626	28191400T022 UNCOATED	P16
5877627	28191500T026 UNCOATED	P16
5877628	28191600T026 UNCOATED	P16
5877629	28191800T026 UNCOATED	P16
5877630	28192000T032 UNCOATED	P16
5880362	D0110200T006 TIALN	P19
5880363	D0010300T004 TIALN	P19
5880364	D0110300T007 TIALN	P19
5880365	D0010400T005 TIALN	P19
5880366	D0110400T008 TIALN	P19
5880367	D0110500T010 TIALN	P19
5880368	D0110600T010 TIALN	P19
5880369	D0110700T013 TIALN	P19
5880370	D0110800T016 TIALN	P19
5880381	D0111000T019 TIALN	P19
5880382	D0111200T022 TIALN	P19
5880383	D0111400T022 TIALN	P19
5880384	D0111600T026 TIALN	P19
5880385	D0012000T020 TIALN	P19
5880386	D0112000T032 TIALN	P19
5880387	40010100T004 TIALN	P21
5880388	40010150T005 TIALN	P21
5880389	40010200T006 TIALN	P21
5880390	40010250T007 TIALN	P21
5880391	40010300T009 TIALN	P21
5880392	40010350T012 TIALN	P21
5880393	40010400T012 TIALN	P21
5880395	40110400T019 TIALN	P21
5880396	40210400T031 TIALN	P21
5880397	40210500T014 TIALN	P21
5880398	40010600T020 TIALN	P21
5880399	40110600T028 TIALN	P21
5880400	40210600T038 TIALN	P21
5880401	40010800T020 TIALN	P21
5880402	40110800T028 TIALN	P21
5880403	40210800T040 TIALN	P21
5880404	40011000T022 TIALN	P21
5880405	40111000T032 TIALN	P21
5880406	40211000T045 TIALN	P21
5880407	40011200T025 TIALN	P22
5880408	40111200T045 TIALN	P22
5880409	40211200T075 TIALN	P22
5880410	40011400T032 TIALN	P22
5880411	40011600T032 TIALN	P22
5880412	40012000T038 TIALN	P22
5880413	40112000T075 TIALN	P22
5880425	40010100T004 UNCOATED	P21
5880426	40010150T005 UNCOATED	P21
5880427	40010200T006 UNCOATED	P21
5880428	40010250T007 UNCOATED	P21
5880429	40010300T009 UNCOATED	P21
5880430	40010400T012 UNCOATED	P21
5880431	40110400T019 UNCOATED	P21
5880432	40210400T031 UNCOATED	P21
5880433	40010500T014 UNCOATED	P21
5880435	40010600T020 UNCOATED	P21
5880436	40110600T028 UNCOATED	P21
5880437	40210600T038 UNCOATED	P21
5880438	40010800T020 UNCOATED	P21
5880439	40110800T028 UNCOATED	P21
5880440	40210800T040 UNCOATED	P21
5880441	40011000T022 UNCOATED	P21
5880442	40111000T032 UNCOATED	P21
5880443	40211000T045 UNCOATED	P21
5880444	40011200T025 UNCOATED	P22
5880445	40111200T045 UNCOATED	P22
5880446	40211200T075 UNCOATED	P22
5880447	40011400T032 UNCOATED	P22
5880448	40011600T032 UNCOATED	P22
5880449	40012000T038 UNCOATED	P22
5880450	40112000T075 UNCOATED	P22
5880451	28380200T007 TIALN	P20
5880452	28380300T007 TIALN	P20
5880453	28380400T008 TIALN	P20
5880454	28380500T010 TIALN	P20
5880455	28380600T010 TIALN	P20
5880456	28380800T016 TIALN	P20
5880457	28381000T019 TIALN	P20
5880458	28381200T022 TIALN	P20
5880459	28381400T022 TIALN	P20
5880460	28381600T026 TIALN	P20
5880461	28382000T032 TIALN	P20
5880462	28380300T007 UNCOATED	P20
5880463	28380400T008 UNCOATED	P20
5880464	28380500T010 UNCOATED	P20
5880465	28380600T010 UNCOATED	P20
5880466	28380800T016 UNCOATED	P20
5880467	28381000T019 UNCOATED	P20
5880468	28381200T022 UNCOATED	P20
5880469	28381400T022 UNCOATED	P20
5880470	28381600T026 UNCOATED	P20
5880471	28382000T032 UNCOATED	P20
5883097	XNPU15T608ERML WP25PM	J37
5883098	XNPU15T608ERML WP40PM	J37
5883099	XNPU15T608ERML WU35PM	J37
5883447	XNPU15T616SRMM WP25PM	J37
5883448	XNPU15T616SRMM WP40PM	J37
5883449	XNPU15T616SRMM WU35PM	J37
5883450	XNPU15T616SRMM WP35CM	J37
5883521	XNPU15T616SRMM WK15PM	J37
5883522	XNPU15T616SRMM WK15CM	J37
5885722	CCGW060204FST WDN00U	B197
5885723	CCGW09T304FST WDN00U	B197
5885724	CCGW09T308FST WDN00U	B197
5885725	CNGA120404FST WDN00U	B200
5885726	CNGA120408FST WDN00U	B200
5885758	CPGW060204FWST WDN00U	B204
5885759	CPGW09T308FWST WDN00U	B204
5885760	CPGW120408FWST WDN00U	B204
5885774	DNGA150404FST WDN00U	B207
5885775	DNGA150408FST WDN00U	B207
5885776	DNMS150404FST WDN00U	B209
5885777	DNMS150408FST WDN00U	B209
5885778	DPGW070202FST WDN00U	B210
5885779	DPGW070204FST WDN00U	B210
5885780	DPGW11T304FST WDN00U	B210
5885791	DPGW11T304FWST WDN00U	B210
5885792	DPGW070204FWST WDN00U	B210
5890728	XNPU15T612SRMM WP25PM	J37
5890729	XNPU15T612SRMM WP40PM	J37
5890730	XNPU15T612SRMM WU35PM	J37
5890761	XNPU15T612SRMM WP35CM	J37
5890762	XNPU15T612SRMM WK15PM	J37
5890763	XNPU15T612SRMM WK15CM	J37
5890821	XNGU15T604ERML WP25PM	J36
5890822	XNGU15T604ERML WP40PM	J36
5890823	XNGU15T604ERML WU35PM	J36
5895291	HNGJ0704ANENLD WP25PM	H8, H16, H21
5895292	HNGJ0704ANENLD WP35CM	H8, H16, H21
5895293	HNPJ0704ANSNGD WP25PM	H9, H17, H22
5895294	HNPJ0704ANSNGD WP35CM	H9, H17, H22
5895295	HNPJ0704ANSNHD WP25PM	H9, H17, H22
5895296	HNPJ0704ANSNHD WP35CM	H9, H17, H22
5895297	HNPJ070432ANSNHD WP40PM	H9, H17, H22
5895298	XNGJ0704ANENLD3W WP25PM	H17
5895299	XNGJ0704ANENLD3W WP40PM	H17
5895346	HNGJ0905ANENLD WP25PM	H33, H39
5895347	HNGJ0905ANENLD WP35CM	H33, H39

Order No.	Catalogue No.	Page(s)
5895348	HNGJ0905ANENLD WP40PM	H33, H39
5895349	HNGJ0905ANSNGD WP35CM	H28, H34, H40
5895350	HNGJ0905ANSNGD WP40PM	H28, H34, H40
5895371	HNGJ0905ANSNHD WP25PM	H28, H34, H40
5895372	HNGJ0905ANSNHD WP35CM	H28, H34, H40
5895373	HNGJ0905ANSNHD WP40PM	H28, H34, H40
5895374	HNPJ0905ANSNGD WP25PM	H27, H34, H40
5895375	HNPJ0905ANSNGD WP35CM	H27, H34, H40
5895376	HNPJ0905ANSNHD WP25PM	H28, H34, H40
5895377	HNPJ0905ANSNHD WP35CM	H28, H34, H40
5895378	HNPJ090543ANSNHD WP25PM	H28, H34, H40
5895379	HNPJ090543ANSNHD WP35CM	H28, H34, H40
5895380	HNPJ090543ANSNHD WP40PM	H28, H34, H40
5895381	XNGJ0905ANSNGD3W WP25PM	H35
5895382	XNGJ0905ANSNGD3W WP40PM	H35
5895536	SNMT1205AZR31 WP25PM	H55
5895537	SNMT1205AZR31 WP35CM	H55
5895538	SNKT1505AZR31 WP25PM	H59
5895539	SNKT1505AZR31 WP35CM	H59
5895540	SNKT1505AZR31 WP40PM	H59
5895782	HPGT06T3DZENGD WP25PM	H47
5895783	HPGT06T3DZENGD WP40PM	H47
5895784	HPGT06T3DZERLD WP25PM	H46
5895785	HPGT06T3DZERLD WP40PM	H46
5895786	HPGT06T3DZERGD3W WP25PM	H47
5895787	HPGT06T3DZERGD3W WP40PM	H47
5895788	HPPT06T3DZENGD WP25PM	H47
5895789	HPPT06T3DZENGD WP40PM	H47
5895790	HPPT06T3DZENGD WP35CM	H47
5901354	XDPT110424PDSRMM WP40PM	J10
5901355	XDPT110424PDSRMM WP25PM	J10
5903644	123506599 WP40PM	L19
5903645	123506600 WP40PM	L20
5903646	123506601 WP40PM	L19
5903647	123506602 WP40PM	L20
5903648	123506599 WK15CM	L19
5903649	123506600 WK15CM	L20
5903650	123506601 WK15CM	L19
5903671	123506602 WK15CM	L20
5903672	123506599 WP35CM	L19
5903673	123506600 WP35CM	L20
5903674	123506601 WP35CM	L19
5903675	123506602 WP35CM	L20
5903676	CPNT060204T WP35CM	L5
5903677	CPNT080308T WP35CM	L5
5903678	CPNT09T308T WP35CM	L6
5903679	CPNT120408T WP35CM	L6
5903680	CPNT060204T WK15CM	L5
5903701	CPNT080308T WK15CM	L5
5903702	CPNT09T308T WK15CM	L6
5903703	CPNT120408T WK15CM	L6
5903704	MDHX09T308 WP40PM	L26
5903705	MDHW120408 WP40PM	L29
5903706	MDHX09T308 WK15CM	L26
5903707	MDHW120408 WK15CM	L29
5903708	MDHX09T308 WP35CM	L26
5903709	MDHW120408 WP35CM	L29
5903710	MDHX09T308 WU35PM	L26
5903721	MDHW120408 WU35PM	L29
5903722	MDHX09T308 WP25PM	L26
5903723	MDHW120408 WP25PM	L29
5908742	CNMG120404MS WS10PT	B40
5908743	CNMG120404MS WS25PT	B40
5908744	CNMG120404MS WU10HT	B40
5908745	CNMG120408MS WS10PT	B40
5908746	CNMG120408MS WS25PT	B40
5908747	CNMG120408MS WU10HT	B40
5908748	CNMG120412MS WS10PT	B40
5908749	CNMG120412MS WS25PT	B40
5908750	CNMG120412MS WU10HT	B40
5908751	CNMG120416MS WS10PT	B40
5908752	CNMG120416MS WS25PT	B40
5908753	CNMG120416MS WU10HT	B40
5908754	CNMG160608MS WS10PT	B40
5908755	CNMG160608MS WS25PT	B40
5908756	CNMG160608MS WU10HT	B40
5908757	CNMG160612MS WS10PT	B40
5908758	CNMG160612MS WS25PT	B40
5908759	CNMG160612MS WU10HT	B40
5908760	CNMG190608MS WS10PT	B40
5908761	CNMG190608MS WS25PT	B40
5908762	CNMG190608MS WU10HT	B40
5908763	CNMG190612MS WS10PT	B40
5908764	CNMG190612MS WS25PT	B40
5908765	CNMG190612MS WU10HT	B40
5908766	CNMG190616MS WS10PT	B40
5908767	CNMG190616MS WS25PT	B40
5908768	CNMG190616MS WU10HT	B40
5908769	DNMG110408MS WS10PT	B58
5908770	DNMG110408MS WS25PT	B58
5908781	DNMG110408MS WU10HT	B58
5908782	DNMG150404MS WS10PT	B58
5908783	DNMG150404MS WS25PT	B58
5908784	DNMG150404MS WU10HT	B58
5908785	DNMG150408MS WS10PT	B58
5908787	DNMG150408MS WS25PT	B58
5908788	DNMG150408MS WU10HT	B58
5908789	DNMG150412MS WS10PT	B58
5908790	DNMG150412MS WS25PT	B58
5908791	DNMG150412MS WU10HT	B58
5908792	DNMG150604MS WS10PT	B58
5908793	DNMG150604MS WS25PT	B58
5908794	DNMG150604MS WU10HT	B58
5908795	DNMG150608MS WS10PT	B58
5908796	DNMG150608MS WS25PT	B58
5908797	DNMG150608MS WU10HT	B58
5908798	DNMG150612MS WS10PT	B58
5908799	DNMG150612MS WS25PT	B58
5908800	DNMG150612MS WU10HT	B58
5908847	SNMG120408MS WS10PT	B73
5908848	SNMG120408MS WS25PT	B73
5908849	SNMG120408MS WU10HT	B73
5908850	SNMG120412MS WS10PT	B73
5908921	SNMG120412MS WS25PT	B73
5908922	SNMG120412MS WU10HT	B73
5908923	SNMG150612MS WS25PT	B73
5908924	SNMG150612MS WU10HT	B73
5908925	SNMG190612MS WS10PT	B73
5908926	SNMG190612MS WS25PT	B73
5908927	TNMG160404MS WS10PT	B86
5908928	TNMG160404MS WS25PT	B86
5908929	TNMG160404MS WU10HT	B86
5908930	TNMG160408MS WS10PT	B86
5908931	TNMG160408MS WS25PT	B86
5908932	TNMG160408MS WU10HT	B86
5908933	TNMG220404MS WS10PT	B86
5908934	TNMG220404MS WS25PT	B86
5908935	TNMG220404MS WU10HT	B86
5908936	TNMG220408MS WS10PT	B86
5908937	TNMG220408MS WS25PT	B86
5908938	TNMG220408MS WU10HT	B86
5908939	TNMG220412MS WS10PT	B86
5908940	TNMG220412MS WS25PT	B86
5908941	TNMG220412MS WU10HT	B86
5908942	TNMG270608MS WS25PT	B86
5908943	TNMG270608MS WU10HT	B86
5908944	VNMG160404MS WS10PT	B98
5908945	VNMG160404MS WS25PT	B98
5908946	VNMG160404MS WU10HT	B98
5908947	VNMG160408MS WS10PT	B98
5908948	VNMG160408MS WS25PT	B98
5908949	VNMG160408MS WU10HT	B98
5908950	VNMG220404MS WS10PT	B98
5908961	VNMG220404MS WS25PT	B98
5908962	VNMG220404MS WU10HT	B98
5908963	VNMG220408MS WS10PT	B98
5908964	VNMG220408MS WS25PT	B98
5908965	VNMG220408MS WU10HT	B98
5908966	WNMG060408MS WS10PT	B102
5908967	WNMG060408MS WS25PT	B102
5908968	WNMG060408MS WU10HT	B102
5908969	WNMG080404MS WS10PT	B102
5908970	WNMG080404MS WS25PT	B102
5908971	WNMG080404MS WU10HT	B102
5908972	WNMG080408MS WS10PT	B102
5908973	WNMG080408MS WS25PT	B102
5908974	WNMG080408MS WU10HT	B102
5910033	HNEC0905ANSN WK25YM	H35
5933940	XDCT110404PDFRALP WN10HM	J11
5936171	XDCT110408PDFRALP WN10HM	J11
5949204	XNGU15T604SRMM WP25PM	J37
5949205	XNGU15T604SRMM WP40PM	J37
5949206	XNGU15T604SRMM WU35PM	J37
5966234	VSM490KITCD25Z02WP40PM	J39
5966235	VSM490KITCD32Z03WP40PM	J39
5966236	VSM490KITSD40Z04WP40PM	J39
5966237	VSM490KITSD50Z05WP40PM	J39
5966238	VSM490KITSD50Z06WP40PM	J39
5966239	VSM490KITSD63Z06WP40PM	J39
5966240	VSM490KITSD80Z07WP40PM	J39
5966251	VSM490KITSD100Z08WP40PM	J39
5966252	VSM490KITCD25Z02WU35PM	J40
5966253	VSM490KITCD32Z03WU35PM	J40
5966255	VSM490KITSD40Z04WU35PM	J40
5966256	VSM490KITSD50Z05WU35PM	J40
5966257	VSM490KITSD50Z06WU35PM	J40
5966258	VSM490KITSD63Z06WU35PM	J40
5966259	VSM490KITSD80Z07WU35PM	J40
5966260	VSM490KITCD25Z02WK15PM	J40
5966261	VSM490KITCD32Z03WK15PM	J40
5966262	VSM490KITSD40Z04WK15PM	J40
5966263	VSM490KITSD50Z05WK15PM	J40
5966264	VSM490KITSD50Z06WK15PM	J40
5966265	VSM490KITSD63Z07WK15PM	J40
5966266	VSM490KITSD80Z09WK15PM	J40
5966267	VSM490KITSD100Z11WK15PM	J40
5978039	77NE10004T WS15PE	044
5978040	77NE10024T WS15PE	044
5978092	771E10004T WS15PE	045
5978093	771E10024T WS15PE	045
5978094	772E10004T WS15PE	045
5978095	772E10024T WS15PE	045
5978096	77NE12005T WS15PE	044
5978097	77NE12025T WS15PE	044
5978098	771E12005T WS15PE	045
5978099	771E12025T WS15PE	045
5978100	772E12005T WS15PE	045
5978101	772E12025T WS15PE	045
5978102	772E12005V WS15PE	045
5978103	772E12025V WS15PE	045
5978104	77NE16006T WS15PE	044
5978105	77NE16026T WS15PE	044
5978106	771E16006T WS15PE	045
5978107	771E16026T WS15PE	045
5978108	772E16006T WS15PE	045
5978109	772E16026T WS15PE	045
5978110	772E16006V WS15PE	045
5978111	772E16026V WS15PE	045
5978112	77NE20007T WS15PE	044
5978113	77NE20027T WS15PE	044
5978114	771E20007T WS15PE	045
5978115	771E20027T WS15PE	045
5978116	772E20007T WS15PE	045
5978117	772E20027T WS15PE	045
5978118	772E20007V WS15PE	045
5978119	772E20027V WS15PE	045
5980398	XDPT110420PDSRMM WP40PM	J10
5980399	XDPT110420PDSRMM WP25PM	J10
5980400	XDPT110420PDSRMM WP35CM	J10
5983390	SXHX060204R20 WP20PH	U17
5983701	SXHX060208R20 WP20PH	U17
5983702	SXHX070304R20 WP20PH	U17
5983703	SXHX070308R20 WP20PH	U17
5983704	SXHX090304R20 WP20PH	U17
5983705	SXHX090308R20 WP20PH	U17
5983706	VXGX10030234 WP20PH	U17
5987689	XDPT170404PESRMM WP40PM	J27
5987690	XDPT170404PESRMM WU35PM	J27
5987946	XDPT170408PESRMM WP40PM	J27
5987947	XDPT170408PESRMM WP35CM	J27
5987948	XDPT170408PESRMM WK15CM	J27
5987949	XDPT170408PESRMM WP25PM	J27
5987950	XDPT170408PESRMM WU35PM	J27
5988055	VSM17D025Z02A25XD17L110	J22
5988056	VSM17D025Z02A25XD17L170	J22
5988057	VSM17D032Z03A32XD17L120	J22
5988058	VSM17D032Z03A32XD17L210	J23
5988059	VSM17D040Z04A32XD17L130	J22
5988060	VSM17D040Z04A32XD17L250	J23
5988091	VSM17D025Z02M12XD17	J20
5988092	VSM17D032Z03M16XD17	J20
5988093	VSM17D040Z04M16XD17	J20
5988094	VSM17D040Z04S16XD17	J24
5988095	VSM17D050Z04S22XD17	J24
5988096	VSM17D050Z05S22XD17	J24
5988097	VSM17D063Z05S22XD17	J24
5988098	VSM17D080Z06S27XD17	J24
5988099	VSM17D100Z08S32XD17	J24
5988100	VSM17D125Z09S40XD17	J24

Order No.	Catalogue No.	Page(s)
5988101	VSM17D160Z12S40XD17	J24
5988102	VSM17D025Z02B25XD17	J21
5988103	VSM17D032Z03B32XD17	J21
5988104	VSM17D040Z04B40XD17	J21
5988107	VSM17D032Z02A32XD17L120	J22
5988108	VSM17D032Z02A32XD17L210	J23
5988109	VSM17D040Z03A32XD17L130	J22
5988110	VSM17D040Z03A32XD17L250	J23
5988131	VSM17D40Z03M016XD17	J20
5988132	VSM17D32Z02M016XD17	J20
5988133	VSM17D080Z07S27XD17	J24
5988134	VSM17D050Z06S22XD17	J24
5988135	VSM17D063Z06S22XD17	J24
5988136	VSM17D032Z02B32XD17	J21
5988137	VSM17D040Z03B40XD17	J21
5988138	XDPT170412PESRMM WK15CM	J27
5988139	XDPT170412PESRMM WP40PM	J27
5988140	XDPT170412PESRMM WP35CM	J27
5988151	XDPT170412PESRMM WP25PM	J27
5988152	XDPT170412PESRMM WU35PM	J27
5988153	XDPT170416PESRMM WK15CM	J27
5988154	XDPT170416PESRMM WP40PM	J27
5988155	XDPT170416PESRMM WP25PM	J27
5988156	XDPT170416PESRMM WP35CM	J27
5988158	XDPT170420PESRMM WP25PM	J27
5988159	XDPT170420PESRMM WP40PM	J27
5988160	XDPT170420PESRMM WP35CM	J27
5988202	XDPT170424PESRMM WP40PM	J27
5988203	XDPT170424PESRMM WP25PM	J27
5988204	XDPT170432PESRMM WP35CM	J27
5988205	XDPT170432PESRMM WP40PM	J27
5988206	XDPT170432PESRMM WP25PM	J27
5988969	XDPT170440PESRMM WP40PM	J27
5988970	XDPT170440PESRMM WP25PM	J27
5988981	XDCT170408PEERML WP40PM	J25
5988982	XDCT170408PEERML WP35CM	J25
5988983	XDCT170408PEERML WP25PM	J25
5988986	XDCT170412PEERML WP40PM	J25
5988987	XDCT170412PEERML WP35CM	J25
5988988	XDCT170412PEERML WP25PM	J25
5989010	XDCT170404PEERML WP25PM	J25
5989052	XDPT170408PESRMH WP40PM	J27
5989053	XDPT170408PESRMH WK15CM	J27
5989054	XDPT170408PESRMH WP35CM	J27
5991815	XDPT170412PESRMH WP40PM	J27
5991816	XDPT170412PESRMH WP35CM	J27
5991817	XDPT170412PESRMH WK15CM	J27
6001238	XDCT170440PEFRALP WN25PM	J26
6001239	XDCT170440PEERML WP25PM	J25
6001240	XDCT170432PEFRALP WN25PM	J26
6001251	XDCT170432PEERML WP25PM	J25
6001252	XDCT170424PEFRALP WN25PM	J26
6001253	XDCT170424PEERML WP25PM	J25
6001254	XDCT170420PEFRALP WN25PM	J26
6001255	XDCT170420PEERML WP25PM	J25
6001256	XDCT170416PEFRALP WN25PM	J26
6001257	XDCT170416PEERML WP25PM	J25
6001537	XDCT170412PEFRALP WN25PM	J26
6003570	XNGU15T608SRMH WP25PM	J37
6003721	XNGU15T608SRMH WP40PM	J37
6003722	XNGU15T608SRMH WU35PM	J37
6003723	XNGU15T608SRMH WP35CM	J37
6003724	XNGU15T608SRMH WK15PM	J37
6003725	XNGU15T608SRMH WK15CM	J37
6007220	XDCT170404PEFRALP WN25PM	J26
6007341	XDCT170404PEFRALP WN10HM	J26
6007342	XDCT170412PEFRALP WN10HM	J26
6007344	XDCT170408PEFRALP WN25PM	J26
6007345	XDCT170408PEFRALP WN10HM	J26
6018004	CCGW09T308S01015MT WBH30P	B198
6018006	CNGA120404S01025MT WBH30P	B201
6018008	CNGA120408S01025MT WBH30P	B201
6018009	CNGA120412S01020MT WBH30P	B201
6018010	CNGA120412S01025MT WBH30P	B201
6018081	CPGW060202S01015C WBH30P	B203
6018082	CPGW060204S01015C WBH30P	B203
6018084	CPGW09T304S01015MT WBH30P	B205
6018085	CPGW09T308S01015MT WBH30P	B205
6018090	DNGA150404S01025MT WBH30P	B208
6018092	TPGW110204S01015C WBH30P	B215
6018093	TPGW110208S01015C WBH30P	B215
6018094	VBGW160404S01015MT WBH30P	B216
6018095	VBGW160408S01015MT WBH30P	B216
6018096	VNGA160404S01025MT WBH30P	B217
6018097	VNGA160408S01025MT WBH30P	B217
6023126	VDS403A01000 WU25PD	T22
6023127	VDS403A01016 WU25PD	T22
6023128	VDS403A01067 WU25PD	T22
6023129	VDS403A01100 WU25PD	T22
6023130	VDS403A01181 WU25PD	T22
6023131	VDS403A01191 WU25PD	T22
6023132	VDS403A01200 WU25PD	T22
6023133	VDS403A01300 WU25PD	T22
6023134	VDS403A01321 WU25PD	T22
6023135	VDS403A01397 WU25PD	T22
6023136	VDS403A01400 WU25PD	T22
6030376	XNGU15T616SRMH WP25PM	J37
6030377	XNGU15T616SRMH WP35CM	J37
6030378	XNGU15T616SRMH WK15PM	J37
6030380	XNGU15T616SRMH WK15CM	J37

Catalogue No.	Page(s)
125.025	J35, M12, M85, M91, M96
125.230	J8, J35, M12, M85, M91, M96
125.825	J35, M6
129.025	M55, M62, M67
129.512	M67
170.004	C34
170.023	L18
170.025	J20–24, L18, M20–23, M28–31
170.026	M36
170.028	J4–8
191.405	C97–101, C106–110, C112–113, C118–121, C123–129
191.406	C92–94, C97–109, C112, C119–122, C124, C126–129
191.407	C92–105, C108–109, C112, C120, C124
191.725	J20–24
191.848	M20–23
192.432	J4–8, V10, V13, V16, V19
192.932	M36
193.281	V10, V13, V16, V19
193.332	V10, V13, V16, V19
193.338	M59–62
193.341	M46–48
193.342	M52–55, M59–62
193.343	M36, M66–67
193.364	M42–43
193.383	M67
193.492	M28–31
420.200	J35, M67
470.232	M67
470.233	J35
511.018	C22, C26–30, C60
511.022	C60, C104–105
511.023	C20–22, C25–30, C60–61, C104–105
511.024	C23–24
511.025	C20–22, C25–27, C60, C104–105
511.028	C29
511.030	C61
511.033	C20–22, C25–27
511.038	C25–27
511.060	C23
512.013	C28–29, C60
512.023	C28–29, C60
512.025	C25–27, C105
512.031	C29
512.053	C26–27
512.060	C23
512.063	C25–27, C105
512.083	C25–27
512.092	C25–27
512.100	C34
512.101	C34
512.111	C22
512.112	C20–22, C60, C104
512.117	C20–22, C60, C104
512.123	C20–22
512.134	C30
512.135	C30, C61
512.153	C23–24
513.018	C28–30, C60
513.019	C22, C26–27
513.020	C34
513.023	C20–30, C60–61, C104–105
513.025	C20–22, C25–27, C29, C60, C104–105
513.033	C20–22, C25–27
513.038	C25–27
513.060	C23
513.123	C34
514.018	C22
514.112	C61
514.118	C23, C26–30, C60
514.122	C60, C104–105
514.123	C20–22, C25–30, C60–61, C104–105
514.125	C20–22, C25–27, C60, C104–105
514.128	C23–24, C29
514.133	C20–22, C25–27
514.138	C25–27
515.018	C20–30, C60–61
515.022	C20–22, C25–27, C29, C60
515.028	C25–27
551.129	C34
551.130	C34
551.316	C31, C62–64
551.317	C31–34, C62, C64
551.332	C32
551.333	C35
552.210	C64
552.220	C31, C62
552.221	C31–32, C62
552.225	C63
552.228	C32–33
552.229	C35
552.230	C35
552.232	C63–64
552.240	C33–34
554.252	C31–35, C62–64
554.253	C62
554.254	C63
557.111	C31, C33–35, C62, C64
557.125	C32–33
206264	E122
206265	E122
206266	E122
206271	E125
206272	E122
206273	E122
206274	E122
206275	E122
206276	E122
206277	E122
206278	E122
206279	E122
206280	E122
206281	E122
206282	E122
206283	E122
206284	E122
206285	E122
206408	E126
206411	E127
206417	E123
206418	E123
206419	E123
206424	E123
206440	E125
206443	E127
206445	E122
206446	E122
206447	E122
206448	E122
206449	E122
206450	E122
206451	E122
206452	E122
206453	E122
206454	E122
206455	E122
206456	E122
206506	E128
206507	E128
206509	E128
206518	E124–125
206519	E124–125
206522	E124–125
206523	E124–125
309105	E127
309111	E127
310102	E126
310108	E126
310109	E126
331101	E125
331102	E125
331109	E125
331110	E125
331117	E125
331118	E125
333101	E124
333102	E124
333103	E124
333104	E124
333111	E124
409182	E128
409183	E128
409185	E128
435101	E107, E126
435102	E126
435103	E127
435104	E126
435105	E126
435106	E127
435109	E126
435110	E126
435116	E126
435117	E126
435126	E122
435127	E122
435128	E125
435129	E125
435130	E122
435131	E122
435136	E127
435137	E127
435140	E122
435141	E122
435142	E125
435143	E125
435148	E126
435149	E126
435150	E126
435151	E126
435152	E122
435153	E122
435154	E124
435155	E124
435156	E124
435157	E124
435170	E122
435171	E122
435180	E123
435181	E123
435194	E124
435200	E122
435201	E122
435202	E122
435203	E122
435204	E122
435205	E122
606243	E128
606244	E128
606247	E124–125
613139	E128
619168	E35
12146006300	M102–104
12146010000	V10, V13, V16, V19
12146034500	H5–7, H12–15, H20, H26, H30, H32, H38
12146101000	H26
12146101800	H26
12146107000	H15, H20, H26, H32, H38, J24
12146109200	H15, H20, H32
12146109400	H15, H20, H26, H32, H38
12146111000	H15, H20, H26, H32, H38
12146111100	H26, H32, H38, J24
12146111200	H32
12146111300	H32
12146111400	H32
12146120500	H7, H15, H20, H26, H38, J8, M6, M12
12147549000	M42–43, M46–48
12148000600	H44–45, I4–6, J44, K4, L4, M78–79, M84–85
12148005900	W51
12148007500	H52–53, H58, I7, J48, L4, L11, M90–91, M96, V10, V13, V16, V19
12148050000	L24–25, L27–28
12148068700	C68, C74, C77, L4, W43, W45–49, W51, W54–55
12148082400	H5–7, H12–15, H20, H26, H30, H32, H38, M52–55, M59–62, V10, V13, V16, V19, W42, W44–45, W54–55
12148086800	M102–104
12148099300	M102–105, M118–120, M124–126
12148099400	M66–67, W42–45
12148783700	K4
12191062686	E107
12346233000	W38
12346292200	W52–53
12748701000	H7, H15, H20, H26, H32, H38
022801-000020 K30F	088–89
022801-000025 K30F	088–89
022801-000030 K30F	088–89
022801-000035 K30F	088–89
022801-000040 K30F	088, 090
022801-000050 K30F	088, 090
022801-000060 K30F	088, 090
022801-000070 K30F	088, 090
022801-000080 K30F	088, 090
022801-000090 K30F	089–90
022801-000120 K30F	089–90
022801-000200 K30F	089–90
022802-000020 K30F	088
022802-000025 K30F	088
022802-000030 K30F	088
022802-000035 K30F	088
022802-000040 K30F	088
022802-000045 K30F	088, 090
022802-000050 K30F	088
022802-000060 K30F	088
022802-000090 K30F	089
022802-000100 K30F	089–90

Catalogue No.	Page(s)
022802-000140 K30F	089–90
022802-000200 K30F	089
022804-000020 K30F	088–89
022804-000025 K30F	088–89
022804-000030 K30F	088–89
022804-000035 K30F	088–89
022804-000040 K30F	088, 090
022804-000045 K30F	088, 090
022804-000050 K30F	088, 090
022804-000060 K30F	088, 090
022804-000070 K30F	088, 090
022804-000080 K30F	088, 090
022804-000090 K30F	089–90
022804-000100 K30F	089–90
022804-000120 K30F	089–90
022804-000140 K30F	089–90
022804-000160 K30F	089–90
022804-000200 K30F	089–90
022806-000020 K30F	088
022806-000025 K30F	088
022806-000030 K30F	088
022806-000035 K30F	088
022806-000040 K30F	088
022806-000045 K30F	088
022806-000050 K30F	088
022806-000060 K30F	088
022806-000070 K30F	088
022806-000080 K30F	088
022806-000090 K30F	089
022806-000100 K30F	089
022806-000120 K30F	089
022806-000140 K30F	089
022806-000160 K30F	089
022806-000180 K30F	089–90
022806-000200 K30F	089
022813-000060 K30F	063
022813-000080 K30F	063
022813-000100 K30F	063
022813-000120 K30F	063
022813-000160 K30F	063
022813-000200 K30F	063
022813-000250 K30F	063
022814-000040 K10F	0135
022814-000050 K10F	0135
022814-000060 K10F	0135
022814-000080 K10F	0135
022814-000100 K10F	0135
022814-000120 K10F	0135
022814-000140 K10F	0135
022814-000160 K10F	0135
022814-000180 K10F	0135
022814-000200 K10F	0135
022817-000040 K10F	0135
022817-000050 K10F	0135
022817-000060 K10F	0135
022817-000080 K10F	0135
022817-000100 K10F	0135
022817-000120 K10F	0135
022817-000140 K10F	0135
022817-000160 K10F	0135
022817-000180 K10F	0135
022817-000200 K10F	0135
022818-000060 K30F	064
022818-000080 K30F	064
022818-000100 K30F	064
022818-000120 K30F	064
022818-000160 K30F	064
022818-000200 K30F	064
022846-000060 K30F	065
022846-000080 K30F	065
022846-000100 K30F	065
022846-000120 K30F	065
022846-000160 K30F	065
022846-000200 K30F	065
022846-000250 K30F	065
022849-000020 K10F	0133
022849-000030 K10F	0133
022849-000040 K10F	0133
022849-000050 K10F	0133
022849-000060 K10F	0133
022849-000080 K10F	0133
022849-000100 K10F	0133
022849-000120 K10F	0133
022852-003005 K10F	0137
022852-004005 K10F	0137
022852-004010 K10F	0137
022852-005005 K10F	0137
022852-005010 K10F	0137
022852-006005 K10F	0137
022852-006010 K10F	0137
022852-006020 K10F	0137
022852-008005 K10F	0137
022852-008010 K10F	0137
022852-008020 K10F	0137
022852-010005 K10F	0137
022852-010010 K10F	0137
022852-010020 K10F	0137
022852-012005 K10F	0137
022852-012010 K10F	0137
022852-012020 K10F	0137
022852-016005 K10F	0137
022852-016010 K10F	0137
022852-016020 K10F	0137
022852-016030 K10F	0137
023007-000004 K30F	0116
023007-000005 K30F	0116
023007-000006 K30F	0116
023007-000008 K30F	0116
023007-000010 K30F	0116
023007-000012 K30F	0116
023007-000015 K30F	0116
023007-000018 K30F	0116
023007-000020 K30F	0116
023007-000025 K30F	0116
023007-000030 K30F	0116
024101-000060 PKD	0138
024101-000080 PKD	0138
024101-000100 PKD	0138
024111-000020 K10F-DIA	098
024111-000030 K10F-DIA	098
024111-000040 K10F-DIA	098
024111-000050 K10F-DIA	098
024111-000060 K10F-DIA	098
024111-000080 K10F-DIA	098
024111-000100 K10F-DIA	098
024111-000120 K10F-DIA	098
024112-006005 K10F-DIA	097
024112-008010 K10F-DIA	097
024112-010020 K10F-DIA	097
026621-000080 CERMET	096
026621-000120 CERMET	096
026621-000160 CERMET	096
026621-000200 CERMET	096
050221-000014 K10	W8
050221-000015 K10	W8
050221-000016 K10	W8
050221-000020 K10	W8
050221-000022 K10	W8
050221-000025 K10	W8
050221-000028 K10	W8
050221-000030 K10	W8
050221-000032 K10	W8
050221-000035 K10	W8
050221-000040 K10	W8
050221-000045 K10	W8
050221-000050 K10	W8
050221-000055 K10	W8
050221-000060 K10	W8
050221-000065 K10	W8
050221-000070 K10	W8
050221-000075 K10	W8
050221-000080 K10	W8
050221-000085 K10	W8
050221-000090 K10	W8
050221-000095 K10	W8
050221-000100 K10	W8
050222-000200 K10F	W13
050222-000300 K10F	W13
050222-000400 K10F	W13
050227-000200 K10F	W9
050227-000300 K10F	W9
050227-000400 K10F	W9
050227-000500 K10F	W9
050227-000600 K10F	W9
050227-000800 K10F	W9
050227-001000 K10F	W9
050227-001200 K10F	W9
050227-001400 K10F	W9
050270-000500 K10F	W14
050270-000600 K10F	W14
050270-000800 K10F	W14
050270-001000 K10F	W14
050270-001200 K10F	W14
050270-001400 K10F	W14
050271-000500 K10F	W10
050271-000600 K10F	W10
050271-000800 K10F	W10
050271-001000 K10F	W10
050271-001200 K10F	W10
050271-001400 K10F	W10
050280-001400 K10F	W15
050280-001600 K10F	W15
050280-001800 K10F	W15
050280-002000 K10F	W15
050280-002200 K10F	W15
050280-002400 K10F	W15
050280-002500 K10F	W15
050280-002600 K10F	W15
050280-002800 K10F	W15
050280-003000 K10F	W15
050280-003200 K10F	W15
050281-001400 K10F	W11
050281-001600 K10F	W11
050281-001800 K10F	W11
050281-002000 K10F	W11
050281-002200 K10F	W11
050281-002400 K10F	W11
050281-002500 K10F	W11
050281-002600 K10F	W11
050281-002800 K10F	W11
050281-003000 K10F	W11
12146003800 W	E104
12146009500 W	E104
12146011800 W	V10, V13, V16, V19
12146012600 W	E102–103
12146012700 W	E102–103
12146013400 W	E104
12147519100 W	W38–39, W41
12147522400 W	W64
12147548500 W	L18
12147548600 W	L18
12147562300 W	L18
12147572400 W	L18
12147579300 W	W44–45
12147600100 W	W36–37
12147600200 W	W36–37
12147600300 W	W36–38, W40
12147600400 W	W36–37
12147602200 W	W42–45
12147602300 W	W36–37
12147602400 W	W36–37
12147602500 W	W36–37
12147602600 W	W36–37
12147602700 W	W36–37
12147602800 W	W36–37
12147603900 W	W36–37
12147604000 W	W36–37
12147613500 W	W38
12147617400 W	W50
12147620000 W	W52–53
12147620300 W	W52–53
12147620400 W	W52–53
12147620500 W	W52–53
12147620600 W	W52–53
12147621100 W	W52–53
12147621200 W	W52–53
12147621300 W	W52–53
12147621400 W	W52–53
12147621500 W	W52–53
12147621600 W	W52–53
12147622300 W	W52–53
12147625200 W	W41
12147625400 W	K4, W40
12147665000 W	W39, W42–45
12147666700 W	W40
12147676800 W	L18
12147676900 W	L18
12147677000 W	L18
12147680200 W	W52–53
12147680300 W	W52–53
12147680400 W	W52–53
12147680500 W	W49–50, W52–53
12147680600 W	W52–53
12147680700 W	W52–53
12147739800 W	W41
12147739900 W	W40
12147740200 W	W38
12147789100 W	F75
12148001100 W	F75
12148001300 W	M74
12148005800 W	C67, C70, W51
12148007200 W	H52–53, H58, I7, L4, L11, M90–91, M96, W42, W45
12148021100 W	E107
12148021900 W	E107
12148024100 W	E107
12148024200 W	E107
12148024500 W	E107
12148024800 W	E107
12148031686 TTR	E107
12148032086 TTR	E107
12148032586 W	E107

Catalogue No.	Page(s)
12148036000 W	E104
12148036300 W	C66, C68
12148036700 W	M78–79
12148037700 W	J44, K4
12148038800 W	C44, C68, C72, C74, C77, H44–45, L4, M84–85, W42–43, W54–55
12148040900 W	E106, W42–45, W52–53
12148041000 W	E106, W42–45, W52–53
12148041100 W	E102–103, E106, W39, W42–45, W49–50, W52–53, W56, W58, W60, W62, W65–66
12148041200 W	E106, W41, W52–53, W56–62, W65–66
12148041300 W	E102–104, W41, W49–50, W52–53, W56–63, W65–66
12148041400 W	E104, W52–53, W56–63, W65–66
12148042400 W	W49–50
12148046000 W	E106, W44–45
12148060600 W	E106
12148060700 W	E106
12148060800 W	E106
12148067200 W	L4, L10–11, L24–25, W42
12148069600 W	W42–45
12148079000 W	W52–53
12148080000 W	C72, C74, L10
12148086600 W	L4, L10–11, M74, W42–48, W51, W54–55
12148087100 W	W52–53
12148094300 W	E106
12148094400 W	E106
12148094500 W	E106
12148094600 W	E106
12148094700 W	E106
12148095100 W	I4–6
12148541600 W	W44
12148574000 W	E106
12148574100 W	E106, L24–25, L27–28
12148574900 W	E106
12148575900 W	W52–53
12148580011 TTR	E107
12148580411 W	E107
12148580511PKG W	E107
12148580611 W	E107
12148582511 W	E107
12148586000 W	E107
12148586611 TTR	E107
12148586800 W	E107
12148586900 W	E107
12148587011 TTR	E107
12148587111 TTR	E107
12148588211 W	E107
12148588311 TTR	E107
12148588411 W	E107
12148589200 W	E107
12148589300 W	E107
12148589800 W	E107
12148591011 W	E107
12148591111 W	E107
12148596200 W	E102–103
12148788900 W	M102–105, M118–120, M124–126
12191061900 W	E107
12191062086 W	E107
12191062586 W	E107
12191063286 W	E107
12250023000 W	E102
12250023100 W	E102
12250023200 W	E102
12250025200 W	E102
12250110100 W	E106
12250110200 W	E106
12250110300 W	E106
12250110400 W	E106
12250110500 W	E106
12250110600 W	E106
12250110700 W	E106
12250110800 W	E106
12250110900 W	E106
12250111000 W	E106
12251212500 W	E104
12251213200 W	E104
12251221600 W	E104
12251221900 W	E104
12251222000 W	E104
12251222500 W	E104
12251223200 W	E104
12251233200 W	E104
12251234000 W	E104
12251332000 W	E104
12251342000 W	E104
12251343000 W	E104
12251344000 W	E104
12251352000 W	E104
12251353000 W	E104
12251354000 W	E104
12251355000 W	E104
12251356000 W	E104
12251358000 W	E104
12251368000 W	E104
12251762000 W	E103
12251762100 W	E103
12251762200 W	E103
12251762300 W	E103
12251762400 W	E103
12251762500 W	E103
12251763000 W	E103
12251763100 W	E103
12251763200 W	E103
12251763300 W	E103
12251763400 W	E103
12251763500 W	E103
12251764000 W	E103
12251764100 W	E103
12251764200 W	E103
12251764300 W	E103
12251764400 W	E103
12251764500 W	E103
12251765200 W	E103
12251765300 W	E103
12251765500 W	E103
12251766200 W	E103
12251766300 W	E103
12251766400 W	E103
12251766500 W	E103
12251768400 W	E103
12251768500 W	E103
12251782000 W	E102
12251782100 W	E102
12251783000 W	E102
12251783100 W	E102
12251783200 W	E102
12251783300 W	E102
12251783600 W	E102
12251783700 W	E102
12251784000 W	E102
12251784100 W	E102
12251784200 W	E102
12251784300 W	E102
12251784400 W	E102
12251784500 W	E102
12251785200 W	E102
12251785300 W	E102
12251785400 W	E102
12251785500 W	E102
12251786400 W	E102
12251786500 W	E102
12251788400 W	E102
12251788500 W	E102
12290900800 W	L10
12290901200 W	L10
12290911600 W	L11
12290911800 W	L11
12292510400 W	I4
12292510800 W	I4
12292511000 W	I4
12292511200 W	I6
12292511400 W	I7
12292511600 W	I7
12292550400 W	I5
12292550800 W	I5
12292551000 W	I5
12299510400 W	L18
12299515500 W	L18
12299515600 W	L18
12299515700 W	L18
12299515800 W	L18
12299520400 W	L18
12299525500 W	L18
12299525600 W	L18
12299525700 W	L18
12299525800 W	L18
12299526000 W	L18
12299530400 W	L18
12299535500 W	L18
12299535600 W	L18
12299535800 W	L18
12299536000 W	L18
12299545800 W	L18
12299546000 W	L18
12346292100 W	W52–53
123506599 THM	L19
123506599 WK15CM	L19
123506599 WP35CM	L19
123506599 WP40PM	L19
123506600 THM	L20
123506600 WK15CM	L20
123506600 WP35CM	L20
123506600 WP40PM	L20
123506601 THM	L19
123506601 WK15CM	L19
123506601 WP35CM	L19
123506601 WP40PM	L19
123506602 THM	L20
123506602 WK15CM	L20
123506602 WP35CM	L20
123506602 WP40PM	L20
123567230 TN6030	E98
123567230 TN7525	E98
123567230 TN7535	E98
123567231 TN6030	E98
123567231 TN7525	E98
123567231 TN7535	E98
123567240 TN6030	E98
123567240 TN7525	E98
123567240 TN7535	E98
123567241 TN6030	E98
123567320 THM	E97
123567320 TN6030	E97
123567320 TN7525	E97
123567320 TN7535	E97
123567320 TN8025	E97
123567330 THM	E97
123567330 TN6030	E97
123567330 TN7535	E97
123567330 TN8025	E97
123567340 THM	E97
123567340 TN6030	E97
123567340 TN7525	E97
123567340 TN7535	E97
123567350 THM	E97
123567350 TN6030	E97
123567350 TN7525	E97
123567350 TN7535	E97
123567360 THM	E97
123567360 TN6030	E97
123567360 TN7525	E97
123567360 TN7535	E97
123567380 THM	E97
123567380 TN6030	E97
123567380 TN7535	E97
123567380 TN8025	E97
123567420 TN6030	E99
123567420 TN7525	E99
123567420 TN7535	E99
123567430 TN6030	E99
123567430 TN7525	E99
123567430 TN7535	E99
123567440 TN6030	E99
123567440 TN7525	E99
123567440 TN7535	E99
123567440 TPC35	E99
123567450 TN6030	E99
123567450 TN7525	E99
123567450 TN7535	E99
123567460 TN6030	E99
123567460 TN7525	E99
123567460 TN7535	E99
123567480 TN6030	E99
123567480 TN7525	E99
123567480 TN7535	E99
123567702 TN7535	E100
123567703 TN7535	E100
123567704 TN7535	E100
123567720 TN7535	E100
123567721 TN7535	E100
123567730 TN7535	E100
123567730 TN8025	E100
123567731 TN7535	E100
123567740 TN7535	E100
123567803 TN7525	E101
123567804 TN7525	E101
123567805 TN7525	E101
123567806 TN7525	E101
123568080 THM	E105
123568080 TN7525	E105
123568080 TN7535	E105
123568080 TTM	E105
123568081 THM	E105
123568100 THM	E105
123568100 TN7525	E105

Catalogue No.	Page(s)
123568100 TN7535	E105
123568120 THM	E105
123568120 TN7525	E105
123568120 TN7535	E105
123568121 THM	E105
123568140 THM	E105
123568140 TN7525	E105
123568140 TN7535	E105
123568141 THM	E105
123568160 THM	E105
123568160 TN7525	E105
123568160 TN7535	E105
123568160 TTM	E105
123568161 THM	E105
12391010000 W	M74
12391010400 W	M74
12391010600 W	M74
12391011000 W	M74
12391011400 W	M74
12391011600 W	M79
12391012000 W	M79
12391012400 W	M79
12391012800 W	M79
12391013200 W	M79
12391013800 W	M90
12391020000 W	M85
12391020200 W	M85
12391020400 W	M85
12391020600 W	M85
12391020800 W	M85
12391021000 W	M91
12391021200 W	M91
12391021400 W	M91
12391021600 W	M91
12391021800 W	M91
12391022000 W	M96
12391022200 W	M96
12391022400 W	M96
12391022600 W	M96
12391022800 W	M96
12391023200 W	M96
12391023400 W	M96
12391023600 W	M96
12391023800 W	M96
12391024000 W	M85
12391050200 W	M84
12391050400 W	M78
12391050600 W	M78
12391051000 W	M84
12391051200 W	M84
12391602600M W	L4
12391603000 W	L4
12391603400 W	L4
12391603800 W	L4
12393041200 W	K4
12393041400 W	K4
12393041800 W	K4
12393051200 W	K4–5
12393051400 W	K4–5
12393051800 W	K4–5
12395405200 W	H44
12395410200 W	H45
12395410400 W	H45
12395410600 W	H45
12395410800 W	H45
12395411000 W	H45
12395415800 W	H45
12396202200 W	H52
12396202600 W	H52
12396203800 W	H53
12396204200 W	H53
12396204600 W	H53
12396205000 W	H53
12396205400 W	H53
12396205800 W	H53
12396215000 W	H58
12396943800 W	J48
12396944200 W	J48
12396944600 W	J48
12396945000 W	J48
12396945400 W	J48
12396953800 W	J44
12396954000 W	J44
12396954200 W	J44
12396954400 W	J44
12396954600 W	J44
12396954800 W	J44
12396955000 W	J44
12396955200 W	J44
12396955400 W	J44
12396955600 W	J44
12396955800 W	J44
12396956000 W	J44
12399010200 W	L24
12399010400 W	L24
12399010800 W	L24
12399011400 W	L24
12399011600 W	L24
12399011800 W	L24
12399012000 W	L24
12399012800 W	L24
12399013000 W	L24
12399013200 W	L24
12399013400 W	L24
12399013600 W	L24
12399014400 W	L27
12399014600 W	L27
12399014800 W	L27
12399015600 W	L27
12399015800 W	L27
12399016000 W	L27
12399110400 W	L25
12399110600 W	L25
12399110800 W	L25
12399111400 W	L25
12399111600 W	L25
12399111800 W	L25
12399112000 W	L25
12399112800 W	L25
12399113000 W	L25
12399113200 W	L25
12399113400 W	L25
12399113600 W	L25
12399114400 W	L28
12399114600 W	L28
12399114800 W	L28
12399115600 W	L28
12399115800 W	L28
12399116000 W	L28
12600020000 WG	W40
12600027800 WG	W40
12600035800 WG	W40
12600043800 WG	W40
12600208800 WG	W38
12600210900 WG	W38
12600213200 WG	W38
12600215500 WG	W38
12600217800 WG	W38
12614020100 WG	W41
12625702200 WG	W44
12625703000 WG	W44
12625704000 WG	W44
12625705000 WG	W44
12625706700 WG	W39, W44
12625708986 WG	W44
12625804000 WG	W43
12625805100 WG	W43
12625806800 WG	W39, W43
12625902200 WG	W45
12625903000 WG	W45
12625904000 WG	W45
12625905000 WG	W45
12625906700 WG	W39, W45
12625908986 WG	W45
12626003000 WG	W42
12626004000 WG	W42
12626005000 WG	W42
12626006700 WG	W39, W42
12627006200 WG	W51
12627008200 WG	W51
12627010200 WG	W51
12627013200 WG	W51
12627016200 WG	W51
12627019300 WG	W51
12627270300 WG	W54
12627270700 WG	W54
12627270800 WG	W55
12627275300 WG	W54
12627276500 WG	W54
12627276800 WG	W55
12627277700 WG	W54
12627277800 WG	W55
12627278700 WG	W54
12627278800 WG	W55
12748210100 W	L24–25
12748210200 W	L24–25
12748210300 W	L24–25
12748210400 W	L24–25
12748210500 W	L24–25
12748210600 W	L24–25
12748210700 W	L27–28
12748210800 W	L27–28
12748210900 W	L27–28
12748211000 W	L27–28
12748307600 W	L24–25
12748307700 W	L24–25, L27–28
12748307800 W	L27–28
12748308500 W	H72
12748551100 W	L24–25, L27–28
12748551200 W	L24–25, L27–28
12748600900 W	H72
12748605300 W	L27–28
12748610000 W	V10, V13, V16, V19
12748610500 W	M102–105, M119–120, M125–126
12748610600 W	M102–105, M118–120, M124–126
12748610700 W	M102–105, M118–120, M124–126
12748610800 W	M102–105, M118–120, M124–126
12748610900 W	M102–104
12748611000 W	M102–104
12749723200 W	L27–28
12749726100 W	L24–25
12MHC030M	T117
12MHC040M	T117
12MHC050M	T117
12MHC060M	T117
12MHC070M	T117
12MHC080M	T117
12MHC090M	T117
12MHC100M	T117
1N0M03002LJ	Q8
1N0M04003LJ	Q8
1N0M05003LJ	Q8
1N0M06003LJ	Q8
1N0M08004LJ	Q8
1N0M10004LJ	Q8
1N0M12005LJ	Q8
1N0M14006LJ	Q8
1N0M16006LJ	Q8
1N0M18007LJ	Q8
1N0M20007LJ	Q8
1N0M22007LJ	Q8
1N7706002CT	Q9
1N7706002CW	Q9
1N7708004CT	Q9
1N7708004CW	Q9
1N7710004CT	Q9
1N7710004CW	Q9
1N7712005CT	Q9
1N7712005CW	Q9
1N7714005CT	Q9
1N7714005CW	Q9
1N7716006CT	Q9
1N7716006CW	Q9
1N7718006CT	Q9
1N7718006CW	Q9
1N7720007CT	Q9
1N7720007CW	Q9
1N7722007CT	Q9
1N7722007CW	Q9
1N7725008CT	Q9
1N7725008CW	Q9
1N7730008CT	Q9
1N7730008CW	Q9
20MHC030M	T117
20MHC040M	T117
20MHC050M	T117
20MHC060M	T117
20MHC070M	T117
20MHC080M	T117
20MHC090M	T117
20MHC100M	T117
20MHC110M	T117
20MHC120M	T117
20MHC130M	T117
20MHC140M	T117
20MHC150M	T117
20MHC160M	T117
25280400T011 TIALN	P34
25280400T011 UNCOATED	P34
25280500T013 TIALN	P34
25280500T013 UNCOATED	P34
25280600T013 TIALN	P34
25280600T013 UNCOATED	P34
25280800T019 TIALN	P34
25280800T019 UNCOATED	P34
25281000T022 TIALN	P34
25281000T022 UNCOATED	P34
25281200T026 TIALN	P34

Catalogue No.	Page(s)
25281200T026 UNCOATED	P34
25281400T026 TIALN	P34
25281400T026 UNCOATED	P34
25281600T032 TIALN	P34
25281600T032 UNCOATED	P34
25281800T032 TIALN	P34
25281800T032 UNCOATED	P34
25282000T038 TIALN	P34
25282000T038 UNCOATED	P34
25MHC030M	T117
25MHC040M	T117
25MHC050M	T117
25MHC060M	T117
25MHC070M	T117
25MHC080M	T117
25MHC090M	T117
25MHC100M	T117
25MHC120M	T117
25MHC140M	T117
25MHC160M	T117
28190300T007 TIALN	P16
28190300T007 UNCOATED	P16
28190400T008 TIALN	P16
28190400T008 UNCOATED	P16
28190500T010 TIALN	P16
28190500T010 UNCOATED	P16
28190600T010 TIALN	P16
28190600T010 UNCOATED	P16
28190700T013 TIALN	P16
28190700T013 UNCOATED	P16
28190800T016 TIALN	P16
28190800T016 UNCOATED	P16
28190900T016 TIALN	P16
28190900T016 UNCOATED	P16
28191000T019 TIALN	P16
28191000T019 UNCOATED	P16
28191200T022 TIALN	P16
28191200T022 UNCOATED	P16
28191400T022 TIALN	P16
28191400T022 UNCOATED	P16
28191500T026 TIALN	P16
28191500T026 UNCOATED	P16
28191600T026 TIALN	P16
28191600T026 UNCOATED	P16
28191800T026 TIALN	P16
28191800T026 UNCOATED	P16
28192000T032 TIALN	P16
28192000T032 UNCOATED	P16
28380200T007 TIALN	P20
28380300T007 TIALN	P20
28380300T007 UNCOATED	P20
28380400T008 TIALN	P20
28380400T008 UNCOATED	P20
28380500T010 TIALN	P20
28380500T010 UNCOATED	P20
28380600T010 TIALN	P20
28380600T010 UNCOATED	P20
28380800T016 TIALN	P20
28380800T016 UNCOATED	P20
28381000T019 TIALN	P20
28381000T019 UNCOATED	P20
28381200T022 TIALN	P20
28381200T022 UNCOATED	P20
28381400T022 TIALN	P20
28381400T022 UNCOATED	P20
28381600T026 TIALN	P20
28381600T026 UNCOATED	P20
28382000T032 TIALN	P20
28382000T032 UNCOATED	P20
28480400T011 TIALN	P38
28480400T011 UNCOATED	P38
28480500T013 TIALN	P38
28480500T013 UNCOATED	P38
28480600T013 TIALN	P38
28480600T013 UNCOATED	P38
28480800T019 TIALN	P38
28480800T019 UNCOATED	P38
28481000T022 TIALN	P38
28481000T022 UNCOATED	P38
28481200T026 TIALN	P38
28481200T026 UNCOATED	P38
28481400T026 TIALN	P38
28481400T026 UNCOATED	P38
28481600T032 TIALN	P38
28481600T032 UNCOATED	P38
28481800T032 TIALN	P38
28481800T032 UNCOATED	P38
28482000T038 TIALN	P38
28482000T038 UNCOATED	P38
2EL05ISO TN6025	F49
2EL06ISO TN6025	F49
2EL075ISO TN6025	F49
2EL07ISO TN6025	F49
2EL08ISO TN6025	F49
2EL10ISO TN6025	F49
2EL125ISO TN6025	F49
2EL15ISO TN6025	F49
2EL175ISO TN6025	F49
2ER15ISO TN6025	F48
2ERA60 TN6025	F46
2IL035ISO TN6025	F52
2IL04ISO TN6025	F52
2IL05ISO TN6025	F52
2IL06ISO TN6025	F52
2IL075ISO TN6025	F52
2IL07ISO TN6025	F52
2IL08ISO TN6025	F52
2IL125ISO TN6025	F52
2IL15ISO TN6025	F52
2IL20ISO TN6025	F52
2IL32UN TN6025	F57
2ILA60 TN6025	F47
2IR075ISO TN6025	F51
2IR10ISO TN6025	F51
2IR125ISO TN6025	F51
2IR14W TN6025	F63
2IR15ISO TN6025	F51
2IR16UN TN6025	F56
2IR175ISO TN6025	F51
2IR18UN TN6025	F56
2IR19W TN6025	F63
2IR20UN TN6025	F56
2IR32UN TN6025	F56
2IRA55 TN6025	F61
2IRA60 TN6025	F47
322801-000020 K30F-TICN	088
322801-000025 K30F-TICN	088
322801-000030 K30F-TICN	088
322801-000035 K30F-TICN	088
322801-000040 K30F-TICN	088
322801-000045 K30F-TICN	088
322801-000050 K30F-TICN	088
322801-000060 K30F-TICN	088
322801-000070 K30F-TICN	088
322801-000080 K30F-TICN	088
322801-000090 K30F-TICN	089
322801-000100 K30F-TICN	089
322801-000120 K30F-TICN	089
322801-000140 K30F-TICN	089
322801-000160 K30F-TICN	089–90
322801-000180 K30F-TICN	089–90
322801-000200 K30F-TICN	089
322802-000020 K30F-TICN	088
322802-000025 K30F-TICN	088
322802-000030 K30F-TICN	088
322802-000035 K30F-TICN	088
322802-000040 K30F-TICN	088
322802-000045 K30F-TICN	088
322802-000050 K30F-TICN	088
322802-000060 K30F-TICN	088
322802-000070 K30F-TICN	088
322802-000080 K30F-TICN	088
322802-000090 K30F-TICN	089
322802-000100 K30F-TICN	089
322802-000120 K30F-TICN	089
322802-000140 K30F-TICN	089
322802-000160 K30F-TICN	089
322802-000180 K30F-TICN	089
322802-000200 K30F-TICN	089
322804-000020 K30F-TICN	088
322804-000025 K30F-TICN	088
322804-000030 K30F-TICN	088
322804-000035 K30F-TICN	088
322804-000040 K30F-TICN	088
322804-000045 K30F-TICN	088
322804-000050 K30F-TICN	088
322804-000060 K30F-TICN	088
322804-000070 K30F-TICN	088
322804-000080 K30F-TICN	088
322804-000090 K30F-TICN	089
322804-000100 K30F-TICN	089
322804-000120 K30F-TICN	089
322804-000140 K30F-TICN	089
322804-000160 K30F-TICN	089
322804-000180 K30F-TICN	089
322804-000200 K30F-TICN	089
322806-000020 K30F-TICN	088
322806-000025 K30F-TICN	088
322806-000030 K30F-TICN	088
322806-000035 K30F-TICN	088
322806-000040 K30F-TICN	088
322806-000045 K30F-TICN	088
322806-000050 K30F-TICN	088
322806-000060 K30F-TICN	088
322806-000070 K30F-TICN	088
322806-000080 K30F-TICN	088
322806-000090 K30F-TICN	089
322806-000100 K30F-TICN	089
322806-000120 K30F-TICN	089
322806-000140 K30F-TICN	089
322806-000160 K30F-TICN	089
322806-000180 K30F-TICN	089
322806-000200 K30F-TICN	089
323001-000020 K30F-TICN	P4
323001-000030 K30F-TICN	P4
323001-000040 K30F-TICN	P4
323001-000050 K30F-TICN	P4
323001-000060 K30F-TICN	P4
323001-000080 K30F-TICN	P4
323001-000100 K30F-TICN	P4
323001-000120 K30F-TICN	P4
323002-000020 K30F-TICN	P4
323002-000030 K30F-TICN	P4
323002-000040 K30F-TICN	P4
323002-000050 K30F-TICN	P4
323002-000060 K30F-TICN	P4
323002-000080 K30F-TICN	P4
323002-000100 K30F-TICN	P4
323002-000120 K30F-TICN	P4
32MHC060M	T117
32MHC070M	T117
32MHC080M	T117
32MHC090M	T117
32MHC100M	T117
32MHC110M	T117
32MHC120M	T117
32MHC130M	T117
32MHC140M	T117
32MHC150M	T117
32MHC160M	T117
3EL035ISO TN6025	F49
3EL045ISO TN6025	F49
3EL04ISO TN6025	F49
3EL06ISO TN6025	F50
3EL10ISO TN6025	F50
3EL10UN TN6025	F55
3EL11UN TN6025	F55
3EL11W TN6025	F62
3EL12UN TN6025	F55
3EL13UN TN6025	F55
3EL15ISO TN6025	F50
3EL175ISO TN6025	F50
3EL20ISO TN6025	F50
3EL30ISO TN6025	F50
3EL3TR TN6025	F67
3EL8RD TN6025	F65
3EL8W TN6025	F62
3ELAG60 TN6025	F46
3ELG55 TN6025	F60
3ELG60 TN6025	F46
3ER05ISO TN6025	F48
3ER075ISO TN6025	F48
3ER07ISO TN6025	F48
3ER08ISO TN6025	F48
3ER10APIRD TN6025	F64
3ER10ISO TN6025	F48
3ER10UN TN6025	F55
3ER10W TN6025	F62
3ER115NPT TN6025	F58
3ER11UN TN6025	F55
3ER11W TN6025	F62
3ER125ISO TN6025	F48
3ER12UN TN6025	F55
3ER12W TN6025	F62
3ER13UN TN6025	F55
3ER14NPT TN6025	F58
3ER14UN TN6025	F54
3ER14W TN6025	F62
3ER15ISO TN6025	F48
3ER16UN TN6025	F54
3ER16W TN6025	F62
3ER175ISO TN6025	F48
3ER18NPT TN6025	F58
3ER18UN TN6025	F54
3ER18W TN6025	F62
3ER19W TN6025	F62
3ER20ISO TN6025	F48
3ER20UN TN6025	F54
3ER24UN TN6025	F54
3ER25ISO TN6025	F48
3ER27UN TN6025	F54
3ER28UN TN6025	F54

Catalogue No.	Page(s)
3ER28W TN6025	F62
3ER2TR TN6025	F67
3ER30ISO TN6025	F48
3ER32UN TN6025	F54
3ER32W TN6025	F62
3ER36UN TN6025	F54
3ER3TR TN6025	F67
3ER40UN TN6025	F54
3ER48UN TN6025	F54
3ER8NPT TN6025	F58
3ER8RD TN6025	F65
3ER8UN TN6025	F55
3ER8W TN6025	F62
3ERA55 TN6025	F60
3ERA60 TN6025	F46
3ERAG55 TN6025	F60
3ERAG60 TN6025	F46
3ERG55 TN6025	F60
3ERG60 TN6025	F46
3IL035ISO TN6025	F53
3IL04ISO TN6025	F53
3IL05ISO TN6025	F53
3IL06ISO TN6025	F53
3IL075ISO TN6025	F53
3IL07ISO TN6025	F53
3IL12UN TN6025	F57
3IL15ISO TN6025	F53
3IL20ISO TN6025	F53
3IL25ISO TN6025	F53
3IL30ISO TN6025	F53
3IL56UN TN6025	F57
3IL64UN TN6025	F57
3IL8RD TN6025	F66
3IL8UN TN6025	F57
3IL9UN TN6025	F57
3ILA55 TN6025	F61
3ILAG55 TN6025	F61
3ILAG60 TN6025	F47
3ILG60 TN6025	F47
3IR05ISO TN6025	F51
3IR075ISO TN6025	F51
3IR10APIRD TN6025	F64
3IR10ISO TN6025	F51
3IR10RD TN6025	F66
3IR10UN TN6025	F57
3IR115NPT TN6025	F59
3IR11W TN6025	F63
3IR125ISO TN6025	F51
3IR12UN TN6025	F57
3IR12W TN6025	F63
3IR14NPT TN6025	F59
3IR14UN TN6025	F56
3IR14W TN6025	F63
3IR15ISO TN6025	F51
3IR16PG TN6025	F65
3IR16UN TN6025	F56
3IR16W TN6025	F63
3IR175ISO TN6025	F51
3IR18NPT TN6025	F59
3IR18UN TN6025	F56
3IR19W TN6025	F63
3IR20ISO TN6025	F51
3IR20UN TN6025	F56
3IR24UN TN6025	F56
3IR25ISO TN6025	F51
3IR28UN TN6025	F56
3IR30ISO TN6025	F51
3IR32UN TN6025	F56
3IR3TR TN6025	F68
3IR8APIRD TN6025	F64
3IR8NPT TN6025	F59
3IR8RD TN6025	F66
3IR8UN TN6025	F57
3IR8W TN6025	F63
3IRA55 TN6025	F61
3IRA60 TN6025	F47
3IRAG55 TN6025	F61
3IRAG60 TN6025	F47
3IRG55 TN6025	F61
3IRG60 TN6025	F47
40000200T006 TIALN	P39
40000300T020 TIALN	P39
40000400T014 TIALN	P39
40000500T016 TIALN	P39
40000600T016 TIALN	P39
40000800T019 TIALN	P39
40001000T022 TIALN	P39
40001200T025 TIALN	P39
40001400T032 TIALN	P39
40001600T032 TIALN	P39
40001800T038 TIALN	P39
400101001T WP15PE	084
40010100T004 TIALN	P21
40010100T004 UNCOATED	P21
400101501T WP15PE	084
40010150T005 TIALN	P21
40010150T005 UNCOATED	P21
400102001T WP15PE	084
40010200T006 TIALN	P21
40010200T006 UNCOATED	P21
40010250T007 TIALN	P21
40010250T007 UNCOATED	P21
400103002T WP15PE	084
40010300T009 TIALN	P21
40010300T009 UNCOATED	P21
40010350T012 TIALN	P21
400104002T WP15PE	084
40010400T012 TIALN	P21
40010400T012 UNCOATED	P21
400105002T WP15PE	084
40010500T014 UNCOATED	P21
400106002T WP15PE	084
40010600T020 TIALN	P21
40010600T020 UNCOATED	P21
400108003T WP15PE	084
40010800T020 TIALN	P21
40010800T020 UNCOATED	P21
400110004T WP15PE	084
40011000T022 TIALN	P21
40011000T022 UNCOATED	P21
400112005T WP15PE	084
40011200T025 TIALN	P22
40011200T025 UNCOATED	P22
400114005T WP15PE	084
40011400T032 TIALN	P22
40011400T032 UNCOATED	P22
400116006T WP15PE	084
40011600T032 TIALN	P22
40011600T032 UNCOATED	P22
400118006T WP15PE	084
400120007T WP15PE	084
40012000T038 TIALN	P22
40012000T038 UNCOATED	P22
40020100T004 TIALN	P17
40020150T004 TIALN	P17
40020180T004 TIALN	P17
40020200T006 TIALN	P17
40020250T006 TIALN	P17
40020300T009 TIALN	P17
40020300T019 TIALN	P17
40020350T012 TIALN	P17
40020400T012 TIALN	P17
40020400T019 TIALN	P17
40020450T014 TIALN	P17
40020480T014 TIALN	P17
40020500T014 TIALN	P17
40020500T020 TIALN	P17
40020550T014 TIALN	P17
40020600T016 TIALN	P17
40020600T028 TIALN	P17
40020700T020 TIALN	P18
40020800T020 TIALN	P18
40020800T028 TIALN	P18
40020900T020 TIALN	P18
40021000T022 TIALN	P18
40021000T032 TIALN	P18
40021100T025 TIALN	P18
40021200T025 TIALN	P18
40021200T045 TIALN	P18
40021400T032 TIALN	P18
40021400T050 TIALN	P18
40021600T032 TIALN	P18
40021600T056 TIALN	P18
40021800T038 TIALN	P18
40021800T060 TIALN	P18
40022000T038 TIALN	P18
40022000T056 TIALN	P18
40040100T004 TIALN	P35
40040100T004 UNCOATED	P35
40040150T004 TIALN	P35
40040150T004 UNCOATED	P35
40040200T006 TIALN	P35
40040200T006 UNCOATED	P35
40040250T006 TIALN	P35
40040250T006 UNCOATED	P35
40040300T009 TIALN	P35
40040300T009 UNCOATED	P35
40040350T012 TIALN	P35
40040350T012 UNCOATED	P35
40040400T011 TIALN	P35
40040400T011 UNCOATED	P35
40040450T014 TIALN	P35
40040450T014 UNCOATED	P35
40040500T013 TIALN	P35
40040500T020 TIALN	P35
40040500T020 UNCOATED	P35
40040600T016 TIALN	P35
40040600T016 UNCOATED	P35
40040700T020 TIALN	P35
40040800T020 TIALN	P36
40040800T020 UNCOATED	P36
40040900T020 TIALN	P36
40041000T022 TIALN	P36
40041000T022 UNCOATED	P36
40041200T025 TIALN	P36
40041200T025 UNCOATED	P36
40041200W025 TIALN	P36
40041200W025 UNCOATED	P36
40041400T032 TIALN	P36
40041400T032 UNCOATED	P36
40041400W032 TIALN	P36
40041400W032 UNCOATED	P36
40041600T032 TIALN	P36
40041600T032 UNCOATED	P36
40041600W032 TIALN	P36
40041600W032 UNCOATED	P36
40041800T038 TIALN	P36
40041800T038 UNCOATED	P36
40041800W038 TIALN	P36
40041800W038 UNCOATED	P36
40042000T038 TIALN	P36
40042000T038 UNCOATED	P36
40042000W038 TIALN	P36
40042000W038 UNCOATED	P36
40100400T025 TIALN	P39
40100500T030 TIALN	P39
40100600T019 TIALN	P39
40100600T030 TIALN	P39
40100800T040 TIALN	P39
40101000T040 TIALN	P39
40101200T045 TIALN	P39
40101400T050 TIALN	P39
40101600T065 TIALN	P39
40102000T056 TIALN	P39
40110400T019 TIALN	P21
40110400T019 UNCOATED	P21
40110600T028 TIALN	P21
40110600T028 UNCOATED	P21
40110800T028 TIALN	P21
40110800T028 UNCOATED	P21
40111000T032 TIALN	P21
40111000T032 UNCOATED	P21
40111200T045 TIALN	P22
40111200T045 UNCOATED	P22
40112000T075 TIALN	P22
40112000T075 UNCOATED	P22
40120300T025 TIALN	P17
40120400T031 TIALN	P17
40120500T031 TIALN	P17
40120600T038 TIALN	P18
40120800T041 TIALN	P18
40121000T045 TIALN	P18
40121200T075 TIALN	P18
40121400T075 TIALN	P18
40121600T075 TIALN	P18
40121800T075 TIALN	P18
40122000T075 TIALN	P18
40140300T019 TIALN	P35
40140300T019 UNCOATED	P35
40140400T019 TIALN	P35
40140500T030 TIALN	P35
40140600T028 TIALN	P35
40140600T028 UNCOATED	P35
40140800T028 TIALN	P36
40140800T028 UNCOATED	P36
40141000T032 TIALN	P36
40141000T032 UNCOATED	P36
40141200T045 TIALN	P36
40141200T045 UNCOATED	P36
40141200W045 TIALN	P36
40141200W045 UNCOATED	P36
40141400T050 TIALN	P36
40141400T050 UNCOATED	P36
40141400W050 TIALN	P36
40141400W050 UNCOATED	P36
40141600T056 TIALN	P36
40141600T056 UNCOATED	P36
40141600W056 TIALN	P36
40141600W056 UNCOATED	P36
40141800T060 TIALN	P36
40141800T060 UNCOATED	P36
40141800W060 TIALN	P36

Catalogue No.	Page(s)
40141800W060 UNCOATED	P36
40142000T056 TIALN	P36
40142000T056 UNCOATED	P36
40142000W056 TIALN	P36
40142000W056 UNCOATED	P36
40210400T031 TIALN	P21
40210400T031 UNCOATED	P21
40210500T014 TIALN	P21
40210600T038 TIALN	P21
40210600T038 UNCOATED	P21
40210800T040 TIALN	P21
40210800T040 UNCOATED	P21
40211000T045 TIALN	P21
40211000T045 UNCOATED	P21
40211200T075 TIALN	P22
40211200T075 UNCOATED	P22
40240300T025 TIALN	P35
40240300T025 UNCOATED	P35
40240400T031 TIALN	P35
40240500T031 TIALN	P35
40240600T038 TIALN	P35
40240600T038 UNCOATED	P35
40240800T041 TIALN	P36
40240800T041 UNCOATED	P36
40241000T045 TIALN	P36
40241000T045 UNCOATED	P36
40241200T075 TIALN	P36
40241200T075 UNCOATED	P36
40241200W075 TIALN	P36
40241200W075 UNCOATED	P36
40241400T075 TIALN	P36
40241400T075 UNCOATED	P36
40241400W075 TIALN	P36
40241400W075 UNCOATED	P36
40241600T075 TIALN	P36
40241600T075 UNCOATED	P36
40241600W075 TIALN	P36
40241600W075 UNCOATED	P36
40241800T075 TIALN	P36
40241800T075 UNCOATED	P36
40241800W075 TIALN	P36
40241800W075 UNCOATED	P36
40242000T075 TIALN	P36
40242000T075 UNCOATED	P36
40242000W075 TIALN	P36
40242000W075 UNCOATED	P36
410201000.. UNCOATED	0136
410201500.. UNCOATED	0136
410202000.. UNCOATED	0136
410202500.. UNCOATED	0136
410203000.. UNCOATED	0136
410204001.. UNCOATED	0136
410205001.. UNCOATED	0136
410205002.. UNCOATED	0136
410206002.. UNCOATED	0136
410208003.. UNCOATED	0136
410210004.. UNCOATED	0136
410212005.. UNCOATED	0136
410214014.. UNCOATED	0136
410216006.. UNCOATED	0136
410218018.. UNCOATED	0136
410220007.. UNCOATED	0136
410303000.. UNCOATED	0139
410303000CT TICN-CT	0139
410304001.. UNCOATED	0139
410304001CT TICN-CT	0139
410304002.. UNCOATED	0139
410305001.. UNCOATED	0139
410305001CT TICN-CT	0139
410305002.. UNCOATED	0139
410305002CT TICN-CT	0139
410306002.. UNCOATED	0139
410306002CT TICN-CT	0139
410308003.. UNCOATED	0139
410308003CT TICN-CT	0139
410310004.. UNCOATED	0139
410310004CT TICN-CT	0139
410312005.. UNCOATED	0139
410312005CT TICN-CT	0139
410314014.. UNCOATED	0139
410314014CT TICN-CT	0139
410316006.. UNCOATED	0139
410316006CT TICN-CT	0139
410318018.. UNCOATED	0139
410318018CT TICN-CT	0139
410320007.. UNCOATED	0139
410320007CT TICN-CT	0139
422150-000060 K30F-DCHP	056
422150-000080 K30F-DCHP	056
422150-000100 K30F-DCHP	056
422150-000120 K30F-DCHP	056
422150-000160 K30F-DCHP	056
422150-000200 K30F-DCHP	056
422150-000250 K30F-DCHP	056
422152-000060 K30F-DCHP	056
422152-000080 K30F-DCHP	056
422152-000100 K30F-DCHP	056
422152-000120 K30F-DCHP	056
422152-000160 K30F-DCHP	056
422152-000200 K30F-DCHP	056
422152-000250 K30F-DCHP	056
422801-000020 K30F-DCF	089
422801-000025 K30F-DCF	089
422801-000030 K30F-DCF	089
422801-000035 K30F-DCF	089
422801-000040 K30F-DCF	090
422801-000045 K30F-DCF	090
422801-000050 K30F-DCF	090
422801-000060 K30F-DCF	090
422801-000070 K30F-DCF	090
422801-000080 K30F-DCF	090
422801-000090 K30F-DCF	090
422801-000100 K30F-DCF	090
422801-000120 K30F-DCF	090
422801-000140 K30F-DCF	090
422801-000160 K30F-DCF	090
422801-000180 K30F-DCF	090
422801-000200 K30F-DCF	090
422802-000020 K30F-DCF	089
422802-000025 K30F-DCF	089
422802-000030 K30F-DCF	089
422802-000035 K30F-DCF	089
422802-000040 K30F-DCF	090
422802-000045 K30F-DCF	090
422802-000050 K30F-DCF	090
422802-000060 K30F-DCF	090
422802-000070 K30F-DCF	090
422802-000080 K30F-DCF	090
422802-000090 K30F-DCF	090
422802-000100 K30F-DCF	090
422802-000120 K30F-DCF	090
422802-000140 K30F-DCF	090
422802-000160 K30F-DCF	090
422802-000180 K30F-DCF	090
422802-000200 K30F-DCF	090
422804-000020 K30F-DCF	089
422804-000025 K30F-DCF	089
422804-000030 K30F-DCF	089
422804-000035 K30F-DCF	089
422804-000040 K30F-DCF	090
422804-000045 K30F-DCF	090
422804-000050 K30F-DCF	090
422804-000060 K30F-DCF	090
422804-000070 K30F-DCF	090
422804-000080 K30F-DCF	090
422804-000090 K30F-DCF	090
422804-000100 K30F-DCF	090
422804-000120 K30F-DCF	090
422804-000140 K30F-DCF	090
422804-000160 K30F-DCF	090
422804-000180 K30F-DCF	090
422804-000200 K30F-DCF	090
422806-000020 K30F-DCF	089
422806-000025 K30F-DCF	089
422806-000030 K30F-DCF	089
422806-000035 K30F-DCF	089
422806-000040 K30F-DCF	090
422806-000045 K30F-DCF	090
422806-000050 K30F-DCF	090
422806-000060 K30F-DCF	090
422806-000070 K30F-DCF	090
422806-000080 K30F-DCF	090
422806-000090 K30F-DCF	090
422806-000100 K30F-DCF	090
422806-000120 K30F-DCF	090
422806-000140 K30F-DCF	090
422806-000160 K30F-DCF	090
422806-000180 K30F-DCF	090
422806-000200 K30F-DCF	090
422813-000060 K30F-DCF	063
422813-000080 K30F-DCF	063
422813-000100 K30F-DCF	063
422813-000120 K30F-DCF	063
422813-000160 K30F-DCF	063
422813-000200 K30F-DCF	063
422813-000250 K30F-DCF	063
422818-000060 K30F-DCF	064
422818-000080 K30F-DCF	064
422818-000100 K30F-DCF	064
422818-000120 K30F-DCF	064
422818-000160 K30F-DCF	064
422818-000200 K30F-DCF	064
422820-000060 K30F-DCHP	058
422820-000080 K30F-DCHP	058
422820-000100 K30F-DCHP	058
422820-000120 K30F-DCHP	058
422820-000160 K30F-DCHP	058
422820-000200 K30F-DCHP	058
422820-000250 K30F-DCHP	058
422822-000060 K30F-DCHP	093
422822-000080 K30F-DCHP	093
422822-000100 K30F-DCHP	093
422822-000120 K30F-DCHP	093
422822-000160 K30F-DCHP	093
422822-000180 K30F-DCHP	093
422822-000200 K30F-DCHP	093
422822-000250 K30F-DCHP	093
422824-000060 K30F-DCHP	058
422824-000080 K30F-DCHP	058
422824-000100 K30F-DCHP	058
422824-000120 K30F-DCHP	058
422824-000160 K30F-DCHP	058
422824-000200 K30F-DCHP	058
422824-000250 K30F-DCHP	058
422826-000060 K30F-DCHP	093
422826-000080 K30F-DCHP	093
422826-000100 K30F-DCHP	093
422826-000120 K30F-DCHP	093
422826-000160 K30F-DCHP	093
422826-000180 K30F-DCHP	093
422826-000200 K30F-DCHP	093
422826-000250 K30F-DCHP	093
422827-000060 K30F-DCHP	094
422827-000080 K30F-DCHP	094
422827-000100 K30F-DCHP	094
422827-000120 K30F-DCHP	094
422827-000160 K30F-DCHP	094
422827-000200 K30F-DCHP	094
422827-000250 K30F-DCHP	094
422831-006005 K10UF-DCHP	0192
422831-008005 K10UF-DCHP	0192
422831-010005 K10UF-DCHP	0192
422831-012005 K10UF-DCHP	0192
422831-012010 K10UF-DCHP	0192
422831-016005 K10UF-DCHP	0192
422831-016010 K10UF-DCHP	0192
422831-020010 K10UF-DCHP	0192
422831-025015 K10UF-DCHP	0192
422837-006005 K10UF-DCHP	0192
422837-008005 K10UF-DCHP	0192
422837-010005 K10UF-DCHP	0192
422837-012005 K10UF-DCHP	0192
422837-012010 K10UF-DCHP	0192
422837-016005 K10UF-DCHP	0192
422837-016010 K10UF-DCHP	0192
422837-020005 K10UF-DCHP	0192
422837-020010 K10UF-DCHP	0192
422837-025005 K10UF-DCHP	0192
422846-000060 K30F-DCF	065
422846-000080 K30F-DCF	065
422846-000100 K30F-DCF	065
422846-000120 K30F-DCF	065
422846-000160 K30F-DCF	065
422846-000200 K30F-DCF	065
422846-000250 K30F-DCF	065
422868-000060 K10UF-DCHP	0177
422868-000080 K10UF-DCHP	0177
422868-000100 K10UF-DCHP	0177
422869-000010 K10UF-DCHP	0177
422869-000020 K10UF-DCHP	0177
422869-000030 K10UF-DCHP	0177
422869-000040 K10UF-DCHP	0177
422869-000050 K10UF-DCHP	0177
422869-000060 K10UF-DCHP	0177
422869-000080 K10UF-DCHP	0177
422869-000100 K10UF-DCHP	0177
422869-000120 K10UF-DCHP	0177
422869-000160 K10UF-DCHP	0177
422870-000020 K10UF-DCHP	0178
422870-000030 K10UF-DCHP	0178
422870-000040 K10UF-DCHP	0178
422870-000050 K10UF-DCHP	0178
422870-000060 K10UF-DCHP	0178
422870-000080 K10UF-DCHP	0178
422870-000100 K10UF-DCHP	0178
422870-000120 K10UF-DCHP	0178
422871-030075 K10UF-DCHP	0190
422871-030100 K10UF-DCHP	0190
422871-040075 K10UF-DCHP	0190
422871-040100 K10UF-DCHP	0190
422871-050075 K10UF-DCHP	0190
422871-050100 K10UF-DCHP	0190

Catalogue No.	Page(s)
422871-060075 K10UF-DCHP	0190
422871-060100 K10UF-DCHP	0190
422871-080100 K10UF-DCHP	0190
422871-080150 K10UF-DCHP	0190
422871-100100 K10UF-DCHP	0190
422871-100150 K10UF-DCHP	0190
422873-050100 K10UF-DCHP	0179
422873-060100 K10UF-DCHP	0179
422873-100100 K10UF-DCHP	0179
422873-100150 K10UF-DCHP	0179
422875-002003 K10UF-DCHP	0173
422875-002005 K10UF-DCHP	0173
422875-003005 K10UF-DCHP	0173
422875-003010 K10UF-DCHP	0173
422875-004005 K10UF-DCHP	0173
422875-004010 K10UF-DCHP	0173
422875-005005 K10UF-DCHP	0173
422875-005010 K10UF-DCHP	0173
422875-006005 K10UF-DCHP	0173
422875-006010 K10UF-DCHP	0173
422875-008005 K10UF-DCHP	0173
422875-008010 K10UF-DCHP	0173
422875-008015 K10UF-DCHP	0173
422875-008020 K10UF-DCHP	0173
422875-010005 K10UF-DCHP	0173
422875-010010 K10UF-DCHP	0173
422875-010015 K10UF-DCHP	0173
422875-010020 K10UF-DCHP	0173
422875-010030 K10UF-DCHP	0173
422875-012005 K10UF-DCHP	0173
422875-012010 K10UF-DCHP	0173
422875-012030 K10UF-DCHP	0173
422875-012040 K10UF-DCHP	0173
422876-004005 K10UF-DCHP	0187
422876-004010 K10UF-DCHP	0187
422876-005005 K10UF-DCHP	0187
422876-005010 K10UF-DCHP	0187
422876-006005 K10UF-DCHP	0187
422876-006010 K10UF-DCHP	0187
422876-008005 K10UF-DCHP	0187
422876-008010 K10UF-DCHP	0187
422876-008020 K10UF-DCHP	0187
422876-010005 K10UF-DCHP	0187
422876-010010 K10UF-DCHP	0187
422876-010020 K10UF-DCHP	0187
422876-012005 K10UF-DCHP	0187
422876-012010 K10UF-DCHP	0187
422876-012020 K10UF-DCHP	0187
422876-012030 K10UF-DCHP	0187
422878-006005 K10UF-DCHP	0187
422878-008010 K10UF-DCHP	0187
422878-008015 K10UF-DCHP	0187
422878-008020 K10UF-DCHP	0187
422878-010005 K10UF-DCHP	0187
422878-010010 K10UF-DCHP	0187
422878-010020 K10UF-DCHP	0187
422878-012010 K10UF-DCHP	0187
422878-012030 K10UF-DCHP	0187
423001-000020 K30F-DCF	P4
423001-000030 K30F-DCF	P4
423001-000040 K30F-DCF	P4
423001-000050 K30F-DCF	P4
423001-000060 K30F-DCF	P4
423001-000080 K30F-DCF	P4
423001-000100 K30F-DCF	P4
423001-000120 K30F-DCF	P4
423002-000020 K30F-DCF	P4
423002-000030 K30F-DCF	P4
423002-000040 K30F-DCF	P4
423002-000050 K30F-DCF	P4
423002-000060 K30F-DCF	P4
423002-000080 K30F-DCF	P4
423002-000100 K30F-DCF	P4
423002-000120 K30F-DCF	P4
423003-000040 K30F-DCHP	P5
423003-000060 K30F-DCHP	P5
423003-000080 K30F-DCHP	P5
423003-000100 K30F-DCHP	P5
423003-000120 K30F-DCHP	P5
423004-000040 K30F-DCHP	P5
423004-000060 K30F-DCHP	P5
423004-000080 K30F-DCHP	P5
423004-000100 K30F-DCHP	P5
423004-000120 K30F-DCHP	P5
423007-000004 K30F-DCHP	0116
423007-000005 K30F-DCHP	0116
423007-000006 K30F-DCHP	0116
423007-000008 K30F-DCHP	0116
423007-000010 K30F-DCHP	0116
423007-000012 K30F-DCHP	0116
423007-000015 K30F-DCHP	0116
423007-000018 K30F-DCHP	0116
423007-000020 K30F-DCHP	0116
423007-000025 K30F-DCHP	0116
423007-000030 K30F-DCHP	0116
423034-000005 K10UF-DCHP	0164
423034-000006 K10UF-DCHP	0164
423034-000008 K10UF-DCHP	0164
423034-000010 K10UF-DCHP	0164
423034-000012 K10UF-DCHP	0164
423034-000015 K10UF-DCHP	0164
423034-000020 K10UF-DCHP	0164
423034-000025 K10UF-DCHP	0164
423034-000030 K10UF-DCHP	0164
423036-000060 K30F-DCF	P8
423036-000080 K30F-DCF	P8
423036-000100 K30F-DCF	P8
423037-000060 K30F-DCHP	P8
423037-000080 K30F-DCHP	P8
423037-000100 K30F-DCHP	P8
423038-000020 K30F-DCHP	P7
423038-000030 K30F-DCHP	P7
423038-000040 K30F-DCHP	P7
423038-000050 K30F-DCHP	P7
423038-000060 K30F-DCHP	P7
423038-000080 K30F-DCHP	P7
423038-000100 K30F-DCHP	P7
423038-000120 K30F-DCHP	P7
423039-000020 K30F-DCHP	P7
423039-000030 K30F-DCHP	P7
423039-000040 K30F-DCHP	P7
423039-000050 K30F-DCHP	P7
423039-000060 K30F-DCHP	P7
423039-000080 K30F-DCHP	P7
423039-000100 K30F-DCHP	P7
423039-000120 K30F-DCHP	P7
423047-000020 K30F-DCHP	P6
423047-000030 K30F-DCHP	P6
423047-000040 K30F-DCHP	P6
423047-000050 K30F-DCHP	P6
423047-000060 K30F-DCHP	P6
423047-000080 K30F-DCHP	P6
423047-000100 K30F-DCHP	P6
423047-000120 K30F-DCHP	P6
423048-000020 K30F-DCHP	P6
423048-000030 K30F-DCHP	P6
423048-000040 K30F-DCHP	P6
423048-000050 K30F-DCHP	P6
423048-000060 K30F-DCHP	P6
423048-000080 K30F-DCHP	P6
423048-000100 K30F-DCHP	P6
423048-000120 K30F-DCHP	P6
446101 W	E33
446102 W	E33
446103 W	E33
446104 W	E33–34
450222-000200 K10F-DCFD	W13
450222-000300 K10F-DCFD	W13
450222-000400 K10F-DCFD	W13
450227-000200 K10F-DCFD	W9
450227-000300 K10F-DCFD	W9
450227-000400 K10F-DCFD	W9
450227-000500 K10F-DCFD	W9
450227-000600 K10F-DCFD	W9
450227-000800 K10F-DCFD	W9
450227-001000 K10F-DCFD	W9
450227-001200 K10F-DCFD	W9
450227-001400 K10F-DCFD	W9
450270-000500 K10F-DCFD	W14
450270-000600 K10F-DCFD	W14
450270-000800 K10F-DCFD	W14
450270-001000 K10F-DCFD	W14
450270-001200 K10F-DCFD	W14
450270-001400 K10F-DCFD	W14
450271-000500 K10F-DCFD	W10
450271-000600 K10F-DCFD	W10
450271-000800 K10F-DCFD	W10
450271-001000 K10F-DCFD	W10
450271-001200 K10F-DCFD	W10
450271-001400 K10F-DCFD	W10
450280-001400 K10F-DCFD	W15
450280-001600 K10F-DCFD	W15
450280-001800 K10F-DCFD	W15
450280-002000 K10F-DCFD	W15
450280-002200 K10F-DCFD	W15
450280-002400 K10F-DCFD	W15
450280-002500 K10F-DCFD	W15
450280-002600 K10F-DCFD	W15
450280-002800 K10F-DCFD	W15
450280-003000 K10F-DCFD	W15
450280-003200 K10F-DCFD	W15
450281-001400 K10F-DCFD	W11
450281-001600 K10F-DCFD	W11
450281-001800 K10F-DCFD	W11
450281-002000 K10F-DCFD	W11
450281-002200 K10F-DCFD	W11
450281-002400 K10F-DCFD	W11
450281-002500 K10F-DCFD	W11
450281-002600 K10F-DCFD	W11
450281-002800 K10F-DCFD	W11
450281-003000 K10F-DCFD	W11
450281-003200 K10F-DCFD	W11
450301001T WP15PE	O87
450301501T WP15PE	O87
450302001T WP15PE	O87
450302501T WP15PE	O87
450302511T WP15PE	O87
450303002T WP15PE	O87
450303502T WP15PE	O87
450304002T WP15PE	O87
450304502T WP15PE	O87
450305002T WP15PE	O87
450306002T WP15PE	O87
450308003T WP15PE	O87
450310004T WP15PE	O87
450312005T WP15PE	O87
450316006T WP15PE	O87
450320007T WP15PE	O87
456680-001400 CERMETDCFD	W16
456680-001500 CERMETDCFD	W16
456680-001600 CERMETDCFD	W16
456680-001700 CERMETDCFD	W16
456680-001800 CERMETDCFD	W16
456680-001900 CERMETDCFD	W16
456680-002000 CERMETDCFD	W16
456681-001400 CERMETDCFD	W12
456681-001500 CERMETDCFD	W12
456681-001600 CERMETDCFD	W12
456681-001700 CERMETDCFD	W12
456681-001800 CERMETDCFD	W12
456681-001900 CERMETDCFD	W12
456681-002000 CERMETDCFD	W12
460303002RT TIALN-RT	091
460304002RT TIALN-RT	091
460305002RT TIALN-RT	091
460306002.. UNCOATED	091
460306002RT TIALN-RT	091
460308003RT TIALN-RT	091
460310004.. UNCOATED	091
460310004RT TIALN-RT	091
460312005RT TIALN-RT	091
460316006RT TIALN-RT	091
460320007RT TIALN-RT	091
463200400.. UNCOATED	0117
463200400RT TIALN-RT	0117
463200500.. UNCOATED	0117
463200500RT TIALN-RT	0117
463200600.. UNCOATED	0117
463200600RT TIALN-RT	0117
463200800.. UNCOATED	0117
463200800RT TIALN-RT	0117
463201000.. UNCOATED	0117
463201000RT TIALN-RT	0117
463201500.. UNCOATED	0117
463201500RT TIALN-RT	0117
463202000.. UNCOATED	0117
463300400.. UNCOATED	0118
463300400RT TIALN-RT	0118
463300500.. UNCOATED	0118
463300500RT TIALN-RT	0118
463300600.. UNCOATED	0118
463300600RT TIALN-RT	0118
463300800.. UNCOATED	0118
463300800RT TIALN-RT	0118
463301000.. UNCOATED	0118
463301000RT TIALN-RT	0118
463301200.. UNCOATED	0118
463301200RT TIALN-RT	0118
463301500.. UNCOATED	0118
463301500RT TIALN-RT	0118
463301800.. UNCOATED	0118
463301800RT TIALN-RT	0118
463302000.. UNCOATED	0118
463302000RT TIALN-RT	0118
463302500RT TIALN-RT	0118
463303000RT TIALN-RT	0118
465101000.. UNCOATED	0119
465101000CT TICN-CT	0119
465101000RT TIALN-RT	0119
465101200.. UNCOATED	0119
465101200CT TICN-CT	0119
465101200RT TIALN-RT	0119

Catalogue No.	Page(s)
465101500.. UNCOATED	0119
465101500CT TICN-CT	0119
465101500RT TIALN-RT	0119
465101800CT TICN-CT	0119
465101800RT TIALN-RT	0119
465102000.. UNCOATED	0119
465102000CT TICN-CT	0119
465102000RT TIALN-RT	0119
471706002LW TIALN-LW	07
471708003LW TIALN-LW	07
471710004LW TIALN-LW	07
471712005LW TIALN-LW	07
471716006LW TIALN-LW	07
471720007LW TIALN-LW	07
472712005LW TIALN-LW	08
472716006LW TIALN-LW	08
472720007LW TIALN-LW	08
477704001T WP15PE	04
477704002T WP15PE	04
477704002W WP15PE	04
4777040Z2T WP15PE	04
477705002T WP15PE	04
477705002W WP15PE	04
477705012T WP15PE	04
4777050Z2T WP15PE	04
477706002T WP15PE	04
477706002W WP15PE	04
477706012T WP15PE	04
4777060Z2T WP15PE	04
477707003T WP15PE	04
477707003W WP15PE	04
477707013T WP15PE	04
4777070Z3T WP15PE	04
477708003T WP15PE	04
477708003W WP15PE	04
477708013T WP15PE	04
4777080Z3T WP15PE	04
477709004T WP15PE	04
477709004W WP15PE	04
477709014T WP15PE	04
4777090Z4T WP15PE	04
477710004T WP15PE	04
477710004W WP15PE	04
477710024T WP15PE	04
4777100Z4T WP15PE	05
4777110Z5T WP15PE	05
477712005T WP15PE	05
477712005W WP15PE	05
477712025T WP15PE	05
4777120Z5T WP15PE	05
477714014W WP15PE	05
477714015T WP15PE	05
477716006T WP15PE	05
477716006W WP15PE	05
477716026T WP15PE	05
4777160Z6T WP15PE	05
477718018T WP15PE	05
477718018W WP15PE	05
477720007T WP15PE	05
477720007W WP15PE	05
47772002T WP15PE	05
477725008T WP15PE	05
477725008W WP15PE	05
477804002MT ALTIN-MT	06
477804002MW ALTIN-MW	06
477805002MT ALTIN-MT	06
477805002MW ALTIN-MW	06
477806002MT ALTIN-MT	06
477806002MW ALTIN-MW	06
477807003MT ALTIN-MT	06
477807003MW ALTIN-MW	06
477808003MT ALTIN-MT	06
477808003MW ALTIN-MW	06
477809004MT ALTIN-MT	06
477809004MW ALTIN-MW	06
477810004MT ALTIN-MT	06
477810004MW ALTIN-MW	06
477812005MT ALTIN-MT	06
477812005MW ALTIN-MW	06
477814014MT ALTIN-MT	06
477814014MW ALTIN-MW	06
477816006MT ALTIN-MT	06
477816006MW ALTIN-MW	06
477818018MT ALTIN-MT	06
477818018MW ALTIN-MW	06
477820007MT ALTIN-MT	06
477820007MW ALTIN-MW	06
477825008MT ALTIN-MT	06
477825008MW ALTIN-MW	06
47N005002T WP15PE	012
47N006002T WP15PE	012
47N008003T WP15PE	012
47N010004T WP15PE	012
47N012005T WP15PE	012
47N016006T WP15PE	012
47N020007T WP15PE	012
47N606002LW TIALN-LW	011
47N608003LW TIALN-LW	011
47N610004LW TIALN-LW	011
47N612005LW TIALN-LW	011
47N616006LW TIALN-LW	011
47N620007LW TIALN-LW	011
47N704002LT TIALN-LT	09
47N704012LT TIALN-LT	09
47N704012MT ALTIN-MT	09
47N704022LT TIALN-LT	09
47N705002LT TIALN-LT	09
47N705012LT TIALN-LT	09
47N705012MT ALTIN-MT	09
47N706002LT TIALN-LT	09
47N706002MT ALTIN-MT	09
47N706012LT TIALN-LT	09
47N706012MT ALTIN-MT	09
47N706022LT TIALN-LT	09
47N708003LT TIALN-LT	09
47N708003MT ALTIN-MT	09
47N708013LT TIALN-LT	09
47N708013MT ALTIN-MT	09
47N708023LT TIALN-LT	09
47N708033LT TIALN-LT	09
47N710004LT TIALN-LT	09
47N710004MT ALTIN-MT	09
47N710014LT TIALN-LT	09
47N710014MT ALTIN-MT	09
47N710024LT TIALN-LT	09
47N710034LT TIALN-LT	09
47N710034MT ALTIN-MT	09
47N712005LT TIALN-LT	09
47N712005MT ALTIN-MT	09
47N712015LT TIALN-LT	09
47N712015MT ALTIN-MT	09
47N712025LT TIALN-LT	09
47N712035LT TIALN-LT	09
47N712035MT ALTIN-MT	09
47N712045LT TIALN-LT	010
47N712045MT ALTIN-MT	010
47N716006LT TIALN-LT	010
47N716006MT ALTIN-MT	010
47N716016LT TIALN-LT	010
47N716016MT ALTIN-MT	010
47N716026LT TIALN-LT	010
47N716026MT ALTIN-MT	010
47N720007LT TIALN-LT	010
47N720007MT ALTIN-MT	010
47N720017LT TIALN-LT	010
47N720017MT ALTIN-MT	010
47N720027LT TIALN-LT	010
47N720027MT ALTIN-MT	010
490604002CW TICN-CW	066
490604002LW TIALN-LW	066
490604002RT TIALN-RT	066
490604002RW TIALN-RW	066
490605002CW TICN-CW	066
490605002LW TIALN-LW	066
490605002RT TIALN-RT	066
490605002RW TIALN-RW	066
490606002CW TICN-CW	066
490606002LW TIALN-LW	066
490606002RT TIALN-RT	066
490606002RW TIALN-RW	066
490607003CW TICN-CW	066
490607003LW TIALN-LW	066
490607003RT TIALN-RT	066
490607003RW TIALN-RW	066
490608003CW TICN-CW	066
490608003LW TIALN-LW	066
490608003RT TIALN-RT	066
490608003RW TIALN-RW	066
490609004CW TICN-CW	066
490609004LW TIALN-LW	066
490609004RT TIALN-RT	066
490609004RW TIALN-RW	066
490610004CW TICN-CW	066
490610004LW TIALN-LW	066
490610004RT TIALN-RT	066
490610004RW TIALN-RW	066
490611005CW TICN-CW	066
490611005LW TIALN-LW	066
490611005RT TIALN-RT	066
490611005RW TIALN-RW	066
490612005CW TICN-CW	066
490612005LW TIALN-LW	066
490612005RT TIALN-RT	066
490612005RW TIALN-RW	066
490613014CW TICN-CW	066
490613014LW TIALN-LW	066
490613014RT TIALN-RT	066
490613014RW TIALN-RW	066
490614014CW TICN-CW	066
490614014LW TIALN-LW	066
490614014RT TIALN-RT	066
490614014RW TIALN-RW	066
490616006CW TICN-CW	066
490616006LW TIALN-LW	066
490616006RT TIALN-RT	066
490616006RW TIALN-RW	066
490618018CW TICN-CW	066
490618018LW TIALN-LW	066
490618018RT TIALN-RT	066
490618018RW TIALN-RW	066
490620007CW TICN-CW	066
490620007LW TIALN-LW	066
490620007RT TIALN-RT	066
490620007RW TIALN-RW	066
490625008CW TICN-CW	066
490625008LW TIALN-LW	066
490625008RT TIALN-RT	066
490625008RW TIALN-RW	066
490906002.. UNCOATED	0140
490906002WW UNCOATEDWW	0140
490908003.. UNCOATED	0140
490908003WW UNCOATEDWW	0140
490910004.. UNCOATED	0140
490910004WW UNCOATEDWW	0140
490912005.. UNCOATED	0140
490912005WW UNCOATEDWW	0140
490914014.. UNCOATED	0140
490914014WW UNCOATEDWW	0140
490916006.. UNCOATED	0140
490916006WW UNCOATEDWW	0140
490918018.. UNCOATED	0140
490918018WW UNCOATEDWW	0140
490920007.. UNCOATED	0140
490920007WW UNCOATEDWW	0140
490925008.. UNCOATED	0140
490925008WW UNCOATEDWW	0140
496605002CW TICN-CW	067
496605002LW TIALN-LW	067
496605002RW TIALN-RW	067
496606002CW TICN-CW	067
496606002LW TIALN-LW	067
496606002RW TIALN-RW	067
496608003CW TICN-CW	067
496608003LW TIALN-LW	067
496608003RW TIALN-RW	067
496610004CW TICN-CW	067
496610004LW TIALN-LW	067
496610004RW TIALN-RW	067
496612005CW TICN-CW	067
496612005LW TIALN-LW	067
496612005RW TIALN-RW	067
496614014LW TIALN-LW	067
496614014RW TIALN-RW	067
496616006CW TICN-CW	067
496616006LW TIALN-LW	067
496616006RW TIALN-RW	067
496618018CW TICN-CW	067
496620007CW TICN-CW	067
496620007RW TIALN-RW	067
496625008CW TICN-CW	067
496625008RW TIALN-RW	067
496905002LW TIALN-LW	062
496906002LW TIALN-LW	062
496908003LW TIALN-LW	062
496910004LW TIALN-LW	062
496912005LW TIALN-LW	062
496914014LW TIALN-LW	062
496916006LW TIALN-LW	062
496918018LW TIALN-LW	062
496920007LW TIALN-LW	062
497604002T WP15PE	057
497605002T WP15PE	057
497606002T WP15PE	057
497608003T WP15PE	057
497610004T WP15PE	057
497612005T WP15PE	057
497614014T WP15PE	057
497616006T WP15PE	057
497618018T WP15PE	057
497620007T WP15PE	057
497625008T WP15PE	057
497906002.. UNCOATED	0141

Catalogue No.	Page(s)
497906002CT TICN-CT	0141
497908003.. UNCOATED	0141
497908003CT TICN-CT	0141
497910004.. UNCOATED	0141
497910004CT TICN-CT	0141
497912005.. UNCOATED	0141
497912005CT TICN-CT	0141
497916006.. UNCOATED	0141
497916006CT TICN-CT	0141
497920007.. UNCOATED	0141
497920007CT TICN-CT	0141
497925008.. UNCOATED	0141
497925008CT TICN-CT	0141
49G908003CT TICN-CT	0143
49G908003CW TICN-CW	0143
49G910004CT TICN-CT	0143
49G910004CW TICN-CW	0143
49G912005CT TICN-CT	0143
49G912005CW TICN-CW	0143
49G916006CT TICN-CT	0143
49G916006CW TICN-CW	0143
49G920007CT TICN-CT	0143
49G920007CW TICN-CW	0143
49G925008CT TICN-CT	0143
49G925008CW TICN-CW	0143
49H608003LW TIALN-LW	055
49H608003RW TIALN-RW	055
49H610004LW TIALN-LW	055
49H610004RW TIALN-RW	055
49H612005RW TIALN-RW	055
49H614014LW TIALN-LW	055
49H616006LW TIALN-LW	055
49H616006RW TIALN-RW	055
49H618018LW TIALN-LW	055
49H618018RW TIALN-RW	055
49H620007LW TIALN-LW	055
49H620007RW TIALN-RW	055
49N604002MW ALTIN-MW	061
49N605002MW ALTIN-MW	061
49N606002MW ALTIN-MW	061
49N608003MW ALTIN-MW	061
49N610004MW ALTIN-MW	061
49N612005MW ALTIN-MW	061
49N614014MW ALTIN-MW	061
49N616006MW ALTIN-MW	061
49N618018MW ALTIN-MW	061
49N620007MW ALTIN-MW	061
49N625008MW ALTIN-MW	061
49N906002.. UNCOATED	0142
49N908003.. UNCOATED	0142
49N910004.. UNCOATED	0142
49N912005.. UNCOATED	0142
49N916006.. UNCOATED	0142
49N920007.. UNCOATED	0142
4EL40ISO TN6025	F50
4EL4TR TN6025	F67
4EL50ISO TN6025	F50
4ER35ISO TN6025	F48
4ER40ISO TN6025	F48
4ER45ISO TN6025	F48
4ER4TR TN6025	F67
4ER50ISO TN6025	F49
4ER5TR TN6025	F67
4ER6RD TN6025	F65
4ER6W TN6025	F62
4ERN55 TN6025	F60
4ERN60 TN6025	F46
4IL40ISO TN6025	F53
4IL45ISO TN6025	F53
4IL50ISO TN6025	F53
4ILN60 TN6025	F47
4IR35ISO TN6025	F51
4IR40ISO TN6025	F52
4IR45ISO TN6025	F52
4IR4RD TN6025	F66
4IR4TR TN6025	F68
4IR50ISO TN6025	F52
4IR5TR TN6025	F68
4IR6RD TN6025	F66
4IR6W TN6025	F63
4IRN55 TN6025	F61
4IRN60 TN6025	F47
4U4006002T WP15PE	059
4U4008003T WP15PE	059
4U4010004T WP15PE	059
4U4012005T WP15PE	059
4U4016006T WP15PE	059
4U4020007T WP15PE	059
4U4025008T WP15PE	059
4U7006002T WP15PE	060
4U7006002W WP15PE	060
4U7008003T WP15PE	060
4U7008003W WP15PE	060
4U7010004T WP15PE	060
4U7010004W WP15PE	060
4U7012005T WP15PE	060
4U7012005W WP15PE	060
4U7016006T WP15PE	060
4U7016006W WP15PE	060
4U7016046T WP15PE	060
4U7020007T WP15PE	060
4U7020007W WP15PE	060
4U7020047T WP15PE	060
4U7025008T WP15PE	060
4U7025008W WP15PE	060
4U7025048T WP15PE	060
507116 C5	E119
507116 M40	E119
507116 M45	E119
507117 C2	E119
507117 M40	E119
507117 M45	E119
507117 M93	E119
507124 GC	E120
507124 M40	E120
507124 M45	E120
507124 M93	E120
507125 M40	E119
507128 C2	E120
507128 M40	E120
507128 M45	E120
507128 M93	E120
507129 M40	E119
507129 M45	E119
507140 M40	E119
507140 M45	E119
507140 M93	E119
507143 C2	E120
507143 M40	E120
507143 M45	E120
507143 M93	E120
507144 M40	E119
507144 M45	E119
507146 M40	E120
507146 M45	E120
507151 M40	E120
507151 M43	E120
507151 M45	E120
507152 M40	E119
507154 M40	E119
507154 M45	E119
507155 M40	E120
507155 M45	E120
507161 M40	E120
507161 M45	E120
507171 M40	E120
507176 M40	E120
507176 M45	E120
507196 M40	E119
507196 M45	E119
507197 M40	E120
507207 M45	E120
507214 M40	E120
507214 M45	E120
507224 M40	E120
507224 M45	E120
507240 M40	E121
507240 M45	E121
507241 M40	E121
507241 M45	E121
507242 M40	E121
507242 M45	E121
507243 M40	E121
507243 M45	E121
507244 M40	E121
507244 M45	E121
507245 M40	E121
507245 M45	E121
507246 M40	E121
507246 M45	E121
507247 M40	E121
507247 M45	E121
507252 M40	E121
507252 M45	E121
507253 M40	E121
507253 M45	E121
507255 M40	E121
507257 M45	E121
507275 M40	E116
507275 M43	E116
507275 M45	E116
507275 M93	E116
507276 M40	E117
507276 M43	E117
507276 M45	E117
507276 M93	E117
507277 M45	E116
507277 M93	E116
507278 M40	E116
507278 M43	E116
507278 M45	E116
507278 M93	E116
507279 M40	E117
507279 M43	E117
507279 M45	E117
507279 M93	E117
507280 M45	E116
507281 M43	E116
507281 M45	E116
507281 M93	E116
507282 M43	E117
507282 M45	E117
507282 M93	E117
507283 M93	E116
507295 M43	E116
507295 M45	E116
507295 M93	E116
507296 M43	E117
507296 M45	E117
507296 M93	E117
507297 M43	E116
507297 M93	E116
507298 M43	E117
507298 M45	E117
507298 M93	E117
507301 M45	E117
507305 M45	E114
507305 M93	E114
507306 M45	E114
507306 M93	E114
507307 M45	E114
507307 M93	E114
507308 M43	E114
507308 M45	E114
507308 M93	E114
507309 M45	E114
507309 M93	E114
507310 M45	E114
507310 M93	E114
507329 M433B	E118
507330 M433B	E118
507331 M433B	E118
507332 M433B	E118
507333 M433B	E118
507334 M433B	E118
507354 M433B	E115
507355 M433B	E115
507356 M433B	E115
507357 M433B	E115
507358 M433B	E115
507359 M433B	E115
507378 M43	E116
507378 M45	E116
507378 M93	E116
507379 M43	E117
507379 M45	E117
50HC030M	T117
50HC040M	T117
50HC050M	T117
50HC060M	T117
50HC080M	T117
50HC100M	T117
510201500.. UNCOATED	0126
510202000.. UNCOATED	0126
510202500.. UNCOATED	0126
510203000.. UNCOATED	0126
510204001.. UNCOATED	0126
510205001.. UNCOATED	0126
510205002.. UNCOATED	0126
510206002.. UNCOATED	0126
510208003.. UNCOATED	0126
510210004.. UNCOATED	0126
510212005.. UNCOATED	0126
510214014.. UNCOATED	0126
510216006.. UNCOATED	0126
510218018.. UNCOATED	0126
510220007.. UNCOATED	0126
510303000.. UNCOATED	0127
510304001.. UNCOATED	0127
510305001.. UNCOATED	0127
510306002.. UNCOATED	0127
510308003.. UNCOATED	0127

Catalogue No.	Page(s)
510310004.. UNCOATED	0127
510312005.. UNCOATED	0127
510314014.. UNCOATED	0127
510316006.. UNCOATED	0127
510318018.. UNCOATED	0127
510320007.. UNCOATED	0127
51N306002.. UNCOATED	0128
51N306012.. UNCOATED	0128
51N306022.. UNCOATED	0128
51N308003.. UNCOATED	0128
51N308013.. UNCOATED	0128
51N308023.. UNCOATED	0128
51N310004.. UNCOATED	0128
51N310014.. UNCOATED	0128
51N310024.. UNCOATED	0128
51N312005.. UNCOATED	0128
51N312015.. UNCOATED	0128
51N312025.. UNCOATED	0128
51N316006.. UNCOATED	0128
51N316016.. UNCOATED	0128
51N316026.. UNCOATED	0128
51N316036.. UNCOATED	0128
51N320007.. UNCOATED	0128
51N320017.. UNCOATED	0128
51N320027.. UNCOATED	0128
51N320037.. UNCOATED	0128
524149-000030 K10F-DCL	0132
524149-000040 K10F-DCL	0132
524149-000050 K10F-DCL	0132
524149-000060 K10F-DCL	0132
524149-000080 K10F-DCL	0132
524149-000100 K10F-DCL	0132
524149-000120 K10F-DCL	0132
524152-003005 K10F-DCL	0137
524152-004005 K10F-DCL	0137
524152-004010 K10F-DCL	0137
524152-005005 K10F-DCL	0137
524152-005010 K10F-DCL	0137
524152-006005 K10F-DCL	0137
524152-006010 K10F-DCL	0137
524152-006020 K10F-DCL	0137
524152-008005 K10F-DCL	0137
524152-008010 K10F-DCL	0137
524152-008020 K10F-DCL	0137
524152-010005 K10F-DCL	0137
524152-010010 K10F-DCL	0137
524152-010020 K10F-DCL	0137
524152-012005 K10F-DCL	0137
524152-012020 K10F-DCL	0137
524152-016005 K10F-DCL	0137
524152-016010 K10F-DCL	0137
524152-016020 K10F-DCL	0137
524152-016030 K10F-DCL	0137
56-1014	U40–45
56-1015	U40–41, U44–45
56-1018	U40–45
56-1020	U40–45
56-1025	U40–41, U44–45
56-1585	U40–42, U44–45
56-2015	U40–41, U44–45
56-2017	U40–41, U44–45
56-2020	U40–41, U44–45
56-2026	U40–41, U44–45
56-2028	U40–41, U44–45
56-2125	U40–41, U44–45
571806002MT ALTIN-MT	038
571806012MT ALTIN-MT	038
571806022MT ALTIN-MT	038
571808003MT ALTIN-MT	038
571808013MT ALTIN-MT	038
571808023MT ALTIN-MT	038
571810004MT ALTIN-MT	038
571810014MT ALTIN-MT	038
571810034MT ALTIN-MT	038
571810044MT ALTIN-MT	038
571812005MT ALTIN-MT	038
571812025MT ALTIN-MT	038
571812035MT ALTIN-MT	038
571812045MT ALTIN-MT	038
571814014MT ALTIN-MT	038
571814024MT ALTIN-MT	038
571814034MT ALTIN-MT	038
571814044MT ALTIN-MT	038
571814054MT ALTIN-MT	038
571816006MT ALTIN-MT	038
571816016MT ALTIN-MT	039
571816026MT ALTIN-MT	039
571816036MT ALTIN-MT	039
571816046MT ALTIN-MT	039
571816056MT ALTIN-MT	039
571818018MT ALTIN-MT	039
571818028MT ALTIN-MT	039
571818038MT ALTIN-MT	039
571818048MT ALTIN-MT	039
571818058MT ALTIN-MT	039
571820007MT ALTIN-MT	039
571820017MT ALTIN-MT	039
571820027MT ALTIN-MT	039
571820037MT ALTIN-MT	039
571820047MT ALTIN-MT	039
571820057MT ALTIN-MT	039
571825008MT ALTIN-MT	039
571825018MT ALTIN-MT	039
571825028MT ALTIN-MT	039
571825038MT ALTIN-MT	039
571825048MT ALTIN-MT	039
571825058MT ALTIN-MT	039
577C04002T WP15PE	024
577C04002W WP15PE	024
577C04012T WP15PE	024
577C05002T WP15PE	024
577C05002W WP15PE	024
577C06002T WP15PE	024
577C06002W WP15PE	024
577C06012T WP15PE	024
577C07003T WP15PE	024
577C07003W WP15PE	024
577C08003T WP15PE	024
577C08003W WP15PE	024
577C08013T WP15PE	024
577C09004T WP15PE	024
577C09004W WP15PE	024
577C10004T WP15PE	024
577C10004W WP15PE	024
577C10014T WP15PE	024
577C12005T WP15PE	024
577C12005W WP15PE	024
577C12015T WP15PE	024
577C14004T WP15PE	024
577C14004W WP15PE	024
577C14014T WP15PE	024
577C16006T WP15PE	024
577C16006W WP15PE	024
577C16016T WP15PE	024
577C18008T WP15PE	024
577C18008W WP15PE	024
577C20007T WP15PE	024
577C20007W WP15PE	024
577C20017T WP15PE	024
577C25008T WP15PE	024
577C25008W WP15PE	024
577E10004T WS15PE	032
577E10024T WS15PE	032
577E10024W WS15PE	032
577E12005V WS15PE	032
577E12015V WS15PE	032
577E12015W WS15PE	032
577E16006V WS15PE	032
577E16016V WS15PE	032
577E16016W WS15PE	032
577E20007V WS15PE	032
577E20017V WS15PE	032
577E20017W WS15PE	032
577E25018V WS15PE	032
577E25018W WS15PE	032
57NC06002T WS15PE	025
57NC06022T WS15PE	025
57NC06022W WS15PE	025
57NC06032T WS15PE	025
57NC06032W WS15PE	025
57NC06042W WS15PE	025
57NC08003T WS15PE	025
57NC08023T WS15PE	025
57NC08023W WS15PE	025
57NC08033T WS15PE	025
57NC08033W WS15PE	025
57NC08053W WS15PE	025
57NC10004T WS15PE	025
57NC10024T WS15PE	025
57NC10024W WS15PE	025
57NC10034T WS15PE	025
57NC10034W WS15PE	025
57NC10054T WS15PE	025
57NC10054W WS15PE	025
57NC12005T WS15PE	025
57NC12025T WS15PE	025
57NC12025W WS15PE	025
57NC12035T WS15PE	025
57NC12035W WS15PE	025
57NC12055T WS15PE	025
57NC12055W WS15PE	025
57NC16006T WS15PE	025
57NC16026T WS15PE	025
57NC16026W WS15PE	025
57NC16036T WS15PE	025
57NC16036W WS15PE	025
57NC16056T WS15PE	025
57NC16056W WS15PE	025
57NC16076T WS15PE	026
57NC16076W WS15PE	026
57NC20007T WS15PE	026
57NC20027T WS15PE	026
57NC20027W WS15PE	026
57NC20037T WS15PE	026
57NC20037W WS15PE	026
57NC20057T WS15PE	026
57NC20057W WS15PE	026
57NC20077T WS15PE	026
57NC20077W WS15PE	026
57NC20087T WS15PE	026
57NC20087W WS15PE	026
57NC25008T WS15PE	026
57NC25028T WS15PE	026
57NC25028W WS15PE	026
57NC25038T WS15PE	026
57NC25038W WS15PE	026
57NC25058T WS15PE	026
57NC25058W WS15PE	026
57NC25078T WS15PE	026
57NC25078W WS15PE	026
57NC25088T WS15PE	026
57NC25088W WS15PE	026
57NE10004T WS15PE	033
57NE10024T WS15PE	033
57NE10024W WS15PE	033
57NE10034T WS15PE	033
57NE10034W WS15PE	033
57NE10054T WS15PE	033
57NE10054W WS15PE	033
57NE12005V WS15PE	033
57NE12025V WS15PE	033
57NE12025W WS15PE	033
57NE12035V WS15PE	033
57NE12035W WS15PE	033
57NE12055V WS15PE	033
57NE12055W WS15PE	033
57NE16006V WS15PE	033
57NE16026V WS15PE	033
57NE16026W WS15PE	033
57NE16036V WS15PE	033
57NE16036W WS15PE	033
57NE16056V WS15PE	033
57NE16056W WS15PE	033
57NE20007V WS15PE	033
57NE20027V WS15PE	033
57NE20027W WS15PE	033
57NE20037V WS15PE	033
57NE20037W WS15PE	033
57NE20057V WS15PE	033
57NE20057W WS15PE	033
57NE20087V WS15PE	033
57NE20087W WS15PE	033
57NE25008V WS15PE	033
57NE25028V WS15PE	033
57NE25028W WS15PE	033
57NE25038V WS15PE	033
57NE25038W WS15PE	033
57NE25058V WS15PE	033
57NE25058W WS15PE	033
57NE25088V WS15PE	033
57NE25088W WS15PE	033
5ER55ISO TN6025	F49
5ER60ISO TN6025	F49
5ER6TR TN6025	F67
5ERQ60 TN6025	F46
5IL55ISO TN6025	F53
5IL60ISO TN6025	F53
5IR55ISO TN6025	F52
5IR60ISO TN6025	F52
5IR6TR TN6025	F68
5IRQ60 TN6025	F47
606249 W	E30–32
606266 W	E32
619168 W	E30–31, E33–34, E123
619205 W	E30–31, E33
660W25008WW	Q4
660W32009WW	Q4
660W40009WW	Q4
660W50000WW	Q4
661W25008WW	Q4
661W32009WW	Q4
661W40009WW	Q4

Catalogue No.	Page(s)
661W50000WW	Q4
664W25008WW	Q4
664W32009WW	Q4
664W40009WW	Q4
664W50000WW	Q4
6N0606002LW	Q5
6N0608004LW	Q5
6N0609004LW	Q5
6N0610004LW	Q5
6N0611005LW	Q5
6N0612005LW	Q5
6N0614005LW	Q5
6N0616006LW	Q5
6N0618006LW	Q5
6N0620007LW	Q5
6N0622007LW	Q5
6N0625008LW	Q5
6N0630008LW	Q5
6N7006002LT	Q6
6N7006002LW	Q6
6N7008004LT	Q6
6N7008004LW	Q6
6N7010004LT	Q6
6N7010004LW	Q6
6N7012005LT	Q6
6N7012005LW	Q6
6N7014005LT	Q6
6N7014005LW	Q6
6N7016006LT	Q6
6N7016006LW	Q6
6N7018006LT	Q6
6N7018006LW	Q6
6N7020007LT	Q6
6N7020007LW	Q6
6N7025008LT	Q6
6N7025008LW	Q6
6N7032009LT	Q6
6N7032009LW	Q6
6NL610004LW	Q7
6NL612005LW	Q7
6NL616006LW	Q7
6NL620007LW	Q7
6NL625008LW	Q7
705002001RT TIALN-RT1	0189
705002501RT TIALN-RT1	0189
705003002RT TIALN-RT1	0189
705004002RT TIALN-RT1	0189
705005002RT TIALN-RT1	0189
705006004RT TIALN-RT1	0189
705008004RT TIALN-RT1	0189
705010005RT TIALN-RT1	0189
705012006RT TIALN-RT1	0189
705016006RT TIALN-RT1	0189
705020007RT TIALN-RT1	0189
706002001RT TIALN-RT1	0189
706002501RT TIALN-RT1	0189
706003002RT TIALN-RT1	0189
706004002RT TIALN-RT1	0189
706005002RT TIALN-RT1	0189
706006004RT TIALN-RT1	0189
706008004RT TIALN-RT1	0189
706010005RT TIALN-RT1	0189
706012006RT TIALN-RT1	0189
706101001RT TIALN-RT1	0175
706102001RT TIALN-RT1	0175
706102501RT TIALN-RT1	0175
706103002RT TIALN-RT1	0175
706104002RT TIALN-RT1	0175
706105002RT TIALN-RT1	0175
706106004RT TIALN-RT1	0175
706108004RT TIALN-RT1	0175
706110005RT TIALN-RT1	0175
706112006RT TIALN-RT1	0175
70N101001RT TIALN-RT1	0176
70N101501RT TIALN-RT1	0176
70N102002RT TIALN-RT1	0176
70N103002RT TIALN-RT1	0176
70N104002RT TIALN-RT1	0176
70N105002RT TIALN-RT1	0176
70N106002RT TIALN-RT1	0176
70N108003RT TIALN-RT1	0176
70N110004RT TIALN-RT1	0176
70N112005RT TIALN-RT1	0176
70N606002MT ALTIN-MT1	0152
70N608003MT ALTIN-MT1	0152
70N610004MT ALTIN-MT1	0152
70N612005MT ALTIN-MT1	0152
70N616006MT ALTIN-MT1	0152
70N620007MT ALTIN-MT1	0152
70N706002MT ALTIN-MT1	0153
70N708003MT ALTIN-MT1	0153
70N710004MT ALTIN-MT1	0153
70N712005MT ALTIN-MT1	0153
70N716006MT ALTIN-MT1	0153
70N720007MT ALTIN-MT1	0153
715002000RT TIALN-RT1	0188
715002500RT TIALN-RT1	0188
715003000RT TIALN-RT1	0188
715004001RT TIALN-RT1	0188
715005001RT TIALN-RT1	0188
715006002RT TIALN-RT1	0188
715008003RT TIALN-RT1	0188
715010004RT TIALN-RT1	0188
715012005RT TIALN-RT1	0188
715016006RT TIALN-RT1	0188
715020007RT TIALN-RT1	0188
715101000RT TIALN-RT1	0174
715102000RT TIALN-RT1	0174
715102500RT TIALN-RT1	0174
715103000RT TIALN-RT1	0174
715104001RT TIALN-RT1	0174
715105001RT TIALN-RT1	0174
715106002RT TIALN-RT1	0174
715108003RT TIALN-RT1	0174
715110004RT TIALN-RT1	0174
715112005RT TIALN-RT1	0174
715116006RT TIALN-RT1	0174
715120007RT TIALN-RT1	0174
71N606002MT ALTIN-MT1	0152
71N608003MT ALTIN-MT1	0152
71N610004MT ALTIN-MT1	0152
71N612005MT ALTIN-MT1	0152
750503002LT TIALN-LT1	0180
750504002LT TIALN-LT1	0180
750505002LT TIALN-LT1	0180
750508003LT TIALN-LT1	0180
750510004LT TIALN-LT1	0180
750512005LT TIALN-LT1	0180
750516006LT TIALN-LT1	0181
750520007LT TIALN-LT1	0181
750525008LT TIALN-LT1	0181
751506002LT TIALN-LT1	0180
751508003LT TIALN-LT1	0180
751510004LT TIALN-LT1	0180
751512005LT TIALN-LT1	0180
751516006LT TIALN-LT1	0181
751520007LT TIALN-LT1	0181
751525008LT TIALN-LT1	0181
752506002LT TIALN-LT1	0180
752508003LT TIALN-LT1	0180
752510004LT TIALN-LT1	0180
752512005LT TIALN-LT1	0181
752516006LT TIALN-LT1	0181
752520007LT TIALN-LT1	0181
752525008LT TIALN-LT1	0181
754503002LT TIALN-LT1	0180
754504002LT TIALN-LT1	0180
754505002LT TIALN-LT1	0180
754506002LT TIALN-LT1	0180
754508003LT TIALN-LT1	0180
754510004LT TIALN-LT1	0180
754512005LT TIALN-LT1	0180
754516006LT TIALN-LT1	0181
754520007LT TIALN-LT1	0181
754525008LT TIALN-LT1	0181
758506002LT TIALN-LT1	0182
758506012LT TIALN-LT1	0182
758508003LT TIALN-LT1	0182
758508013LT TIALN-LT1	0182
758510004LT TIALN-LT1	0183
758510014LT TIALN-LT1	0183
758512005LT TIALN-LT1	0183
758512015LT TIALN-LT1	0183
758516006LT TIALN-LT1	0183
758516016LT TIALN-LT1	0183
758520007LT TIALN-LT1	0183
758520017LT TIALN-LT1	0183
758525008LT TIALN-LT1	0183
758525018LT TIALN-LT1	0183
759503002LT TIALN-LT1	0182
759503012LT TIALN-LT1	0182
759504002LT TIALN-LT1	0182
759504012LT TIALN-LT1	0182
759505002LT TIALN-LT1	0182
759505012LT TIALN-LT1	0182
759506002LT TIALN-LT1	0182
759506012LT TIALN-LT1	0182
759506022LT TIALN-LT1	0182
759506032LT TIALN-LT1	0182
759508003LT TIALN-LT1	0182
759508013LT TIALN-LT1	0182
759508023LT TIALN-LT1	0182
759508033LT TIALN-LT1	0182
759510004LT TIALN-LT1	0182
759510014LT TIALN-LT1	0182
759510024LT TIALN-LT1	0183
759510034LT TIALN-LT1	0183
759512005LT TIALN-LT1	0183
759512015LT TIALN-LT1	0183
759512025LT TIALN-LT1	0183
759512035LT TIALN-LT1	0183
759516006LT TIALN-LT1	0183
759516016LT TIALN-LT1	0183
759516036LT TIALN-LT1	0183
759520007LT TIALN-LT1	0183
759520017LT TIALN-LT1	0183
759520027LT TIALN-LT1	0183
759525008LT TIALN-LT1	0183
759525018LT TIALN-LT1	0183
75HC030M	T117
75HC040M	T117
75HC050M	T117
75HC060M	T117
75HC080M	T117
75HC100M	T117
75HC120M	T117
75HC140M	T117
75HC160M	T117
75N203022RT TIALN-RT1	0172
75N203042RT TIALN-RT1	0172
75N203062RT TIALN-RT1	0172
75N204022RT TIALN-RT1	0172
75N204042RT TIALN-RT1	0172
75N204062RT TIALN-RT1	0172
75N205022RT TIALN-RT1	0172
75N205042RT TIALN-RT1	0172
75N206032RT TIALN-RT1	0172
75N206042RT TIALN-RT1	0172
75N206052RT TIALN-RT1	0172
75N206062RT TIALN-RT1	0172
75N206072RT TIALN-RT1	0172
75N208023RT TIALN-RT1	0172
75N208043RT TIALN-RT1	0172
75N208063RT TIALN-RT1	0172
75N210024RT TIALN-RT1	0172
75N210034RT TIALN-RT1	0172
75N210044RT TIALN-RT1	0172
75N210064RT TIALN-RT1	0172
75N212025RT TIALN-RT1	0172
75N212035RT TIALN-RT1	0172
75N212045RT TIALN-RT1	0172
75N212055RT TIALN-RT1	0172
75N212065RT TIALN-RT1	0172
75N503022LT TIALN-LT1	0184
75N503042LT TIALN-LT1	0184
75N504022LT TIALN-LT1	0184
75N504042LT TIALN-LT1	0184
75N505022LT TIALN-LT1	0184
75N505042LT TIALN-LT1	0184
75N506002LT TIALN-LT1	0184
75N506022LT TIALN-LT1	0184
75N506042LT TIALN-LT1	0184
75N506062LT TIALN-LT1	0184
75N506082LT TIALN-LT1	0184
75N508003LT TIALN-LT1	0184
75N508023LT TIALN-LT1	0184
75N508033LT TIALN-LT1	0184
75N508043LT TIALN-LT1	0184
75N508053LT TIALN-LT1	0184
75N510004LT TIALN-LT1	0184
75N510024LT TIALN-LT1	0184
75N510034LT TIALN-LT1	0184
75N510044LT TIALN-LT1	0184
75N510054LT TIALN-LT1	0185
75N512005LT TIALN-LT1	0185
75N512025LT TIALN-LT1	0185
75N512035LT TIALN-LT1	0185
75N512045LT TIALN-LT1	0185
75N512055LT TIALN-LT1	0185
75N516006LT TIALN-LT1	0185
75N516026LT TIALN-LT1	0185
75N516046LT TIALN-LT1	0185
75N520007LT TIALN-LT1	0185
75N520027LT TIALN-LT1	0185
75N520047LT TIALN-LT1	0185
75N525008LT TIALN-LT1	0185
75N525028LT TIALN-LT1	0185
75N525048LT TIALN-LT1	0185
75N806002RT TIALN-RT1	0186
75N808003RT TIALN-RT1	0186
75N810004RT TIALN-RT1	0186
75N812005RT TIALN-RT1	0186

Catalogue No.	Page(s)
767004002LT TIALN-LT1	0193
767005002LT TIALN-LT1	0193
767006004LT TIALN-LT1	0193
767008004LT TIALN-LT1	0193
767010005LT TIALN-LT1	0193
767012006LT TIALN-LT1	0193
767016006LT TIALN-LT1	0193
767020007LT TIALN-LT1	0193
767025008LT TIALN-LT1	0193
771E10004T WS15PE	045
771E10024T WS15PE	045
771E12005T WS15PE	045
771E12025T WS15PE	045
771E16006T WS15PE	045
771E16026T WS15PE	045
771E20007T WS15PE	045
771E20027T WS15PE	045
772E10004T WS15PE	045
772E10024T WS15PE	045
772E12005T WS15PE	045
772E12005V WS15PE	045
772E12025T WS15PE	045
772E12025V WS15PE	045
772E16006T WS15PE	045
772E16006V WS15PE	045
772E16026T WS15PE	045
772E16026V WS15PE	045
772E20007T WS15PE	045
772E20007V WS15PE	045
772E20027T WS15PE	045
772E20027V WS15PE	045
77NE10004T WS15PE	044
77NE10024T WS15PE	044
77NE12005T WS15PE	044
77NE12025T WS15PE	044
77NE16006T WS15PE	044
77NE16026T WS15PE	044
77NE20007T WS15PE	044
77NE20027T WS15PE	044
7F0-0509A	U29
7F0-0512T	U29
7F0-0516A	U29
7F0-0531A	U29
7F0-0531T	U29
7F0-0547A	U29
7F0-0547T	U29
7F0-0551A	U29
7F0-0551T	U29
7F0-0563A	U29
7F0-0563T	U29
7F0-0571A	U29
7F0-0578A	U29
7F0-0578T	U29
7F0-0591A	U29
7F0-0591T	U29
7F0-0594A	U29
7F0-0594T	U29
7F0-0609A	U29
7F0-0609T	U29
7F0-0610A	U29
7F0-0625A	U29
7F0-0625T	U29
7F0-0630A	U29
7F0-0630T	U29
7F0-0641A	U29
7F0-0641T	U29
7F0-0650T	U29
7F0-0656A	U29
7F0-0656T	U29
7F0-0669A	U29
7F0-0672A	U29
7F0-0672T	U29
7F0-0688A	U29
7F0-0688T	U29
7F0-0689A	U29
7F0-0689T	U29
7F1-0703A	U30
7F1-0703T	U30
7F1-0709A	U30
7F1-0709T	U30
7F1-0719T	U30
7F1-0734A	U30
7F1-0734T	U30
7F1-0748A	U30
7F1-0748T	U30
7F1-0750A	U30
7F1-0750T	U30
7F1-0756T	U30
7F1-0766A	U30
7F1-0766T	U30
7F1-0768T	U30
7F1-0781A	U30
7F1-0781T	U30
7F1-0787A	U30
7F1-0787T	U30
7F1-0797N	U30
7F1-0797T	U30
7F1-0806A	U30
7F1-0807A	U30
7F1-0807T	U30
7F1-0813A	U30
7F1-0813T	U30
7F1-0827A	U30
7F1-0827T	U30
7F1-0828A	U30
7F1-0828T	U30
7F1-0844T	U30
7F1-0859A	U30
7F1-0859T	U30
7F1-0866A	U30
7F1-0866T	U30
7F1-0875A	U30
7F1-0875T	U30
7F1-0891A	U30
7F1-0891T	U30
7F1-0906A	U30
7F1-0906T	U30
7F1-0922A	U30
7F1-0922T	U30
7F1-0938A	U30
7F1-0938T	U30
7F1-0945A	U30
7F1-0945T	U30
7F1-0953A	U30
7F1-0953T	U30
7F1-0960T	U30
7F2-0969N	U31
7F2-0969T	U31
7F2-0984A	U31
7F2-0984T	U31
7F2-1000A	U31
7F2-1000T	U31
7F2-1003A	U31
7F2-1016A	U31
7F2-1016T	U31
7F2-1024A	U31
7F2-1024T	U31
7F2-1031A	U31
7F2-1031T	U31
7F2-1047A	U31
7F2-1047T	U31
7F2-1063A	U31
7F2-1063T	U31
7F2-1078A	U31
7F2-1078T	U31
7F2-1094A	U31
7F2-1094T	U31
7F2-1102A	U31
7F2-1102T	U31
7F2-1109T	U31
7F2-1125A	U31
7F2-1125T	U31
7F2-1141A	U31
7F2-1142A	U31
7F2-1156A	U31
7F2-1156T	U31
7F2-1172T	U31
7F2-1181A	U31
7F2-1181T	U31
7F2-1188A	U31
7F2-1188T	U31
7F2-1203T	U31
7F2-1219A	U31
7F2-1219T	U31
7F2-1221A	U31
7F2-1231A	U31
7F2-1234N	U31
7F2-1234T	U31
7F2-1250A	U31
7F2-1250T	U31
7F2-1254T	U31
7F2-1260A	U31
7F2-1260T	U31
7F2-1266A	U31
7F2-1266T	U31
7F2-1281T	U31
7F2-1299A	U31
7F2-1313A	U31
7F2-1313T	U31
7F2-1328T	U32
7F2-1339A	U32
7F2-1344A	U32
7F2-1344T	U32
7F2-1359T	U32
7F2-1375A	U32
7F2-1375T	U32
7F2-1378A	U32
7F3-1391T	U33
7F3-1406A	U33
7F3-1406T	U33
7F3-1417A	U33
7F3-1417T	U33
7F3-1438A	U33
7F3-1438T	U33
7F3-1457A	U33
7F3-1457T	U33
7F3-1469A	U33
7F3-1469T	U33
7F3-1484T	U33
7F3-1496A	U33
7F3-1500A	U33
7F3-1500T	U33
7F3-1516T	U33
7F3-1531T	U33
7F3-1535A	U33
7F3-1563A	U33
7F3-1563T	U33
7F3-1575A	U33
7F3-1575T	U33
7F3-1594T	U33
7F3-1614A	U33
7F3-1625A	U33
7F3-1625T	U33
7F3-1654A	U33
7F3-1656T	U33
7F3-1688A	U33
7F3-1688T	U33
7F3-1693T	U33
7F3-1719A	U33
7F3-1719T	U33
7F3-1732A	U33
7F3-1750A	U33
7F3-1750T	U33
7F3-1766T	U33
7F3-1772A	U33
7F3-1772T	U33
7F3-1781T	U33
7F3-1811A	U33
7F3-1813A	U33
7F3-1813T	U33
7F3-1844T	U33
7F3-1850T	U33
7F3-1875A	U33
7F3-1875T	U33
7F4-1880T	U34
7F4-1890A	U34
7F4-1890T	U34
7F4-1906A	U34
7F4-1906T	U34
7F4-1929A	U34
7F4-1938A	U34
7F4-1938T	U34
7F4-1969A	U34
7F4-1969T	U34
7F4-2000A	U34
7F4-2000T	U34
7F4-2008T	U34
7F4-2016T	U34
7F4-2031A	U34
7F4-2031T	U34
7F4-2047A	U34
7F4-2047T	U34
7F4-2063A	U34
7F4-2063T	U34
7F4-2087A	U34
7F4-2094T	U34
7F4-2125A	U34
7F4-2125T	U34
7F4-2126A	U34
7F4-2156T	U34
7F4-2166A	U32
7F4-2188T	U34
7F4-2205A	U34
7F4-2219A	U34
7F4-2219T	U34
7F4-2244A	U34
7F4-2250A	U34
7F4-2250T	U34
7F4-2281T	U34
7F4-2284A	U34
7F4-2313A	U34
7F4-2313T	U34

Catalogue No.	Page(s)
7F4-2323A	U34
7F4-2344T	U34
7F4-2362T	U34
7F4-2375A	U35
7F4-2375T	U35
7F4-2438A	U35
7F4-2438T	U35
7F4-2441A	U35
7F4-2469A	U35
7F4-2480T	U35
7F4-2500A	U35
7F4-2500T	U35
7F4-2531T	U35
7F4-2559A	U35
7F4-2563A	U35
7F4-2563T	U35
7F5-2500T	U36
7F5-2563A	U36
7F5-2563T	U36
7F5-2625T	U36
7F5-2656T	U36
7F5-2677A	U36
7F5-2719T	U36
7F5-2750A	U36
7F5-2750T	U36
7F5-2756A	U36
7F5-2813A	U36
7F5-2875A	U36
7F5-2875T	U36
7F5-2938T	U36
7F5-2969A	U36
7F5-2969T	U36
7F5-3000A	U36
7F5-3000T	U36
7F6-3063A	U37
7F6-3063T	U37
7F6-3071A	U37
7F6-3125A	U37
7F6-3150A	U37
7F6-3188N	U37
7F6-3188T	U37
7F6-3250T	U37
7F6-3375T	U37
7F6-3438T	U37
7F6-3500T	U37
7F7-3543T	U37
7F7-3563T	U37
7F7-3688T	U37
7F7-3813A	U37
7F7-3938T	U37
7F7-4000A	U37
7FZ-0438A	U28
7FZ-0472A	U28
7FZ-0484A	U28
7FZ-0492A	U28
7FZ-0500A	U28
7FZ-0500T	U28
7N0100302MJ ALTIN-MJ1	0165
7N0100302RJ TIALN-RJ1	0165
7N0100402MJ ALTIN-MJ1	0165
7N0100402RJ TIALN-RJ1	0165
7N0100502MJ ALTIN-MJ1	0165
7N0100502RJ TIALN-RJ1	0165
7N0100602MJ ALTIN-MJ1	0165
7N0100602RJ TIALN-RJ1	0165
7N0100802MJ ALTIN-MJ1	0165
7N0100802RJ TIALN-RJ1	0165
7N0101002MJ ALTIN-MJ1	0165
7N0101002RJ TIALN-RJ1	0165
7N0101202MJ ALTIN-MJ1	0165
7N0101202RJ TIALN-RJ1	0165
7N0101402MJ ALTIN-MJ1	0165
7N0101402RJ TIALN-RJ1	0165
7N0101502MJ ALTIN-MJ1	0165
7N0101502RJ TIALN-RJ1	0165
7N0101602MJ ALTIN-MJ1	0165
7N0101602RJ TIALN-RJ1	0165
7N0101802MJ ALTIN-MJ1	0165
7N0101802RJ TIALN-RJ1	0165
7N0102002MJ ALTIN-MJ1	0165
7N0102002RJ TIALN-RJ1	0165
7N0102502MJ ALTIN-MJ1	0165
7N0102502RJ TIALN-RJ1	0165
7N0103002MJ ALTIN-MJ1	0165
7N0103002RJ TIALN-RJ1	0165
7N0104002MJ ALTIN-MJ1	0165
7N0104002RJ TIALN-RJ1	0165
7N0106002MJ ALTIN-MJ1	0165
7N0106002RJ TIALN-RJ1	0165
7N0200302MJ ALTIN-MJ1	0160
7N0200302RJ TIALN-RJ1	0160
7N0200402MJ ALTIN-MJ1	0160
7N0200402RJ TIALN-RJ1	0160
7N0200502MJ ALTIN-MJ1	0160
7N0200502RJ TIALN-RJ1	0160
7N0200602MJ ALTIN-MJ1	0160
7N0200602RJ TIALN-RJ1	0160
7N0200802MJ ALTIN-MJ1	0160
7N0200802RJ TIALN-RJ1	0160
7N0201002MJ ALTIN-MJ1	0161
7N0201002RJ TIALN-RJ1	0161
7N0201202MJ ALTIN-MJ1	0161
7N0201202RJ TIALN-RJ1	0161
7N0201402MJ ALTIN-MJ1	0161
7N0201402RJ TIALN-RJ1	0161
7N0201502MJ ALTIN-MJ1	0161
7N0201502RJ TIALN-RJ1	0161
7N0201602MJ ALTIN-MJ1	0162
7N0201602RJ TIALN-RJ1	0162
7N0201802MJ ALTIN-MJ1	0162
7N0201802RJ TIALN-RJ1	0162
7N0202002MJ ALTIN-MJ1	0162
7N0202002RJ TIALN-RJ1	0162
7N0202502MJ ALTIN-MJ1	0163
7N0202502RJ TIALN-RJ1	0163
7N1200502MJ ALTIN-MJ1	0160
7N1200502RJ TIALN-RJ1	0160
7N1200602MJ ALTIN-MJ1	0160
7N1200602RJ TIALN-RJ1	0160
7N1200802MJ ALTIN-MJ1	0160
7N1200802RJ TIALN-RJ1	0160
7N1201002MJ ALTIN-MJ1	0161
7N1201002RJ TIALN-RJ1	0161
7N1201202MJ ALTIN-MJ1	0161
7N1201202RJ TIALN-RJ1	0161
7N1201402MJ ALTIN-MJ1	0161
7N1201402RJ TIALN-RJ1	0161
7N1201502MJ ALTIN-MJ1	0161
7N1201502RJ TIALN-RJ1	0161
7N1201602MJ ALTIN-MJ1	0162
7N1201602RJ TIALN-RJ1	0162
7N1201802MJ ALTIN-MJ1	0162
7N1201802RJ TIALN-RJ1	0162
7N1202002MJ ALTIN-MJ1	0162
7N1202002RJ TIALN-RJ1	0162
7N1202502MJ ALTIN-MJ1	0163
7N1202502RJ TIALN-RJ1	0163
7N2100501RT TIALN-RT1	0166
7N2100601RT TIALN-RT1	0166
7N2100801RT TIALN-RT1	0166
7N2101001RT TIALN-RT1	0166
7N2101201RT TIALN-RT1	0166
7N2101501RT TIALN-RT1	0166
7N2102001RT TIALN-RT1	0166
7N2102501RT TIALN-RT1	0166
7N2103001RT TIALN-RT1	0166
7N2200400MJ ALTIN-MJ1	0160
7N2200400RJ TIALN-RJ1	0160
7N2200410MJ ALTIN-MJ1	0160
7N2200410RJ TIALN-RJ1	0160
7N2200500MJ ALTIN-MJ1	0160
7N2200500RJ TIALN-RJ1	0160
7N2200510MJ ALTIN-MJ1	0160
7N2200510RJ TIALN-RJ1	0160
7N2200520MJ ALTIN-MJ1	0160
7N2200520RJ TIALN-RJ1	0160
7N2200600MJ ALTIN-MJ1	0160
7N2200600RJ TIALN-RJ1	0160
7N2200610MJ ALTIN-MJ1	0160
7N2200610RJ TIALN-RJ1	0160
7N2200620MJ ALTIN-MJ1	0160
7N2200620RJ TIALN-RJ1	0160
7N2200701MJ ALTIN-MJ1	0160
7N2200701RJ TIALN-RJ1	0160
7N2200711MJ ALTIN-MJ1	0160
7N2200711RJ TIALN-RJ1	0160
7N2200721MJ ALTIN-MJ1	0160
7N2200721RJ TIALN-RJ1	0160
7N2200801MJ ALTIN-MJ1	0160
7N2200801RJ TIALN-RJ1	0160
7N2200811MJ ALTIN-MJ1	0160
7N2200811RJ TIALN-RJ1	0160
7N2200821MJ ALTIN-MJ1	0160
7N2200821RJ TIALN-RJ1	0160
7N2200901MJ ALTIN-MJ1	0160
7N2200901RJ TIALN-RJ1	0160
7N2200911MJ ALTIN-MJ1	0161
7N2200911RJ TIALN-RJ1	0161
7N2200921MJ ALTIN-MJ1	0161
7N2200921RJ TIALN-RJ1	0161
7N2201001MJ ALTIN-MJ1	0161
7N2201001RJ TIALN-RJ1	0161
7N2201011MJ ALTIN-MJ1	0161
7N2201011RJ TIALN-RJ1	0161
7N2201021MJ ALTIN-MJ1	0161
7N2201021RJ TIALN-RJ1	0161
7N2201031MJ ALTIN-MJ1	0161
7N2201031RJ TIALN-RJ1	0161
7N2201201MJ ALTIN-MJ1	0161
7N2201201RJ TIALN-RJ1	0161
7N2201211MJ ALTIN-MJ1	0161
7N2201211RJ TIALN-RJ1	0161
7N2201221MJ ALTIN-MJ1	0161
7N2201221RJ TIALN-RJ1	0161
7N2201231MJ ALTIN-MJ1	0161
7N2201231RJ TIALN-RJ1	0161
7N2201401MJ ALTIN-MJ1	0161
7N2201401RJ TIALN-RJ1	0161
7N2201411MJ ALTIN-MJ1	0161
7N2201411RJ TIALN-RJ1	0161
7N2201421MJ ALTIN-MJ1	0161
7N2201421RJ TIALN-RJ1	0161
7N2201431MJ ALTIN-MJ1	0161
7N2201431RJ TIALN-RJ1	0161
7N2201441MJ ALTIN-MJ1	0161
7N2201441RJ TIALN-RJ1	0161
7N2201501MJ ALTIN-MJ1	0161
7N2201501RJ TIALN-RJ1	0161
7N2201511MJ ALTIN-MJ1	0161
7N2201511RJ TIALN-RJ1	0161
7N2201521MJ ALTIN-MJ1	0161
7N2201521RJ TIALN-RJ1	0161
7N2201531MJ ALTIN-MJ1	0161
7N2201531RJ TIALN-RJ1	0161
7N2201541MJ ALTIN-MJ1	0161
7N2201541RJ TIALN-RJ1	0161
7N2201551MJ ALTIN-MJ1	0161
7N2201551RJ TIALN-RJ1	0161
7N2201561RJ TIALN-RJ1	0161
7N2201571RJ TIALN-RJ1	0161
7N2201601MJ ALTIN-MJ1	0162
7N2201601RJ TIALN-RJ1	0162
7N2201611MJ ALTIN-MJ1	0161
7N2201611RJ TIALN-RJ1	0161
7N2201621MJ ALTIN-MJ1	0161
7N2201621RJ TIALN-RJ1	0161
7N2201631MJ ALTIN-MJ1	0161
7N2201631RJ TIALN-RJ1	0161
7N2201641MJ ALTIN-MJ1	0161
7N2201641RJ TIALN-RJ1	0161
7N2201701MJ ALTIN-MJ1	0162
7N2201701RJ TIALN-RJ1	0162
7N2201711MJ ALTIN-MJ1	0162
7N2201711RJ TIALN-RJ1	0162
7N2201721MJ ALTIN-MJ1	0162
7N2201721RJ TIALN-RJ1	0162
7N2201731MJ ALTIN-MJ1	0162
7N2201731RJ TIALN-RJ1	0162
7N2201741MJ ALTIN-MJ1	0162
7N2201741RJ TIALN-RJ1	0162
7N2201801MJ ALTIN-MJ1	0162
7N2201801RJ TIALN-RJ1	0162
7N2201811MJ ALTIN-MJ1	0162
7N2201811RJ TIALN-RJ1	0162
7N2201821MJ ALTIN-MJ1	0162
7N2201821RJ TIALN-RJ1	0162
7N2201831MJ ALTIN-MJ1	0162
7N2201831RJ TIALN-RJ1	0162
7N2201841MJ ALTIN-MJ1	0162
7N2201841RJ TIALN-RJ1	0162
7N2201901MJ ALTIN-MJ1	0162
7N2201901RJ TIALN-RJ1	0162
7N2201911MJ ALTIN-MJ1	0162
7N2201911RJ TIALN-RJ1	0162
7N2201921MJ ALTIN-MJ1	0162
7N2201921RJ TIALN-RJ1	0162
7N2201931MJ ALTIN-MJ1	0162
7N2201931RJ TIALN-RJ1	0162
7N2201941MJ ALTIN-MJ1	0162
7N2201941RJ TIALN-RJ1	0162
7N2202001MJ ALTIN-MJ1	0162
7N2202001RJ TIALN-RJ1	0162
7N2202011MJ ALTIN-MJ1	0162
7N2202011RJ TIALN-RJ1	0162
7N2202021MJ ALTIN-MJ1	0162
7N2202021RJ TIALN-RJ1	0162
7N2202031MJ ALTIN-MJ1	0162
7N2202031RJ TIALN-RJ1	0162
7N2202041MJ ALTIN-MJ1	0162
7N2202041RJ TIALN-RJ1	0162
7N2202051RJ TIALN-RJ1	0162
7N2202061RJ TIALN-RJ1	0162

Catalogue No.	Page(s)
7N2202071RJ TIALN-RJ1	0162
7N2202091RJ TIALN-RJ1	0162
7N2202501MJ ALTIN-MJ1	0162
7N2202501RJ TIALN-RJ1	0162
7N2202511MJ ALTIN-MJ1	0163
7N2202511RJ TIALN-RJ1	0163
7N2202521MJ ALTIN-MJ1	0163
7N2202521RJ TIALN-RJ1	0163
7N2202531MJ ALTIN-MJ1	0163
7N2202531RJ TIALN-RJ1	0163
7N2202541MJ ALTIN-MJ1	0163
7N2202541RJ TIALN-RJ1	0163
7N2203002MJ ALTIN-MJ1	0163
7N2203002RJ TIALN-RJ1	0163
7N2203012MJ ALTIN-MJ1	0163
7N2203012RJ TIALN-RJ1	0163
7N2203022MJ ALTIN-MJ1	0163
7N2203022RJ TIALN-RJ1	0163
7N2203032MJ ALTIN-MJ1	0163
7N2203032RJ TIALN-RJ1	0163
7N2203042MJ ALTIN-MJ1	0163
7N2203042RJ TIALN-RJ1	0163
7N2203052RJ TIALN-RJ1	0163
7N2203062RJ TIALN-RJ1	0163
7S0.5SE	U41
7S0.5SL	U41
7S0.5SM	U40
7S0.5SS	U40
7S0.5TE	U45
7S0SE	U41
7S0SL	U41
7S0SM	U40
7S0SS	U40
7S0TE	U45
7S0TL	U45
7S0TM	U44
7S1.5SE	U41
7S1.5SM	U40
7S1.5SS	U40
7S1.5TM	U44
7S1SE	U41
7S1SL	U41
7S1SM	U40
7S1SS	U40
7S1TL	U45
7S1TM	U44
7S1TS	U44
7S2.5SM	U40
7S2.5SS	U40
7S2.5TM-4MT	U44
7S2.5TS	U44
7S2SE	U41
7S2SL	U41
7S2SM	U40
7S2SS	U40
7S2TE	U45
7S2TL	U45
7S2TM	U44
7S2TS	U44
7S3SE	U41
7S3SL	U41
7S3SM	U40
7S3SS	U40
7S3TL	U45
7S3TM	U44
7S3TS	U44
7S4SE	U41
7S4SL	U41
7S4SM	U40
7S4SS	U40
7S4TL	U45
7S4TM	U44
7S4TS	U44
7S5SM	U40
7S5SS	U40
7S5TL	U45
7S5TM	U44
7S5TS	U44
7S7SL	U41
7S7SM	U40
7S7TL	U45
7S7TM	U44
7SZSL	U41
7SZSM	U40
7SZSS	U40
7SZTL	U45
7SZTS	U44
8S0SL	U43
8S0SM	U42
8S0SS	U42
8S1SL	U43
8S1SM	U42
8S1SS	U42
8S2SE	U43
8S2SL	U43
8S2SM	U42
8S2SS	U42
8S3SM	U42
8S4SS	U42
A08JSCFPL06 WG	C66
A08JSCFPR06 WG	C66
A08JSCLCL06 WG	C67
A08JSCLCR06 WG	C67
A08JSCLPL06 WG	C69
A08JSCLPR06 WG	C69
A08JSTFPL09 WG	C78
A08JSTFPR09 WG	C78
A10KNNTOR1 W	E79, F32
A10KSCFPL06 WG	C66
A10KSCFPR06 WG	C66
A10KSCLCL06 WG	C67
A10KSCLCR06 WG	C67
A10KSCLPL06 WG	C69
A10KSCLPR06 WG	C69
A10KSDUCL07 WG	C73
A10KSDUCR07 WG	C73
A10KSTFCL11 WG	C76
A10KSTFCR11 WG	C76
A10KSTFPL11 WG	C78
A10KSTFPR11 WG	C78
A10KSTWPL11 WG	C80
A12MNNTOL2 W	E78, F31
A12MNNTOR1 W	E79, F32
A12MNNTOR2 W	E78, F31
A12MSCFPL06 WG	C66
A12MSCFPR06 WG	C66
A12MSCLPL06 WG	C69
A12MSCLPR06 WG	C69
A12MSDQPL07 WG	C72
A12MSDQPR07 WG	C72
A12MSDUPL07 WG	C75
A12MSDUPR07 WG	C75
A12MSDXPL07	C76
A12MSDXPR07	C76
A12MSTFPL11 WG	C78
A12MSTFPR11 WG	C78
A12MSTWPL11 WG	C80
A12MSTWPR11 WG	C80
A16MNNTOL2 W	E78, F31
A16MNNTOR2 W	E78, F31
A16RCTFPL11 WG	C65
A16RCTFPR11 WG	C65
A16RPWLNL06 WG	C61
A16RPWLNR06 WG	C61
A16RSCFPL06 WG	C66
A16RSCFPL09 WG	C66
A16RSCFPR06 WG	C66
A16RSCFPR09 WG	C66
A16RSCLCL09 WG	C67
A16RSCLCR09 WG	C67
A16RSCLPL06 WG	C69
A16RSCLPL09 WG	C69
A16RSCLPR06 WG	C69
A16RSCLPR09 WG	C69
A16RSDQCL07 WG	C71
A16RSDQCR07 WG	C71
A16RSDQPL07 WG	C72
A16RSDQPR07 WG	C72
A16RSDUCL07 WG	C73
A16RSDUCL11 WG	C73
A16RSDUCR07 WG	C73
A16RSDUCR11 WG	C73
A16RSDUPL07 WG	C75
A16RSDUPR07 WG	C75
A16RSDXPL07	C76
A16RSDXPR07	C76
A16RSTFPL11 WG	C78
A16RSTFPR11 WG	C78
A16RSTWPL11 WG	C80
A16RSTWPR11 WG	C80
A16RSVQBR11 WG	C80
A20QNNTOL2 W	E78, F31
A20QNNTOR2 W	E78, F31
A20SPWLNL06 WG	C61
A20SPWLNR06 WG	C61
A20SSCFPL06 WG	C66
A20SSCFPL09 WG	C66
A20SSCFPR06 WG	C66
A20SSCFPR09 WG	C66
A20SSCLCL09 WG	C67
A20SSCLCR09 WG	C67
A20SSCLPL09 WG	C69
A20SSCLPR09 WG	C69
A20SSDQCL11 WG	C71
A20SSDQCR11 WG	C71
A20SSDQPL11 WG	C72
A20SSDQPR11 WG	C72
A20SSDUCL11 WG	C73
A20SSDUCR11 WG	C73
A20SSDUPL11 WG	C75
A20SSDUPR11 WG	C75
A20SSDXPL11	C76
A20SSDXPR11	C76
A20SSTFPL16 WG	C78
A20SSTFPR16 WG	C78
A20SSVUBR11 WG	C81
A25RCTFPL16 WG	C65
A25RCTFPR16 WG	C65
A25RDCLNL12KC04 WG	C56
A25RDCLNR12KC04 WG	C56
A25RDDPNR11KC04 WG	C56
A25RDDUNL11KC04 WG	C57
A25RDDUNR11KC04 WG	C57
A25RDTFNL16KC04 WG	C58
A25RDTFNR16KC04 WG	C58
A25RDWLNL06KC04 WG	C59
A25RDWLNL08KC04 WG	C59
A25RDWLNR06KC04 WG	C59
A25RDWLNR08KC04 WG	C59
A25RNNTOL2 W	E78, F31
A25RNNTOL3 W	E78, F31
A25RNNTOR2 W	E78, F31
A25RNNTOR3 W	E78, F31
A25RPWLNR08 WG	C61
A25RWMTEL0316M W	E35
A25RWMTEL0416M W	E35
A25RWMTER0316M W	E35
A25RWMTER0416M W	E35
A25TPCLNL12 WG	C60
A25TPCLNR12 WG	C60
A25TPTFNL16 WG	C60
A25TPTFNR16 WG	C60
A25TSCLCL12 WG	C67
A25TSCLCR12 WG	C67
A25TSDQCL11 WG	C71
A25TSDQCR11 WG	C71
A25TSDQPL11 WG	C72
A25TSDQPR11 WG	C72
A25TSDUCL11 WG	C73
A25TSDUCR11 WG	C73
A25TSDUPL11 WG	C75
A25TSDUPR11 WG	C75
A25TSTFPL16 WG	C78
A25TSTFPR16 WG	C78
A25TSVQBL16 WG	C80
A25TSVQBR16 WG	C80
A25TSVUBL16 WG	C81
A25TSVUBR16 WG	C81
A32SDCLNL12KC04 WG	C56
A32SDCLNR12KC04 WG	C56
A32SDDPNL15KC06 WG	C56
A32SDDPNR15KC06 WG	C56
A32SDDQNL15KC06 WG	C57
A32SDDQNR15KC06 WG	C57
A32SDDUNL11KC04 WG	C57
A32SDDUNL15KC06 WG	C57
A32SDDUNR11KC04 WG	C57
A32SDDUNR15KC06 WG	C57
A32SDTFNL16KC04 WG	C58
A32SDTFNR16KC04 WG	C58
A32SDVUNL16KC04 WG	C58
A32SDVUNR16KC04 WG	C58
A32SDWLNL08KC04 WG	C59
A32SDWLNR08KC04 WG	C59
A32SNNTOL3 W	E78, F31
A32SNNTOR3 W	E78, F31
A32SPWLNL08 WG	C61
A32SPWLNR08 WG	C61
A32SWMTEL0319M W	E35
A32SWMTEL0419M W	E35
A32SWMTEL0519M W	E35
A32SWMTEL0619M W	E35
A32SWMTER0319M W	E35
A32SWMTER0419M W	E35
A32SWMTER0519M W	E35
A32SWMTER0619M W	E35
A32TSCLCL12 WG	C67
A32TSCLCR12 WG	C67
A32TSDUCL15 WG	C73
A32TSDUCR15 WG	C73
A32UPCLNL12 WG	C60
A32UPCLNR12 WG	C60

Catalogue No.	Page(s)
A32UPTFNR16 WG	C60
A40TDCLNL12KC04 WG	C56
A40TDCLNL16KC06 WG	C56
A40TDCLNR12KC04 WG	C56
A40TDCLNR16KC06 WG	C56
A40TDDPNL15KC06 WG	C56
A40TDDPNR15KC06 WG	C56
A40TDDQNL15KC06 WG	C57
A40TDDQNR15KC06 WG	C57
A40TDDUNL15KC06 WG	C57
A40TDDUNR15KC06 WG	C57
A40TDVUNL16KC04 WG	C58
A40TDVUNR16KC04 WG	C58
A40TDWLNL08KC04 WG	C59
A40TDWLNR08KC04 WG	C59
A40TNNTOL3 W	E78, F31
A40TNNTOL4 W	E78, F31
A40TNNTOR3 W	E78, F31
A40TNNTOR4 W	E78, F31
A40TWMTEL0522M W	E35
A40TWMTEL0622M W	E35
A40TWMTER0522M W	E35
A40TWMTER0622M W	E35
A40VPCLNL12 WG	C60
A40VPCLNL16 WG	C60
A40VPCLNR12 WG	C60
A40VPCLNR16 WG	C60
A40VPTFNL22 WG	C60
A40VPTFNR22 WG	C60
A50UDDUNL15KC06 WG	C57
A50UDDUNR15KC06 WG	C57
A50UNNTOL4 W	E78, F31
A50UNNTOR4 W	E78, F31
ABC1000R WG	D63
ABC1250R WG	D63
ABC1500R WG	D63
ABC500R WG	D63
ABC750R WG	D63
ABD06187R CG5	D67
ABD06187R CM1	D67
ABD06312R CG5	D67
ABD06312R CM1	D67
ABD09281R CG5	D67
ABD09281R CM1	D67
ABD09500R CG5	D67
ABD09500R CM1	D67
ABD125375R CG5	D67
ABD125375R CM1	D67
ABD125625R CG5	D67
ABD125625R CM1	D67
ABD156500R CG5	D67
ABD156875R CG5	D67
ABD156875RM CBN6	D67
AGD09503 CG5	D68
AGD09503 CM1	D68
AGD12504 CG5	D68
AGD15605 CG5	D68
AKEY WG	D59, D71, D84
AL163L W	F70
AL163R W	F70
AL203L W	F70
AL203R W	F70
AL253R W	F70
AL254L W	F70
AL254R W	F70
AL323R W	F70
AL324R W	F70
AL325R W	F70
AL404R W	F70
AL405R W	F70
APD06187R CG5	D68
APD09281R CM1	D68
APD125375R CG5	D68
APD156500R CM1	D68
AS832/AS-8-32 WG	D59, D62, D71, D84
ATBM12100 WG	D62
ATBM16100 WG	D62
ATBM1638 WG	D62
ATBM20102 WG	D62
ATBM25102 WG	D62
ATD12560F2 CM1	D69
ATD15660F2 CG5	D69
ATD15660F2 CM1	D69
AVR203L W	F74
AVR203R W	F74
AVR253L W	F74
AVR253R W	F74
AVR254R W	F74
AVR25D3L W	F74
AVR25D3R W	F74
AVR25D4L W	F74
AVR25D4R W	F74
AVR324R W	F74
AVR325R W	F74
AVR32D3R W	F74
AVR403R W	F74
AVR405R W	F74
AVR505R W	F74
AW250/AW-250 WG	D59, D62, D71, D84
BB1871250R CG5	D69
BB187750R CG5	D69
BB2501000R CG5	D69
BB2501000R CM1	D69
BB3121250R CG5	D69
BB3121250R CM1	D69
BP187600R CG5	D70
BP250825R CG5	D70
BS832 WG	D59, D62, D71, D84
BSBM20152 WG	D62
BT40BRFX185060M WG	W60
BT40BRFX245060M WG	W60
BT40BRFX320060M WG	W60
BT40BRFX420060M WG	W60
BT40BRFX550065M WG	W60
BT50BRFX320060M WG	W61
BT50BRFX420060M WG	W61
BT50BRFX550065M WG	W61
BT50BRFX720070M WG	W61
BW312 WG	D59, D62, D71, D84
CBIT WG	D59, D71, D84
CC09	D10–13, D63
CC11	D10
CC11 WG	D10–13, D28, D59, D71, D84
CCBM41007L WG	D12
CCBM41007R WG	D12
CCBM41527L WG	D12
CCBM41527R WG	D12
CCBM4812225R WG	D13
CCBM4812485R WG	D13
CCBM4816225R WG	D13
CCBM4816485R WG	D13
CCBM51000L WG	D12
CCBM51000R WG	D12
CCBM51005L WG	D12
CCBM51005R WG	D12
CCBM51525L WG	D12
CCBM5312255R WG	D13
CCBM5312510R WG	D13
CCBM5316255L WG	D13
CCBM5316255R WG	D13
CCBM5316510R WG	D13
CCBM5316515L WG	D13
CCBM5316515R WG	D13
CCBM61000L WG	D12
CCBM61000R WG	D12
CCBM61005L WG	D12
CCBM61005R WG	D12
CCBM61520L WG	D12
CCBM61525L WG	D12
CCBM61525R WG	D12
CCBM6516320R WG	D13
CCBM6516325L WG	D13
CCBM6516325R WG	D13
CCBM6612320R WG	D13
CCBM6612325L WG	D13
CCBM6612325R WG	D13
CCBM6612630R WG	D13
CCBM6612635L WG	D13
CCBM6612635R WG	D13
CCBM81005L WG	D12
CCBM81520L WG	D12
CCBM81520R WG	D12
CCBM81525L WG	D12
CCBM81525R WG	D12
CCGT0602021P TN10U	B122
CCGT0602021P TN15U	B122
CCGT060202AL3 HCK10	B155
CCGT060202AL3 HWK15	B155
CCGT0602041P TN10U	B122
CCGT0602041P TN15U	B122
CCGT060204AL3 HCK10	B155
CCGT060204AL3 HWK15	B155
CCGT0602081P TN10U	B122
CCGT09T3011P TN10U	B122
CCGT09T3011P TN15U	B122
CCGT09T3021P TN10U	B122
CCGT09T3021P TN15U	B122
CCGT09T302AL3 HWK15	B155
CCGT09T3041P TN10U	B122
CCGT09T3041P TN15U	B122
CCGT09T304AL3 HCK10	B155
CCGT09T304AL3 HWK15	B155
CCGT09T3081P TN10U	B122
CCGT09T3081P TN15U	B122
CCGT09T308AL3 HWK15	B155
CCGT120402AL3 HWK15	B155
CCGT120404AL3 HCK10	B155
CCGT120404AL3 HWK15	B155
CCGT120408AL3 HCK10	B155
CCGT120408AL3 HWK15	B155
CCGW060202EC WBH25P	B197
CCGW060202EFWC WBH25P	B198
CCGW060202S01015C WBH10P	B197
CCGW060204EFWC WBH25P	B198
CCGW060204FST WDN00U	B197
CCGW060204FST WDN25U	B197
CCGW060204S01015C WBH10P	B197
CCGW060204S01015C WBH25P	B197
CCGW09T304EFWC WBH25P	B198
CCGW09T304FST WDN00U	B197
CCGW09T304FST WDN25U	B197
CCGW09T304S01015C WBH25P	B197
CCGW09T304S01015MT WBH10P	B198
CCGW09T308EFWC WBH25P	B198
CCGW09T308FST WDN00U	B197
CCGW09T308FST WDN25U	B197
CCGW09T308S01015C WBH25P	B197
CCGW09T308S01015MT WBH10P	B198
CCGW09T308S01015MT WBH30P	B198
CCLNL2525M12MN4 WG	C31
CCLNL2525M12MX7 WG	C31
CCLNR2525M12MF7 WG	C32
CCLNR2525M12MN4 WG	C31
CCLNR2525M12MN7 WG	C31
CCLNR2525M12MX7 WG	C31
CCLNR3225P12MN7 WG	C31
CCLNR3225P12MX7 WG	C31
CCMT060202 THM	B30
CCMT0602021P TN10P	B123
CCMT0602021P TN10U	B123
CCMT0602021P TN15M	B123
CCMT0602021P TN15U	B123
CCMT0602021P TN20K	B123
CCMT0602021P TN30M	B123
CCMT060202FP WM25CT	B31
CCMT060202FP WP15CT	B31
CCMT060202FP WP25CT	B31
CCMT060202FW WP15CT	B32
CCMT060204 HK1500	B30
CCMT060204 THM	B30
CCMT060204 TTI15	B30
CCMT060204 TTR	B30
CCMT0602041P TN10P	B123
CCMT0602041P TN10U	B123
CCMT0602041P TN15M	B123
CCMT0602041P TN15U	B123
CCMT0602041P TN20K	B123
CCMT0602041P TN20P	B123
CCMT0602041P TN30M	B123
CCMT0602042 TTI15	B30
CCMT060204FP WK20CT	B31
CCMT060204FP WM15CT	B31
CCMT060204FP WM25CT	B31
CCMT060204FP WP15CT	B31
CCMT060204FP WP25CT	B31
CCMT060204FP WS10PT	B31
CCMT060204FP WS25PT	B31
CCMT060204FW WM15CT	B32
CCMT060204FW WP15CT	B32
CCMT060204MP WK20CT	B32
CCMT060204MP WM15CT	B32
CCMT060204MP WM25CT	B32
CCMT060204MP WP15CT	B32
CCMT060204MP WP25CT	B32
CCMT060204MP WS10PT	B32
CCMT0602081P TN10P	B123
CCMT0602081P TN10U	B123
CCMT0602081P TN15M	B123
CCMT0602081P TN20K	B123
CCMT0602081P TN20P	B123
CCMT0602081P TN30M	B123
CCMT060208FP WK20CT	B31
CCMT060208FP WM15CT	B31
CCMT060208FP WM25CT	B31
CCMT060208FP WP15CT	B31
CCMT060208FP WP25CT	B31
CCMT060208FP WS10PT	B31
CCMT060208FP WS25PT	B31
CCMT060208FW WM15CT	B32
CCMT060208FW WP15CT	B32
CCMT060208MU TN5120	B33
CCMT060208MU WK20CT	B33

Catalogue No.	Page(s)
CCMT060208MU WM25CT	B33
CCMT090304 HK1500	B30
CCMT090304 THM	B30
CCMT090304 TTR	B30
CCMT090304MU TN2000	B33
CCMT090304MU WM25CT	B33
CCMT090304MU WP25CT	B33
CCMT090308 HK1500	B30
CCMT090308 THM	B30
CCMT090308 TTR	B30
CCMT090308MU TN7115	B33
CCMT090308MU WM25CT	B33
CCMT090308MU WP15CT	B33
CCMT090308MU WP25CT	B33
CCMT09T3021P TN10U	B123
CCMT09T3021P TN15U	B123
CCMT09T302FP WM25CT	B31
CCMT09T302FP WP25CT	B31
CCMT09T304 HK1500	B30
CCMT09T304 THM	B30
CCMT09T3041P TN10P	B123
CCMT09T3041P TN10U	B123
CCMT09T3041P TN15M	B123
CCMT09T3041P TN15U	B123
CCMT09T3041P TN20K	B123
CCMT09T3041P TN20P	B123
CCMT09T3041P TN30M	B123
CCMT09T304FP WK20CT	B31
CCMT09T304FP WM15CT	B31
CCMT09T304FP WM25CT	B31
CCMT09T304FP WP15CT	B31
CCMT09T304FP WP25CT	B31
CCMT09T304FP WS10PT	B31
CCMT09T304FP WS25PT	B31
CCMT09T304FW WM15CT	B32
CCMT09T304FW WP15CT	B32
CCMT09T304MP WK20CT	B32
CCMT09T304MP WM15CT	B32
CCMT09T304MP WM25CT	B32
CCMT09T304MP WP15CT	B32
CCMT09T304MP WP25CT	B32
CCMT09T304MP WS10PT	B32
CCMT09T304MU TN2000	B33
CCMT09T304MU WK05CT	B33
CCMT09T304MU WK20CT	B33
CCMT09T304MU WM25CT	B33
CCMT09T304MU WP15CT	B33
CCMT09T304MU WP25CT	B33
CCMT09T304MU WS10PT	B33
CCMT09T304MU WS25PT	B33
CCMT09T304MW WP15CT	B33
CCMT09T304MW WP25CT	B33
CCMT09T308 HK1500	B30
CCMT09T308 THM	B30
CCMT09T3081P TN10P	B123
CCMT09T3081P TN10U	B123
CCMT09T3081P TN15M	B123
CCMT09T3081P TN15U	B123
CCMT09T3081P TN20K	B123
CCMT09T3081P TN20P	B123
CCMT09T3081P TN30M	B123
CCMT09T308FP WK20CT	B31
CCMT09T308FP WM15CT	B31
CCMT09T308FP WM25CT	B31
CCMT09T308FP WP15CT	B31
CCMT09T308FP WP25CT	B31
CCMT09T308FP WS25PT	B31
CCMT09T308FW WP15CT	B32
CCMT09T308MP WK20CT	B32
CCMT09T308MP WM15CT	B32
CCMT09T308MP WM25CT	B32
CCMT09T308MP WP15CT	B32
CCMT09T308MP WP25CT	B32
CCMT09T308MP WS10PT	B32
CCMT09T308MU SPN3W1	B33
CCMT09T308MU WK20CT	B33
CCMT09T308MU WM25CT	B33
CCMT09T308MU WP15CT	B33
CCMT09T308MU WP25CT	B33
CCMT09T308MU WP35CT	B33
CCMT09T308MU WS10PT	B33
CCMT09T308MU WS25PT	B33
CCMT09T308MW WP15CT	B33
CCMT09T308MW WP25CT	B33
CCMT09T312 TN7125	B30
CCMT09T312 TTR	B30
CCMT09T312MP WM25CT	B32
CCMT09T312MP WP25CT	B32
CCMT1204041P TN10P	B123
CCMT1204041P TN10U	B123
CCMT1204041P TN15M	B123
CCMT1204041P TN20K	B123
CCMT1204041P TN20P	B123
CCMT1204041P TN30M	B123
CCMT12040441 THM	B31
CCMT120404FP WK20CT	B31
CCMT120404FP WM15CT	B31
CCMT120404FP WM25CT	B31
CCMT120404FP WP15CT	B31
CCMT120404FP WP25CT	B31
CCMT120404MW WP15CT	B33
CCMT120404MW WP25CT	B33
CCMT120408 THM	B30
CCMT120408 TTR	B30
CCMT1204081P TN10P	B123
CCMT1204081P TN10U	B123
CCMT1204081P TN15M	B123
CCMT1204081P TN20K	B123
CCMT1204081P TN20P	B123
CCMT1204081P TN30M	B123
CCMT12040841 THM	B31
CCMT120408FP WK20CT	B31
CCMT120408FP WM15CT	B31
CCMT120408FP WM25CT	B31
CCMT120408FP WP15CT	B31
CCMT120408FP WP25CT	B31
CCMT120408MP WK20CT	B32
CCMT120408MP WM15CT	B32
CCMT120408MP WM25CT	B32
CCMT120408MP WP15CT	B32
CCMT120408MP WP25CT	B32
CCMT120408MP WS10PT	B32
CCMT120408MU TN5120	B33
CCMT120408MU WK20CT	B33
CCMT120408MU WM25CT	B33
CCMT120408MU WP15CT	B33
CCMT120408MU WP25CT	B33
CCMT120408MU WS25PT	B33
CCMT120408MW WP15CT	B33
CCMT120408MW WP25CT	B33
CCMT120412FP WK20CT	B31
CCMT120412FP WM25CT	B31
CCMT120412FP WP15CT	B31
CCMT120412FP WP25CT	B31
CCMT120412MP WK20CT	B32
CCMT120412MP WM15CT	B32
CCMT120412MP WM25CT	B32
CCMT120412MP WP25CT	B32
CCMW060202 THM	B34
CCMW060204 THM	B34
CCMW060204 WK05CT	B34
CCMW060204 WK20CT	B34
CCMW060204FST WDN25U	B199
CCMW060208FST WDN25U	B199
CCMW090302 THM	B34
CCMW090304 THM	B34
CCMW090304 WK05CT	B34
CCMW090304 WK20CT	B34
CCMW090308 WK05CT	B34
CCMW090308 WK20CT	B34
CCMW09T304 THM	B34
CCMW09T304 WK05CT	B34
CCMW09T304 WK20CT	B34
CCMW09T304FST WDN25U	B199
CCMW09T308 THM	B34
CCMW09T308 WK05CT	B34
CCMW09T308 WK20CT	B34
CCMW09T308FST WDN25U	B199
CCMW120404 THM	B34
CCMW120404 WK05CT	B34
CCMW120404 WK20CT	B34
CCMW120408 THM	B34
CCMW120408 WK05CT	B34
CCMW120408 WK20CT	B34
CCPM6152225L WG	D26
CCPM6152225R WG	D26
CCPM61525L WG	D26
CCPM61525R WG	D26
CCPM8152225L WG	D26
CCPM81525L WG	D26
CDG50252R CG5	D55
CDG50302R CG5	D55
CDG50302R CM1	D55
CDHBS4T002 ALO	D42
CDHBS4T002 C25	D42
CDHBS4T002 CG5	D42
CDHBS4T002 CG6	D42
CDHBS4T002 CM1	D42
CDHBS4T002 TN7	D42
CDHBS4T002FST WDN25U	B199
CDHBS4T002M CBN6	D42
CDHBS4T002M CPD1	D42
CDHBS4T004 C25	D42
CDHBS4T004 CG5	D42
CDHBS4T004 CG6	D42
CDHBS4T004 CM1	D42
CDHBS4T004 TN7	D42
CDHBS4T004FST WDN25U	B199
CDHBS4T004M CPD1	D42
CDHBS4T0X0 C25	D42
CDHBS4T0X0 CG5	D42
CDHBS4T0X0 CG6	D42
CDHBS4T0X0 CM1	D42
CDHBS4T0X0M CBN6	D42
CDHHS4T002 CG5	D44
CDHHS4T002 CM1	D44
CDHHS4T002L CG5	D43–44
CDHHS4T002L CG6	D43–44
CDHHS4T002L CM1	D43–44
CDHHS4T002R CG5	D43–44
CDHHS4T002R CM1	D43–44
CDHHS4T004 CG5	D44
CDHHS4T004L CG5	D43–44
CDHHS4T004R CG5	D43–44
CDJNL2525M15MN7 WG	C33
CDJNL2525M15MX7 WG	C32
CDJNL3225P15MN7 WG	C33
CDJNR2525M15MN7 WG	C33
CDJNR2525M15MX7 WG	C32
CDJNR3225P15MN7 WG	C33
CDT50022R CG5	D56
CELNL2525M13MF7 WG	C33
CELNL2525M13MN7 WG	C34
CELNR2525M13MF7 WG	C33
CELNR2525M13MN7 WG	C34
CKC3	F71–72, F77
CKC4	F71–72, F77
CKC5	F71–72
CKEY WG	D59, D71, D84
CKJNL2525M16 WG	C34
CKJNL3225P16 WG	C34
CKJNR2525M16 WG	C34
CKJNR3225P16 WG	C34
CKM10	C36–39, C65
CKM13	C37
CKM19	C38–39, C65
CKM20	C108
CKM34	C92–94, C96–103, C106–109
CKM35	C94, C97, C101–103, C109
CKM36	C92, C95–101
CKM37	C97–99
CKM38	C102
CKM41	C95
CKM7	C36–37
CKM9	C36–39
CM-72	F28–29, F34
CM109	E79, F32
CM146	E78, F31, F34–35
CM147	E78, F31, F34–35
CM182	E75, F26
CM183	E75, F26
CM184LP	E75, F26
CM185LP	E75, F26
CM209R ASSY	C8–10, C12–16, C56
CM210R ASSY	C8–10, C12–15
CM214	C40–41
CM215R ASSY	C17–18, C58
CM216	C40–41
CM219	C40–41
CM234R ASSY	C8–16, C19, C56–59
CM234RLP ASSY	C56–59
CM235R ASSY	C17
CM236R ASSY	C9, C12, C14
CM72LP	E74, E76, E78, F24, F27, F31
CM73	F28–29, F34
CM73LP	E74, E76, E78, F25, F27, F31
CM74	E74, E76, E78, F24, F27–29, F31, F34
CM75	E74, E76, E78, F25, F27–29, F31, F34
CM80	E76, F24, F27
CM81	E74, E76, F25, F27
CNGA120404EFWMT WBH25P	B201
CNGA120404FST WDN00U	B200
CNGA120404FST WDN25U	B200
CNGA120404S01025MT WBH10P	B201
CNGA120404S01025MT WBH25P	B201
CNGA120404S01025MT WBH30P	B201
CNGA120404T02020 CW2015	B178
CNGA120408EFWMT WBH25P	B201
CNGA120408EMT WBH25P	B200
CNGA120408FST WDN00U	B200
CNGA120408FST WDN25U	B200
CNGA120408S01025FWMT WBH10P	B201

Catalogue No.	Page(s)
CNGA120408S01025MT WBH10P	B201
CNGA120408S01025MT WBH25P	B201
CNGA120408S01025MT WBH30P	B201
CNGA120408T01020FW CW5025	B178
CNGA120408T02020 CW2015	B178
CNGA120408T02020 CW5025	B178
CNGA120412EMT WBH25P	B200
CNGA120412S01020MT WBH30P	B201
CNGA120412S01025MT WBH10P	B201
CNGA120412S01025MT WBH25P	B201
CNGA120412S01025MT WBH30P	B201
CNGA120412T01020FW CW5025	B178
CNGA120412T02020 CW2015	B178
CNGA120412T02020 CW5025	B178
CNGA120416T01020FW CW5025	B178
CNGA120416T02020 CW5025	B178
CNGA160612T02020 CW2015	B178
CNGA160612T02020 CW5025	B178
CNGA160616T02020 CW5025	B178
CNGA190612T02020 CW2015	B178
CNGA190612T02020 CW5025	B178
CNGA190616T02020 CW2015	B178
CNGG120401FS WS10PT	B35
CNGG120402FS WS10PT	B35
CNGG120404FS WS10PT	B35
CNGG120404FS WS25PT	B35
CNGG120404FS WU10HT	B35
CNGG120408FS WS10PT	B35
CNGG120408FS WS25PT	B35
CNGG120408FS WU10HT	B35
CNGG120412FS WS10PT	B35
CNGN120404T02020 CW2015	B177
CNGN120408T01020 CW3020	B177
CNGN120408T02020 CW2015	B177
CNGN120408T02020 CW5025	B177
CNGN120412T01020 CW3020	B177
CNGN120412T02020 CW2015	B177
CNGN120412T02020 CW5025	B177
CNGN120416T01020 CW3020	B177
CNGN120416T02020 CW2015	B177
CNGN120416T02020 CW5025	B177
CNGN120712T01020 CW3020	B177
CNGN120712T02020 CW2015	B177
CNGN120712T02020 CW5025	B177
CNGN120716T01020 CW3020	B177
CNGP120401 TN10U	B35, B124
CNGP120401 WS10PT	B35
CNGP120402 TN10U	B35, B124
CNGP120402 WS10PT	B35
CNGP120402 WU10HT	B35
CNGP120404 TN10U	B35, B124
CNGP120404 TN15U	B124
CNGP120404 WS10PT	B35
CNGP120404 WU10HT	B35
CNGP120408 TN10U	B35, B124
CNGP120408 TN15U	B124
CNGP120408 WS10PT	B35
CNGP120408 WU10HT	B35
CNGP120412 TN10U	B124
CNGP120412 TN15U	B124
CNGX120708T02020 CW5025	B179
CNGX120712T01020FW CW5025	B179
CNGX120712T02020 CW5025	B179
CNGX160716T02020 CW5025	B179
CNMA120404 HK1500	B36
CNMA120404 TN20K	B125
CNMA120404 WK05CT	B36
CNMA120404 WK20CT	B36
CNMA120408 HK1500	B36
CNMA120408 TN20K	B125
CNMA120408 WK05CT	B36
CNMA120408 WK20CT	B36
CNMA120408S02020 WBK40U	B202
CNMA120412 HK1500	B36
CNMA120412 TN20K	B125
CNMA120412 WK05CT	B36
CNMA120412 WK20CT	B36
CNMA120412S02020 WBK40U	B202
CNMA120416 TN20K	B36, B125
CNMA120416 WK05CT	B36
CNMA120416 WK20CT	B36
CNMA160608 WK20CT	B36
CNMA160612 TN20K	B36, B125
CNMA160612 WK05CT	B36
CNMA160612 WK20CT	B36
CNMA160616 TN20K	B36, B125
CNMA160616 WK05CT	B36
CNMA160616 WK20CT	B36
CNMA190608 WK05CT	B36
CNMA190608 WK20CT	B36
CNMA190612 TN20K	B36, B125
CNMA190612 WK05CT	B36
CNMA190612 WK20CT	B36
CNMA190616 TN20K	B36, B125
CNMA190616 WK05CT	B36
CNMA190616 WK20CT	B36
CNMG0903086P TN10P	B127
CNMG0903086P TN15M	B127
CNMG0903086P TN20P	B127
CNMG0903086P TN30M	B127
CNMG120404 HK1500	B37
CNMG120404 THM	B37
CNMG120404 TN2000	B37
CNMG120404 TTI15	B37
CNMG1204042P TN10P	B126
CNMG1204042P TN10U	B126
CNMG1204042P TN15M	B126
CNMG1204042P TN15U	B126
CNMG1204042P TN20K	B126
CNMG1204042P TN20P	B126
CNMG1204042P TN30M	B126
CNMG1204044P TN10U	B126
CNMG1204044P TN15M	B126
CNMG1204044P TN20P	B126
CNMG1204044P TN30M	B126
CNMG1204046P TN10P	B127
CNMG1204046P TN15M	B127
CNMG1204046P TN20P	B127
CNMG1204046P TN30M	B127
CNMG1204047N TN10P	B128
CNMG1204047N TN20K	B128
CNMG1204047N TN20P	B128
CNMG120404FF WK20CT	B37
CNMG120404FF WM25CT	B37
CNMG120404FF WP15CT	B37
CNMG120404FF WS10PT	B37
CNMG120404FW WK05CT	B38
CNMG120404FW WM15CT	B38
CNMG120404FW WM25CT	B38
CNMG120404ML WK05CT	B38
CNMG120404ML WK20CT	B38
CNMG120404ML WP15CT	B38
CNMG120404ML WP25CT	B38
CNMG120404MR WP15CT	B39
CNMG120404MR WP25CT	B39
CNMG120404MR WP35CT	B39
CNMG120404MS WS10PT	B40
CNMG120404MS WS25PT	B40
CNMG120404MS WU10HT	B40
CNMG120404UF WM15CT	B42
CNMG120404UF WM25CT	B42
CNMG120404UF WP15CT	B42
CNMG120404UF WS10PT	B42
CNMG120404UM WM15CT	B42
CNMG120404UM WM25CT	B42
CNMG120404UM WM35CT	B42
CNMG120404UM WS10PT	B42
CNMG120404UR WM15CT	B43
CNMG120404UR WM25CT	B43
CNMG120404UR WM35CT	B43
CNMG120404UR WP15CT	B43
CNMG120404UR WP25CT	B43
CNMG120404UR WS10PT	B43
CNMG120404UR WS25PT	B43
CNMG120408 HK1500	B37
CNMG120408 THM	B37
CNMG1204082P TN10P	B126
CNMG1204082P TN10U	B126
CNMG1204082P TN15M	B126
CNMG1204082P TN15U	B126
CNMG1204082P TN20K	B126
CNMG1204082P TN20P	B126
CNMG1204082P TN30M	B126
CNMG1204084P TN10U	B126
CNMG1204084P TN15M	B126
CNMG1204084P TN20P	B126
CNMG1204084P TN30M	B126
CNMG1204086P TN10P	B127
CNMG1204086P TN15M	B127
CNMG1204086P TN20P	B127
CNMG1204086P TN30M	B127
CNMG1204086P TN30P	B127
CNMG1204087N TN10P	B128
CNMG1204087N TN20K	B128
CNMG1204087N TN20P	B128
CNMG1204087N TN30P	B128
CNMG120408FF WK20CT	B37
CNMG120408FF WM25CT	B37
CNMG120408FF WP15CT	B37
CNMG120408FF WS10PT	B37
CNMG120408FW WK05CT	B38
CNMG120408FW WM15CT	B38
CNMG120408FW WM25CT	B38
CNMG120408FW WP15CT	B38
CNMG120408ML WK05CT	B38
CNMG120408ML WK20CT	B38
CNMG120408ML WP15CT	B38
CNMG120408ML WP25CT	B38
CNMG120408MR WM25CT	B39
CNMG120408MR WM35CT	B39
CNMG120408MR WP15CT	B39
CNMG120408MR WP25CT	B39
CNMG120408MR WP35CT	B39
CNMG120408MS WS10PT	B40
CNMG120408MS WS25PT	B40
CNMG120408MS WU10HT	B40
CNMG120408MW WK05CT	B40
CNMG120408MW WM25CT	B40
CNMG120408RH WK20CT	B41
CNMG120408RH WM25CT	B41
CNMG120408RH WP15CT	B41
CNMG120408RH WP25CT	B41
CNMG120408RH WP35CT	B41
CNMG120408UF WM15CT	B42
CNMG120408UF WM25CT	B42
CNMG120408UF WS10PT	B42
CNMG120408UM WM15CT	B42
CNMG120408UM WM25CT	B42
CNMG120408UM WM35CT	B42
CNMG120408UM WP15CT	B42
CNMG120408UM WP25CT	B42
CNMG120408UR WK05CT	B43
CNMG120408UR WK20CT	B43
CNMG120408UR WM15CT	B43
CNMG120408UR WM25CT	B43
CNMG120408UR WM35CT	B43
CNMG120408UR WP15CT	B43
CNMG120408UR WP25CT	B43
CNMG120408UR WP35CT	B43
CNMG120408UR WS10PT	B43
CNMG120408UR WS25PT	B43
CNMG1204122P TN10P	B126
CNMG1204122P TN10U	B126
CNMG1204122P TN15M	B126
CNMG1204122P TN20K	B126
CNMG1204122P TN20P	B126
CNMG1204124P TN10U	B126
CNMG1204124P TN15M	B126
CNMG1204124P TN20P	B126
CNMG1204124P TN30M	B126
CNMG1204126P TN10P	B127
CNMG1204126P TN15M	B127
CNMG1204126P TN20P	B127
CNMG1204126P TN30M	B127
CNMG1204126P TN30P	B127
CNMG1204127N TN10P	B128
CNMG1204127N TN20K	B128
CNMG1204127N TN20P	B128
CNMG1204127N TN30P	B128
CNMG120412FF WK20CT	B37
CNMG120412FF WM25CT	B37
CNMG120412FF WP15CT	B37
CNMG120412FW WK05CT	B38
CNMG120412FW WM15CT	B38
CNMG120412FW WM25CT	B38
CNMG120412FW WP15CT	B38
CNMG120412ML WK05CT	B38
CNMG120412ML WK20CT	B38
CNMG120412ML WP15CT	B38
CNMG120412ML WP25CT	B38
CNMG120412MR WM25CT	B39
CNMG120412MR WM35CT	B39
CNMG120412MR WP15CT	B39
CNMG120412MR WP25CT	B39
CNMG120412MR WP35CT	B39
CNMG120412MS WS10PT	B40
CNMG120412MS WS25PT	B40
CNMG120412MS WU10HT	B40
CNMG120412MW WK05CT	B40
CNMG120412MW WM25CT	B40
CNMG120412RH WK20CT	B41
CNMG120412RH WM25CT	B41
CNMG120412RH WP15CT	B41
CNMG120412RH WP25CT	B41
CNMG120412RH WP35CT	B41
CNMG120412UF WM15CT	B42
CNMG120412UF WM25CT	B42
CNMG120412UM WM15CT	B42
CNMG120412UM WM25CT	B42
CNMG120412UM WM35CT	B42
CNMG120412UM WS10PT	B42
CNMG120412UR WK05CT	B43

Catalogue No.	Page(s)
CNMG120412UR WK20CT	B43
CNMG120412UR WM15CT	B43
CNMG120412UR WM25CT	B43
CNMG120412UR WM35CT	B43
CNMG120412UR WP15CT	B43
CNMG120412UR WP25CT	B43
CNMG120412UR WP35CT	B43
CNMG120412UR WS10PT	B43
CNMG120412UR WS25PT	B43
CNMG1204167N TN10P	B128
CNMG1204167N TN20K	B128
CNMG1204167N TN20P	B128
CNMG120416ML WK20CT	B38
CNMG120416ML WP25CT	B38
CNMG120416MR WM25CT	B39
CNMG120416MR WM35CT	B39
CNMG120416MR WP15CT	B39
CNMG120416MR WP25CT	B39
CNMG120416MS WS10PT	B40
CNMG120416MS WS25PT	B40
CNMG120416MS WU10HT	B40
CNMG120416RH WK20CT	B41
CNMG120416RH WM25CT	B41
CNMG120416RH WP15CT	B41
CNMG120416RH WP25CT	B41
CNMG120416RH WP35CT	B41
CNMG120416UR WK20CT	B43
CNMG120416UR WM15CT	B43
CNMG120416UR WM25CT	B43
CNMG120416UR WM35CT	B43
CNMG120416UR WP15CT	B43
CNMG120416UR WP25CT	B43
CNMG120416UR WS10PT	B43
CNMG120416UR WS25PT	B43
CNMG160608MR WM25CT	B39
CNMG160608MR WM35CT	B39
CNMG160608MR WP15CT	B39
CNMG160608MR WP25CT	B39
CNMG160608MS WS10PT	B40
CNMG160608MS WS25PT	B40
CNMG160608MS WU10HT	B40
CNMG160608RH WK20CT	B41
CNMG160608RH WM25CT	B41
CNMG160608RH WP15CT	B41
CNMG160608RH WP25CT	B41
CNMG160608RH WP35CT	B41
CNMG160608UR WK20CT	B43
CNMG160608UR WM15CT	B43
CNMG160608UR WM25CT	B43
CNMG160608UR WM35CT	B43
CNMG160608UR WP15CT	B43
CNMG160608UR WP25CT	B43
CNMG160608UR WS10PT	B43
CNMG160608UR WS25PT	B43
CNMG1606124P TN15M	B126
CNMG1606124P TN30M	B126
CNMG1606126P TN15M	B127
CNMG1606126P TN20P	B127
CNMG1606126P TN30M	B127
CNMG1606126P TN30P	B127
CNMG1606127N TN10P	B128
CNMG1606127N TN20K	B128
CNMG1606127N TN20P	B128
CNMG1606127N TN30P	B128
CNMG160612MR WM25CT	B39
CNMG160612MR WM35CT	B39
CNMG160612MR WP15CT	B39
CNMG160612MR WP25CT	B39
CNMG160612MR WP35CT	B39
CNMG160612MS WS10PT	B40
CNMG160612MS WS25PT	B40
CNMG160612MS WU10HT	B40
CNMG160612RH WK20CT	B41
CNMG160612RH WM25CT	B41
CNMG160612RH WP15CT	B41
CNMG160612RH WP25CT	B41
CNMG160612RH WP35CT	B41
CNMG160612UR WK20CT	B43
CNMG160612UR WM15CT	B43
CNMG160612UR WM25CT	B43
CNMG160612UR WM35CT	B43
CNMG160612UR WP15CT	B43
CNMG160612UR WP25CT	B43
CNMG160612UR WP35CT	B43
CNMG160612UR WS10PT	B43
CNMG1606167N TN10P	B128
CNMG1606167N TN20K	B128
CNMG1606167N TN20P	B128
CNMG160616MR WM25CT	B39
CNMG160616MR WM35CT	B39
CNMG160616MR WP15CT	B39
CNMG160616MR WP25CT	B39
CNMG160616MR WP35CT	B39
CNMG160616RH WK20CT	B41
CNMG160616RH WM25CT	B41
CNMG160616RH WP15CT	B41
CNMG160616RH WP25CT	B41
CNMG160616RH WP35CT	B41
CNMG160616UR WK20CT	B43
CNMG160616UR WM25CT	B43
CNMG160616UR WM35CT	B43
CNMG160616UR WP15CT	B43
CNMG160616UR WP25CT	B43
CNMG160616UR WP35CT	B43
CNMG160616UR WS10PT	B43
CNMG160616UR WS25PT	B43
CNMG1906087N TN10P	B128
CNMG1906087N TN20K	B128
CNMG190608MS WS10PT	B40
CNMG190608MS WS25PT	B40
CNMG190608MS WU10HT	B40
CNMG190608RH WK20CT	B41
CNMG190608RH WM25CT	B41
CNMG190608RH WP15CT	B41
CNMG190608RH WP25CT	B41
CNMG190608RH WP35CT	B41
CNMG190612 HK1500	B37
CNMG190612 THM	B37
CNMG1906124P TN15M	B126
CNMG1906124P TN30M	B126
CNMG1906126P TN15M	B127
CNMG1906126P TN20P	B127
CNMG1906126P TN30M	B127
CNMG1906126P TN30P	B127
CNMG1906127N TN10P	B128
CNMG1906127N TN20K	B128
CNMG1906127N TN20P	B128
CNMG1906127N TN30P	B128
CNMG190612MR WM25CT	B39
CNMG190612MR WM35CT	B39
CNMG190612MR WP15CT	B39
CNMG190612MR WP25CT	B39
CNMG190612MR WP35CT	B39
CNMG190612MS WS10PT	B40
CNMG190612MS WS25PT	B40
CNMG190612MS WU10HT	B40
CNMG190612RH WK20CT	B41
CNMG190612RH WM25CT	B41
CNMG190612RH WP15CT	B41
CNMG190612RH WP25CT	B41
CNMG190612RH WP35CT	B41
CNMG190612UR WK05CT	B43
CNMG190612UR WK20CT	B43
CNMG190612UR WM15CT	B43
CNMG190612UR WM25CT	B43
CNMG190612UR WM35CT	B43
CNMG190612UR WP15CT	B43
CNMG190612UR WP25CT	B43
CNMG190612UR WP35CT	B43
CNMG190612UR WS10PT	B43
CNMG190612UR WS25PT	B43
CNMG190616 HK1500	B37
CNMG190616 THM	B37
CNMG1906167N TN10P	B128
CNMG1906167N TN20K	B128
CNMG1906167N TN20P	B128
CNMG1906167N TN30P	B128
CNMG190616MR WM25CT	B39
CNMG190616MR WM35CT	B39
CNMG190616MR WP15CT	B39
CNMG190616MR WP25CT	B39
CNMG190616MR WP35CT	B39
CNMG190616MS WS10PT	B40
CNMG190616MS WS25PT	B40
CNMG190616MS WU10HT	B40
CNMG190616RH WK20CT	B41
CNMG190616RH WM25CT	B41
CNMG190616RH WP15CT	B41
CNMG190616RH WP25CT	B41
CNMG190616RH WP35CT	B41
CNMG190616UR WK20CT	B43
CNMG190616UR WM15CT	B43
CNMG190616UR WM25CT	B43
CNMG190616UR WM35CT	B43
CNMG190616UR WP15CT	B43
CNMG190616UR WP25CT	B43
CNMG190616UR WP35CT	B43
CNMG190616UR WS10PT	B43
CNMG190616UR WS25PT	B43
CNMG190624RH WM25CT	B41
CNMG190624RH WP15CT	B41
CNMG190624RH WP25CT	B41
CNMG190624RH WP35CT	B41
CNMG2509247N TN30P	B128
CNMM12040865 TN7025	B44
CNMM12040865 WM25CT	B44
CNMM12040865 WP15CT	B44
CNMM12040865 WP25CT	B44
CNMM12040865 WP35CT	B44
CNMM12041265 TN7115	B44
CNMM12041265 WM25CT	B44
CNMM12041265 WP15CT	B44
CNMM12041265 WP25CT	B44
CNMM12041665 WM25CT	B44
CNMM12041665 WP25CT	B44
CNMM16060865 TN7125	B44
CNMM16060865 WP25CT	B44
CNMM16060865 WP35CT	B44
CNMM16061265 TN7125	B44
CNMM16061265 WM25CT	B44
CNMM16061265 WP15CT	B44
CNMM16061265 WP25CT	B44
CNMM16061265 WP35CT	B44
CNMM16061665 TN7025	B44
CNMM16061665 WP15CT	B44
CNMM16061665 WP25CT	B44
CNMM19061265 TN7125	B44
CNMM19061265 WM25CT	B44
CNMM19061265 WP35CT	B44
CNMM19061665 TN8025	B44
CNMM19061665 WM25CT	B44
CNMM19061665 WP15CT	B44
CNMM190616SR TN7015	B44
CNMM190616SR WM25CT	B44
CNMM190616SR WP15CT	B44
CNMM19062465 WM25CT	B44
CNMM19062465 WP15CT	B44
CNMM19062465 WP25CT	B44
CNMM190624SR TN7115	B44
CNMM190624SR WP35CT	B44
CNMM250924SR TN7025	B44
CNMM250924SR WP15CT	B44
CNMM250924SR WP25CT	B44
CNMM250924SR WP35CT	B44
CNMN090312S02020 WBK40U	B202
CNMN120408S02020 WBK40U	B202
CNMN120412S02020 WBK40U	B202
CNMP120404 WM15CT	B45
CNMP120404 WM25CT	B45
CNMP120404 WM35CT	B45
CNMP120404 WS10PT	B45
CNMP120408 WM15CT	B45
CNMP120408 WM25CT	B45
CNMP120408 WM35CT	B45
CNMP120408 WS10PT	B45
CNMP120408 WS25PT	B45
CNMP120412 WM15CT	B45
CNMP120412 WM25CT	B45
CNMP120412 WM35CT	B45
CNMP120412 WS10PT	B45
CNMP120412 WS25PT	B45
CNMP160608 WM15CT	B45
CNMP160608 WM25CT	B45
CNMP160608 WM35CT	B45
CNMP160612 WM15CT	B45
CNMP160612 WM25CT	B45
CNMP160612 WM35CT	B45
CNMP160612 WS10PT	B45
CNMP190612 WS10PT	B45
CNMP190616 WM15CT	B45
CNMP190616 WM25CT	B45
CNMP190616 WM35CT	B45
CNMS120408FST WDN25U	B202
CPG2032R CG5	D55
CPG2062R CG5	D55
CPGN120304F WDN25U	B203
CPGN120308F WDN25U	B203
CPGT04T1043 TN35	B45
CPGT04T1043 TTR	B45
CPGW060202EC WBH25P	B203
CPGW060202FST WDN25U	B204
CPGW060202S01015C WBH10P	B203
CPGW060202S01015C WBH30P	B203
CPGW060204FST WDN25U	B204
CPGW060204FWST WDN00U	B204
CPGW060204FWST WDN25U	B204
CPGW060204S01015C WBH10P	B203
CPGW060204S01015C WBH25P	B203
CPGW060204S01015C WBH30P	B203
CPGW060208FST WDN25U	B204
CPGW060208S01015C WBH25P	B203
CPGW09T304FST WDN25U	B204

Catalogue No.	Page(s)
CPGW09T304S01015C WBH25P	B203
CPGW09T304S01015MT WBH10P	B205
CPGW09T304S01015MT WBH30P	B205
CPGW09T308FST WDN25U	B204
CPGW09T308FWST WDN00U	B204
CPGW09T308FWST WDN25U	B204
CPGW09T308S01015C WBH25P	B203
CPGW09T308S01015MT WBH10P	B205
CPGW09T308S01015MT WBH30P	B205
CPGW120404FST WDN25U	B204
CPGW120408FST WDN25U	B204
CPGW120408FWST WDN00U	B204
CPGW120408FWST WDN25U	B204
CPHB06T102 CG5	D44
CPHB06T104 CG5	D44
CPHH06T102 CG5	D45
CPHH06T102 CG6	D45
CPHH06T102 CM1	D45
CPHH06T104 CG5	D45
CPMT060202FP WM25CT	B46
CPMT060202FP WP15CT	B46
CPMT060202FP WP25CT	B46
CPMT060204FP WK20CT	B46
CPMT060204FP WM15CT	B46
CPMT060204FP WM25CT	B46
CPMT060204FP WP15CT	B46
CPMT060204FP WP25CT	B46
CPMT060208FP WK20CT	B46
CPMT060208FP WM15CT	B46
CPMT060208FP WM25CT	B46
CPMT060208FP WP15CT	B46
CPMT060208FP WP25CT	B46
CPMT060208MP WP15CT	B46
CPMT060208MP WP25CT	B46
CPMT09T302FP WM25CT	B46
CPMT09T302LF CG5	D45
CPMT09T304FP WK20CT	B46
CPMT09T304FP WM15CT	B46
CPMT09T304FP WM25CT	B46
CPMT09T304FP WP15CT	B46
CPMT09T304FP WP25CT	B46
CPMT09T304LF CG5	D45
CPMT09T308FP WK20CT	B46
CPMT09T308FP WM15CT	B46
CPMT09T308FP WM25CT	B46
CPMT09T308FP WP15CT	B46
CPMT09T308FP WP25CT	B46
CPMT09T308LF CG5	D45
CPMT09T308MP WK20CT	B46
CPMT09T308MP WM15CT	B46
CPMT09T308MP WM25CT	B46
CPMT09T308MP WP15CT	B46
CPMT09T308MP WP25CT	B46
CPMT09T312MP WK20CT	B46
CPMT09T312MP WM15CT	B46
CPMT09T312MP WP25CT	B46
CPMW050204FST WDN25U	B205
CPMW060204FST WDN25U	B205
CPMW09T304FWST WDN25U	B205
CPNT060204T WK15CM	L5
CPNT060204T WP35CM	L5
CPNT060204T WP40PM	L5
CPNT080308T THM	L5
CPNT080308T WK15CM	L5
CPNT080308T WP35CM	L5
CPNT09T308T TTM08	L6
CPNT09T308T WK15CM	L6
CPNT09T308T WP35CM	L6
CPNT120408T TN7535	L6
CPNT120408T WK15CM	L6
CPNT120408T WP35CM	L6
CPT20052R CG5	D56
CPT20052R CM1	D56
CRDNN2525M12MN4 WG	C35
CRDNN2525M12MN7 WG	C35
CRDNN3225P12MN4 WG	C35
CRDNN3225P12MN7 WG	C35
CRDPN2525M06V WG	C40
CRDPN2525M09V WG	C40
CRDPN2525M12V WG	C40
CRDPN3232P09V WG	C40
CRDPN3232P12V WG	C40
CRGPL2525M06V WG	C41
CRGPL2525M09V WG	C41
CRGPL2525M12V WG	C41
CRGPL3232P09V WG	C41
CRGPL3232P12V WG	C41
CRGPR2525M06V WG	C41
CRGPR2525M09V WG	C41
CRGPR2525M12V WG	C41
CRGPR3232P09V WG	C41
CRSNL2525M12MN7 WG	C35
CRSNL3225P12MN4 WG	C35
CRSNL3225P12MN7 WG	C35
CRSNR2525M12MN7 WG	C35
CRSNR3225P12MN4 WG	C35
CRSNR3225P12MN7 WG	C35
CS412	C40–41
CSBM4510125L WG	D11
CSBM4510125R WG	D11
CSBM4512125L WG	D11
CSBM4512125R WG	D11
CSBM4512255L WG	D11
CSBM4657L WG	D10
CSBM4657R WG	D10
CSBM5210125R WG	D11
CSBM5210250R WG	D11
CSBM5210255R WG	D11
CSBM5212125L WG	D11
CSBM5212250R WG	D11
CSBM5212255R WG	D11
CSBM5650L WG	D10
CSBM5650R WG	D10
CSBM5655L WG	D10
CSBM5655R WG	D10
CSBM6410195L WG	D11
CSBM6410195R WG	D11
CSBM6412190R WG	D11
CSBM6412195L WG	D11
CSBM6412195R WG	D11
CSBM6412320R WG	D11
CSBM6412325L WG	D11
CSBM6412325R WG	D11
CSBM6650L WG	D10
CSBM6650R WG	D10
CSBM6655L WG	D10
CSBM6655R WG	D10
CSBM8760L WG	D10
CSBM8765L WG	D10
CSBM8765R WG	D10
CSBPL2020K12 WG	C36
CSBPR2020K12 WG	C36
CSBPR2525M12 WG	C36
CSDPN1616H09 WG	C36
CSDPN2020K12 WG	C36
CSDPN2525M12 WG	C36
CSKPR10CA09 WG	C106
CSKPR12CA12 WG	C106
CSM22156 WG	D29
CSM22187 WG	D29
CSM22250 WG	D29
CSM22312 WG	D29
CSM22375 WG	D29
CSM22500 WG	D29
CSMM6760R WG	D28
CSPM71225225L WG	D25
CSPM71225225R WG	D25
CSPM712255L WG	D25
CSPM712255R WG	D25
CSPM81232225L WG	D25
CSPM81232225R WG	D25
CSPM812325L WG	D25
CSRPR10CA09 WG	C107
CSRPR12CA12 WG	C107
CSSPL10CA09 WG	C108
CSSPL12CA12 WG	C108
CSSPL20CA12 WG	C108
CSSPL2525M12 WG	C37
CSSPR10CA09 WG	C108
CSSPR12CA12 WG	C108
CSSPR2020K12 WG	C37
CSSPR2525M12 WG	C37
CSWM 035 040	C110, C113, C115–116
CSWM 040 050	C110–111, C113–117, C119, C126–129
CSWM 060 050	C92–94, C97–110, C112–113, C118–129
CSWM 080 050	C92–105, C108–109, C112, C120, C124
CSWM 100 080	C94, C97, C101–102
CT11 WG	D23, D59, D71, D84
CT15 WG	D25–26, D59, D71, D84
CTCPN2510M11 WG	C37
CTCPN2514M16 WG	C37
CTCPN2518M22 WG	C37
CTCPN2520M22 WG	C37
CTCPN4018R22 WG	C37
CTDPL1212F11 WG	C38
CTDPR1212F11 WG	C38
CTFPL12CA16 WG	C109
CTFPL2525M16 WG	C38
CTFPR10CA11 WG	C109
CTFPR12CA16 WG	C109
CTFPR2020K16 WG	C38
CTFPR20CA22 WG	C109
CTFPR2525M16 WG	C38
CTGPL1212F11 WG	C39
CTGPL2020K16 WG	C39
CTGPL2525M16 WG	C39
CTGPR1212F11 WG	C39
CTGPR1616H11 WG	C39
CTGPR2020K11 WG	C39
CTGPR2020K16 WG	C39
CTGPR2525M16 WG	C39
CTGPR2525M22 WG	C39
CV40BRFX185236 WG	W56
CV40BRFX245236 WG	W56
CV40BRFX320236 WG	W56
CV40BRFX420236 WG	W56
CV40BRFX550256 WG	W56
CV50BRFX320236 WG	W57
CV50BRFX420236 WG	W57
CV50BRFX550236 WG	W57
CV50BRFX720276 WG	W57
D0010300T004 TIALN	P19
D0010400T005 TIALN	P19
D0012000T020 TIALN	P19
D0020200T003 TIALN	P14
D0020200T003 UNCOATED	P14
D0020250T003 TIALN	P14
D0020250T003 UNCOATED	P14
D0020300T004 TIALN	P14
D0020300T004 UNCOATED	P14
D0020350T004 TIALN	P14
D0020350T004 UNCOATED	P14
D0020400T005 TIALN	P14
D0020400T005 UNCOATED	P14
D0020450T005 TIALN	P14
D0020450T005 UNCOATED	P14
D0020500T006 TIALN	P14
D0020500T006 UNCOATED	P14
D0020600T007 TIALN	P14
D0020600T007 UNCOATED	P14
D0020700T008 TIALN	P14
D0020700T008 UNCOATED	P14
D0020800T009 TIALN	P14
D0020800T009 UNCOATED	P14
D0020900T010 TIALN	P14
D0020900T010 UNCOATED	P14
D0021000T011 TIALN	P15
D0021000T011 UNCOATED	P15
D0021200T012 TIALN	P15
D0021200T012 UNCOATED	P15
D0021200W012 TIALN	P15
D0021200W012 UNCOATED	P15
D0021400T014 TIALN	P15
D0021400T014 UNCOATED	P15
D0021400W014 TIALN	P15
D0021400W014 UNCOATED	P15
D0021600T016 TIALN	P15
D0021600T016 UNCOATED	P15
D0021600W016 TIALN	P15
D0021600W016 UNCOATED	P15
D0021800T018 TIALN	P15
D0021800T018 UNCOATED	P15
D0021800W018 TIALN	P15
D0021800W018 UNCOATED	P15
D0022000T020 TIALN	P15
D0022000T020 UNCOATED	P15
D0022000W020 TIALN	P15
D0022000W020 UNCOATED	P15
D0040200T004 TIALN	P32
D0040300T005 TIALN	P32
D0040400T008 TIALN	P32
D0040500T009 TIALN	P32
D0040600T010 TIALN	P32
D0040700T011 TIALN	P32
D0040800T012 TIALN	P32
D0040900T013 TIALN	P33
D0041000T014 TIALN	P33
D0041200T016 TIALN	P33
D0041200W016 TIALN	P33
D0041200W016 UNCOATED	P33
D0041400T018 TIALN	P33
D0041400W018 TIALN	P33
D0041400W018 UNCOATED	P33
D0041600T022 TIALN	P33
D0041600W022 TIALN	P33
D0041600W022 UNCOATED	P33
D0041800T024 TIALN	P33
D0041800W024 TIALN	P33
D0041800W024 UNCOATED	P33

Catalogue No.	Page(s)
D0042000T026 TIALN	P33
D0042000W026 TIALN	P33
D0042000W026 UNCOATED	P33
D0100300T008 TIALN	P37
D0100300T008 UNCOATED	P37
D0100400T011 TIALN	P37
D0100400T011 UNCOATED	P37
D0100500T013 TIALN	P37
D0100500T013 UNCOATED	P37
D0100600T013 TIALN	P37
D0100600T013 UNCOATED	P37
D0100800T019 TIALN	P37
D0100800T019 UNCOATED	P37
D0101000T022 TIALN	P37
D0101000T022 UNCOATED	P37
D0101200T026 TIALN	P37
D0101200T026 UNCOATED	P37
D0101200W026 TIALN	P37
D0101200W026 UNCOATED	P37
D0101400T026 TIALN	P37
D0101400T026 UNCOATED	P37
D0101400W026 TIALN	P37
D0101400W026 UNCOATED	P37
D0101600T032 TIALN	P37
D0101600T032 UNCOATED	P37
D0101600W032 TIALN	P37
D0101600W032 UNCOATED	P37
D0101800T032 TIALN	P37
D0101800T032 UNCOATED	P37
D0101800W032 TIALN	P37
D0101800W032 UNCOATED	P37
D0102000T038 TIALN	P37
D0102000T038 UNCOATED	P37
D0102000W038 TIALN	P37
D0102000W038 UNCOATED	P37
D0110200T006 TIALN	P19
D0110300T007 TIALN	P19
D0110400T008 TIALN	P19
D0110500T010 TIALN	P19
D0110600T010 TIALN	P19
D0110700T013 TIALN	P19
D0110800T016 TIALN	P19
D0111000T019 TIALN	P19
D0111200T022 TIALN	P19
D0111400T022 TIALN	P19
D0111600T026 TIALN	P19
D0112000T032 TIALN	P19
D0120250T007 TIALN	P14
D0120250T007 UNCOATED	P14
D0120300T007 TIALN	P14
D0120300T007 UNCOATED	P14
D0120400T008 TIALN	P14
D0120400T008 UNCOATED	P14
D0120450T008 TIALN	P14
D0120450T008 UNCOATED	P14
D0120500T010 TIALN	P14
D0120500T010 UNCOATED	P14
D0120600T010 TIALN	P14
D0120600T010 UNCOATED	P14
D0120700T013 TIALN	P14
D0120700T013 UNCOATED	P14
D0120800T016 TIALN	P14
D0120800T016 UNCOATED	P14
D0120900T016 TIALN	P14
D0120900T016 UNCOATED	P14
D0121000T019 TIALN	P15
D0121000T019 UNCOATED	P15
D0121200T022 TIALN	P15
D0121200T022 UNCOATED	P15
D0121200W022 TIALN	P15
D0121200W022 UNCOATED	P15
D0121400T022 TIALN	P15
D0121400T022 UNCOATED	P15
D0121400W022 TIALN	P15
D0121400W022 UNCOATED	P15
D0121600T026 TIALN	P15
D0121600T026 UNCOATED	P15
D0121600W026 TIALN	P15
D0121600W026 UNCOATED	P15
D0121800T026 TIALN	P15
D0121800T026 UNCOATED	P15
D0121800W026 TIALN	P15
D0121800W026 UNCOATED	P15
D0122000T032 TIALN	P15
D0122000T032 UNCOATED	P15
D0122000W032 TIALN	P15
D0122000W032 UNCOATED	P15
D0140200T007 TIALN	P32
D0140250T008 TIALN	P32
D0140300T008 TIALN	P32
D0140350T010 TIALN	P32
D0140400T011 TIALN	P32
D0140450T011 TIALN	P32
D0140500T013 TIALN	P32
D0140550T013 TIALN	P32
D0140600T013 TIALN	P32
D0140650T016 TIALN	P32
D0140700T016 TIALN	P32
D0140750T019 TIALN	P32
D0140800T019 TIALN	P32
D0140900T019 TIALN	P33
D0141000T022 TIALN	P33
D0141200T026 TIALN	P33
D0141200W026 TIALN	P33
D0141200W026 UNCOATED	P33
D0141400T026 TIALN	P33
D0141400W026 TIALN	P33
D0141400W026 UNCOATED	P33
D0141600T032 TIALN	P33
D0141600W032 TIALN	P33
D0141600W032 UNCOATED	P33
D0141800T032 TIALN	P33
D0141800W032 TIALN	P33
D0141800W032 UNCOATED	P33
D0142000T038 TIALN	P33
D0142000W038 TIALN	P33
D0142000W038 UNCOATED	P33
D100MTTB1330KM63	C84
D40MTTB560KM40	C84
D50203002.. UNCOATED	0134
D50203002RT TIALN-RT	0134
D50204002.. UNCOATED	0134
D50204002RT TIALN-RT	0134
D50205002.. UNCOATED	0134
D50205002RT TIALN-RT	0134
D50206002.. UNCOATED	0134
D50206002RT TIALN-RT	0134
D50208003.. UNCOATED	0134
D50208003RT TIALN-RT	0134
D50210004.. UNCOATED	0134
D50210004RT TIALN-RT	0134
D50212005.. UNCOATED	0134
D50212005RT TIALN-RT	0134
D50214014.. UNCOATED	0134
D50216006.. UNCOATED	0134
D50216006RT TIALN-RT	0134
D50220007.. UNCOATED	0134
D50302002CW TICN-CW	085
D50302002RW TIALN-RW	085
D50302002WW UNCOATEDWW	085
D50303002CW TICN-CW	085
D50303002RW TIALN-RW	085
D50303002WW UNCOATEDWW	085
D50304002CW TICN-CW	085
D50304002RW TIALN-RW	085
D50304002WW UNCOATEDWW	085
D50305002CW TICN-CW	085
D50305002RW TIALN-RW	085
D50305002WW UNCOATEDWW	085
D50306002CW TICN-CW	085
D50306002RW TIALN-RW	085
D50306002WW UNCOATEDWW	085
D50308003CW TICN-CW	085
D50308003RW TIALN-RW	085
D50308003WW UNCOATEDWW	085
D50310004CW TICN-CW	085
D50310004RW TIALN-RW	085
D50310004WW UNCOATEDWW	085
D50312005RW TIALN-RW	085
D50312005WW UNCOATEDWW	085
D50314014RW TIALN-RW	085
D50316006RW TIALN-RW	085
D50316006WW UNCOATEDWW	085
D50320007RW TIALN-RW	085
D50706002W WP15PE	092
D50708003W WP15PE	092
D50710004W WP15PE	092
D50712005W WP15PE	092
D50714014W WP15PE	092
D50716006W WP15PE	092
D50718018W WP15PE	092
D50720007W WP15PE	092
D50MTTB737KM40	C84
D51303002RW TIALN-RW	085
D51303002WW UNCOATEDWW	085
D51304002RW TIALN-RW	085
D51304002WW UNCOATEDWW	085
D51305002RW TIALN-RW	085
D51305002WW UNCOATEDWW	085
D51306002RW TIALN-RW	085
D51306002WW UNCOATEDWW	085
D51308003RW TIALN-RW	085
D51308003WW UNCOATEDWW	085
D51310004RW TIALN-RW	085
D51310004WW UNCOATEDWW	085
D51312005RW TIALN-RW	085
D51312005WW UNCOATEDWW	085
D51314014RW TIALN-RW	085
D51316006RW TIALN-RW	085
D51316006WW UNCOATEDWW	085
D51318018RW TIALN-RW	085
D51318018WW UNCOATEDWW	085
D51320007RW TIALN-RW	085
D51320007WW UNCOATEDWW	085
D51706002W WP15PE	092
D51708003W WP15PE	092
D51710004W WP15PE	092
D51712005W WP15PE	092
D51714014W WP15PE	092
D51716006W WP15PE	092
D51718018W WP15PE	092
D51720007W WP15PE	092
D51804002W WP15PE	095
D51805002W WP15PE	095
D51806002W WP15PE	095
D51807003W WP15PE	095
D51808003W WP15PE	095
D51809004W WP15PE	095
D51810004W WP15PE	095
D51812005W WP15PE	095
D51814014W WP15PE	095
D51816006W WP15PE	095
D51818018W WP15PE	095
D51820007W WP15PE	095
D51825008W WP15PE	095
D60MTTB1000KM40	C84
D61803002RJ TIALN-RJ	0191
D61804002RJ TIALN-RJ	0191
D61805002RJ TIALN-RJ	0191
D61806002RJ TIALN-RJ	0191
D61807003RJ TIALN-RJ	0191
D61808003RJ TIALN-RJ	0191
D61810004RJ TIALN-RJ	0191
D61812005RJ TIALN-RJ	0191
D61816006RJ TIALN-RJ	0191
D61820007RJ TIALN-RJ	0191
D80MTTB1120KM63	C84
DC0303002LW TIALN-LW	086
DC0304002LW TIALN-LW	086
DC0305002LW TIALN-LW	086
DC0306002LW TIALN-LW	086
DC0308003LW TIALN-LW	086
DC0310004LW TIALN-LW	086
DC0312005LW TIALN-LW	086
DC0314014LW TIALN-LW	086
DC0316006LW TIALN-LW	086
DC0318018LW TIALN-LW	086
DC0320007LW TIALN-LW	086
DCGT0702011P TN10U	B129
DCGT0702011P TN15U	B129
DCGT070202AL3 HCK10	B156
DCGT070202AL3 HWK15	B156
DCGT070204AL3 HCK10	B156
DCGT070204AL3 HWK15	B156
DCGT11T3011P TN10U	B129
DCGT11T3011P TN15U	B129
DCGT11T302AL3 HWK15	B156
DCGT11T304AL3 HCK10	B156
DCGT11T304AL3 HWK15	B156
DCGT11T308AL3 HCK10	B156
DCGT11T308AL3 HWK15	B156
DCGT1504081P TN10U	B129
DCGW070202EC WBH25P	B206
DCGW070202S01015C WBH10P	B206
DCGW070204FST WDN25U	B206
DCGW070204S01015C WBH10P	B206
DCGW070204S01015C WBH25P	B206
DCGW11T304FST WDN25U	B206
DCGW11T304S01015MT WBH10P	B206
DCGW11T308S01015MT WBH10P	B206
DCKNL2020K12KC04 WG	C8
DCKNL2525M12KC04 WG	C8
DCKNL3225P12KC04 WG	C8
DCKNR2020K12KC04 WG	C8
DCKNR2525M12KC04 WG	C8
DCKNR3225P12KC04 WG	C8
DCKNR3232P16KC06 WG	C8
DCKNR3232P19KC06 WG	C8
DCLNL1616H09KC03 WG	C9
DCLNL2020K09KC03 WG	C9
DCLNL2020K12KC04 WG	C9
DCLNL2525M12KC04 WG	C9

Catalogue No.	Page(s)
DCLNL2525M16KC06 WG	C9
DCLNL3232P16KC06 WG	C9
DCLNL3232P19KC06 WG	C9
DCLNL4040S19KC06 WG	C9
DCLNL4040S25KC09 WG	C9
DCLNR1616H09KC03 WG	C9
DCLNR2020K09KC03 WG	C9
DCLNR2020K12KC04 WG	C9
DCLNR2525M12KC04 WG	C9
DCLNR2525M16KC06 WG	C9
DCLNR3232P16KC06 WG	C9
DCLNR3232P19KC06 WG	C9
DCLNR4040S19KC06 WG	C9
DCLNR4040S25KC09 WG	C9
DCMT0702021P TN10U	B129
DCMT0702021P TN15U	B129
DCMT070202FP WM25CT	B48
DCMT070202FP WP25CT	B48
DCMT070204 THM	B47
DCMT0702041P TN10P	B129
DCMT0702041P TN10U	B129
DCMT0702041P TN15M	B129
DCMT0702041P TN15U	B129
DCMT0702041P TN20K	B129
DCMT0702041P TN20P	B129
DCMT0702041P TN30M	B129
DCMT070204FP WK20CT	B48
DCMT070204FP WM15CT	B48
DCMT070204FP WM25CT	B48
DCMT070204FP WP15CT	B48
DCMT070204FP WP25CT	B48
DCMT070208FP WM25CT	B48
DCMT070208FP WP25CT	B48
DCMT11T3021P TN10U	B129
DCMT11T3021P TN15U	B129
DCMT11T302FP WM25CT	B48
DCMT11T302FP WP15CT	B48
DCMT11T302FP WP25CT	B48
DCMT11T304 HK1500	B47
DCMT11T304 THM	B47
DCMT11T304 TTI15	B47
DCMT11T304 TTR	B47
DCMT11T3041P TN10P	B129
DCMT11T3041P TN10U	B129
DCMT11T3041P TN15M	B129
DCMT11T3041P TN15U	B129
DCMT11T3041P TN20K	B129
DCMT11T3041P TN20P	B129
DCMT11T3041P TN30M	B129
DCMT11T304FP WK20CT	B48
DCMT11T304FP WM15CT	B48
DCMT11T304FP WM25CT	B48
DCMT11T304FP WP15CT	B48
DCMT11T304FP WP25CT	B48
DCMT11T304FW WM15CT	B48
DCMT11T304FW WP15CT	B48
DCMT11T304MP WK20CT	B49
DCMT11T304MP WP15CT	B49
DCMT11T304MP WP25CT	B49
DCMT11T304MU TN5105	B49
DCMT11T304MU WK05CT	B49
DCMT11T304MU WK20CT	B49
DCMT11T304MU WM25CT	B49
DCMT11T304MU WP15CT	B49
DCMT11T304MU WP25CT	B49
DCMT11T304MU WS10PT	B49
DCMT11T304MU WS25PT	B49
DCMT11T304MW WP15CT	B50
DCMT11T304MW WP25CT	B50
DCMT11T308 HK1500	B47
DCMT11T308 THM	B47
DCMT11T3081P TN10P	B129
DCMT11T3081P TN10U	B129
DCMT11T3081P TN15M	B129
DCMT11T3081P TN20K	B129
DCMT11T3081P TN20P	B129
DCMT11T3081P TN30M	B129
DCMT11T308FP WK20CT	B48
DCMT11T308FP WM15CT	B48
DCMT11T308FP WM25CT	B48
DCMT11T308FP WP15CT	B48
DCMT11T308FP WP25CT	B48
DCMT11T308FW WM15CT	B48
DCMT11T308FW WP15CT	B48
DCMT11T308MP WK20CT	B49
DCMT11T308MP WM15CT	B49
DCMT11T308MP WM25CT	B49
DCMT11T308MP WP15CT	B49
DCMT11T308MP WP25CT	B49
DCMT11T308MU TN2000	B49
DCMT11T308MU WK05CT	B49
DCMT11T308MU WK20CT	B49
DCMT11T308MU WM25CT	B49
DCMT11T308MU WP15CT	B49
DCMT11T308MU WS10PT	B49
DCMT11T308MU WS25PT	B49
DCMT11T308MW WP15CT	B50
DCMT11T308MW WP25CT	B50
DCMT11T312 THM	B47
DCMT11T3121P TN10P	B129
DCMT11T3121P TN10U	B129
DCMT11T3121P TN15M	B129
DCMT11T3121P TN20K	B129
DCMT11T312FP WP15CT	B48
DCMT11T312FP WP25CT	B48
DCMT11T312MP WP15CT	B49
DCMT11T312MP WP25CT	B49
DCMT150404 THM	B47
DCMT1504041P TN10P	B129
DCMT1504041P TN20K	B129
DCMT1504041P TN20P	B129
DCMT150404FP WM25CT	B48
DCMT150404FP WP15CT	B48
DCMT150404FP WP25CT	B48
DCMT150408 THM	B47
DCMT150408 TTR	B47
DCMT1504081P TN10P	B129
DCMT1504081P TN20K	B129
DCMT1504081P TN20P	B129
DCMT150408FP WK20CT	B48
DCMT150408FP WM25CT	B48
DCMT150408FP WP15CT	B48
DCMT150408FP WP25CT	B48
DCMT150408MU TN5105	B49
DCMT150408MU WK05CT	B49
DCMT150408MU WK20CT	B49
DCMT150408MU WM25CT	B49
DCMT150408MU WP15CT	B49
DCMT150408MU WP25CT	B49
DCMT150408MU WS10PT	B49
DCMT150408MU WS25PT	B49
DCMT150412 THM	B47
DCMT150412MU TN5105	B49
DCMT150412MU WK05CT	B49
DCMT150412MU WK20CT	B49
DCMT150416 THM	B47
DCMW070204 THM	B50
DCMW070204 WK05CT	B50
DCMW070204 WK20CT	B50
DCMW070204FST WDN25U	B207
DCMW11T304 THM	B50
DCMW11T304 WK05CT	B50
DCMW11T304 WK20CT	B50
DCMW11T304FST WDN25U	B207
DCMW11T308FST WDN25U	B207
DCMW150408 THM	B50
DCMW150408 WK05CT	B50
DCMW150408 WK20CT	B50
DCMX11T302R18 THM	B50
DCRNL2020K12KC04 WG	C10
DCRNL2525M12KC04 WG	C10
DCRNL3225P12KC04 WG	C10
DCRNL3232P16KC06 WG	C10
DCRNR2020K12KC04 WG	C10
DCRNR2525M12KC04 WG	C10
DCRNR3225P12KC04 WG	C10
DCRNR3232P16KC06 WG	C10
DCRNR3232P19KC06 WG	C10
DCSNL2020K12KC04 WG	C10
DCSNL2525M12KC04 WG	C10
DCSNR2020K12KC04 WG	C10
DCSNR2525M12KC04 WG	C10
DDJNL2020K11KC04 WG	C11
DDJNL2020K15KC06 WG	C11
DDJNL2525M11KC04 WG	C11
DDJNL2525M15KC06 WG	C11
DDJNL3225P15KC06 WG	C11
DDJNL3232P15KC06 WG	C11
DDJNR2020K11KC04 WG	C11
DDJNR2020K15KC06 WG	C11
DDJNR2525M11KC04 WG	C11
DDJNR2525M15KC06 WG	C11
DDJNR3225P15KC06 WG	C11
DDJNR3232P15KC06 WG	C11
DDNNL2020K15KC06 WG	C11
DDNNL2525M15KC06 WG	C11
DDNNL3225P15KC06 WG	C11
DDNNR2020K15KC06 WG	C11
DDNNR2525M15KC06 WG	C11
DNGA150404EFWMT WBH25P	B208
DNGA150404FST WDN00U	B207
DNGA150404FST WDN25U	B207
DNGA150404S01025MT WBH10P	B208
DNGA150404S01025MT WBH25P	B208
DNGA150404S01025MT WBH30P	B208
DNGA150404T02020 CW2015	B181
DNGA150408EFWMT WBH25P	B208
DNGA150408EMT WBH25P	B207
DNGA150408FST WDN00U	B207
DNGA150408FST WDN25U	B207
DNGA150408S01025MT WBH10P	B208
DNGA150408S01025MT WBH25P	B208
DNGA150408T02020 CW2015	B181
DNGA150412EFWMT WBH25P	B208
DNGA150412EMT WBH25P	B207
DNGA150412T02020 CW2015	B181
DNGA150412T02020 CW5025	B181
DNGA150604T02020 CW2015	B181
DNGA150608T02020 CW2015	B181
DNGA150612T02020 CW2015	B181
DNGA150612T02020 CW5025	B181
DNGG110402FS WS10PT	B51
DNGG110402FS WS25PT	B51
DNGG110402FS WU10HT	B51
DNGG110404FS WS10PT	B51
DNGG110404FS WU10HT	B51
DNGG110408FS WS10PT	B51
DNGG110408FS WU10HT	B51
DNGG150401FS WS10PT	B51
DNGG150401FS WU10HT	B51
DNGG150402FS WS10PT	B51
DNGG150402FS WU10HT	B51
DNGG150404FS WS10PT	B51
DNGG150404FS WS25PT	B51
DNGG150404FS WU10HT	B51
DNGG150408FS WS10PT	B51
DNGG150408FS WS25PT	B51
DNGG150408FS WU10HT	B51
DNGG150412FS WS10PT	B51
DNGG150412FS WU10HT	B51
DNGG150604FS WS10PT	B51
DNGG150604FS WS25PT	B51
DNGG150604FS WU10HT	B51
DNGG150608FS WS10PT	B51
DNGG150608FS WS25PT	B51
DNGG150608FS WU10HT	B51
DNGN150704T02020 CW2015	B180
DNGN150708T01020 CW3020	B180
DNGN150708T02020 CW2015	B180
DNGN150712T02020 CW2015	B180
DNGN150716T01020 CW3020	B180
DNGP150401 TN10U	B52, B130
DNGP150401 WS10PT	B52
DNGP150402 TN10U	B52, B130
DNGP150402 TN15U	B130
DNGP150402 WS10PT	B52
DNGP150404 TN10U	B52, B130
DNGP150404 TN15U	B130
DNGP150404 WS10PT	B52
DNGP150404 WU10HT	B52
DNGP150408 TN10U	B52, B130
DNGP150408 TN15U	B130
DNGP150408 WS10PT	B52
DNGP150408 WU10HT	B52
DNGX120712T02020 CW5025	B181
DNGX120716T02020 CW5025	B181
DNGX150708T02020 CW5025	B181
DNGX150712T02020 CW5025	B181
DNGX150716T02020 CW5025	B181
DNMA110408 WK05CT	B52
DNMA110408 WK20CT	B52
DNMA110408S02020 WBK40U	B208
DNMA110412 WK20CT	B52
DNMA150408 TN20K	B130
DNMA150408 WK05CT	B52
DNMA150408 WK20CT	B52
DNMA150412 TN20K	B130
DNMA150412 WK05CT	B52
DNMA150412 WK20CT	B52
DNMA150416 WK20CT	B52
DNMA150608 TN20K	B130
DNMA150608 WK05CT	B52
DNMA150608 WK20CT	B52
DNMA150612 TN20K	B130
DNMA150612 WK05CT	B52
DNMA150612 WK20CT	B52
DNMA150616 WK20CT	B52
DNMG110404FF WK20CT	B54
DNMG110404FF WM25CT	B54
DNMG110404FF WP15CT	B54
DNMG110404FF WS10PT	B54
DNMG110404FW WP15CT	B55

Catalogue No.	Page(s)
DNMG110404ML WK05CT	B56
DNMG110404ML WK20CT	B56
DNMG110404ML WP15CT	B56
DNMG110404ML WP25CT	B56
DNMG110404UF WM15CT	B60
DNMG110404UF WM25CT	B60
DNMG110404UF WS10PT	B60
DNMG110404UM WM15CT	B61
DNMG110404UM WM25CT	B61
DNMG110404UM WM35CT	B61
DNMG11040822 TTI15	B53
DNMG1104086P TN10P	B132
DNMG1104086P TN20P	B132
DNMG1104086P TN30M	B132
DNMG110408FF WK20CT	B54
DNMG110408FF WM25CT	B54
DNMG110408FF WP15CT	B54
DNMG110408FW WP15CT	B55
DNMG110408ML WK05CT	B56
DNMG110408ML WK20CT	B56
DNMG110408ML WP15CT	B56
DNMG110408ML WP25CT	B56
DNMG110408MR WP15CT	B57
DNMG110408MR WP25CT	B57
DNMG110408MR WP35CT	B57
DNMG110408MS WS10PT	B58
DNMG110408MS WS25PT	B58
DNMG110408MS WU10HT	B58
DNMG110408UF WM15CT	B60
DNMG110408UF WM25CT	B60
DNMG110408UF WS10PT	B60
DNMG110408UM WM15CT	B61
DNMG110408UM WM25CT	B61
DNMG110408UM WM35CT	B61
DNMG110408UM WS10PT	B61
DNMG110408UR WK20CT	B62
DNMG110408UR WM15CT	B62
DNMG110408UR WM25CT	B62
DNMG110408UR WM35CT	B62
DNMG110408UR WP15CT	B62
DNMG110408UR WP25CT	B62
DNMG110408UR WP35CT	B62
DNMG110412FF WM25CT	B54
DNMG110412ML WP15CT	B56
DNMG110412UM WM15CT	B61
DNMG110412UM WM25CT	B61
DNMG110412UM WM35CT	B61
DNMG110412UR WK20CT	B62
DNMG110412UR WM15CT	B62
DNMG110412UR WP15CT	B62
DNMG110412UR WP25CT	B62
DNMG1504042P TN10P	B131
DNMG1504042P TN10U	B131
DNMG1504042P TN15M	B131
DNMG1504042P TN15U	B131
DNMG1504042P TN20K	B131
DNMG1504042P TN20P	B131
DNMG1504042P TN30M	B131
DNMG1504044P TN15M	B131
DNMG1504044P TN30M	B131
DNMG1504046P TN10P	B132
DNMG1504046P TN15M	B132
DNMG1504046P TN20P	B132
DNMG1504046P TN30M	B132
DNMG1504047N TN10P	B133
DNMG1504047N TN20P	B133
DNMG150404FF WM25CT	B54
DNMG150404FF WP15CT	B54
DNMG150404FF WS10PT	B54
DNMG150404FW WK05CT	B55
DNMG150404FW WM15CT	B55
DNMG150404FW WM25CT	B55
DNMG150404FW WP15CT	B55
DNMG150404ML WK05CT	B56
DNMG150404ML WK20CT	B56
DNMG150404ML WP15CT	B56
DNMG150404ML WP25CT	B56
DNMG150404MR WP15CT	B57
DNMG150404MR WP25CT	B57
DNMG150404MR WP35CT	B57
DNMG150404MS WS10PT	B58
DNMG150404MS WS25PT	B58
DNMG150404MS WU10HT	B58
DNMG150404UF WM15CT	B60
DNMG150404UF WM25CT	B60
DNMG150404UF WS10PT	B60
DNMG150404UM WM15CT	B61
DNMG150404UM WM25CT	B61
DNMG150404UM WM35CT	B61
DNMG150404UM WS10PT	B61
DNMG1504082P TN10P	B131
DNMG1504082P TN10U	B131
DNMG1504082P TN15M	B131
DNMG1504082P TN15U	B131
DNMG1504082P TN20K	B131
DNMG1504082P TN20P	B131
DNMG1504082P TN30M	B131
DNMG1504084P TN10U	B131
DNMG1504084P TN15M	B131
DNMG1504084P TN20P	B131
DNMG1504084P TN30M	B131
DNMG1504086P TN10P	B132
DNMG1504086P TN15M	B132
DNMG1504086P TN20P	B132
DNMG1504086P TN30M	B132
DNMG1504086P TN30P	B132
DNMG1504087N TN10P	B133
DNMG1504087N TN20K	B133
DNMG1504087N TN20P	B133
DNMG1504087N TN30P	B133
DNMG150408FF WK20CT	B54
DNMG150408FF WM25CT	B54
DNMG150408FF WP15CT	B54
DNMG150408FF WS10PT	B54
DNMG150408FW WK05CT	B55
DNMG150408FW WM15CT	B55
DNMG150408FW WM25CT	B55
DNMG150408FW WP15CT	B55
DNMG150408ML WK05CT	B56
DNMG150408ML WK20CT	B56
DNMG150408ML WP15CT	B56
DNMG150408ML WP25CT	B56
DNMG150408MR WP15CT	B57
DNMG150408MR WP25CT	B57
DNMG150408MR WP35CT	B57
DNMG150408MS WS10PT	B58
DNMG150408MS WS25PT	B58
DNMG150408MS WU10HT	B58
DNMG150408MW WK05CT	B58
DNMG150408MW WM25CT	B58
DNMG150408MW WP15CT	B58
DNMG150408MW WP25CT	B58
DNMG150408RH WK20CT	B59
DNMG150408RH WM25CT	B59
DNMG150408RH WP15CT	B59
DNMG150408RH WP25CT	B59
DNMG150408RH WP35CT	B59
DNMG150408UF WM15CT	B60
DNMG150408UF WM25CT	B60
DNMG150408UF WP15CT	B60
DNMG150408UF WP25CT	B60
DNMG150408UF WS10PT	B60
DNMG150408UM WM15CT	B61
DNMG150408UM WM25CT	B61
DNMG150408UM WM35CT	B61
DNMG150408UM WP15CT	B61
DNMG150408UM WP25CT	B61
DNMG150408UM WS10PT	B61
DNMG150408UR WK20CT	B62
DNMG150408UR WM15CT	B62
DNMG150408UR WM25CT	B62
DNMG150408UR WM35CT	B62
DNMG150408UR WP15CT	B62
DNMG150408UR WP25CT	B62
DNMG150408UR WP35CT	B62
DNMG150408UR WS25PT	B62
DNMG1504126P TN10P	B132
DNMG1504126P TN15M	B132
DNMG1504126P TN20P	B132
DNMG1504126P TN30M	B132
DNMG1504127N TN10P	B133
DNMG1504127N TN20K	B133
DNMG1504127N TN20P	B133
DNMG1504127N TN30P	B133
DNMG150412FF WK20CT	B54
DNMG150412ML WK05CT	B56
DNMG150412ML WK20CT	B56
DNMG150412ML WP15CT	B56
DNMG150412MR WP15CT	B57
DNMG150412MR WP25CT	B57
DNMG150412MR WP35CT	B57
DNMG150412MS WS10PT	B58
DNMG150412MS WS25PT	B58
DNMG150412MS WU10HT	B58
DNMG150412MW WK05CT	B58
DNMG150412MW WM25CT	B58
DNMG150412RH WK20CT	B59
DNMG150412RH WP15CT	B59
DNMG150412RH WP25CT	B59
DNMG150412RH WP35CT	B59
DNMG150412UF WM15CT	B60
DNMG150412UF WM25CT	B60
DNMG150412UM WM15CT	B61
DNMG150412UM WM25CT	B61
DNMG150412UM WM35CT	B61
DNMG150412UM WS10PT	B61
DNMG150412UR WK20CT	B62
DNMG150412UR WM25CT	B62
DNMG150412UR WM35CT	B62
DNMG150412UR WP15CT	B62
DNMG150412UR WP25CT	B62
DNMG150412UR WP35CT	B62
DNMG150412UR WS25PT	B62
DNMG150416UR WK20CT	B62
DNMG150416UR WM35CT	B62
DNMG150416UR WS10PT	B62
DNMG1506042P TN10P	B131
DNMG1506042P TN10U	B131
DNMG1506042P TN15M	B131
DNMG1506042P TN15U	B131
DNMG1506042P TN20K	B131
DNMG1506042P TN20P	B131
DNMG1506044P TN15M	B131
DNMG1506044P TN20P	B131
DNMG1506044P TN30M	B131
DNMG1506046P TN10P	B132
DNMG1506046P TN15M	B132
DNMG1506046P TN20P	B132
DNMG1506046P TN30M	B132
DNMG150604CT WM15CT	B53
DNMG150604CT WM25CT	B53
DNMG150604FF WK20CT	B54
DNMG150604FF WM25CT	B54
DNMG150604FF WP15CT	B54
DNMG150604FF WS10PT	B54
DNMG150604FW WK05CT	B55
DNMG150604FW WM15CT	B55
DNMG150604FW WM25CT	B55
DNMG150604FW WP15CT	B55
DNMG150604ML WK05CT	B56
DNMG150604ML WK20CT	B56
DNMG150604ML WP15CT	B56
DNMG150604ML WP25CT	B56
DNMG150604MR WP15CT	B57
DNMG150604MR WP25CT	B57
DNMG150604MR WP35CT	B57
DNMG150604MS WS10PT	B58
DNMG150604MS WS25PT	B58
DNMG150604MS WU10HT	B58
DNMG150604UF WM15CT	B60
DNMG150604UF WM25CT	B60
DNMG150604UF WS10PT	B60
DNMG150604UM WM15CT	B61
DNMG150604UM WM25CT	B61
DNMG150604UM WM35CT	B61
DNMG150604UM WS10PT	B61
DNMG1506082P TN10P	B131
DNMG1506082P TN10U	B131
DNMG1506082P TN15M	B131
DNMG1506082P TN15U	B131
DNMG1506082P TN20K	B131
DNMG1506082P TN20P	B131
DNMG1506084P TN15M	B131
DNMG1506084P TN20P	B131
DNMG1506084P TN30M	B131
DNMG1506086P TN10P	B132
DNMG1506086P TN15M	B132
DNMG1506086P TN20P	B132
DNMG1506086P TN30M	B132
DNMG1506086P TN30P	B132
DNMG1506087N TN10P	B133
DNMG1506087N TN20K	B133
DNMG1506087N TN20P	B133
DNMG1506087N TN30P	B133
DNMG150608CT WM15CT	B53
DNMG150608CT WM25CT	B53
DNMG150608FF WK20CT	B54
DNMG150608FF WM25CT	B54
DNMG150608FF WP15CT	B54
DNMG150608FW WK05CT	B55
DNMG150608FW WM15CT	B55
DNMG150608FW WM25CT	B55
DNMG150608FW WP15CT	B55
DNMG150608ML WK05CT	B56
DNMG150608ML WK20CT	B56
DNMG150608ML WP15CT	B56
DNMG150608ML WP25CT	B56
DNMG150608MR WM25CT	B57
DNMG150608MR WM35CT	B57
DNMG150608MR WP15CT	B57
DNMG150608MR WP25CT	B57
DNMG150608MR WP35CT	B57

Catalogue No.	Page(s)
DNMG150608MS WS10PT	B58
DNMG150608MS WS25PT	B58
DNMG150608MS WU10HT	B58
DNMG150608MW WK05CT	B58
DNMG150608MW WM25CT	B58
DNMG150608MW WP15CT	B58
DNMG150608MW WP25CT	B58
DNMG150608RH WK20CT	B59
DNMG150608RH WM25CT	B59
DNMG150608RH WP15CT	B59
DNMG150608RH WP25CT	B59
DNMG150608RH WP35CT	B59
DNMG150608UF WM15CT	B60
DNMG150608UF WM25CT	B60
DNMG150608UF WP25CT	B60
DNMG150608UF WS10PT	B60
DNMG150608UM WM15CT	B61
DNMG150608UM WM25CT	B61
DNMG150608UM WM35CT	B61
DNMG150608UM WP25CT	B61
DNMG150608UM WS10PT	B61
DNMG150608UM WS25PT	B61
DNMG150608UR WK20CT	B62
DNMG150608UR WM15CT	B62
DNMG150608UR WM25CT	B62
DNMG150608UR WM35CT	B62
DNMG150608UR WP15CT	B62
DNMG150608UR WP25CT	B62
DNMG150608UR WP35CT	B62
DNMG150608UR WS25PT	B62
DNMG1506122P TN10P	B131
DNMG1506122P TN10U	B131
DNMG1506122P TN15M	B131
DNMG1506122P TN20K	B131
DNMG1506122P TN20P	B131
DNMG1506122P TN30M	B131
DNMG1506124P TN15M	B131
DNMG1506124P TN30M	B131
DNMG1506126P TN10P	B132
DNMG1506126P TN15M	B132
DNMG1506126P TN20P	B132
DNMG1506126P TN30M	B132
DNMG1506126P TN30P	B132
DNMG1506127N TN10P	B133
DNMG1506127N TN20K	B133
DNMG1506127N TN20P	B133
DNMG1506127N TN30P	B133
DNMG150612CT WM15CT	B53
DNMG150612CT WM25CT	B53
DNMG150612FF WK20CT	B54
DNMG150612FF WM25CT	B54
DNMG150612FF WP15CT	B54
DNMG150612ML WK05CT	B56
DNMG150612ML WK20CT	B56
DNMG150612ML WP15CT	B56
DNMG150612ML WP25CT	B56
DNMG150612MR WM25CT	B57
DNMG150612MR WM35CT	B57
DNMG150612MR WP15CT	B57
DNMG150612MR WP25CT	B57
DNMG150612MR WP35CT	B57
DNMG150612MS WS10PT	B58
DNMG150612MS WS25PT	B58
DNMG150612MS WU10HT	B58
DNMG150612MW WK05CT	B58
DNMG150612MW WM25CT	B58
DNMG150612RH WK20CT	B59
DNMG150612RH WM25CT	B59
DNMG150612RH WP15CT	B59
DNMG150612RH WP25CT	B59
DNMG150612RH WP35CT	B59
DNMG150612UF WM15CT	B60
DNMG150612UF WM25CT	B60
DNMG150612UM WM15CT	B61
DNMG150612UM WM25CT	B61
DNMG150612UM WM35CT	B61
DNMG150612UM WS10PT	B61
DNMG150612UM WS25PT	B61
DNMG150612UR WK05CT	B62
DNMG150612UR WK20CT	B62
DNMG150612UR WM15CT	B62
DNMG150612UR WM25CT	B62
DNMG150612UR WM35CT	B62
DNMG150612UR WP15CT	B62
DNMG150612UR WP25CT	B62
DNMG150612UR WP35CT	B62
DNMG150616RH WK20CT	B59
DNMG150616RH WM25CT	B59
DNMG150616RH WP15CT	B59
DNMG150616RH WP25CT	B59
DNMG150616RH WP35CT	B59
DNMG150616UM WM25CT	B61
DNMG150616UM WM35CT	B61
DNMG150616UR WK20CT	B62
DNMG150616UR WM35CT	B62
DNMG150616UR WP15CT	B62
DNMG150616UR WP25CT	B62
DNMG150616UR WP35CT	B62
DNMG1906126P TN30P	B132
DNMG1906127N TN20P	B133
DNMG1906127N TN30P	B133
DNMG190612RH WP15CT	B59
DNMG190612RH WP25CT	B59
DNMG190612RH WP35CT	B59
DNMM15060865 TN7115	B62
DNMM15060865 WM25CT	B62
DNMM15060865 WP15CT	B62
DNMM15060865 WP25CT	B62
DNMM15060865 WP35CT	B62
DNMM15061265 TN7115	B62
DNMM15061265 WM25CT	B62
DNMM15061265 WP15CT	B62
DNMM15061665 WP15CT	B62
DNMM15061665 WP25CT	B62
DNMP150404 WM15CT	B63
DNMP150404 WM25CT	B63
DNMP150404 WM35CT	B63
DNMP150404 WS10PT	B63
DNMP150408 WM15CT	B63
DNMP150408 WM25CT	B63
DNMP150408 WM35CT	B63
DNMP150408 WS10PT	B63
DNMP150412 WM15CT	B63
DNMP150412 WM25CT	B63
DNMP150412 WM35CT	B63
DNMP150604 WM15CT	B63
DNMP150604 WM25CT	B63
DNMP150604 WM35CT	B63
DNMP150604 WS10PT	B63
DNMP150608 WM15CT	B63
DNMP150608 WM25CT	B63
DNMP150608 WM35CT	B63
DNMP150608 WS10PT	B63
DNMP150608 WS25PT	B63
DNMP150612 WM15CT	B63
DNMP150612 WM25CT	B63
DNMP150612 WM35CT	B63
DNMP150612 WS10PT	B63
DNMP150612 WS25PT	B63
DNMS150404FST WDN00U	B209
DNMS150404FST WDN25U	B209
DNMS150408FST WDN00U	B209
DNMS150408FST WDN25U	B209
DPGW070202EC WBH25P	B209
DPGW070202FST WDN00U	B210
DPGW070202FST WDN25U	B210
DPGW070204FST WDN00U	B210
DPGW070204FST WDN25U	B210
DPGW070204FWST WDN00U	B210
DPGW070204FWST WDN25U	B210
DPGW070204S01015C WBH25P	B209
DPGW070208S01015C WBH25P	B209
DPGW11T304FST WDN00U	B210
DPGW11T304FST WDN25U	B210
DPGW11T304FWST WDN00U	B210
DPGW11T304FWST WDN25U	B210
DPMT070204FP WM15CT	B63
DPMT070204FP WM25CT	B63
DPMT070204FP WP15CT	B63
DPMT070204FP WP25CT	B63
DPMT11T304FP WM15CT	B63
DPMT11T304FP WM25CT	B63
DPMT11T304FP WP15CT	B63
DPMT11T304FP WP25CT	B63
DPMT11T308FP WK20CT	B63
DPMT11T308FP WM25CT	B63
DPMT11T308FP WP15CT	B63
DPMT11T308FP WP25CT	B63
DPMT11T308MP WK20CT	B64
DPMT11T308MP WP25CT	B64
DQ1303002T WP15PE	O54
DQ1303002W WP15PE	O54
DQ1304002T WP15PE	O54
DQ1304002W WP15PE	O54
DQ1305002W WP15PE	O54
DQ1306002W WP15PE	O54
DQ1307003W WP15PE	O54
DQ1308003W WP15PE	O54
DQ1310004W WP15PE	O54
DQ1312005W WP15PE	O54
DQ1314014W WP15PE	O54
DQ1316006W WP15PE	O54
DQ1318018W WP15PE	O54
DQ1320007W WP15PE	O54
DRGNL3225P12KC04 WG	C12
DRGNL4040S25KC09 WG	C12
DRGNR2525M12KC04 WG	C12
DRGNR3225P12KC04 WG	C12
DRGNR4040S25KC09 WG	C12
DSDNN2020K12KC04 WG	C12
DSDNN2525M12KC04 WG	C12
DSDNN2525M15KC06 WG	C12
DSDNN3225P12KC04 WG	C12
DSDNN3232P19KC06 WG	C12
DSDNN4040S25KC09 WG	C12
DSKNL2525M12KC04 WG	C13
DSKNL3225P12KC04 WG	C13
DSKNL3232P15KC06 WG	C13
DSKNR2020K12KC04 WG	C13
DSKNR2525M12KC04 WG	C13
DSKNR3225P12KC04 WG	C13
DSKNR3232P15KC06 WG	C13
DSKNR3232P19KC06 WG	C13
DSM550	H65
DSRNL2525M12KC04 WG	C14
DSRNL3232P15KC06 WG	C14
DSRNL4040S25KC09 WG	C14
DSRNR2020K12KC04 WG	C14
DSRNR2525M12KC04 WG	C14
DSRNR3232P15KC06 WG	C14
DSRNR3232P19KC06 WG	C14
DSRNR4040S25KC09 WG	C14
DSSNL2020K12KC04 WG	C15
DSSNL2525M12KC04 WG	C15
DSSNL3225P12KC04 WG	C15
DSSNL3232P15KC06 WG	C15
DSSNL3232P19KC06 WG	C15
DSSNR2020K12KC04 WG	C15
DSSNR2525M12KC04 WG	C15
DSSNR2525M15KC06 WG	C15
DSSNR3225P12KC04 WG	C15
DSSNR3232P15KC06 WG	C15
DSSNR3232P19KC06 WG	C15
DT15IP	J32–35, M11–12
DT9IP	M4–6
DTFNL2020K16KC04 WG	C16
DTFNL2525M16KC04 WG	C16
DTFNL2525M22KC04 WG	C16
DTFNL3225P16KC04 WG	C16
DTFNL3225P22KC04 WG	C16
DTFNR2020K16KC04 WG	C16
DTFNR2525M16KC04 WG	C16
DTFNR3232P27KC06 WG	C16
DTGNL2020K16KC04 WG	C16
DTGNL2525M16KC04 WG	C16
DTGNR2020K16KC04 WG	C16
DTGNR2525M16KC04 WG	C16
DTGNR2525M22KC04 WG	C16
DV40BRFX185060M WG	W58
DV40BRFX245060M WG	W58
DV40BRFX320060M WG	W58
DV40BRFX420060M WG	W58
DV40BRFX550065M WG	W58
DV50BRFX320060M WG	W59
DV50BRFX420060M WG	W59
DV50BRFX550060M WG	W59
DV50BRFX720065M WG	W59
DVJNL2020K16KC04 WG	C17
DVJNL2525M16KC04 WG	C17
DVJNL2525M22KC04 WG	C17
DVJNL3225P16KC04 WG	C17
DVJNL3225P22KC04 WG	C17
DVJNR2020K16KC04 WG	C17
DVJNR2525M16KC04 WG	C17
DVJNR2525M22KC04 WG	C17
DVJNR3225P16KC04 WG	C17
DVJNR3225P22KC04 WG	C17
DVONL2020K16KC04 WG	C18
DVONL2525M16KC04 WG	C18
DVONL3225P16KC04 WG	C18
DVONR2020K16KC04 WG	C18
DVONR2525M16KC04 WG	C18
DVONR3225P16KC04 WG	C18
DVWNN2020K16KC04 WG	C18
DVWNN2525M16KC04 WG	C18
DVWNN3225P16KC04 WG	C18
DWLNL2020K06KC04 WG	C19
DWLNL2020K08KC04 WG	C19
DWLNL2525M06KC04 WG	C19
DWLNL2525M08KC04 WG	C19
DWLNL3225P08KC04 WG	C19
DWLNL3232P08KC04 WG	C19

Catalogue No.	Page(s)
DWLNR2020K06KC04 WG	C19
DWLNR2020K08KC04 WG	C19
DWLNR2525M06KC04 WG	C19
DWLNR2525M08KC04 WG	C19
DWLNR3225P08KC04 WG	C19
DWLNR3232P08KC04 WG	C19
E06JSCFPL04 WG	C67
E06JSCFPR04 WG	C67
E06JSCLPL04 WG	C70
E06JSCLPR04 WG	C70
E08KSCFCL06 WG	C66
E08KSCFCR06 WG	C66
E08KSCFPL06A WG	C67
E08KSCFPR06A WG	C67
E08KSCLCL06 WG	C68
E08KSCLCL065 WG	C68
E08KSCLCR06 WG	C68
E08KSCLCR065 WG	C68
E08KSCLPL06A WG	C70
E08KSCLPR06A WG	C70
E08KSTFPL09A WG	C79
E08KSTFPR09A WG	C79
E10MSCFPL06A WG	C67
E10MSCFPR06A WG	C67
E10MSCLCL06 WG	C68
E10MSCLCR06	C68
E10MSCLPL06A WG	C70
E10MSCLPR06A WG	C70
E10MSTFCL11 WG	C77
E10MSTFCR11 WG	C77
E10MSTFPL11A WG	C79
E10MSTFPR11A WG	C79
E12QSCFPL06 WG	C67
E12QSCFPR06 WG	C67
E12QSCLCL06 WG	C68
E12QSCLCR06 WG	C68
E12QSCLPL06 WG	C70
E12QSCLPR06 WG	C70
E12QSDQCL07 WG	C72
E12QSDQCR07 WG	C72
E12QSDUCL07 W	C74
E12QSDUCR07 W	C74
E12QSDUPL07 WG	C75
E12QSDUPR07 WG	C75
E12QSTFCL11 WG	C77
E12QSTFCR11 WG	C77
E12QSTFPL11 WG	C79
E12QSTFPR11 WG	C79
E16RSCLCL09 WG	C68
E16RSCLCL09T3 WG	C68
E16RSCLCR09 WG	C68
E16RSCLCR09T3 WG	C68
E16RSCLPL09 WG	C70
E16RSCLPR09 WG	C70
E16RSDQCL07 WG	C72
E16RSDQCR07 WG	C72
E16RSDUCL07 W	C74
E16RSDUCR07 W	C74
E16RSDUPL07 WG	C75
E16RSDUPR07 WG	C75
E16RSTFCL16 WG	C77
E16RSTFCR16 WG	C77
E16RSTFPL11 WG	C79
E16RSTFPR11 WG	C79
E20SSCLCL09 WG	C68
E20SSCLCL09T3 WG	C68
E20SSCLCR09 WG	C68
E20SSCLCR09T3 WG	C68
E20SSCLPL09 WG	C70
E20SSCLPR09 WG	C70
E20SSDQCL11 WG	C72
E20SSDQCR11 WG	C72
E20SSDUCL11 W	C74
E20SSDUCR11 W	C74
E20SSDUPL11 WG	C75
E20SSDUPR11 WG	C75
E20SSTFCL16 WG	C77
E20SSTFCR16 WG	C77
E20SSTFPL16 WG	C79
E20SSTFPR16 WG	C79
E25TSCLCL09 WG	C68
E25TSCLCL09T3 WG	C68
E25TSCLCR09 WG	C68
E25TSCLCR09T3 WG	C68
E25TSDUCL11 W	C74
E25TSDUCR11 W	C74
E25TSTFCL16 WG	C77
E25TSTFCR16 WG	C77
E32USCLCR12 WG	C68
EDR100031E1W4 WDN00U	H66
ENGN130704T02020 CW2015	B182
ENGN130708T02020 CW2015	B182
ENGN130712T02020 CW2015	B182
ENGN130716T02020 CW2015	B182
ENGX130716T02020 CW5025	B182
FBIT WG	D59, D71, D84
FC11	D16
FC11 WG	D14–17, D59, D71, D84
FC14	D15–17
FCBM51000L WG	D16
FCBM51000R WG	D16
FCBM51005L WG	D16
FCBM5312255L WG	D17
FCBM5312255R WG	D17
FCBM5312510L WG	D17
FCBM5312515L WG	D17
FCBM5316250R WG	D17
FCBM5316255L WG	D17
FCBM5316255R WG	D17
FCBM61520L WG	D16
FCBM61520R WG	D16
FCBM61525L WG	D16
FCBM61525R WG	D16
FCBM6612325L WG	D17
FCBM6612325R WG	D17
FCBM6612630R WG	D17
FCBM6612635R WG	D17
FCBM6616320R WG	D17
FCBM6616325L WG	D17
FCBM6616325R WG	D17
FCBM6616635R WG	D17
FCBM81520L WG	D16
FCBM81520R WG	D16
FCBM81525R WG	D16
FCBM8212385L WG	D17
FCBM8212385R WG	D17
FCBM8212790R WG	D17
FCBM8212795R WG	D17
FCBM8216380R WG	D17
FCBM8216385L WG	D17
FCBM8216790R WG	D17
FCBM8216795R WG	D17
FKEY WG	D59, D71, D84
FNR150472R CG5	D56
FNT1512ACME2R CG5	D57
FNT1528UN2R CG5	D57
FSBM5212125L WG	D15
FSBM5212125R WG	D15
FSBM5212255R WG	D15
FSBM5216125R WG	D15
FSBM61000L WG	D14
FSBM61000R WG	D14
FSBM61005R WG	D14
FSBM6612195R WG	D15
FSBM6612320R WG	D15
FSBM6616190R WG	D15
FSBM6616195R WG	D15
FSBM6616320L WG	D15
FSBM6616325R WG	D15
FSBM81000L WG	D14
FSBM81005L WG	D14
FSBM8212250R WG	D15
FSBM8212380L WG	D15
FSBM8212380R WG	D15
FSBM8212385R WG	D15
FT15	U42–43
FT20	U42
FT7	U42–43
FT8	U42–43
G100MTTB2066KM63	C84
G50MTTB1026KM40	C84
G60MTTB1226KM40	C84
G80MTTB1564KM63	C84
GCBMW51523L WG	D23
GCBMW51523R WG	D23
GCBMW61523L WG	D23
GCBMW61523R WG	D23
GCBMW81523L WG	D23
GCHT060202 CG5	D46
GCHT060204 CG5	D46
GCHT060204 CM1	D46
GCHW060202 CG5	D46
GCHW060202 CM1	D46
GCHW060204 CG5	D46
GCHW060204 CM1	D46
GCPM10254225L WG	D27
GCPM10254225R WG	D27
GCPM102545L WG	D27
GCPM102545R WG	D27
GCPM12254225L WG	D27
GCPM12254225R WG	D27
GCPM122545L WG	D27
GCPM122545R WG	D27
GCPM16254225L WG	D27
GCPM16254225R WG	D27
GCPM162545L WG	D27
GCPM162545R WG	D27
GPHT050102 CG5	D47
GPHT050102 CM1	D47
GPHT050104 CG5	D47
GPHT050104 CM1	D47
GPHW050102 CG5	D46
GPHW050102 CG6	D46
GPHW050102 CM1	D46
GPHW050104 CG5	D46
GPHW050104 CG6	D46
GPHW050104 CM1	D46
GSBMW61003L WG	D23
GSBMW61003R WG	D23
GSBMW81003L WG	D23
GSBMW81003R WG	D23
GSPM101638225L WG	D26
GSPM1016385L WG	D26
GSPM131651225L WG	D26
GSPM1316515L WG	D26
GSPM1316515R WG	D26
GT005001 WP31MG	Y10
GT005002 WP31MG	Y10
GT005003 WP31MG	Y10
GT005004 WP31MG	Y10
GT005005 WP31MG	Y10
GT005006 WP31MG	Y10
GT005007 WP31MG	Y10
GT005008 WP31MG	Y10
GT005009 WP31MG	Y10
GT005010 WP31MG	Y10
GT005011 WP31MG	Y10
GT005012 WP31MG	Y10
GT005013 WP31MG	Y10
GT005014 WP31MG	Y10
GT005015 WP31MG	Y10
GT005016 WP31MG	Y10
GT005017 WP31MG	Y10
GT005018 WP31MG	Y10
GT025001 WP31MG	Y33
GT025002 WP31MG	Y33
GT025003 WP31MG	Y33
GT025004 WP31MG	Y33
GT025005 WP31MG	Y33
GT025006 WP31MG	Y33
GT025007 WP31MG	Y33
GT025008 WP31MG	Y33
GT025009 WP31MG	Y33
GT025010 WP31MG	Y33
GT025011 WP31MG	Y33
GT025012 WP31MG	Y33
GT025013 WP31MG	Y33
GT025014 WP31MG	Y33
GT025015 WP31MG	Y33
GT025016 WP31MG	Y33
GT025017 WP31MG	Y33
GT025018 WP31MG	Y33
GT045001 WH36MG	Y34
GT045002 WH36MG	Y34
GT045003 WH36MG	Y34
GT045004 WH36MG	Y34
GT045005 WH36MG	Y34
GT045006 WH36MG	Y34
GT045007 WH36MG	Y34
GT045008 WH36MG	Y34
GT045009 WH36MG	Y34
GT045010 WH36MG	Y34
GT045011 WH36MG	Y34
GT045012 WH36MG	Y34
GT045013 WH36MG	Y34
GT045014 WH36MG	Y34
GT045015 WH36MG	Y34
GT045016 WH36MG	Y34
GT045017 WH36MG	Y34
GT045018 WH36MG	Y34
GT065001 WS32MG	Y56
GT065002 WS32MG	Y56
GT065003 WS32MG	Y56
GT065004 WS32MG	Y56
GT065005 WS32MG	Y56
GT065006 WS32MG	Y56
GT065007 WS32MG	Y56
GT065008 WS32MG	Y56
GT065009 WS32MG	Y56
GT065010 WS32MG	Y56
GT105001 WS32MG	Y7
GT105002 WS32MG	Y7

Catalogue No.	Page(s)
GT105003 WS32MG	Y7
GT105004 WS32MG	Y7
GT105005 WS32MG	Y7
GT105006 WS32MG	Y7
GT105007 WS32MG	Y7
GT105008 WS32MG	Y7
GT105009 WS32MG	Y7
GT105010 WS32MG	Y7
GT125001 WS32MG	Y30
GT125002 WS32MG	Y30
GT125003 WS32MG	Y30
GT125004 WS32MG	Y30
GT125005 WS32MG	Y30
GT125006 WS32MG	Y30
GT125007 WS32MG	Y30
GT125008 WS32MG	Y30
GT125009 WS32MG	Y30
GT125010 WS32MG	Y30
GT145001 WN35MG	Y8
GT145002 WN35MG	Y8
GT145003 WN35MG	Y8
GT145004 WN35MG	Y8
GT145005 WN35MG	Y8
GT145006 WN35MG	Y8
GT145007 WN35MG	Y8
GT165001 WN35MG	Y31
GT165002 WN35MG	Y31
GT165003 WN35MG	Y31
GT165004 WN35MG	Y31
GT165005 WN35MG	Y31
GT165006 WN35MG	Y31
GT165007 WN35MG	Y31
GT205077 GM6515	Y4
GT205078 GM6515	Y4
GT205079 GM6515	Y4
GT205080 GM6515	Y4
GT205081 GM6515	Y4
GT205082 GM6515	Y4
GT205083 GM6515	Y4
GT205084 GM6515	Y4
GT205085 GM6515	Y4
GT205086 GM6515	Y4
GT205087 GM6515	Y4
GT205088 GM6515	Y4
GT205089 GM6515	Y4
GT205090 GM6515	Y4
GT205091 GM6515	Y4
GT205092 GM6515	Y4
GT205093 GM6515	Y4
GT205094 GP6520	Y4
GT205095 GP6520	Y4
GT205096 GP6520	Y4
GT205097 GP6520	Y4
GT205098 GP6520	Y4
GT205099 GP6520	Y4
GT205100 GP6520	Y4
GT205101 GP6520	Y4
GT205102 GP6520	Y4
GT205103 GP6520	Y4
GT205104 GP6520	Y4
GT205105 GP6520	Y4
GT205106 GP6520	Y4
GT205107 GP6520	Y4
GT205108 GP6520	Y4
GT205109 GP6520	Y4
GT205110 GP6520	Y4
GT205111 GP6520	Y4
GT205113 GP6520	Y4
GT205114 GP6520	Y4
GT205116 GP6520	Y4
GT205118 GP6520	Y4
GT205122 GP6520	Y5
GT205124 GP6520	Y5
GT205125 GP6520	Y5
GT205127 GP6520	Y5
GT205129 GP6520	Y5
GT21 WG	D26–27, D59, D71, D84
GT215001 GM6515	Y6
GT215002 GM6515	Y6
GT215003 GM6515	Y6
GT215004 GM6515	Y6
GT215005 GM6515	Y6
GT215006 GM6515	Y6
GT215007 GP6520	Y6
GT215008 GP6520	Y6
GT215009 GP6520	Y6
GT215010 GP6520	Y6
GT215011 GP6520	Y6
GT215012 GP6520	Y6
GT225001 WN38MG	Y62
GT225002 WN38MG	Y62
GT225003 WN38MG	Y62
GT225004 WN38MG	Y62
GT225005 WN38MG	Y62
GT225006 WN38MG	Y62
GT225007 WN38MG	Y62
GT225008 WN38MG	Y62
GT225009 WN38MG	Y62
GT225010 WN38MG	Y62
GT225011 WN38MG	Y62
GT225012 WN38MG	Y62
GT225013 WN38MG	Y62
GT225014 WN38MG	Y62
GT225015 WN38MG	Y62
GT225016 WP31MG	Y62
GT225017 WP31MG	Y62
GT225018 WP31MG	Y62
GT225019 WP31MG	Y62
GT225020 WP31MG	Y62
GT225021 WP31MG	Y62
GT225022 WP31MG	Y62
GT225023 WP31MG	Y62
GT225024 WP31MG	Y62
GT225025 WP31MG	Y62
GT225026 WP31MG	Y62
GT225027 WP31MG	Y62
GT225028 WP31MG	Y62
GT225029 WP31MG	Y62
GT225030 WP31MG	Y62
GT235001 WN38MG	Y63
GT235002 WN38MG	Y63
GT235003 WN38MG	Y63
GT235004 WN38MG	Y63
GT235005 WN38MG	Y63
GT235006 WN38MG	Y63
GT235007 WN38MG	Y63
GT235008 WN38MG	Y63
GT235009 WN38MG	Y63
GT235010 WN38MG	Y63
GT235011 WN38MG	Y63
GT235012 WP31MG	Y63
GT235013 WP31MG	Y63
GT235014 WP31MG	Y63
GT235015 WP31MG	Y63
GT235016 WP31MG	Y63
GT235017 WP31MG	Y63
GT235018 WP31MG	Y63
GT235019 WP31MG	Y63
GT235020 WP31MG	Y63
GT235021 WP31MG	Y63
GT235022 WP31MG	Y63
GT305079 GM6515	Y20
GT305080 GM6515	Y20
GT305081 GM6515	Y20
GT305082 GM6515	Y20
GT305083 GM6515	Y20
GT305084 GM6515	Y20
GT305085 GM6515	Y20
GT305086 GM6515	Y20
GT305087 GM6515	Y20
GT305088 GM6515	Y20
GT305089 GM6515	Y20
GT305090 GM6515	Y20
GT305091 GM6515	Y20
GT305092 GM6515	Y20
GT305093 GM6515	Y20
GT305094 GM6515	Y20
GT305095 GM6515	Y20
GT305096 GM6515	Y20
GT305097 GP6520	Y20
GT305098 GP6520	Y20
GT305099 GP6520	Y20
GT305100 GP6520	Y20
GT305101 GP6520	Y20
GT305102 GP6520	Y20
GT305103 GP6520	Y20
GT305104 GP6520	Y20
GT305105 GP6520	Y20
GT305106 GP6520	Y20
GT305107 GP6520	Y20
GT305108 GP6520	Y20
GT305109 GP6520	Y20
GT305110 GP6520	Y20
GT305111 GP6520	Y20
GT305112 GP6520	Y20
GT305113 GP6520	Y20
GT305114 GP6520	Y20
GT305115 GP6520	Y20
GT305116 GP6505	Y20
GT305117 GP6505	Y20
GT305118 GP6505	Y20
GT305119 GP6505	Y20
GT305120 GP6505	Y20
GT305121 GP6505	Y20
GT305122 GP6505	Y20
GT305123 GP6505	Y20
GT305124 GP6505	Y20
GT305148 GM6515	Y20
GT305151 GP6520	Y21
GT305153 GP6520	Y21
GT305154 GP6520	Y21
GT305156 GP6520	Y21
GT305158 GP6520	Y21
GT305161 GP6520	Y20
GT305163 GP6520	Y20
GT305164 GP6520	Y20
GT305166 GP6520	Y20
GT305168 GP6520	Y20
GT315001 GM6515	Y22
GT315002 GM6515	Y22
GT315003 GM6515	Y22
GT315004 GM6515	Y22
GT315005 GM6515	Y22
GT315006 GM6515	Y22
GT315007 GP6520	Y22
GT315008 GP6520	Y22
GT315009 GP6520	Y22
GT315010 GP6520	Y22
GT315011 GP6520	Y22
GT315012 GP6520	Y22
GT315014 GP6520	Y23
GT315016 GP6520	Y23
GT315017 GP6520	Y23
GT315019 GP6520	Y23
GT315021 GP6520	Y23
GT315025 GP6520	Y22
GT315027 GP6520	Y22
GT315028 GP6520	Y22
GT315030 GP6520	Y22
GT315032 GP6520	Y22
GT315033 GP6520	Y22
GT315034 GP6520	Y22
GT315035 GP6520	Y22
GT325001 GP6520	Y24
GT325002 GP6520	Y24
GT325003 GP6520	Y24
GT325004 GP6520	Y24
GT325005 GP6520	Y24
GT325006 GP6520	Y24
GT325007 GP6520	Y24
GT325008 GP6520	Y24
GT325009 GP6520	Y24
GT335001 GP6520	Y25
GT335002 GP6520	Y25
GT335003 GP6520	Y25
GT335004 GP6520	Y25
GT335005 GP6520	Y25
GT335006 GP6520	Y25
GT335007 GP6520	Y25
GT335008 GP6520	Y25
GT335009 GP6520	Y25
GT405001 GP6520	Y52
GT405002 GP6520	Y52
GT405003 GP6520	Y52
GT405004 GP6520	Y52
GT405005 GP6520	Y52
GT405006 GP6520	Y52
GT405007 GP6520	Y52
GT405008 GP6520	Y52
GT405009 GP6520	Y52
GT405010 GP6520	Y52
GT405011 GP6520	Y52
GT405057 GP6520	Y52
GT405058 GP6520	Y52
GT405059 GP6520	Y52
GT415001 GP6520	Y53
GT415002 GP6520	Y53
GT415003 GP6520	Y53
GT415004 GP6520	Y53
GT415005 GP6520	Y53
GT415006 GP6520	Y53
GT415007 GP6520	Y53
GT415008 GP6520	Y53
GT415009 GP6520	Y53
GT415010 GP6520	Y53
GT415021 GP6520	Y53
GT415022 GP6520	Y53
GT415023 GP6520	Y53
GT425001 GP6520	Y54
GT425002 GP6520	Y54
GT425003 GP6520	Y54
GT425004 GP6520	Y54

Catalogue No.	Page(s)
GT425005 GP6520	Y54
GT425006 GP6520	Y54
GT425007 GP6520	Y54
GT425008 GP6520	Y54
GT425009 GP6520	Y54
GT425010 GP6520	Y54
GT425011 GP6520	Y54
GT425012 GP6520	Y54
GT435001 GP6520	Y55
GT435002 GP6520	Y55
GT435003 GP6520	Y55
GT435004 GP6520	Y55
GT435005 GP6520	Y55
GT435006 GP6520	Y55
GT435007 GP6520	Y55
GT435008 GP6520	Y55
GT435009 GP6520	Y55
GT435010 GP6520	Y55
GT435011 GP6520	Y55
GT435012 GP6520	Y55
GT505001 GP6520	Y26
GT505002 GP6520	Y26
GT505003 GP6520	Y26
GT505004 GP6520	Y26
GT505005 GP6520	Y26
GT505006 GP6520	Y27
GT505007 GP6520	Y27
GT505008 GP6520	Y27
GT505009 GP6520	Y27
GT505010 GP6520	Y27
GT515001 GP6520	Y28
GT515002 GP6520	Y28
GT515003 GP6520	Y28
GT515004 GP6520	Y28
GT515005 GP6520	Y28
GT515006 GP6520	Y29
GT515007 GP6520	Y29
GT515008 GP6520	Y29
GT515009 GP6520	Y29
GT515010 GP6520	Y29
GT705001 WN48EG	Y9
GT705002 WN48EG	Y9
GT705003 WN48EG	Y9
GT705004 WN48EG	Y9
GT705005 WN48EG	Y9
GT705006 WN48EG	Y9
GT705007 WN48EG	Y9
GT705008 WN48EG	Y9
GT805001 WN48EG	Y32
GT805002 WN48EG	Y32
GT805003 WN48EG	Y32
GT805004 WN48EG	Y32
GT805005 WN48EG	Y32
GT805006 WN48EG	Y32
GT805007 WN48EG	Y32
GT805008 WN48EG	Y32
GT805009 WN48EG	Y32
GTKEY WG	D59, D71, D84
GTM115001 WU13PV	Y69
GTM115002 WU13PV	Y69
GTM115003 WU13PV	Y69
GTM115004 WU13PV	Y69
GTM115005 WU13PV	Y69
GTM115006 WU13PV	Y69
GTM115007 WU13PV	Y69
GTM115008 WU13PV	Y69
GTM115009 WU13PV	Y69
GTM115010 WU13PV	Y69
GTM115011 WU13PV	Y69
GTM115012 WU13PV	Y69
GTM115013 WU13PV	Y69
GTM115014 WU13PV	Y69
GTM115015 WU13PV	Y69
GTM115016 WU13PV	Y69
GTM115017 WU13PV	Y69
GTM115018 WU13PV	Y69
GTM115019 WU13PV	Y69
GTM115020 WU13PV	Y69
GTM115021 WU13PV	Y69
GTM115022 WU13PV	Y69
GTM115023 WU13PV	Y69
GTM215001 WU12PV	Y71
GTM215002 WU12PV	Y71
GTM215003 WU12PV	Y71
GTM215004 WU12PV	Y71
GTM215005 WU12PV	Y71
GTM215006 WU12PV	Y71
GTM215007 WU12PV	Y71
GTM215008 WU12PV	Y71
GTM215009 WU12PV	Y71
GTM215010 WU12PV	Y71
GTM215011 WU12PV	Y71
GTM215012 WU12PV	Y71
GTM215013 WU12PV	Y71
GTM215014 WU12PV	Y71
GTM215015 WU12PV	Y71
GTM215016 WU12PV	Y71
GTM215017 WU12PV	Y70
GTM215018 WU12PV	Y70
GTM215019 WU12PV	Y70
GTM215020 WU12PV	Y70
GTM215021 WU12PV	Y70
GTM215022 WU12PV	Y70
GTM215023 WU12PV	Y70
GTM215024 WU12PV	Y70
GTM215025 WU12PV	Y70
GTM215026 WU12PV	Y70
GTM215027 WU12PV	Y70
GTM215028 WU12PV	Y70
GTM215029 WU12PV	Y70
GTM215030 WU12PV	Y70
GTM215031 WU12PV	Y70
GTM315001 WU12PV	Y73
GTM315002 WU12PV	Y73
GTM315003 WU12PV	Y73
GTM315004 WU12PV	Y73
GTM315005 WU12PV	Y73
GTM315006 WU12PV	Y73
GTM315007 WU12PV	Y73
GTM315008 WU12PV	Y73
GTM315009 WU12PV	Y73
GTM315010 WU12PV	Y73
GTM315011 WU12PV	Y73
GTM315012 WU12PV	Y73
GTM315013 WU12PV	Y73
GTM315014 WU12PV	Y73
GTM315015 WU12PV	Y73
GTM315016 WU12PV	Y73
GTM315017 WU12PV	Y72
GTM315018 WU12PV	Y72
GTM315019 WU12PV	Y72
GTM315020 WU12PV	Y72
GTM315021 WU12PV	Y72
GTM315022 WU12PV	Y72
GTM315023 WU12PV	Y72
GTM315024 WU12PV	Y72
GTM315025 WU12PV	Y72
GTM315026 WU12PV	Y72
GTM315027 WU12PV	Y72
GTM315028 WU12PV	Y72
GTM315029 WU12PV	Y72
GTM315030 WU12PV	Y72
GTM415001 WU16PV	Y75
GTM415002 WU16PV	Y75
GTM415003 WU16PV	Y75
GTM415004 WU16PV	Y75
GTM415005 WU16PV	Y75
GTM415006 WU16PV	Y75
GTM415007 WU16PV	Y75
GTM415008 WU16PV	Y75
GTM415009 WU16PV	Y75
GTM415010 WU16PV	Y75
GTM415011 WU16PV	Y75
GTM415012 WU16PV	Y75
GTM415013 WU16PV	Y75
GTM415014 WU16PV	Y75
GTM415015 WU16PV	Y75
GTM415016 WU16PV	Y75
GTM415017 WU16PV	Y75
GTM415018 WU16PV	Y75
GTM415019 WU16PV	Y75
GTM415020 WU16PV	Y75
GTM415021 WU16PV	Y75
GTM415022 WU16PV	Y75
GTM415023 WU16PV	Y75
GTM415024 WU16PV	Y75
GTM415025 WU16PV	Y74
GTM415026 WU16PV	Y74
GTM415027 WU16PV	Y74
GTM415028 WU16PV	Y74
GTM415029 WU16PV	Y74
GTM415030 WU16PV	Y74
GTM415031 WU16PV	Y74
GTM415032 WU16PV	Y74
GTM415033 WU16PV	Y74
GTM415034 WU16PV	Y74
GTM415035 WU16PV	Y74
GTM415036 WU16PV	Y74
GTM415037 WU16PV	Y74
GTM415038 WU16PV	Y74
GTM415039 WU16PV	Y74
GTM415040 WU16PV	Y74
GTM415041 WU16PV	Y76
GTM415042 WU16PV	Y76
GTM415043 WU16PV	Y76
GTM415044 WU16PV	Y76
GTM415045 WU16PV	Y76
GTM415046 WU16PV	Y76
GTM415047 WU16PV	Y76
GX105001 WH16PG	Y46
GX105002 WH16PG	Y46
GX105003 WH16PG	Y46
GX105004 WH16PG	Y46
GX105005 WH16PG	Y46
GX105006 WH16PG	Y46
GX105007 WH16PG	Y46
GX105008 WH16PG	Y46
GX105009 WH16PG	Y46
GX105010 WH16PG	Y46
GX105011 WH16PG	Y46
GX105012 WH16PG	Y46
GX105013 WH16PG	Y46
GX352733 WK12PG	Y47
GX352734 WK12PG	Y47
GX352735 WK12PG	Y47
GX352737 WK12PG	Y47
GX352738 WK12PG	Y47
GX352739 WK12PG	Y47
GX352740 WK12PG	Y47
GX352741 WK12PG	Y47
GX355006 WK12PG	Y48
GX355007 WK12PG	Y48
GX355008 WK12PG	Y48
GX355009 WK12PG	Y48
GX355010 WK12PG	Y48
GX355012 WK12PG	Y48
GX355014 WK12PG	Y48
GX355101 WK12PG	Y48
GX355102 WK12PG	Y48
GX355121 WK12PG	Y48
GX355122 WK12PG	Y48
GX355141 WK12PG	Y48
GX355142 WK12PG	Y48
GX472866 WN14PG	Y50
GX472867 WN14PG	Y50
GX472868 WN14PG	Y50
GX472870 WN14PG	Y50
GX472872 WN14PG	Y50
GX472873 WN14PG	Y50
GX472874 WN14PG	Y50
GX472875 WN14PG	Y50
GX475006 WN14PG	Y49
GX475008 WN14PG	Y49
GX475010 WN14PG	Y49
GX492908 WN14PG	Y61
GX492909 WN14PG	Y61
GX492911 WN14PG	Y61
GX492914 WN14PG	Y61
GX492915 WN14PG	Y61
GX495006 WN14PG	Y60
GX495008 WN14PG	Y60
GX495010 WN14PG	Y60
GX505004 WK12PG	Y51
GX505005 WK12PG	Y51
GX505006 WK12PG	Y51
GX505008 WK12PG	Y51
GX505010 WK12PG	Y51
GX505012 WK12PG	Y51
GX505014 WK12PG	Y51
HDWM5EU4DD	H64
HDWM5S	H65
HNEC0905ANSN WK25YM	H35
HNGJ070432ANENLD TN6510	H8, H16, H21
HNGJ070432ANENLD TN6525	H8, H16, H21
HNGJ070432ANENLD TN6540	H8, H16, H21
HNGJ0704ANENLD TN6505	H8, H16, H21
HNGJ0704ANENLD TN6510	H8, H16, H21
HNGJ0704ANENLD TN6520	H8, H16, H21
HNGJ0704ANENLD TN6525	H8, H16, H21
HNGJ0704ANENLD TN6540	H8, H16, H21
HNGJ0704ANENLD WP25PM	H8, H16, H21
HNGJ0704ANENLD WP35CM	H8, H16, H21
HNGJ0704ANENLD WP40PM	H8, H16, H21
HNGJ0704ANENLD WS30PM	H8, H16, H21
HNGJ0704ANFNLDJ THM-U	H8, H16, H21
HNGJ0704ANFNLDJ TN6501	H8, H16, H21
HNGJ090543ANSNHD TN6520	H28, H34, H40
HNGJ090543ANSNHD TN6525	H28, H34, H40
HNGJ090543ANSNHD TN6540	H28, H34, H40
HNGJ0905ANENLD TN6520	H33, H39
HNGJ0905ANENLD TN6525	H33, H39
HNGJ0905ANENLD TN6540	H33, H39

Catalogue No.	Page(s)
HNGJ0905ANENLD TN7535	H33, H39
HNGJ0905ANENLD WP25PM	H33, H39
HNGJ0905ANENLD WP35CM	H33, H39
HNGJ0905ANENLD WP40PM	H33, H39
HNGJ0905ANENLD WS30PM	H33, H39
HNGJ0905ANFNLDJ THM-U	H27, H33, H39
HNGJ0905ANFNLDJ TN6501	H27, H33, H39
HNGJ0905ANSNGD TN6520	H28, H34, H40
HNGJ0905ANSNGD TN6525	H28, H34, H40
HNGJ0905ANSNGD TN6540	H28, H34, H40
HNGJ0905ANSNGD TN7535	H28, H34, H40
HNGJ0905ANSNGD WK15CM	H28, H34, H40
HNGJ0905ANSNGD WP35CM	H28, H34, H40
HNGJ0905ANSNGD WP40PM	H28, H34, H40
HNGJ0905ANSNGD WS30PM	H28, H34, H40
HNGJ0905ANSNHD TN6520	H28, H34, H40
HNGJ0905ANSNHD TN6525	H28, H34, H40
HNGJ0905ANSNHD TN6540	H28, H34, H40
HNGJ0905ANSNHD WP25PM	H28, H34, H40
HNGJ0905ANSNHD WP35CM	H28, H34, H40
HNGJ0905ANSNHD WP40PM	H28, H34, H40
HNPJ070432ANSNHD TN6510	H9, H17, H22
HNPJ070432ANSNHD TN6520	H9, H17, H22
HNPJ070432ANSNHD TN6540	H9, H17, H22
HNPJ070432ANSNHD TN7535	H9, H17, H22
HNPJ070432ANSNHD WP40PM	H9, H17, H22
HNPJ0704ANSNGD TN6510	H9, H17, H22
HNPJ0704ANSNGD TN6520	H9, H17, H22
HNPJ0704ANSNGD TN6540	H9, H17, H22
HNPJ0704ANSNGD TN7535	H9, H17, H22
HNPJ0704ANSNGD WK15CM	H9, H17, H22
HNPJ0704ANSNGD WP25PM	H9, H17, H22
HNPJ0704ANSNGD WP35CM	H9, H17, H22
HNPJ0704ANSNGD WP40PM	H9, H17, H22
HNPJ0704ANSNGD WS30PM	H9, H17, H22
HNPJ0704ANSNHD TN6510	H9, H17, H22
HNPJ0704ANSNHD TN6520	H9, H17, H22
HNPJ0704ANSNHD TN6540	H9, H17, H22
HNPJ0704ANSNHD TN7535	H9, H17, H22
HNPJ0704ANSNHD WK15CM	H9, H17, H22
HNPJ0704ANSNHD WP25PM	H9, H17, H22
HNPJ0704ANSNHD WP35CM	H9, H17, H22
HNPJ0704ANSNHD WP40PM	H9, H17, H22
HNPJ090543ANSNHD TN6520	H28, H34, H40
HNPJ090543ANSNHD TN6540	H28, H34, H40
HNPJ090543ANSNHD WP25PM	H28, H34, H40
HNPJ090543ANSNHD WP35CM	H28, H34, H40
HNPJ090543ANSNHD WP40PM	H28, H34, H40
HNPJ0905ANSNGD TN6520	H27, H34, H40
HNPJ0905ANSNGD TN6540	H27, H34, H40
HNPJ0905ANSNGD TN7535	H27, H34, H40
HNPJ0905ANSNGD WK15CM	H27, H34, H40
HNPJ0905ANSNGD WP25PM	H27, H34, H40
HNPJ0905ANSNGD WP35CM	H27, H34, H40
HNPJ0905ANSNGD WP40PM	H27, H34, H40
HNPJ0905ANSNHD TN6520	H28, H34, H40
HNPJ0905ANSNHD TN6540	H28, H34, H40
HNPJ0905ANSNHD WK15CM	H28, H34, H40
HNPJ0905ANSNHD WP25PM	H28, H34, H40
HNPJ0905ANSNHD WP35CM	H28, H34, H40
HNPJ0905ANSNHD WP40PM	H28, H34, H40
HPGT06T3DZENGD TN2510	H47
HPGT06T3DZENGD TN6510	H47
HPGT06T3DZENGD TN6525	H47
HPGT06T3DZENGD TN6540	H47
HPGT06T3DZENGD TN7525	H47
HPGT06T3DZENGD TN7535	H47
HPGT06T3DZENGD WK15CM	H47
HPGT06T3DZENGD WP25PM	H47
HPGT06T3DZENGD WP40PM	H47
HPGT06T3DZENGD WS30PM	H47
HPGT06T3DZERGD3W TN6510	H47
HPGT06T3DZERGD3W TN6525	H47
HPGT06T3DZERGD3W TN7525	H47
HPGT06T3DZERGD3W WK15CM	H47
HPGT06T3DZERGD3W WP25PM	H47
HPGT06T3DZERGD3W WP40PM	H47
HPGT06T3DZERLD TN2510	H46
HPGT06T3DZERLD TN6520	H46
HPGT06T3DZERLD TN6525	H46
HPGT06T3DZERLD TN6540	H46
HPGT06T3DZERLD TN7525	H46
HPGT06T3DZERLD WP25PM	H46
HPGT06T3DZERLD WP40PM	H46
HPGT06T3DZFRLDAL THM	H46
HPGT06T3DZFRLDAL THM-U	H46
HPGT06T3DZFRLDAL TN6501	H46
HPPT06T3DZENGD TN6520	H47
HPPT06T3DZENGD TN6525	H47
HPPT06T3DZENGD TN6540	H47
HPPT06T3DZENGD TN7525	H47
HPPT06T3DZENGD TN7535	H47
HPPT06T3DZENGD WP25PM	H47
HPPT06T3DZENGD WP35CM	H47
HPPT06T3DZENGD WP40PM	H47
HSK100ARFX420080M WG	W63
HSK100ARFX550090M WG	W63
HSK100ARFX720105M WG	W63
HSK63ARFX185060M WG	W62
HSK63ARFX245060M WG	W62
HSK63ARFX320060M WG	W62
HSK63ARFX420070M WG	W62
HSK63ARFX550080M WG	W62
HSK63ARFX720095M WG	W62
ICSN332 K9	C9
ICSN432 K9	C92–94
ICSN433 K9	C8–10, C56
ICSN443 K9	C8–10
ICSN533 K9	C56
ICSN543 K9	C8–10
ICSN633 K9	C94
ICSN643 K9	C8–10
ICSN846 K9	C9
IDSN322 K9	C11, C56–57
IDSN432 K9	C95–96
IDSN433 K9	C11, C56–57
IDSN443 K9	C11
IRSN44 K9	C12
IRSN84 K9	C12
ISSN432 K9	C97–101
ISSN433 K9	C12–15
ISSN443 K9	C12–15
ISSN543 K9	C12–15
ISSN633 K9	C97, C101
ISSN643 K9	C12–15
ISSN846 K9	C12, C14
ITSN322 K9	C102–103
ITSN323 K9	C16, C58
ITSN433 K9	C16, C102–103
ITSN534 K9	C16, C102
IVSN322 K9	C17–18, C58
IVSN432 K9	C17
IWSN322 K9	C19
IWSN433 K9	C19, C59
KLM33	C92, C97–101
KLM33L	C102–103
KLM34L	C102–103
KLM34L9IP	C9, C11, C16–19
KLM43	C92–94, C97–101
KLM46	C92, C94–96, C102–103
KLM4615IP	C8–10, C12–15, C17, C19
KLM46L15IP	C8–16
KLM46S	C92–101
KLM54	C97–99
KLM58	C102
KLM5815IP	C16
KLM58L15IP	C8–10, C12–15
KLM68	C94, C97, C101
KLM68L25IP	C8–10, C12–15
KLM81025IP	C9, C12, C14
KLS32M	M12, M31, M36
KLS40M	M12, M36, W64
KM32TSFBH022029 WG	W53
KM32TSFBH029038 WG	W53
KM32TSFBH038050 WG	W53
KM32TSTCHS022030 WG	W37
KM32TSTCHS030039 WG	W37
KM32TSTCHS039050 WG	W37
KM40TSE16JNEL2 KWH	F35
KM40TSE16JNER2 KWH	F35
KM40TSFBH029038 WG	W53
KM40TSFBH038050 WG	W53
KM40TSFBH050065 WG	W53
KM40TSFBHBB006022 WG	W50
KM40TSLSEL16N	F71
KM40TSLSEL22N	F71
KM40TSLSEL27N	F71
KM40TSLSER16N	F71
KM40TSLSER22N	F71
KM40TSLSER27N	F71
KM40TSLSSL16	F72
KM40TSLSSL22	F72
KM40TSLSSL27	F72
KM40TSLSSR16	F72
KM40TSLSSR22	F72
KM40TSLSSR27	F72
KM40TSNEL2	F28
KM40TSNEL3	F28
KM40TSNEL4	F28
KM40TSNER2	F28
KM40TSNER3	F28
KM40TSNER4	F28
KM40TSNRL3045M	F29
KM40TSNRR3045M	F29
KM40TSNSL2	F29
KM40TSNSL3	F29
KM40TSNSL4	F29
KM40TSNSR2	F29
KM40TSNSR3	F29
KM40TSNSR4	F29
KM40TSS10DLSEL11	F76–77
KM40TSS10DLSER11	F76–77
KM40TSS12ELSEL11	F76–77
KM40TSS12ELSER11	F76–77
KM40TSS12ENEL2	F33–34
KM40TSS12ENER2	F33–34
KM40TSS16FLSEL16	F76–77
KM40TSS16FLSER16	F76–77
KM40TSS16FNEL2	F33–34
KM40TSS16FNER2	F33–34
KM40TSS20GLSEL16	F76–77
KM40TSS20GLSER16	F76–77
KM40TSS20GNEL2	F33–34
KM40TSS20GNER2	F33–34
KM40TSS25ENEL2	F33–34
KM40TSS25ENEL3	F33–34
KM40TSS25ENER2	F33–34
KM40TSS25ENER3	F33–34
KM40TSS25HLSEL16	F76–77
KM40TSS25HLSER16	F76–77
KM40TSS25HNEL2	F33–34
KM40TSS25HNEL3	F33–34
KM40TSS25HNER2	F33–34
KM40TSS25HNER3	F33–34
KM40TSS32GNEL3	F33–34
KM40TSS32GNER3	F33–34
KM40TSS32JLSEL16	F76–77
KM40TSS32JLSEL22	F76–77
KM40TSS32JLSER16	F76–77
KM40TSS32JLSER22	F76–77
KM40TSS32JNEL3	F33–34
KM40TSS32JNER3	F33–34
KM40TSTCHS030039 WG	W37
KM40TSTCHS039050 WG	W37
KM40TSTCHS050067 WG	W37
KM50TSFBH050065 WG	W53
KM50TSFBH065088 WG	W53
KM50TSTCHS050067 WG	W37
KM50TSTCHS067088 WG	W37
KM63TSFBH065088 WG	W53
KM63TSFBH088115 WG	W53
KM63TSTCHS067088 WG	W37
KM63TSTCHS088115 WG	W37
KMSP315IP	C9, C11, C16–19, C56–58
KMSP39IP	C9, C19
KMSP415IP	C8–17, C19, C56–57, C59
KMSP515IP	C8–10, C12–16, C56
KMSP625IP	C8–10, C12–15
KMSP825IP	C9, C12, C14
KUAM20	C110–111, C113–117, C119, C126–129
KUAM22	C92–94, C97–103, C106–109
KUAM23	C104–105, C112, C119–122, C124, C126–129
KUAM25	C92–103, C109, C112, C120, C124
KUAM26	C102, C108
KUAM27	C94, C97, C101
KUAM28	C92, C97–101, C104–110, C112–113, C118–121, C123–129
KUAM30	C92, C97–101, C106–110, C112–113, C118–121, C123–129
KUAM31	C92–94, C97–109, C112, C119–122, C124, C126–129
KUAM32	C92–105, C108–109, C112, C120, C124
KUAM33	C101
KUAM34	C110–111, C113–117, C119, C126–129
KUAM35	C110, C113, C115–116
LNUX19194013 WK20CT	B64
LNUX191940T WK20CT	B65
LNUX30194013 WK20CT	B64
LNUX301940T WK20CT	B65
LNUX400924EN95 TTR	B64
LS103	H64
LTM16 WG	D59, D71, D84
M1200D025Z02A20HN07L120	H14
M1200D025Z02A25HN07L200	H14
M1200D025Z02B20HN07	H13
M1200D025Z02M16HN07	H12
M1200D025Z03A20HN07L120	H14

Catalogue No.	Page(s)
M1200D025Z03A25HN07L200	H14
M1200D025Z03B20HN07	H13
M1200D025Z03M16HN07	H12
M1200D032Z03A25HN07L130	H14
M1200D032Z03B25HN07	H13
M1200D032Z03M16HN07	H12
M1200D032Z04A25HN07L130	H14
M1200D032Z04B25HN07	H13
M1200D032Z04M16HN07	H12
M1200D040Z03B25HN09	H30
M1200D040Z03HN09	H31
M1200D040Z04B25HN09	H30
M1200D040Z04HN07	H15
M1200D040Z04HN09	H31–32
M1200D040Z04M16HN07	H12
M1200D040Z05HN07	H15
M1200D040Z05M16HN07	H12
M1200D050Z04HN07	H15
M1200D050Z04HN09	H31
M1200D050Z05HN07	H15
M1200D050Z05HN09	H31–32
M1200D050Z06HN07	H15
M1200D063Z04HN07	H15
M1200D063Z04HN09	H31
M1200D063Z06HN07	H15
M1200D063Z06HN09	H31
M1200D063Z07HN09	H31–32
M1200D063Z08HN07	H15
M1200D080Z05HN07	H15
M1200D080Z05HN09	H31
M1200D080Z06HN09	H31
M1200D080Z08HN07	H15
M1200D080Z09HN09	H31–32
M1200D080Z10HN07	H15
M1200D100Z06HN07	H15
M1200D100Z06HN09	H31
M1200D100Z08HN09	H31
M1200D100Z09HN07	H15
M1200D100Z11HN09	H31–32
M1200D100Z12HN07	H15
M1200D125Z08HN07	H15
M1200D125Z08HN09	H31
M1200D125Z10HN09	H31
M1200D125Z12HN07	H15
M1200D125Z14HN09	H31–32
M1200D125Z16HN07	H15
M1200D160Z12HN09	H31
M1200D160Z16HN09	H31–32
M1200D200Z16HN09	H31–32
M1200D250Z20HN09	H31–32
M1200D315Z24HN09	H31–32
M1200HD040Z04HN07	H20
M1200HD040Z05HN07	H20
M1200HD050Z04HN07	H20
M1200HD050Z04HN09	H38
M1200HD050Z05HN07	H20
M1200HD050Z05HN09	H38
M1200HD063Z04HN07	H20
M1200HD063Z04HN09	H38
M1200HD063Z06HN07	H20
M1200HD063Z06HN09	H38
M1200HD080Z05HN07	H20
M1200HD080Z05HN09	H38
M1200HD080Z08HN07	H20
M1200HD080Z08HN09	H38
M1200HD100Z06HN07	H20
M1200HD100Z06HN09	H38
M1200HD100Z08HN09	H38
M1200HD100Z09HN07	H20
M1200HD125Z08HN07	H20
M1200HD125Z08HN09	H38
M1200HD125Z10HN09	H38
M1200HD125Z12HN07	H20
M1200HD160Z09HN09	H38
M1200HD160Z12HN09	H38
M1200HF025Z02A20HN07L120	H6
M1200HF025Z02M16HN07	H5
M1200HF025Z03A20HN07L120	H6
M1200HF025Z03M16HN07	H5
M1200HF032Z03A25HN07L130	H6
M1200HF032Z03M16HN07	H5
M1200HF032Z04A25HN07L130	H6
M1200HF032Z04M16HN07	H5
M1200HF040Z04M16HN07	H5
M1200HF040Z05HN07	H7
M1200HF040Z05M16HN07	H5
M1200HF050Z04HN09	H26
M1200HF050Z05HN07	H7
M1200HF063Z05HN09	H26
M1200HF063Z06HN07	H7
M1200HF080Z06HN09	H26
M1200HF080Z08HN07	H7
M1200HF100Z08HN09	H26
M1200HF125Z09HN09	H26
M1200HF160Z12HN09	H26
M170D012Z02A12RD07TL100	M43
M170D012Z02A16RD07TL120	M43
M170D012Z02A16RD07TL140	M43
M170D012Z02M06RD07T	M42
M170D012Z02M08RD07T	M42
M170D015Z02A16RD07L110	M48
M170D015Z02A16RD07L150	M48
M170D015Z02B16RD07	M47
M170D015Z02M08RD07	M46
M170D015Z03A16RD07TL130	M43
M170D015Z03M08RD07T	M42
M170D016Z02A16RD07L150	M48
M170D016Z03A16RD07L110	M48
M170D016Z03M08RD07	M46
M170D020Z02A20RD10L140	M54
M170D020Z02A25RD10L160	M54
M170D020Z02A25RD10L180	M54
M170D020Z02B20RD10	M53
M170D020Z02M10RD10	M52
M170D020Z03A20RD07L140	M48
M170D020Z04A20RD07L115	M48
M170D020Z04M10RD07	M46
M170D022Z02A20RD10L160	M54
M170D024Z02M12RD12	M59
M170D025Z02A25RD10L180	M54
M170D025Z02A25RD10L220	M54
M170D025Z02M12RD10	M52
M170D025Z03B25RD10	M53
M170D025Z03M12RD10	M52
M170D025Z05M12RD07	M46
M170D028Z02A25RD10L200	M54
M170D030Z04M16RD10	M52
M170D030Z05M16RD07	M46
M170D032Z02A32RD12L200	M61
M170D032Z02A32RD12L300	M61
M170D032Z02M16RD16	M66
M170D032Z03B32RD12	M60
M170D035Z02A32RD12L300	M61
M170D035Z03M16RD12	M59
M170D035Z04M16RD12	M59
M170D035Z05M16RD10	M52
M170D035Z06M16RD07	M46
M170D040Z04RD12	M62
M170D040Z05RD10	M55
M170D042Z05M16RD12	M59
M170D042Z05RD10	M55
M170D042Z06M16RD10	M52
M170D050Z04RD16	M67
M170D050Z05RD12	M62
M170D050Z06RD10	M55
M170D052Z04RD16	M67
M170D052Z05RD12	M62
M170D052Z06RD10	M55
M170D063Z05RD16	M67
M170D063Z06RD12	M62
M170D066Z05RD16	M67
M170D066Z06RD12	M62
M170D080Z06RD16	M67
M170D080Z07RD12	M62
M170D100Z07RD16	M67
M170D100Z08RD12	M62
M170D125Z08RD16	M67
M200D100Z06RN16	M36
M200D100Z07RN12	M31
M200D100Z08RN16	M36
M200D100Z09RN12	M31
M200D125Z08RN16	M36
M200D25Z03A25RN10L150	M22
M200D25Z03A25RN10L200	M22
M200D25Z03A32RN10L250	M22
M200D25Z03B25RN10	M21
M200D25Z03M12RN10	M20
M200D28Z03A25RN10L200	M22
M200D32Z02A32RN12L250	M30
M200D32Z03A32RN10L200	M22
M200D32Z03A32RN12L200	M30
M200D32Z03B32RN12	M29
M200D32Z03M16RN12	M28
M200D32Z04A32RN10L150	M22
M200D32Z04B32RN10	M21
M200D32Z04M16RN10	M20
M200D35Z03M16RN12	M28
M200D35Z05M16RN10	M20
M200D40Z04RN10	M23
M200D40Z04RN12	M31
M200D40Z06RN10	M23
M200D42Z04M16RN12	M28
M200D42Z06M16RN10	M20
M200D50Z04RN12	M31
M200D50Z04RN16	M36
M200D50Z05RN10	M23
M200D50Z05RN12	M31
M200D50Z06RN10	M23
M200D52Z04RN16	M36
M200D52Z05RN12	M31
M200D52Z06RN10	M23
M200D63Z04RN16	M36
M200D63Z05RN12	M31
M200D63Z06RN16	M36
M200D63Z07RN12	M31
M200D66Z05RN16	M36
M200D66Z07RN12	M31
M200D80Z05RN16	M36
M200D80Z06RN12	M31
M200D80Z07RN16	M36
M200D80Z08RN12	M31
M270BD010A12L140 W	M104
M270BD010A12L140C W	M105
M270BD010B12L90 W	M103
M270BD010M08 W	M102
M270BD012A12L145 W	M104
M270BD012A12L145C W	M105
M270BD012B12L95 W	M103
M270BD012M08 W	M102
M270BD016A16L155 W	M104
M270BD016A16L155C W	M105
M270BD016B16L105 W	M103
M270BD016M08 W	M102
M270BD020A20L170 W	M104
M270BD020A20L170C W	M105
M270BD020B20L120 W	M103
M270BD020M10 W	M102
M270BD025A25L195 W	M104
M270BD025B25L145 W	M103
M270BD025M12 W	M102
M270BD032A32L205 W	M104
M270BD032B32L155 W	M103
M270BD032M16 W	M102
M270BF10 TN2505	M108
M270BF10 TN2510	M108
M270BF12 TN2505	M108
M270BF12 TN2510	M108
M270BF12 TN6525	M108
M270BF16 TN2505	M108
M270BF16 TN2510	M108
M270BF16 TN6525	M108
M270BF20 TN2505	M108
M270BF20 TN2510	M108
M270BF20 TN6525	M108
M270BF25 TN2505	M108
M270BF25 TN2510	M108
M270BF32 TN2505	M108
M270BF32 TN2510	M108
M270BR10 TN2510	M109
M270BR10 TN7525	M109
M270BR10 TN7535	M109
M270BR12 TN2510	M109
M270BR12 TN6540	M109
M270BR12 TN7525	M109
M270BR12 TN7535	M109
M270BR16 TN2510	M109
M270BR16 TN6540	M109
M270BR16 TN7525	M109
M270BR16 TN7535	M109
M270BR20 TN2510	M109
M270BR20 TN6540	M109
M270BR20 TN7525	M109
M270BR20 TN7535	M109
M270BR25 TN2510	M109
M270BR25 TN7525	M109
M270BR25 TN7535	M109
M270BR32 TN2510	M109
M270BR32 TN7525	M109
M270BR32 TN7535	M109
M270HF10 TN2505	M127
M270HF10 TN6525	M127
M270HF10 TN6540	M127
M270HF12 TN2505	M127
M270HF12 TN6525	M127
M270HF12 TN6540	M127
M270HF13 TN2505	M127
M270HF13 TN6525	M127
M270HF13 TN6540	M127
M270HF16 TN2505	M127
M270HF16 TN6525	M127
M270HF16 TN6540	M127
M270HF20 TN2505	M127

Catalogue No.	Page(s)
M270HF20 TN6525	M127
M270HF20 TN6540	M127
M270TD010A10L120	M119, M125
M270TD010A10L120C	M120, M126
M270TD010A10L150C	M120, M126
M270TD012A12L120C	M120, M126
M270TD012A12L140	M119, M125
M270TD012A12L160C	M120, M126
M270TD012M08	M118, M124
M270TD016A16L140C	M120, M126
M270TD016A16L160	M119, M125
M270TD016A16L180C	M120, M126
M270TD016M08	M118, M124
M270TD020A20L150C	M120, M126
M270TD020A20L180	M119, M125
M270TD020A20L200C	M120, M126
M270TD020M10	M118, M124
M270TF10R05 TN2510	M122
M270TF10R05 TN2525	M122
M270TF10R1 TN2505	M122
M270TF10R1 TN2525	M122
M270TF12R05 TN2510	M122
M270TF12R05 TN2525	M122
M270TF12R1 TN2510	M122
M270TF12R1 TN2525	M122
M270TF12R2 TN2505	M122
M270TF12R2 TN2525	M122
M270TF16R03 TN2510	M122
M270TF16R03 TN2525	M122
M270TF16R05 TN2510	M122
M270TF16R05 TN2525	M122
M270TF16R1 TN2510	M122
M270TF16R1 TN2525	M122
M270TF16R2 TN2510	M122
M270TF16R2 TN2525	M122
M270TF16R3 TN2525	M122
M270TF20R03 TN2510	M122
M270TF20R05 TN2510	M122
M270TF20R05 TN2525	M122
M270TF20R1 TN2525	M122
M270TF20R2 TN2510	M122
M270TF20R2 TN2525	M122
M270TF20R4 TN2525	M122
M370D025Z02A25W008L200	M5
M370D025Z02A25W008L300	M5
M370D025Z02M12W008	M4
M370D025Z03A25W008L150	M5
M370D025Z03A25W008L200	M5
M370D025Z03M12W008	M4
M370D028Z03A25W008L200	M5
M370D032Z03A32W008L300	M5
M370D032Z04A32W008L150	M5
M370D032Z04A32W008L200	M5
M370D032Z04M16W008	M4
M370D040Z04W008	M6
M370D040Z05W008	M6
M370D042Z05M16W008	M4
M370D050Z05W008	M6
M370D050Z06W008	M6
M370D052Z05W008	M6
M370D052Z06W008	M6
M370D063Z06W008	M6
M370D066Z06W008	M6
M370D080Z07W008	M6
M370D100Z06W012	M12
M370D100Z07W012	M12
M370D125Z07W012	M12
M370D125Z09W012	M12
M370D42Z03M16WO12	M11
M370D50Z04WO12	M12
M370D52Z04WO12	M12
M370D63Z04WO12	M12
M370D63Z05WO12	M12
M370D66Z05WO12	M12
M370D80Z05WO12	M12
M370D80Z06WO12	M12
M4000CA-AD1505	H73
M4000CA-AP1003	H73
M4000CA-AP1604	H73
M4000CA-HN07	H73
M4000CA-HN07HD	H73
M4000CA-HN07HF	H73
M4000CA-HN09	H73
M4000CA-HN09HD	H73
M4000CA-HN09HF	H73
M4000CA-HP06	H73
M4000CA-MDHX10	H73
M4000CA-RC1606	H73
M4000CA-SD1204	H73
M4000CA-SD1506	H73
M4000CA-SE1203	H73
M4000CA-SE1204	H73
M4000CA-SE1504	H73
M4000CA-SN12	H73
M4000CA-SN15	H73
M4000CA-SP12	H73
M4000CA-SP1203	H73
M4000CA-SP1504	H73
M4000CA-TP1603	H73
M4000CA-TP2204	H73
M4000CA-XP16	H73
M4000D125Z06ADJ	H72
M4000D125Z08ADJ	H72
M4000D160Z08ADJ	H72
M4000D160Z12ADJ	H72
M4000D200Z10ADJ	H72
M4000D200Z14ADJ	H72
M4000D250Z12ADJ	H72
M4000D250Z18ADJ	H72
M4000D315Z16ADJ	H72
M4000D315Z22ADJ	H72
M40222	R6
M40223	R6
M40224	R6
M40227	R6
M40228	R6
M40229	R6
M40230	R6
M40232	R6
M40233	R6
M40237	R6
M40239	R6
M40242	R6
M40263	R7
M40267	R7
M40268	R7
M40271	R7
M40272	R7
M40274	R7
M40282	R7
M40303	R8
M40304	R8
M40309	R8
M40310	R8
M40316	R8
M40342	R9
M40343	R9
M40344	R9
M40346	R9
M40347	R9
M40349	R9
M40352	R9
M40353	R9
M40354	R9
M40368	R10
M40370	R10
M40373	R10
M40396	R11
M40398	R11
M40399	R11
M40400	R11
M40403	R11
M40406	R11
M40428	R12
M40430	R12
M40431	R12
M40434	R12
M40436	R12
M40452	R13
M40454	R13
M40455	R13
M40474	R14
M40475	R14
M40477	R14
M40478	R14
M40479	R14
M40496	R15
M40497	R15
M40498	R15
M40503	R15
M40516	R16
M40521	R16
M40551	R6
M40552	R6
M40553	R6
M40555	R6
M40559	R8
M40560	R8
M40561	R8
M40567	R9
M40568	R9
M40572	R9
M40574	R10
M40576	R11
M40578	R11
M40582	R14
M40584	R14
M40585	R14
M40589	R18
M40590	R18
M40592	R18
M40595	R18
M40596	R18
M40597	R18
M40598	R18
M41222	R6
M41223	R6
M41224	R6
M41225	R6
M41226	R6
M41227	R6
M41228	R6
M41229	R6
M41231	R6
M41232	R6
M41233	R6
M41235	R6
M41237	R6
M41239	R6
M41241	R6
M41245	R6
M41261	R7
M41262	R7
M41263	R7
M41265	R7
M41266	R7
M41268	R7
M41269	R7
M41270	R7
M41271	R7
M41272	R7
M41274	R7
M41275	R7
M41276	R7
M41277	R7
M41303	R8
M41304	R8
M41306	R8
M41307	R8
M41308	R8
M41309	R8
M41310	R8
M41311	R8
M41312	R8
M41314	R8
M41316	R8
M41317	R8
M41318	R8
M41319	R8
M41320	R8
M41343	R9
M41344	R9
M41345	R9
M41346	R9
M41347	R9
M41348	R9
M41349	R9
M41350	R9
M41351	R9
M41352	R9
M41354	R9
M41356	R9
M41368	R10
M41369	R10
M41370	R10
M41371	R10
M41372	R10
M41373	R10
M41374	R10
M41375	R10
M41377	R10
M41395	R11
M41396	R11
M41397	R11
M41398	R11
M41399	R11
M41400	R11
M41401	R11
M41402	R11
M41403	R11
M41405	R11
M41406	R11

Catalogue No.	Page(s)
M41428	R12
M41431	R12
M41432	R12
M41433	R12
M41434	R12
M41435	R12
M41436	R12
M41439	R12
M41442	R12
M41452	R13
M41453	R13
M41454	R13
M41455	R13
M41457	R13
M41473	R14
M41474	R14
M41476	R14
M41477	R14
M41478	R14
M41479	R14
M41480	R14
M41496	R15
M41497	R15
M41498	R15
M41501	R15
M41502	R15
M41503	R15
M41504	R15
M41505	R15
M41516	R16
M41518	R16
M41519	R16
M41525	R16
M42006	R17
M42007	R17
M42008	R17
M42009	R17
M42010	R17
M42012	R17
M42013	R17
M42014	R17
M42015	R17
M42016	R17
M42018	R17
M42019	R17
M42020	R17
M42021	R17
M42022	R17
M42023	R17
M42024	R17
M42025	R17
M42026	R17
M42027	R17
M42028	R17
M42029	R17
M42030	R17
M42031	R17
M42032	R17
M42033	R17
M42034	R17
M42035	R17
M42036	R17
M42037	R17
M42038	R17
M42039	R17
MASCFCR09CA06F WG	W46
MASCLCR09CA06F WG	W47
MASTFCR09CA11F WG	W48
MB010062L CG5	D80
MB010062L CM1	D80
MB010062R CG5	D79
MB010062R CM1	D79
MB030187L CG5	D80
MB030187L CM1	D80
MB062187L CG5	D80
MB062187L CM1	D80
MB062187R CG5	D79
MB062187R CM1	D79
MB062312L CG5	D80
MB062312L CM1	D80
MB062312R CG5	D79
MB062312R CM1	D79
MB094281L CM1	D80
MB094281R CM1	D79
MB094500L CG5	D80
MB094500L CM1	D80
MB094500R CG5	D79
MB094500R CM1	D79
MB125375L CG5	D80
MB125375L CM1	D80
MB125625L CG5	D80
MB125625L CM1	D80
MB125625R CM1	D79
MB156500L CG5	D80
MB156500L CM1	D80
MB156500R CG5	D79
MB156500R CM1	D79
MB156875L CG5	D80
MB156875L CM1	D80
MB156875R CM1	D79
MBIT WG	D59, D71, D84
MCFNL12CA12 WG	C92
MCFNL16CA12 WG	C92
MCFNR10CA09 WG	C92
MCFNR12CA12 WG	C92
MCFNR16CA12 WG	C92
MCFNR20CA12 WG	C92
MCKNL12CA12 WG	C93
MCKNR12CA12 WG	C93
MCKNR16CA12 WG	C93
MCLNL12CA12 WG	C94
MCLNL16CA12 WG	C94
MCLNL20CA12 WG	C94
MCLNL25CA19 WG	C94
MCLNR12CA12 WG	C94
MCLNR16CA12 WG	C94
MCLNR20CA12 WG	C94
MCLNR25CA19 WG	C94
MDHW120408 THM	L29
MDHW120408 WK15CM	L29
MDHW120408 WP25PM	L29
MDHW120408 WP35CM	L29
MDHW120408 WP40PM	L29
MDHW120408 WU35PM	L29
MDHX09T308 THM	L26
MDHX09T308 WK15CM	L26
MDHX09T308 WP25PM	L26
MDHX09T308 WP35CM	L26
MDHX09T308 WP40PM	L26
MDHX09T308 WU35PM	L26
MDJNL16CA15 WG	C95
MDJNR16CA15 WG	C95
MDJNR20CA15 WG	C95
MDQNL16CA15 WG	C96
MDQNL20CA15 WG	C96
MDQNR16CA15 WG	C96
MDQNR20CA15 WG	C96
MG095030L CG5	D81
MG095030L CM1	D81
MG095030R CM1	D81
MG125040L CG5	D81
MG125040L CM1	D81
MG125040R CG5	D81
MG156050L CG5	D81
MG156050L CM1	D81
MG156050R CM1	D81
MKEY WG	D59, D71, D84
MP062187L CM1	D82
MP062187R CG5	D82
MP094281L CG5	D82
MP094281L CM1	D82
MP094281R CG5	D82
MP094281R CM1	D82
MP125375L CM1	D82
MP125375R CG5	D82
MP125375R CM1	D82
MP156500L CG5	D82
MP156500L CM1	D82
MP156500R CG5	D82
MP156500R CM1	D82
MS-2071	J32–35
MS1034	E79, F32
MS1071	E125
MS1072	E127
MS1073	E125
MS110	C65
MS111	C36–39, C108
MS1152	C126–129, V10, V13, V16, V19
MS1153	C42–45, C48, C66–67, C69–73, C75–76, C78–81, C110–111, C113–119, C126–129
MS1154	C45, C119
MS1155	C42, C44, C66–67, C69–73, C75–76, C78–81, C110, C112–113, C119–121, C123–129
MS1156	C42–49
MS1157	C67, C112, C120, C122, C124
MS1158	C42–47, C67, C73
MS1160	C45, V10, V13, V16, V19
MS1162	E36
MS1200	E74–76, E78, F24–27, F31
MS1234	J24, M23
MS1234CG	J8, J24, J35, M6, M12, M23, M85, M91, M96
MS1242	M23, M31, M36
MS1242CG	M23, M31, M36
MS125	C37, C39, C109
MS1254	M62, M67
MS1254CG	M62, M67
MS1294	E126–127, H72, J8, J24, M23, M31
MS1294 W	M55, M62
MS1294CG	J8, J24, J35, M6, M23, M31, M55, M62
MS1321	C40–41
MS1336	M31
MS1488	F28–29, F34–35
MS1489	F28–29, F34
MS1495	E124–125
MS1933	C78–79, C110, C113, C115–116
MS1939	C67, C69–70
MS1982	V10, V13, V16, V19
MS2002	E36
MS2038	J24, M6, M31, M36, M62, M67
MS2038CG	J8, J24, J35, M6, M12, M31, M36, M62, M67, M85, M91, M96
MS2072CG	M31, M55, M62, M67
MS2085	M11–12
MS2111	E74–76, E78, F24–27, F31
MS2173	C110, C113, C115–116
MS2175	C110–111, C113–117, C119, C126–129
MS2187C	J8, J24, J35, M12, M36
MS2189C	J35
MS2195C	J8, J24, M12, M31, M36
MS2219	M4–6
MS2260	C68, J48, M36
MS318	E122
MS326	E30–31, E34
MS352	E74, E76, E127, F25, F27
MS364	C94, C97, C101–102
MS412	E122
MS518	E128
MS959	C36
MS960	C37–39
MSKNL10CA09 WG	C97
MSKNL16CA12 WG	C97
MSKNL20CA15 WG	C97
MSKNR10CA09 WG	C97
MSKNR12CA12 WG	C97
MSKNR16CA12 WG	C97
MSKNR20CA15 WG	C97
MSKNR25CA19 WG	C97
MSM46 WG	D59, D71, D74, D84
MSRNL12CA12 WG	C98
MSRNL16CA12 WG	C98
MSRNL20CA15 WG	C98
MSRNR10CA09 WG	C98
MSRNR12CA12 WG	C98
MSRNR20CA15 WG	C98
MSSNL10CA09 WG	C99
MSSNL12CA12 WG	C99
MSSNL16CA12 WG	C99
MSSNR10CA09 WG	C99
MSSNR12CA12 WG	C99
MSSNR16CA12 WG	C99
MSSNR20CA15 WG	C99
MSTNR10CA09 WG	C100
MSTNR12CA12 WG	C100
MSTNR16CA12 WG	C100
MSYNL10CA09 WG	C101
MSYNR10CA09 WG	C101
MSYNR12CA12 WG	C101
MSYNR16CA12 WG	C101
MSYNR25CA19 WG	C101
MT09560F2L CG5	D83
MT09560F2L CM1	D83
MT09560F2R CM1	D83
MT12560F2L CG5	D83
MT12560F2L CM1	D83
MT12560F2R CG5	D83
MT12560F2R CM1	D83
MT15660F2L CG5	D83
MT15660F2L CM1	D83
MT15660F2R CM1	D83
MTFNL12CA16 WG	C102
MTFNL16CA16 WG	C102
MTFNR12CA16 WG	C102
MTFNR16CA16 WG	C102
MTFNR20CA22 WG	C102
MTFNR25CA27 WG	C102
MTGNL12CA16 WG	C103

Catalogue No.	Page(s)
MTGNL16CA16 WG	C103
MTGNL20CA22 WG	C103
MTGNR12CA16 WG	C103
MTGNR16CA16 WG	C103
MTGNR20CA22 WG	C103
MTMM1040 WG	D74
MTMM12100 WG	D74
MTMM1240 WG	D74
MTMM22127 WG	D74
MTMM840 WG	D74
NA3L4 TN6025	F21
NA3L6 TN6025	F21
NA3L8 TN6025	F21
NA3R4 TN6025	F21
NA3R6 TN6025	F21
NA3R8 TN6025	F21
NA4L4 TN6025	F21
NA4R4 TN6025	F21
NA6L2 TN6025	F21
NA6L3 TN6025	F21
NA6R2 TN6025	F21
NA6R3 TN6025	F21
NAS3L12 TN6025	F22
NAS3L6 TN6025	F22
NAS3L8 TN6025	F22
NAS3R8 TN6025	F22
NASL1010M2Q W	E75, F26
NASL1212M2Q W	E75, F26
NASL1616K3Q W	E75, F26
NASR1010M2Q W	E75, F26
NASR1212M2Q W	E75, F26
NASR1616K3Q W	E75, F26
NB2L THM	E72
NB2R THM	E72
NB3L THM	E72
NB3R THM	E72
NDC310RDL75 TN6025	F20
NDC3115VR75 TN6010	F18
NDC38RDL75 TN6025	F20
NDC38RDR75 TN6025	F20
NDC8115VR75M TN6010	F19
NDC88VR75M TN6010	F19
NEL1616H2 W	E76, F27
NEL2020K2 W	E76, F27
NEL2525M2 W	E76, F27
NEL2525M3 W	E76, F27
NEL2525M4 W	E76, F27
NEL3225P3 W	E76, F27
NEL3225P4 W	E76, F27
NEL3232P4 W	E76, F27
NEL3232P5 W	E76, F27
NER1616H2 W	E76, F27
NER2020K2 W	E76, F27
NER2525M2 W	E76, F27
NER2525M3 W	E76, F27
NER2525M4 W	E76, F27
NER3225P3 W	E76, F27
NER3225P4 W	E76, F27
NER3232P4 W	E76, F27
NER3232P5 W	E76, F27
NF3125LK TN6025	E65
NF3125RK TN6025	E65
NF3156LK TN6025	E65
NF3M200LK TN6025	E65
NF3M200RK TN6025	E65
NF3M300LK TN6025	E65
NF3M300RK TN6025	E65
NFD3125LK TN6025	E66
NFD3125RK TN6025	E66
NFD3M300LK TN6025	E66
NFD3M300RK TN6025	E66
NFD4189LK TN6025	E66
NFD4189RK TN6025	E66
NFD4250RK TN6025	E66
NG1047L TN6025	E52
NG1062L TN6025	E52
NG1094L TN6025	E52
NG2031L TN6025	E51
NG2031LK TN6010	E56
NG2031LK TN6025	E56
NG2031R THM	E51
NG2031R TN6010	E51
NG2031R TN6025	E51
NG2031RK TN6010	E53
NG2031RK TN6025	E53
NG2041R TN6025	E51
NG2047LK TN6025	E56
NG2047RK TN6010	E53
NG2047RK TN6025	E53
NG2058L TN6025	E51
NG2058R TN6025	E51
NG2062L TN6025	E51
NG2062LK TN6010	E57
NG2062LK TN6025	E57
NG2062R THM	E51
NG2062R TN6010	E51
NG2062R TN6025	E51
NG2062RK TN6010	E53
NG2062RK TN6025	E53
NG2094LK TN6010	E58
NG2094LK TN6025	E58
NG2094RK TN6010	E54
NG2094RK TN6025	E54
NG2125LK TN6010	E58
NG2125LK TN6025	E58
NG2125RK TN6010	E55
NG2125RK TN6025	E55
NG2M050LK TN6010	E56
NG2M050LK TN6025	E56
NG2M050RK TN6010	E53
NG2M050RK TN6025	E53
NG2M080LK TN6010	E56
NG2M080LK TN6025	E56
NG2M080RK TN6010	E53
NG2M080RK TN6025	E53
NG2M100LK TN6010	E56
NG2M100LK TN6025	E56
NG2M100RK TN6010	E53
NG2M100RK TN6025	E53
NG2M120LK TN6010	E57
NG2M120LK TN6025	E57
NG2M120RK TN6010	E53
NG2M120RK TN6025	E53
NG2M140LK TN6010	E57
NG2M140LK TN6025	E57
NG2M140RK TN6010	E53
NG2M140RK TN6025	E53
NG2M150LK TN6025	E57
NG2M150RK TN6025	E53
NG2M170LK TN6010	E57
NG2M170LK TN6025	E57
NG2M170RK TN6010	E53
NG2M170RK TN6025	E53
NG2M175LK TN6025	E57
NG2M175RK TN6025	E54
NG2M195LK TN6010	E57
NG2M195LK TN6025	E57
NG2M195RK TN6010	E54
NG2M195RK TN6025	E54
NG2M200LK TN6010	E57
NG2M200LK TN6025	E57
NG2M200RK TN6010	E54
NG2M200RK TN6025	E54
NG2M220LK TN6025	E57
NG2M220RK TN6025	E54
NG2M225LK TN6010	E58
NG2M225LK TN6025	E58
NG2M225RK TN6010	E54
NG2M225RK TN6025	E54
NG2M250LK TN6025	E58
NG2M250RK TN6025	E54
NG2M275LK TN6010	E58
NG2M275LK TN6025	E58
NG2M275RK TN6010	E54
NG2M275RK TN6025	E54
NG2M300LK TN6010	E58
NG2M300LK TN6025	E58
NG2M300RK TN6010	E55
NG2M300RK TN6025	E55
NG2M325LK TN6025	E59
NG2M325RK TN6025	E55
NG3047L THM	E51
NG3047L TN6010	E51
NG3047L TN6025	E51
NG3047LK TN6010	E56
NG3047LK TN6025	E56
NG3047R TN6010	E51
NG3047R TN6025	E51
NG3047RK TN6010	E53
NG3047RK TN6025	E53
NG3062L TN6010	E51
NG3062L TN6025	E51
NG3062LK TN6010	E57
NG3062LK TN6025	E57
NG3062LK TN7110	E57
NG3062R THM	E51
NG3062R TN6010	E51
NG3062R TN6025	E51
NG3062RK TN6010	E53
NG3062RK TN6025	E53
NG3062RK TN7110	E53
NG3072LK TN6010	E57
NG3072LK TN6025	E57
NG3072RK TN6010	E54
NG3072RK TN6025	E54
NG3078LK TN6010	E57
NG3078LK TN6025	E57
NG3078RK TN6010	E54
NG3078RK TN6025	E54
NG3094L TN6010	E52
NG3094L TN6025	E52
NG3094LK TN6010	E58
NG3094LK TN6025	E58
NG3094R THM	E51
NG3094R TN6010	E51
NG3094R TN6025	E51
NG3094RK TN6010	E54
NG3094RK TN6025	E54
NG3125L THM	E52
NG3125L TN6010	E52
NG3125L TN6025	E52
NG3125LK TN6010	E58
NG3125LK TN6025	E58
NG3125R THM	E51
NG3125R TN6010	E51
NG3125R TN6025	E51
NG3125RK TN6010	E55
NG3125RK TN6025	E55
NG3156LK TN6010	E59
NG3156LK TN6025	E59
NG3156RK TN6010	E55
NG3156RK TN6025	E55
NG3189LK TN6010	E59
NG3189LK TN6025	E59
NG3189LK TN7110	E59
NG3189RK TN6010	E56
NG3189RK TN6025	E56
NG3189RK TN7110	E56
NG3M100LK TN6025	E56
NG3M100RK TN6025	E53
NG3M120LK TN6010	E57
NG3M120LK TN6025	E57
NG3M120RK TN6010	E53
NG3M120RK TN6025	E53
NG3M150LK TN6025	E57
NG3M150LK TN7110	E57
NG3M150RK TN6025	E53
NG3M150RK TN7110	E53
NG3M175LK TN6025	E57
NG3M175RK TN6025	E54
NG3M200LK TN6025	E57
NG3M200LK TN7110	E57
NG3M200RK TN6025	E54
NG3M200RK TN7110	E54
NG3M220LK TN6025	E58
NG3M220RK TN6025	E54
NG3M225LK TN6010	E58
NG3M225LK TN6025	E58
NG3M225RK TN6010	E54
NG3M225RK TN6025	E54
NG3M250LK TN6025	E58
NG3M250RK TN6025	E54
NG3M250RK TN7110	E54
NG3M275LK TN6010	E58
NG3M275LK TN6025	E58
NG3M275RK TN6010	E55
NG3M275RK TN6025	E55
NG3M300LK TN6010	E58
NG3M300LK TN6025	E58
NG3M300RK TN6010	E55
NG3M300RK TN6025	E55
NG3M300RK TN7110	E55
NG3M320LK TN6025	E58
NG3M320RK TN6025	E55
NG3M325LK TN6025	E59
NG3M325RK TN6025	E55
NG3M350LK TN6025	E59
NG3M350RK TN6025	E55
NG3M400LK TN6010	E59
NG3M400LK TN6025	E59
NG3M400LK TN7110	E59
NG3M400RK TN6010	E55
NG3M400RK TN6025	E55
NG3M425LK TN6010	E59
NG3M425LK TN6025	E59
NG3M425RK TN6010	E55
NG3M425RK TN6025	E55
NG3M450LK TN6025	E59
NG3M450RK TN6025	E56
NG4125LK TN6010	E58
NG4125LK TN6025	E58
NG4125RK TN6010	E55

Catalogue No.	Page(s)
NG4125RK TN6025	E55
NG4189LK TN6010	E59
NG4189LK TN6025	E59
NG4189RK TN6010	E56
NG4189RK TN6025	E56
NG4250L TN6010	E52
NG4250L TN6025	E52
NG4250LK TN6010	E59
NG4250LK TN6025	E59
NG4250R TN6010	E51
NG4250R TN6025	E51
NG4250RK TN6010	E56
NG4250RK TN6025	E56
NG4M300LK TN6025	E58
NG4M300RK TN6025	E55
NG4M350LK TN6025	E59
NG4M350LK TN7110	E59
NG4M350RK TN6025	E55
NG4M400LK TN6010	E59
NG4M400LK TN6025	E59
NG4M400RK TN6010	E55
NG4M400RK TN6025	E55
NG4M450LK TN6025	E59
NG4M450RK TN6025	E56
NG4M500LK TN6010	E59
NG4M500LK TN6025	E59
NG4M500RK TN6010	E56
NG4M500RK TN6025	E56
NG4M550LK TN6025	E59
NG4M550RK TN6025	E56
NG4M600LK TN6025	E59
NG4M600RK TN6025	E56
NG5M500L TN6025	E52
NGD2M150LK TN6010	E61
NGD2M150LK TN6025	E61
NGD2M150RK TN6010	E60
NGD2M150RK TN6025	E60
NGD2M200LK TN6010	E61
NGD2M200LK TN6025	E61
NGD2M200RK TN6010	E60
NGD2M200RK TN6025	E60
NGD2M250LK TN6010	E61
NGD2M250LK TN6025	E61
NGD2M250RK TN6010	E60
NGD2M250RK TN6025	E60
NGD3062LK TN6010	E61
NGD3062LK TN6025	E61
NGD3062RK TN6010	E60
NGD3062RK TN6025	E60
NGD3094LK THM	E61
NGD3094LK TN6010	E61
NGD3094LK TN6025	E61
NGD3094RK THM	E60
NGD3094RK TN6010	E60
NGD3094RK TN6025	E60
NGD3125LK TN6010	E61
NGD3125LK TN6025	E61
NGD3125RK TN6010	E60
NGD3125RK TN6025	E60
NGD3189LK TN6010	E62
NGD3189LK TN6025	E62
NGD3189RK TN6010	E60
NGD3189RK TN6025	E60
NGD3M200LK TN6010	E61
NGD3M200LK TN6025	E61
NGD3M200RK TN6010	E60
NGD3M200RK TN6025	E60
NGD3M250LK TN6010	E61
NGD3M250LK TN6025	E61
NGD3M250RK TN6010	E60
NGD3M250RK TN6025	E60
NGD3M300LK TN6010	E61
NGD3M300LK TN6025	E61
NGD3M300RK TN6010	E60
NGD3M300RK TN6025	E60
NGD3M350LK TN6025	E61
NGD3M350RK TN6025	E60
NGD3M400LK TN6010	E62
NGD3M400LK TN6025	E62
NGD3M400RK TN6010	E60
NGD3M400RK TN6025	E60
NGD4125LK TN6010	E61
NGD4125LK TN6025	E61
NGD4125RK TN6010	E60
NGD4125RK TN6025	E60
NGD4189LK TN6010	E62
NGD4189LK TN6025	E62
NGD4189RK TN6010	E61
NGD4189RK TN6025	E61
NGD4250LK TN6010	E62
NGD4250LK TN6025	E62
NGD4250RK TN6010	E61
NGD4250RK TN6025	E61
NGD4M400LK TN6010	E62
NGD4M400LK TN6025	E62
NGD4M400RK TN6010	E60
NGD4M400RK TN6025	E60
NGD4M450LK TN6025	E62
NGD4M450RK TN6025	E60
NGD4M500LK TN6025	E62
NGD4M500RK TN6010	E61
NGD4M500RK TN6025	E61
NGD4M550LK TN6025	E62
NGD4M550RK TN6010	E61
NGP2062L TN6010	E64
NGP2062R TN6010	E63
NGP2M150L THM	E64
NGP2M150L TN6010	E64
NGP2M150R THM	E63
NGP2M150R TN6010	E63
NGP2M200L THM	E64
NGP2M200L TN6010	E64
NGP2M200R THM	E63
NGP2M200R TN6010	E63
NGP2M250L THM	E64
NGP2M250L TN6010	E64
NGP2M250R THM	E63
NGP2M250R TN6010	E63
NGP2M300L THM	E64
NGP2M300R THM	E63
NGP2M300R TN6010	E63
NGP3M150L THM	E64
NGP3M150L TN6010	E64
NGP3M150R THM	E63
NGP3M150R TN6010	E63
NGP3M200L THM	E64
NGP3M200L TN6010	E64
NGP3M200R THM	E63
NGP3M200R TN6010	E63
NGP3M250L THM	E64
NGP3M250L TN6010	E64
NGP3M250R THM	E63
NGP3M250R TN6010	E63
NGP3M300L THM	E64
NGP3M300L TN6010	E64
NGP3M300R THM	E63
NJK3008R20 TN6010	F18
NJP3014R12 TN6025	F18
NL82R W	F70
NP2002RK TN6010	E66
NP2002RK TN6025	E66
NP3002RK TN6010	E66
NP3002RK TN6025	E66
NP3012RK TN6025	E66
NR2031L TN6010	E68
NR2031L TN6025	E68
NR2031R TN6010	E67
NR2031R TN6025	E67
NR2047L TN6025	E68
NR2047R TN6025	E67
NR2M050L TN6010	E68
NR2M050L TN6025	E68
NR2M050L TN7110	E68
NR2M050R TN6010	E67
NR2M050R TN6025	E67
NR2M075L TN6010	E68
NR2M075L TN6025	E68
NR2M075R TN6010	E67
NR2M075R TN6025	E67
NR2M100L TN6010	E68
NR2M100L TN6025	E68
NR2M100L TN7110	E68
NR2M100R TN6010	E67
NR2M100R TN6025	E67
NR2M125L TN6010	E69
NR2M125L TN6025	E69
NR2M125R TN6010	E67
NR2M125R TN6025	E67
NR2M150L TN6010	E69
NR2M150L TN6025	E69
NR2M150R TN6010	E67
NR2M150R TN6025	E67
NR2M175L TN6010	E69
NR2M175L TN6025	E69
NR2M175R TN6010	E67
NR2M175R TN6025	E67
NR3031L THM	E68
NR3031L TN6010	E68
NR3031L TN6025	E68
NR3031LK TN6010	E70
NR3031LK TN6025	E70
NR3031R THM	E67
NR3031R TN6010	E67
NR3031R TN6025	E67
NR3031RK TN6010	E70
NR3031RK TN6025	E70
NR3047L THM	E68
NR3047L TN6010	E68
NR3047L TN6025	E68
NR3047LK TN6010	E70
NR3047LK TN6025	E70
NR3047R THM	E67
NR3047R TN6010	E67
NR3047R TN6025	E67
NR3047RK TN6010	E70
NR3047RK TN6025	E70
NR3062L THM	E69
NR3062L TN6010	E69
NR3062L TN6025	E69
NR3062LK TN6010	E70
NR3062LK TN6025	E70
NR3062R THM	E67
NR3062R TN6010	E67
NR3062R TN6025	E67
NR3062RK TN6010	E70
NR3062RK TN6025	E70
NR3078LK TN6010	E70
NR3078LK TN6025	E70
NR3078RK TN6010	E70
NR3078RK TN6025	E70
NR3094L TN6010	E69
NR3094L TN6025	E69
NR3094R TN6010	E68
NR3094R TN6025	E68
NR3M100L TN6010	E68
NR3M100L TN6025	E68
NR3M100R TN6010	E67
NR3M100R TN6025	E67
NR3M125L TN6010	E69
NR3M125L TN6025	E69
NR3M125L TN7110	E69
NR3M125R TN6010	E67
NR3M125R TN6025	E67
NR3M150L TN6010	E69
NR3M150L TN6025	E69
NR3M150R TN6010	E67
NR3M150R TN6025	E67
NR3M175L TN6010	E69
NR3M175L TN6025	E69
NR3M175L TN7110	E69
NR3M175R TN6010	E67
NR3M175R TN6025	E67
NR3M200L TN6010	E69
NR3M200L TN6025	E69
NR3M200R TN6010	E68
NR3M200R TN6025	E68
NR3M225L TN6010	E69
NR3M225L TN6025	E69
NR3M225R TN6010	E68
NR3M225R TN6025	E68
NR4062LK TN6010	E70
NR4062LK TN6025	E70
NR4062RK TN6025	E70
NR4094LK TN6010	E70
NR4094LK TN6025	E70
NR4094RK TN6010	E70
NR4094RK TN6025	E70
NR4125L TN6010	E69
NR4125L TN6025	E69
NR4125LK TN6010	E70
NR4125LK TN6025	E70
NR4125R TN6010	E68
NR4125R TN6025	E68
NR4125RK TN6010	E70
NR4125RK TN6025	E70
NR4M200L TN6010	E69
NR4M200L TN6025	E69
NR4M200R TN6010	E68
NR4M200R TN6025	E68
NR4M225L TN6010	E69
NR4M225L TN6025	E69
NR4M225R TN6010	E68
NR4M225R TN6025	E68
NR4M250L TN6010	E69
NR4M250L TN6025	E69
NR4M250R TN6010	E68
NR4M250R TN6025	E68
NRD3031L TN6010	E71
NRD3031L TN6025	E71
NRD3031R TN6010	E71
NRD3031R TN6025	E71
NRD3062L TN6010	E71

Catalogue No.	Page(s)
NRD3062L TN6025	E71
NRD3062R TN6010	E71
NRD3062R TN6025	E71
NRD4062L TN6010	E71
NRD4062L TN6025	E71
NRD4062R TN6010	E71
NRD4062R TN6025	E71
NRD4125L TN6010	E71
NRD4125L TN6025	E71
NRD4125R TN6025	E71
NSL062 W	F25
NSL082V W	F25
NSL1010E2 W	E74, F25
NSL102B W	F25
NSL1212F2 W	E74, F25
NSL122B W	F25
NSL123A W	F25
NSL123B W	F25
NSL1616H2 W	E74, F25
NSL162C W	F25
NSL163C W	F25
NSL163D W	F25
NSL2020K2 W	E74, F25
NSL2020K3 W	E74, F25
NSL203D W	F25
NSL205D W	F25
NSL243D W	F25
NSL243E W	F25
NSL2525M2 W	E74, F25
NSL2525M3 W	E74, F25
NSL2525M4 W	E74, F25
NSL3225P3 W	E74, F25
NSL3225P4 W	E74, F25
NSL3232P3 W	E74, F25
NSL3232P4 W	E74, F25
NSL3232P5 W	E74, F25
NSL853D W	F25
NSR062 W	F24
NSR082V W	F24
NSR1010E2 W	E74, F24
NSR102B W	F24
NSR1212F2 W	E74, F24
NSR122B W	F24
NSR123A W	F24
NSR123B W	F24
NSR1616H2 W	E74, F24
NSR162C W	F24
NSR163C W	F24
NSR163D W	F24
NSR2020K2 W	E74, F24
NSR2020K3 W	E74, F24
NSR203D W	F24
NSR205D W	F24
NSR243D W	F24
NSR243E W	F24
NSR245D W	F24
NSR2525M2 W	E74, F24
NSR2525M3 W	E74, F24
NSR2525M4 W	E74, F24
NSR3225P3 W	E74, F24
NSR3225P4 W	E74, F24
NSR3232P3 W	E74, F24
NSR3232P4 W	E74, F24
NSR853D W	F24
NST1	C40–41
NST2	C40–41
NST3	C40–41
NT1L TN6010	F13
NT1L TN6025	F13
NT2L TN6010	F14
NT2L TN6025	F14
NT2LK TN6010	F13
NT2LK TN6025	F13
NT2R TN6010	F14
NT2R TN6025	F14
NT2RK TN6010	F13
NT2RK TN6025	F13
NT3L TN6010	F14
NT3L TN6025	F14
NT3LK TN6010	F13
NT3LK TN6025	F13
NT3R TN6010	F14
NT3R TN6025	F14
NT3RCK TN6010	F15
NT3RCK TN6025	F15
NT3RK TN6010	F13
NT3RK TN6025	F13
NT4L TN6025	F14
NT4R TN6010	F14
NT4R TN6025	F14
NT4RK TN6025	F13
NTB3LB TN6025	F22
NTC3L12I TN6025	F17
NTC3R12E TN6010	F17
NTC3R12E TN6025	F17
NTC3R14E TN6010	F17
NTC3R16E TN6010	F17
NTC3R16E TN6025	F17
NTF2R TN6010	F16
NTF2R TN6025	F16
NTF3L TN6010	F16
NTF3L TN6025	F16
NTF3R TN6010	F16
NTF3R TN6025	F16
NTK2R TN6010	F16
NTK2R TN6025	F16
NTK3L TN6025	F16
NTK3R TN6010	F16
NTK3R TN6025	F16
NTP2L TN6010	F15
NTP2L TN6025	F15
NTP2R TN6010	F15
NTP2R TN6025	F15
NTP3L TN6010	F15
NTP3L TN6025	F15
NTP3R TN6010	F15
NTP3R TN6025	F15
NTP4R TN6025	F15
NVR102R W	F74
NVR132R W	F74
NVR163L W	F74
NVR163R W	F74
NVR204R W	F74
NWC3R11E TN6025	F19
NWC3R14E TN6025	F19
OVR122R W	F75
OVR152R W	F75
PCBNL2020K12 WG	C20
PCBNL2525M12 WG	C20
PCBNL2525M16 WG	C20
PCBNL3225P16 WG	C20
PCBNL3232P16 WG	C20
PCBNL3232P19 WG	C20
PCBNL4040S19 WG	C20
PCBNR2020K12 WG	C20
PCBNR2525M12 WG	C20
PCBNR2525M16 WG	C20
PCBNR3225P16 WG	C20
PCBNR3232P16 WG	C20
PCBNR3232P19 WG	C20
PCBNR4040S19 WG	C20
PCKNL2020K12 WG	C21
PCKNL2525M12 WG	C21
PCKNL2525M16 WG	C21
PCKNL3225P16 WG	C21
PCKNL3232P16 WG	C21
PCKNL3232P19 WG	C21
PCKNL4040S19 WG	C21
PCKNR2020K12 WG	C21
PCKNR2525M12 WG	C21
PCKNR2525M16 WG	C21
PCKNR3225P16 WG	C21
PCKNR3232P16 WG	C21
PCKNR3232P19 WG	C21
PCKNR4040S19 WG	C21
PCLNL1616H09 WG	C22
PCLNL1616H12 WG	C22
PCLNL16CA12 WG	C104
PCLNL2020K12 WG	C22
PCLNL20CA16 WG	C104
PCLNL2525M12 WG	C22
PCLNL2525M16 WG	C22
PCLNL3225P12 WG	C22
PCLNL3225P19 WG	C22
PCLNL3232P16 WG	C22
PCLNL3232P19 WG	C22
PCLNL4040S19 WG	C22
PCLNR12CA12 WG	C104
PCLNR1616H09 WG	C22
PCLNR1616H12 WG	C22
PCLNR16CA12 WG	C104
PCLNR2020K12 WG	C22
PCLNR2525M12 WG	C22
PCLNR2525M16 WG	C22
PCLNR3225P12 WG	C22
PCLNR3225P16 WG	C22
PCLNR3225P19 WG	C22
PCLNR3232P16 WG	C22
PCLNR3232P19 WG	C22
PCLNR4040S19 WG	C22
PDJNL1616H11 WG	C23
PDJNL2020K11 WG	C23
PDJNL2020K15 WG	C23
PDJNL2525M11 WG	C23
PDJNL2525M15 WG	C23
PDJNL3225P15 WG	C23
PDJNL3232P15 WG	C23
PDJNL4025R15 WG	C23
PDJNR1616H11 WG	C23
PDJNR2020K11 WG	C23
PDJNR2020K15 WG	C23
PDJNR2525M11 WG	C23
PDJNR3225P15 WG	C23
PDJNR3232P15 WG	C23
PDJNR4025R15 WG	C23
PDNNL2525M15 WG	C24
PDNNL3225P15 WG	C24
PDNNR2525M15 WG	C24
PDNNR3225P15 WG	C24
PDNNR4025M15 WG	C24
PSBNL2020K12 WG	C25
PSBNL2525M12 WG	C25
PSBNL2525M15 WG	C25
PSBNL3232P15 WG	C25
PSBNL3232P19 WG	C25
PSBNL4040S19 WG	C25
PSBNL4040S25 WG	C25
PSBNL5050T25 WG	C25
PSBNR2020K12 WG	C25
PSBNR2525M12 WG	C25
PSBNR2525M15 WG	C25
PSBNR3232P15 WG	C25
PSBNR3232P19 WG	C25
PSBNR4040S19 WG	C25
PSBNR4040S25 WG	C25
PSDNN1616H09 WG	C26
PSDNN2020K12 WG	C26
PSDNN2525M12 WG	C26
PSDNN3225P15 WG	C26
PSDNN3232P15 WG	C26
PSDNN4040S25 WG	C26
PSKNL1616H09 WG	C26
PSKNL16CA12 WG	C105
PSKNL2020K12 WG	C26
PSKNL2525M12 WG	C26
PSKNL3232P19 WG	C26
PSKNL4040S19 WG	C26
PSKNR12CA12 WG	C105
PSKNR16CA12 WG	C105
PSKNR2020K12 WG	C26
PSKNR20CA15 WG	C105
PSKNR2525M12 WG	C26
PSKNR2525M15 WG	C26
PSKNR3232P19 WG	C26
PSKNR4040S19 WG	C26
PSSNL1616H09 WG	C27
PSSNL2020K09 WG	C27
PSSNL2020K12 WG	C27
PSSNL2525M12 WG	C27
PSSNL2525M15 WG	C27
PSSNL3225P12 WG	C27
PSSNL3225P15 WG	C27
PSSNL3232P15 WG	C27
PSSNL3232P19 WG	C27
PSSNL4040S19 WG	C27
PSSNL4040S25 WG	C27
PSSNR1616H09 WG	C27
PSSNR2020K09 WG	C27
PSSNR2020K12 WG	C27
PSSNR2525M12 WG	C27
PSSNR2525M15 WG	C27
PSSNR3225P12 WG	C27
PSSNR3225P15 WG	C27
PSSNR3232P15 WG	C27
PSSNR3232P19 WG	C27
PSSNR4040S19 WG	C27
PTFNL1616H16 WG	C28
PTFNL2020K16 WG	C28
PTFNL2525M16 WG	C28
PTFNR1616H16 WG	C28
PTFNR2020K16 WG	C28
PTFNR2525M16 WG	C28
PTFNR2525M22 WG	C28
PTFNR3225P22 WG	C28
PTFNR3232P22 WG	C28
PTGNL1616H16 WG	C29
PTGNL2020K16 WG	C29
PTGNL2525M16 WG	C29
PTGNL2525M22 WG	C29
PTGNL3232P22 WG	C29
PTGNL4040T27 WG	C29
PTGNR1616H16 WG	C29

Catalogue No.	Page(s)
PTGNR2020K16 WG	C29
PTGNR2525M16 WG	C29
PTGNR2525M22 WG	C29
PTGNR3225P22 WG	C29
PTGNR3232P22 WG	C29
PTGNR4040T27 WG	C29
PWLNL1616H06 WG	C30
PWLNL2020K06 WG	C30
PWLNL2020K08 WG	C30
PWLNL2525M06 WG	C30
PWLNL2525M08 WG	C30
PWLNL3232P08 WG	C30
PWLNR1616H06 WG	C30
PWLNR2020K06 WG	C30
PWLNR2020K08 WG	C30
PWLNR2525M06 WG	C30
PWLNR2525M08 WG	C30
PWLNR3232P08 WG	C30
Q8BIT WG	D59, D71, D84
Q8KEY WG	D59, D71, D84
QBIT WG	D59, D71, D84
QC15 WG	D59, D71, D84
QC21	D19
QC21 WG	D18–20, D59, D71, D84
QC26	D18–20
QCBM102540R WG	D20
QCBM102545R WG	D20
QCBM122540L WG	D20
QCBM122545L WG	D20
QCBM122545R WG	D20
QCBMW102543L WG	D24
QCBMW102543R WG	D24
QCBMW122543L WG	D24
QKEY WG	D59, D71, D84
QSBM101270L WG	D18
QSBM101275L WG	D18
QSBM101275R WG	D18
QSBM121520L WG	D18
QSBM1316385L WG	D19
QSBM1316385R WG	D19
QSBM1316635L WG	D19
QSBM1316635R WG	D19
QSBM15920630R WG	D19
QSBM15920635R WG	D19
QSBM9912295R WG	D19
QSBM9912480R WG	D19
QSBM9912485L WG	D19
QSBM9912485R WG	D19
QSBM9916295L WG	D19
QSBM9916295R WG	D19
QSBM9916480R WG	D19
QSBM9916485R WG	D19
QSBM9920385L WG	D19
QSBM9920385R WG	D19
QSBMW101273L WG	D24
QSBMW121523R WG	D24
QSOM9516385R WG	D20
QTBIT WG	D59, D71, D84
QTM20 WG	D24, D59, D71, D84
QTM26 WG	D59, D71, D84
RCGT0803M0AL1 HCK10	B156
RCGT0803M0AL1 HWK10	B156
RCGX060400T01020 CW3020	B183
RCGX090700T01020 CW2015	B183
RCGX090700T01020 CW3020	B183
RCGX090700T02020 CW2015	B183
RCGX090700T07015 CW2015	B183
RCGX120700T01020 CW3020	B183
RCGX120700T02020 CW2015	B183
RCGX120700T20015 CW2015	B183
RCMT0602M0 THM	B65
RCMT0602M0 WK20CT	B65
RCMT0602M0 WP15CT	B65
RCMT0602M0 WP25CT	B65
RCMT0803M0 THM	B65
RCMT0803M0 WK20CT	B65
RCMT0803M0 WP15CT	B65
RCMT0803M0 WP25CT	B65
RCMT10T3M0 THM	B65
RCMT10T3M0 TTR	B65
RCMT10T3M0 WK20CT	B65
RCMT10T3M0 WP15CT	B65
RCMT10T3M0 WP25CT	B65
RCMT10T3M0 WP35CT	B65
RCMT1204M0 THM	B65
RCMT1204M0 WK20CT	B65
RCMT1204M0 WP15CT	B65
RCMT1204M0 WP25CT	B65
RCMT1204M0 WP35CT	B65
RCMT1606M0 WK20CT	B65
RCMT1606M0 WP15CT	B65
RCMT1606M0 WP35CT	B65
RCMT1606M043 THM	B65
RCMT1606M043M TN6540	M97
RCMT1606M043M TN7525	M97
RCMT1606M043M TN7535	M97
RCMT1606M0T WP25CT	B66
RCMT1606M0TX TN2510	M97
RCMT1606M0TX TN6525	M97
RCMT1606M0TX TN6540	M97
RCMT1606M0TX TN7525	M97
RCMT1606M0TX TN7535	M97
RCMX2006M0T WK20CT	B66
RCMX2006M0T WP15CT	B66
RCMX2006M0T WP25CT	B66
RCMX2006M0T WP35CT	B66
RCMX2507M0T TTR	B66
RCMX2507M0T WK20CT	B66
RCMX2507M0T WP15CT	B66
RCMX2507M0T WP25CT	B66
RCMX2507M0T WP35CT	B66
RCMX3209M0T WP15CT	B66
RDHT0802M0T TN7525	M75
RDHT1003M0T TN7525	M80
RDHT1204M0TX TN7525	M86
RDHT1605M0TX TTI25	M92
RDHW1003M0MH TN2510	M80
RDHW1204M0MH TN2510	M86
RDHX07T1M0SNMH TN2505	M44
RDHX07T1M0SNMH TN6525	M44
RDHX07T1M0SNMH TN6540	M44
RDMT0802M0T TN7525	M75
RDMT0802M0T TN7535	M75
RDMT1003M0T TN6525	M81
RDMT1003M0T TN6540	M81
RDMT1003M0T TN7525	M81
RDMT1003M0T TN7535	M81
RDMT1204M0TX TN2510	M87
RDMT1204M0TX TN6525	M87
RDMT1204M0TX TN6540	M87
RDMT1204M0TX TN7525	M87
RDMT1204M0TX TN7535	M87
RDMT1204M0TX WS30PM	M87
RDMT1605M0TX TN6525	M92
RDMT1605M0TX TN6540	M92
RDMT1605M0TX TN7525	M92
RDMT1605M0TX TN7535	M92
RDMW0802M0 THM	M76
RDMW0802M0 TN2510	M76
RDMW0802M0T TN6540	M76
RDMW0802M0T TN7535	M76
RDMW1003M0 TN2510	M81
RDMW1003M0T TN6540	M81
RDMW1003M0T TN7525	M81
RDMW1003M0T TN7535	M81
RDMW1003M0T TTI25	M81
RDMW1204M0TX TN2510	M87
RDMW1204M0TX TN6540	M87
RDMW1204M0TX TN7525	M87
RDMW1204M0TX TN7535	M87
RDMW1204M0TX WK15CM	M87
RDMW1605M0TX TN6540	M93
RDMW1605M0TX TN7525	M93
RDMW1605M0TX TN7535	M93
RDPT1204M0SMMX TN6540	M87
RDPT1204M0SMMX TN7535	M87
RDPX0702M0SNMH TN2505	M49
RDPX0702M0SNMH TN6525	M49
RDPX0702M0SNMH TN6540	M49
RDPX1003M0SNMH TN2505	M56
RDPX1003M0SNMH TN6525	M56
RDPX1003M0SNMH TN6540	M56
RDPX1003M0SNMM TN6525	M56
RDPX1003M0SNMM TN6540	M56
RDPX12T3M0SNMH TN2505	M63
RDPX12T3M0SNMH TN6525	M63
RDPX12T3M0SNMH TN6540	M63
RDPX12T3M0SNMM TN6525	M63
RDPX12T3M0SNMM TN6540	M63
RDPX1604M0SNMH TN2505	M68
RDPX1604M0SNMH TN6525	M68
RDPX1604M0SNMH TN6540	M68
RDPX1604M0SNMM TN6525	M68
RDPX1604M0SNMM TN6540	M68
RFX185FBH022029 WG	W52
RFX185LS WG	W56, W58, W60, W62, W65–66
RFX185RFX185030M WG	W65
RFX185TCHS022030 WG	W36
RFX245FBH029038 WG	W52
RFX245LS WG	W56, W58, W60, W62, W65–66
RFX245RFX245035M WG	W65
RFX245TCHS030039 WG	W36
RFX320FBH038050 WG	W52
RFX320LS WG	W56–62, W65–66
RFX320RFX185030M WG	W66
RFX320RFX245040M WG	W66
RFX320RFX320050M WG	W65
RFX320TCHS039050 WG	W36
RFX420FBH050065 WG	W52
RFX420FBHBB006022 WG	W49
RFX420LS WG	W56–63, W65–66
RFX420RFX185035M WG	W66
RFX420RFX245045M WG	W66
RFX420RFX320045M WG	W66
RFX420RFX420060M WG	W65
RFX420TCHS050067 WG	W36
RFX550CS27030M WG	W64
RFX550FBH065088 WG	W52
RFX550LS WG	W56–63, W65–66
RFX550RFX185040M WG	W66
RFX550RFX245050M WG	W66
RFX550RFX320050M WG	W66
RFX550RFX420055M WG	W66
RFX550RFX550090M WG	W65
RFX550TCHS067088 WG	W36
RFX720CS40035M WG	W64
RFX720FBH088115 WG	W52
RFX720LS WG	W57, W59, W61–63, W65
RFX720RFX420060M WG	W66
RFX720RFX550060M WG	W66
RFX720RFX720100M WG	W65
RFX720TCHS088115 WG	W36
RNGJ10T3M0EML WP25PM	M24
RNGJ10T3M0EML WP35CM	M24
RNGJ10T3M0EML WS30PM	M24
RNGJ10T3M0EML WU35PM	M24
RNGJ10T3M0SMM WP25PM	M24
RNGJ10T3M0SMM WS30PM	M24
RNGJ10T3M0SMM WU35PM	M24
RNGJ1204M0EML WP25PM	M32
RNGJ1204M0EML WP35CM	M32
RNGJ1204M0EML WS30PM	M32
RNGJ1204M0EML WU35PM	M32
RNGJ1204M0SMH WK15PM	M33
RNGJ1204M0SMH WP25PM	M33
RNGJ1204M0SMH WP35CM	M33
RNGJ1204M0SMH WU35PM	M33
RNGJ1204M0SMM WK15PM	M32
RNGJ1204M0SMM WP25PM	M32
RNGJ1204M0SMM WP35CM	M32
RNGJ1204M0SMM WS30PM	M32
RNGJ1204M0SMM WU35PM	M32
RNGJ1605M0EML WP25PM	M37
RNGJ1605M0EML WP35CM	M37
RNGJ1605M0EML WS30PM	M37
RNGJ1605M0EML WU35PM	M37
RNGN090300T01020 CW3020	B184
RNGN090400T02020 CW2015	B184
RNGN120400T01020 CW3020	B184
RNGN120400T02020 CW2015	B184
RNGN120400T02020 CW5025	B184
RNGN120700T01020 CW3020	B184
RNGN120700T02020 CW2015	B184
RNGN120700T10015 CW2015	B184
RNGN120700T20015 CW2015	B184
RNGN150700T02020 CW2015	B184
RNGN150700T02020 CW5025	B184
RNMA120400 WK05CT	B67
RNMA120400 WK20CT	B67
RNMG090300RH WP15CT	B67
RNMG090300RH WP25CT	B67
RNMG120400RH WP15CT	B67
RNMG120400RH WP25CT	B67
RNMG120400RH WP35CT	B67
RNMG12047N TN20K	B133
RNMG12047N TN20P	B133
RNMG190600RH WK20CT	B67
RNMG190600RH WP15CT	B67
RNMG190600RH WP25CT	B67
RNMG190600RH WP35CT	B67
RNMG19067N TN10P	B133
RNMG19067N TN20P	B133
RNMN090300S02020 WBK40U	B210
RNMN120300S02020 WBH40C	B210
RNMN120300S02020 WBK40U	B210
RNMN120400S02020 WBK40U	B210
RNPJ10T3M0SMH WK15CM	M25
RNPJ10T3M0SMH WP20CM	M25
RNPJ10T3M0SMH WP25PM	M25
RNPJ10T3M0SMH WP35CM	M25

Catalogue No.	Page(s)
RNPJ10T3M0SMH WP40PM	M25
RNPJ10T3M0SMH WU35PM	M25
RNPJ10T3M0SMM WP20CM	M25
RNPJ10T3M0SMM WP25PM	M25
RNPJ10T3M0SMM WP35CM	M25
RNPJ10T3M0SMM WP40PM	M25
RNPJ1204M0SMH WK15CM	M33
RNPJ1204M0SMH WP20CM	M33
RNPJ1204M0SMH WP25PM	M33
RNPJ1204M0SMH WP35CM	M33
RNPJ1204M0SMH WP40PM	M33
RNPJ1204M0SMH WU35PM	M33
RNPJ1204M0SMM WP20CM	M33
RNPJ1204M0SMM WP25PM	M33
RNPJ1204M0SMM WP35CM	M33
RNPJ1204M0SMM WP40PM	M33
RNPJ1204M0SMM WU35PM	M33
RNPJ1605M0SMH WK15CM	M38
RNPJ1605M0SMH WP20CM	M38
RNPJ1605M0SMH WP25PM	M38
RNPJ1605M0SMH WP35CM	M38
RNPJ1605M0SMH WP40PM	M38
RNPJ1605M0SMH WU35PM	M38
RNPJ1605M0SMM WP20CM	M38
RNPJ1605M0SMM WP25PM	M38
RNPJ1605M0SMM WP35CM	M38
RNPJ1605M0SMM WP40PM	M38
RNPJ1605M0SMM WU35PM	M38
RPGX060400T01020 CW3020	B185
RPGX090700T01020 CW3020	B185
RPGX120700T01020 CW3020	B185
S2112	F24–25
S310	F24–25
S32SCCLNL12MX7 WG	C62
S32SCCLNR12MX7 WG	C62
S352	F24–25
S40TCCLNL12MN4 WG	C62
S40TCCLNL12MN7 WG	C62
S40TCCLNL12MX7 WG	C62
S40TCCLNR12MN4 WG	C62
S40TCCLNR12MN7 WG	C62
S40TCCLNR12MX7 WG	C62
S40TCDQNL12MX7 WG	C63
S40TCDQNR12MX7 WG	C63
S40TCSSNL12MX7 WG	C63
S40TCSSNR12MX7 WG	C63
S40TCSYNL12MN7 WG	C64
S40TCSYNR12MN7 WG	C64
S40TCWLNL08MX7 WG	C64
S40TCWLNR08MX7 WG	C64
SALS063	H64
SALS080	H64
SALS100	H64
SALS125	H64
SALS160	H64
SBIT WG	D59, D71, D84
SC30 WG	D21–22, D59, D71, D84
SCBM162540L WG	D21
SCBM162540R WG	D21
SCBM162545L WG	D21
SCBM162545R WG	D21
SCBM202540L WG	D21
SCBM202545L WG	D21
SCBM202545R WG	D21
SCDPL1212H06 WG	C42
SCDPR1212H06 WG	C42
SCFPL08CA06 WG	C110
SCFPR06CA05 WG	C110
SCFPR08CA06 WG	C110
SCFPR10CA09 WG	C110
SCGN090412T00520 CW5025	B186
SCGPL08CA06 WG	C111
SCGPR08CA06 WG	C111
SCGT120408AL3 HWK15	B156
SCLCL1010E06 WG	C42
SCLCL1212F06 WG	C42
SCLCL1212F09 WG	C42
SCLCL12CA12 WG	C112
SCLCL1616H09 WG	C42
SCLCL16CA12 WG	C112
SCLCL2020K09 WG	C42
SCLCL2020K12 WG	C42
SCLCL2525M12 WG	C42
SCLCR1010E06 WG	C42
SCLCR10CA09 WG	C112
SCLCR1212F06 WG	C42
SCLCR1212F09 WG	C42
SCLCR12CA12 WG	C112
SCLCR1616H09 WG	C42
SCLCR2020K09 WG	C42
SCLCR2020K12 WG	C42
SCLCR2525M12 WG	C42
SCLPL06CA05 WG	C113
SCLPL08CA06 WG	C113
SCLPL10CA09 WG	C113
SCLPL1212M06 WG	C43
SCLPR06CA05 WG	C113
SCLPR08CA06 WG	C113
SCLPR1010M06 WG	C43
SCLPR10CA09 WG	C113
SCLPR1212M06 WG	C43
SCMT090304 TN7115	B68
SCMT090304 TTR	B68
SCMT090308MU TN5120	B69
SCMT090308MU WK20CT	B69
SCMT090308MU WP15CT	B69
SCMT09T304 THM	B68
SCMT09T3041P TN10P	B134
SCMT09T3041P TN10U	B134
SCMT09T3041P TN15M	B134
SCMT09T3041P TN20K	B134
SCMT09T3041P TN20P	B134
SCMT09T3041P TN30M	B134
SCMT09T304FP WK20CT	B68
SCMT09T304FP WM15CT	B68
SCMT09T304FP WM25CT	B68
SCMT09T304FP WP15CT	B68
SCMT09T304FP WP25CT	B68
SCMT09T304MP WK20CT	B69
SCMT09T304MP WM15CT	B69
SCMT09T304MP WM25CT	B69
SCMT09T304MP WP25CT	B69
SCMT09T304MU TN8025	B69
SCMT09T304MU WM25CT	B69
SCMT09T308 THM	B68
SCMT09T308 TTR	B68
SCMT09T3081P TN10P	B134
SCMT09T3081P TN10U	B134
SCMT09T3081P TN15M	B134
SCMT09T3081P TN20K	B134
SCMT09T3081P TN20P	B134
SCMT09T3081P TN30M	B134
SCMT09T308FP WK20CT	B68
SCMT09T308FP WM15CT	B68
SCMT09T308FP WM25CT	B68
SCMT09T308FP WP15CT	B68
SCMT09T308FP WP25CT	B68
SCMT09T308MP WK20CT	B69
SCMT09T308MP WM15CT	B69
SCMT09T308MP WM25CT	B69
SCMT09T308MP WP15CT	B69
SCMT09T308MP WP25CT	B69
SCMT09T308MU TN5120	B69
SCMT09T308MU WK20CT	B69
SCMT09T308MU WM25CT	B69
SCMT09T308MU WP15CT	B69
SCMT09T308MU WP25CT	B69
SCMT09T308MU WP35CT	B69
SCMT09T308MU WS10PT	B69
SCMT1204041P TN10U	B134
SCMT120404FP WM25CT	B68
SCMT120404FP WP25CT	B68
SCMT120404MP WK20CT	B69
SCMT120404MP WM15CT	B69
SCMT120404MP WM25CT	B69
SCMT120404MP WP25CT	B69
SCMT120408 THM	B68
SCMT120408 TTR	B68
SCMT1204081P TN10P	B134
SCMT1204081P TN10U	B134
SCMT1204081P TN15M	B134
SCMT1204081P TN20K	B134
SCMT1204081P TN20P	B134
SCMT1204081P TN30M	B134
SCMT120408FP WK20CT	B68
SCMT120408FP WM15CT	B68
SCMT120408FP WM25CT	B68
SCMT120408FP WP15CT	B68
SCMT120408FP WP25CT	B68
SCMT120408MP WK20CT	B69
SCMT120408MP WM15CT	B69
SCMT120408MP WM25CT	B69
SCMT120408MP WP15CT	B69
SCMT120408MP WP25CT	B69
SCMT120412 THM	B68
SCMT120412 TTI15	B68
SCMT120412FP WK20CT	B68
SCMT120412FP WM25CT	B68
SCMT120412FP WP15CT	B68
SCMT120412FP WP25CT	B68
SCMT120412MP WK20CT	B69
SCMT120412MP WM15CT	B69
SCMT120412MP WM25CT	B69
SCMT120412MP WP25CT	B69
SCMT150512 THM	B68
SCMT150512 TTR	B68
SCMW090304 THM	B70
SCMW090304 WK05CT	B70
SCMW090304 WK20CT	B70
SCMW09T308 SP0G00	B70
SCMW09T308 WK20CT	B70
SCMW120408 THM	B70
SCMW120408 WK05CT	B70
SCMW120408 WK20CT	B70
SCRPL08CA06 WG	C114
SCRPR08CA06 WG	C114
SCSPR06CA05 WG	C115
SCSPR08CA06 WG	C115
SCTPL08CA06 WG	C116
SCTPR06CA05 WG	C116
SCTPR08CA06 WG	C116
SCUN120412T00520 CW2015	B186
SCWPL08CA06 WG	C117
SCWPR08CA06 WG	C117
SDBM162540L WG	D22
SDBM162540R WG	D22
SDBM162545L WG	D22
SDBM162545R WG	D22
SDBM202540L WG	D22
SDBM202540R WG	D22
SDBM202545L WG	D22
SDBM202545R WG	D22
SDEX120408FRALP THM-U	J46
SDHCL1616H11 WG	C43
SDHCL2020K11 WG	C43
SDHCL2525M11 WG	C43
SDHCL2525M15 WG	C43
SDHCR1616H11 WG	C43
SDHCR2020K11 WG	C43
SDHCR2525M11 WG	C43
SDHCR2525M15 WG	C43
SDJCL1010E07 WG	C44
SDJCL1212F07 WG	C44
SDJCL1212F11 WG	C44
SDJCL1616H07 WG	C44
SDJCL1616H11 W	C44
SDJCL1616H11 WG	C44
SDJCL2020K07 WG	C44
SDJCL2020K11 WG	C44
SDJCL2020K15 WG	C44
SDJCL2525M11 WG	C44
SDJCL2525M15 WG	C44
SDJCL3225P15 WG	C44
SDJCR1010M07 WG	C44
SDJCR1212F07 WG	C44
SDJCR1212F11 WG	C44
SDJCR1616H07 WG	C44
SDJCR1616H11 WG	C44
SDJCR2020K07 WG	C44
SDJCR2020K11 WG	C44
SDJCR2020K15 WG	C44
SDJCR2525M11 WG	C44
SDJCR2525M15 WG	C44
SDJCR3225P15 WG	C44
SDJPL10CA07 WG	C118
SDJPR10CA07 WG	C118
SDMT1204PDRMH THM	J46, K7
SDMT1204PDRMH TN2510	J46
SDMT1204PDRMH TN6520	J46, K7
SDMT1204PDRMH TN6525	J46, K7
SDMT1204PDRMH TN6540	J46, K7
SDMT1204PDRMH TN7525	J46, K7
SDMT1204PDRMH TN7535	J46, K7
SDMT1204PDRMH WK15CM	J46, K7
SDMT1204PDRML THM	J45, K6
SDMT1204PDRML TN6520	J45, K6
SDMT1204PDRML TN6540	J45, K6
SDMT1204PDRML TN7525	J45, K6
SDMT1204PDRML TN7535	J45, K6
SDMT1204PDRML WK15CM	J45, K6
SDMT1506PDRMH TN2510	J50
SDMT1506PDRMH TN6540	J50
SDMT1506PDRMH TN7525	J50
SDMT1506PDRMH TN7535	J50
SDMT1506PDRMH WK15CM	J50
SDMT1506PDRML TN6540	J49
SDMT1506PDRML TN7525	J49
SDMT1506PDRML TN7535	J49
SDMT1506PDRML WK15CM	J49
SDMW090308 THM	I8
SDMW090308 TN7525	I8
SDMX120408RMH TN6540	J46, K7

Catalogue No.	Page(s)
SDMX120408RMH TN7525	J46, K7
SDMX120408RMH TN7535	J46, K7
SDMX120408RMH WK15CM	J46, K7
SDMX120408RMM TN6525	J45, K6
SDMX120408RMM TN6540	J45, K6
SDMX120408RMM TN7525	J45, K6
SDMX120408RMM TN7535	J45, K6
SDMX120408RMM WS30PM	J45, K6
SDMX120412RMH TN6520	J46, K7
SDMX120412RMH TN6525	J46, K7
SDMX120412RMH TN6540	J46, K7
SDMX120412RMH TN7525	J46, K7
SDMX120412RMH TN7535	J46, K7
SDMX120412RMH WK15CM	J46, K7
SDMX120412RMM TN6525	J45, K6
SDMX120412RMM TN6540	J45, K6
SDMX120412RMM TN7525	J45, K6
SDMX120412RMM TN7535	J45, K6
SDMX120412RMM WS30PM	J45, K6
SDMX120416RMH TN6540	J46, K7
SDMX120416RMH TN7535	J46, K7
SDMX120416RMM TN6520	J45, K6
SDMX120416RMM TN6525	J45, K6
SDMX120416RMM TN6540	J45, K6
SDMX120424RMM TN6540	J45, K6
SDMX120424RMM TN7535	J45, K6
SDMX120432RMM TN6540	J45, K6
SDMX120432RMM TN7535	J45, K6
SDMX150612RMH TN6540	J50
SDMX150612RMH TN7525	J50
SDMX150612RMH TN7535	J50
SDMX150612RMH WK15CM	J50
SDMX150612RMM TN6540	J49
SDMX150612RMM TN7525	J49
SDMX150616RMH TN6540	J50
SDMX150616RMH TN7535	J50
SDNCN0808L07 WG	C45
SDNCN1010M07 WG	C45
SDNCN1212F11 WG	C45
SDNCN1616H11 WG	C45
SDNCN2020K11 WG	C45
SDNCN2525M11 WG	C45
SDNCN2525M15 WG	C45
SDNCN3225P15 WG	C45
SDNT090308 TN450	I8
SDNT090308 TN7525	I8
SDNT090308 TN7535	I8
SDNT090308T SPTM00	I8
SDNT090308T TN2510	I8
SDR100031E0NW WDN00U	H66
SDR100031E0W4 WDN00U	H66
SDR100031E1W4 WDN00U	H66
SDR100093E1W4 WDN00U	H66
SDR102 WDN00U	H66
SF06306RH W	H64
SF08008RH W	H64
SF10012RH W	H64
SF12515RH W	H64
SF16018RH W	H64
SF20024RH W	H64
SKCP343 K9	C42
SKCP453 K9	C42, C67
SKDP343 K9	C43–45
SKDP453 K9	C43–45, C73
SKEY WG	D59, D71, D84
SKRN100300 K9	C45
SKRN1203M0 K9	C45
SKRN160400 K9	C45
SKSN566K K9	C97–99
SKSP343 K9	C46–47
SKSP453 K9	C46–47
SKTP343 K9	C48
SKVN343 K9	C48–49
SM819 K9	C37–39
SM820 K9	C36
SM837 K9	C37, C39, C109
SM840 K9	C36–37, C108
SM841 K9	C37–39, C65
SMAC087 WG	W39
SMAC200 WG	W41
SMYE3 K9	F70–72, F74, F77
SMYE4 K9	F70–72, F74, F77
SMYE5 K9	F70–72
SMYI3 K9	F70–72, F74, F77
SMYI4 K9	F70–72, F74, F77
SMYI5 K9	F71–72, F74
SN3TPKG	F77
SNGA120404S01025MT WBH25P	B211
SNGA120408S01025MT WBH10U	B211
SNGA120408S01025MT WBH25P	B211
SNGA120408T02020 CW2015	B189
SNGA120408T02020 CW5025	B189
SNGA120412S01025MT WBH10U	B211
SNGA120412S01025MT WBH25P	B211
SNGA120412T02020 CW2015	B189
SNGA120412T02020 CW5025	B189
SNGA120416T02020 CW2015	B189
SNGA120416T02020 CW5025	B189
SNGA150612T02020 CW5025	B189
SNGA150616T02020 CW5025	B189
SNGG120408FS WS10PT	B70
SNGG120408FS WU10HT	B70
SNGN090308T02020 CW2015	B187
SNGN090412T00515 CW2015	B187
SNGN120408T00520 CW2015	B187
SNGN120408T02020 CW2015	B187
SNGN120408T02020 CW5025	B187
SNGN120412T01020 CW3020	B187
SNGN120412T02020 CW2015	B187
SNGN120412T02020 CW5025	B187
SNGN120416T01020 CW3020	B187
SNGN120416T02020 CW5025	B187
SNGN120704T02020 CW2015	B187
SNGN120708T02020 CW2015	B187
SNGN120712T00520 CW2015	B187
SNGN120712T01020 CW3020	B187
SNGN120712T02020 CW2015	B188
SNGN120712T02020 CW5025	B188
SNGN120716T00520 CW2015	B188
SNGN120716T01020 CW3020	B188
SNGN120716T02020 CW5025	B188
SNGN120720T02020 CW2015	B188
SNGN120720T10015 CW2015	B188
SNGN150712T02020 CW2015	B188
SNGN150716T02020 CW2015	B188
SNGN190720K20015 CW2015	B188
SNGN190720T20015 CW2015	B188
SNGX120708T02020 CW5025	B189
SNGX120712T01020FW CW5025	B190
SNGX150716T02020 CW5025	B189
SNKT1205AZER20 TN450	H54
SNKT1205AZER20 TN6540	H54
SNKT1205AZER20 TN7525	H54
SNKT1205AZER20 TN7535	H54
SNKT1205AZER20 TTI25	H54
SNKT1205AZR21 THM	H54
SNKT1205AZR21 TN7525	H54
SNKT1205AZR21 TTI25	H54
SNKT1205AZR21 WK15CM	H54
SNKT1205AZR31 TN25M	H55
SNKT1205AZR31 TN6525	H55
SNKT1205AZR31 TN6540	H55
SNKT1205AZR31 TN7525	H55
SNKT1205AZR31 TN7535	H55
SNKT1205AZR31 WK15CM	H55
SNKT1505AZR31 TN450	H59
SNKT1505AZR31 TN7525	H59
SNKT1505AZR31 TN7535	H59
SNKT1505AZR31 WK15CM	H59
SNKT1505AZR31 WP25PM	H59
SNKT1505AZR31 WP35CM	H59
SNKT1505AZR31 WP40PM	H59
SNMA120408 HK1500	B71
SNMA120408 THM	B71
SNMA120408 TN20K	B134
SNMA120408 WK05CT	B71
SNMA120408 WK20CT	B71
SNMA120408S02020 WBK40U	B212
SNMA120412 HK1500	B71
SNMA120412 TN20K	B134
SNMA120412 WK05CT	B71
SNMA120412 WK20CT	B71
SNMA120412S02020 WBK40U	B212
SNMA120416 WK05CT	B71
SNMA120416 WK20CT	B71
SNMA150608 WK20CT	B71
SNMA150612 TN20K	B71, B134
SNMA150612 WK05CT	B71
SNMA150612 WK20CT	B71
SNMA150616 WK05CT	B71
SNMA150616 WK20CT	B71
SNMA190612 TN20K	B71, B134
SNMA190612 WK05CT	B71
SNMA190612 WK20CT	B71
SNMA190616 WK05CT	B71
SNMA190616 WK20CT	B71
SNMG090304FF WK20CT	B72
SNMG090304FF WP15CT	B72
SNMG090304FF WS10PT	B72
SNMG090304ML WP15CT	B72
SNMG0903082P TN10P	B135
SNMG0903082P TN10U	B135
SNMG0903082P TN20K	B135
SNMG0903082P TN20P	B135
SNMG0903086P TN10P	B136
SNMG0903086P TN20P	B136
SNMG090308FF WK20CT	B72
SNMG090308FF WM25CT	B72
SNMG090308FF WP15CT	B72
SNMG090308FF WS10PT	B72
SNMG090308ML WK05CT	B72
SNMG090308ML WK20CT	B72
SNMG090308ML WP15CT	B72
SNMG090308ML WP25CT	B72
SNMG1204046P TN10P	B136
SNMG1204046P TN15M	B136
SNMG1204046P TN20P	B136
SNMG1204046P TN30M	B136
SNMG120404FF WK20CT	B72
SNMG120404FF WM25CT	B72
SNMG120404FF WP15CT	B72
SNMG120404FF WS10PT	B72
SNMG120404ML WK20CT	B72
SNMG120404UF WM15CT	B74
SNMG120404UF WM25CT	B74
SNMG120404UF WS10PT	B74
SNMG120404UM WM15CT	B75
SNMG120404UM WM25CT	B75
SNMG120404UM WM35CT	B75
SNMG1204082P TN10P	B135
SNMG1204082P TN10U	B135
SNMG1204082P TN15M	B135
SNMG1204082P TN15U	B135
SNMG1204082P TN20K	B135
SNMG1204082P TN20P	B135
SNMG1204084P TN15M	B135
SNMG1204084P TN30M	B135
SNMG1204086P TN10P	B136
SNMG1204086P TN15M	B136
SNMG1204086P TN20P	B136
SNMG1204086P TN30M	B136
SNMG1204086P TN30P	B136
SNMG1204087N TN10P	B137
SNMG1204087N TN20K	B137
SNMG1204087N TN20P	B137
SNMG120408FF WK20CT	B72
SNMG120408FF WM25CT	B72
SNMG120408FF WP15CT	B72
SNMG120408FF WS10PT	B72
SNMG120408ML WK05CT	B72
SNMG120408ML WK20CT	B72
SNMG120408ML WP15CT	B72
SNMG120408ML WP25CT	B72
SNMG120408MR WM25CT	B73
SNMG120408MR WM35CT	B73
SNMG120408MR WP15CT	B73
SNMG120408MR WP25CT	B73
SNMG120408MR WP35CT	B73
SNMG120408MS WS10PT	B73
SNMG120408MS WS25PT	B73
SNMG120408MS WU10HT	B73
SNMG120408RH WK20CT	B74
SNMG120408RH WM25CT	B74
SNMG120408RH WP15CT	B74
SNMG120408RH WP25CT	B74
SNMG120408RH WP35CT	B74
SNMG120408UF WM15CT	B74
SNMG120408UF WM25CT	B74
SNMG120408UF WS10PT	B74
SNMG120408UM WM15CT	B75
SNMG120408UM WM25CT	B75
SNMG120408UM WM35CT	B75
SNMG120408UR WK20CT	B75
SNMG120408UR WM15CT	B75
SNMG120408UR WM25CT	B75
SNMG120408UR WM35CT	B75
SNMG120408UR WP15CT	B75
SNMG120408UR WP25CT	B75
SNMG120408UR WP35CT	B75
SNMG1204124P TN15M	B135
SNMG1204124P TN30M	B135
SNMG1204126P TN10P	B136
SNMG1204126P TN15M	B136
SNMG1204126P TN20P	B136
SNMG1204126P TN30M	B136
SNMG1204126P TN30P	B136
SNMG1204127N TN10P	B137
SNMG1204127N TN20K	B137
SNMG1204127N TN20P	B137
SNMG1204127N TN30P	B137
SNMG120412FF WK20CT	B72
SNMG120412FF WM25CT	B72

Catalogue No.	Page(s)
SNMG120412FF WP15CT	B72
SNMG120412ML WK05CT	B72
SNMG120412ML WK20CT	B72
SNMG120412ML WP15CT	B72
SNMG120412ML WP25CT	B72
SNMG120412MR WM25CT	B73
SNMG120412MR WM35CT	B73
SNMG120412MR WP15CT	B73
SNMG120412MR WP25CT	B73
SNMG120412MS WS10PT	B73
SNMG120412MS WS25PT	B73
SNMG120412MS WU10HT	B73
SNMG120412RH WK20CT	B74
SNMG120412RH WM25CT	B74
SNMG120412RH WP15CT	B74
SNMG120412RH WP25CT	B74
SNMG120412RH WP35CT	B74
SNMG120412UF WM15CT	B74
SNMG120412UF WM25CT	B74
SNMG120412UM WM15CT	B75
SNMG120412UM WM25CT	B75
SNMG120412UM WM35CT	B75
SNMG120412UR WK20CT	B75
SNMG120412UR WM15CT	B75
SNMG120412UR WM25CT	B75
SNMG120412UR WM35CT	B75
SNMG120412UR WP15CT	B75
SNMG120412UR WP25CT	B75
SNMG120412UR WP35CT	B75
SNMG120412UR WS25PT	B75
SNMG1204167N TN10P	B137
SNMG1204167N TN20K	B137
SNMG1204167N TN20P	B137
SNMG1204167N TN30P	B137
SNMG120416FF WM25CT	B72
SNMG120416ML WK20CT	B72
SNMG120416MR WM25CT	B73
SNMG120416MR WM35CT	B73
SNMG120416RH WK20CT	B74
SNMG120416RH WM25CT	B74
SNMG120416RH WP15CT	B74
SNMG120416RH WP25CT	B74
SNMG120416RH WP35CT	B74
SNMG120416UR WK20CT	B75
SNMG120416UR WM25CT	B75
SNMG120416UR WM35CT	B75
SNMG120416UR WP15CT	B75
SNMG120416UR WS10PT	B75
SNMG120416UR WS25PT	B75
SNMG150608MR WM25CT	B73
SNMG150608MR WM35CT	B73
SNMG150608RH WK20CT	B74
SNMG150608RH WM25CT	B74
SNMG150608RH WP15CT	B74
SNMG150608RH WP25CT	B74
SNMG150608RH WP35CT	B74
SNMG1506127N TN20K	B137
SNMG1506127N TN20P	B137
SNMG1506127N TN30P	B137
SNMG150612MR WM25CT	B73
SNMG150612MR WM35CT	B73
SNMG150612MR WP15CT	B73
SNMG150612MS WS25PT	B73
SNMG150612MS WU10HT	B73
SNMG150612RH WK20CT	B74
SNMG150612RH WM25CT	B74
SNMG150612RH WP15CT	B74
SNMG150612RH WP25CT	B74
SNMG150612RH WP35CT	B74
SNMG150612UR WK20CT	B75
SNMG150612UR WM15CT	B75
SNMG150612UR WM25CT	B75
SNMG150612UR WM35CT	B75
SNMG150612UR WP15CT	B75
SNMG150612UR WP25CT	B75
SNMG150612UR WP35CT	B75
SNMG150612UR WS25PT	B75
SNMG1506167N TN20K	B137
SNMG1506167N TN20P	B137
SNMG1506167N TN30P	B137
SNMG150616MR WM25CT	B73
SNMG150616MR WM35CT	B73
SNMG150616RH WK20CT	B74
SNMG150616RH WM25CT	B74
SNMG150616RH WP15CT	B74
SNMG150616RH WP25CT	B74
SNMG150616RH WP35CT	B74
SNMG150616UR WK20CT	B75
SNMG150616UR WM15CT	B75
SNMG150616UR WM25CT	B75
SNMG150616UR WM35CT	B75
SNMG150616UR WP15CT	B75
SNMG150616UR WP25CT	B75
SNMG150616UR WP35CT	B75
SNMG190608RH WK20CT	B74
SNMG190608RH WM25CT	B74
SNMG190608RH WP15CT	B74
SNMG190608RH WP25CT	B74
SNMG190608RH WP35CT	B74
SNMG1906126P TN15M	B136
SNMG1906126P TN20P	B136
SNMG1906126P TN30M	B136
SNMG1906126P TN30P	B136
SNMG1906127N TN20K	B137
SNMG1906127N TN20P	B137
SNMG1906127N TN30P	B137
SNMG190612MR WM25CT	B73
SNMG190612MR WM35CT	B73
SNMG190612MR WP15CT	B73
SNMG190612MR WP25CT	B73
SNMG190612MR WP35CT	B73
SNMG190612MS WS10PT	B73
SNMG190612MS WS25PT	B73
SNMG190612RH WK20CT	B74
SNMG190612RH WM25CT	B74
SNMG190612RH WP15CT	B74
SNMG190612RH WP25CT	B74
SNMG190612RH WP35CT	B74
SNMG190612UR WK20CT	B75
SNMG190612UR WM25CT	B75
SNMG190612UR WM35CT	B75
SNMG190612UR WP15CT	B75
SNMG190612UR WP25CT	B75
SNMG190612UR WP35CT	B75
SNMG190612UR WS25PT	B75
SNMG1906166P TN30P	B136
SNMG1906167N TN20K	B137
SNMG1906167N TN20P	B137
SNMG1906167N TN30P	B137
SNMG190616MR WM25CT	B73
SNMG190616MR WM35CT	B73
SNMG190616MR WP15CT	B73
SNMG190616RH WK20CT	B74
SNMG190616RH WM25CT	B74
SNMG190616RH WP15CT	B74
SNMG190616RH WP25CT	B74
SNMG190616RH WP35CT	B74
SNMG190616UR WK20CT	B75
SNMG190616UR WM15CT	B75
SNMG190616UR WM25CT	B75
SNMG190616UR WM35CT	B75
SNMG190616UR WP15CT	B75
SNMG190616UR WP25CT	B75
SNMG190616UR WP35CT	B75
SNMG190616UR WS25PT	B75
SNMG250924 WP35CT	B71
SNMM12040865 TN7125	B76
SNMM12040865 WM25CT	B76
SNMM12040865 WP25CT	B76
SNMM12040865 WP35CT	B76
SNMM12041265 WM25CT	B76
SNMM12041265 WP25CT	B76
SNMM15061665 WM25CT	B76
SNMM15061665 WP25CT	B76
SNMM19061265 TN7125	B76
SNMM19061265 WM25CT	B76
SNMM19061265 WP15CT	B76
SNMM19061265 WP25CT	B76
SNMM19061265 WP35CT	B76
SNMM19061665 TN7115	B76
SNMM19061665 WM25CT	B76
SNMM19061665 WP15CT	B76
SNMM190616SR TN7015	B76
SNMM190616SR WM25CT	B76
SNMM19062465 WM25CT	B76
SNMM19062465 WP25CT	B76
SNMM190624SR WM25CT	B76
SNMM190624SR WP15CT	B76
SNMM190624SR WP25CT	B76
SNMN090316S02020 WBK40U	B211
SNMN120416T02020 WBK40U	B211
SNMP120408 WM15CT	B77
SNMP120408 WM25CT	B77
SNMP120408 WM35CT	B77
SNMP120408 WS10PT	B77
SNMP120408 WS25PT	B77
SNMP120412 WM15CT	B77
SNMP120412 WM25CT	B77
SNMP120412 WM35CT	B77
SNMP120412 WS10PT	B77
SNMP120412 WS25PT	B77
SNMP150608 WM15CT	B77
SNMP150608 WM25CT	B77
SNMP150608 WM35CT	B77
SNMP150608 WS25PT	B77
SNMP150612 WM15CT	B77
SNMP150612 WM25CT	B77
SNMP150612 WM35CT	B77
SNMP150612 WS25PT	B77
SNMP150616 WM15CT	B77
SNMP150616 WM25CT	B77
SNMP150616 WM35CT	B77
SNMP150616 WS25PT	B77
SNMP190616 WM15CT	B77
SNMP190616 WM25CT	B77
SNMP190616 WM35CT	B77
SNMS120408FST WDN25U	B212
SNMS120412FST WDN25U	B212
SNMT1205AZR31 TN2510	H55
SNMT1205AZR31 TN6525	H55
SNMT1205AZR31 TN6540	H55
SNMT1205AZR31 TN7525	H55
SNMT1205AZR31 TN7535	H55
SNMT1205AZR31 WK15CM	H55
SNMT1205AZR31 WP25PM	H55
SNMT1205AZR31 WP35CM	H55
SNMT1205AZR31 WP40PM	H55
SNMT1505AZR31 TN450	H59
SNMT1505AZR31 TN7525	H59
SNMT1505AZR31 TN7535	H59
SNMT1505AZR31 WK15CM	H59
SNMX120712T02020 CW5025	B190
SNMX120716T02020 CW5025	B190
SNMX150716T02020 CW5025	B190
SNUN120408 WK20CT	B77
SNUN120412 WK20CT	B77
SPGN090308 WK20CT	B78
SPGN090308T01020 CW2015	B190
SPGN120304T01020 CW2015	B190
SPGN120308 WK20CT	B78
SPGN120308T01020 CW2015	B190
SPGN120312 WK20CT	B78
SPMR090308 WK20CT	B78
SPMR090308 WP35CT	B78
SPMR120304 WK20CT	B78
SPMR120304 WP15CT	B78
SPMR120304 WP35CT	B78
SPMR120308 WK20CT	B78
SPMR120308 WP15CT	B78
SPMR120308 WP35CT	B78
SPMR120312 WK20CT	B78
SPMR120312 WP35CT	B78
SPMT09T304FP WK20CT	B79
SPMT09T304FP WM25CT	B79
SPMT09T304FP WP15CT	B79
SPMT09T304FP WP25CT	B79
SPMT09T308FP WK20CT	B79
SPMT09T308FP WM25CT	B79
SPMT09T308FP WP15CT	B79
SPMT09T308FP WP25CT	B79
SPMT09T308MP WK20CT	B79
SPMT09T308MP WM15CT	B79
SPMT09T308MP WP25CT	B79
SPMT120408MP WK20CT	B79
SPMT120408MP WP25CT	B79
SPMW120408 THM	I9
SPMW120408 WK15CM	I9
SPNT120408 SPTM00	I9
SPNT120408 TN7525	I9
SPNT120408 TN7535	I9
SPUN090308 THM	B80
SPUN120304 THM	B80
SPUN120304 WP15CT	B80
SPUN120304T00520 CW2015	B191
SPUN120308 THM	B80
SPUN120308 WK20CT	B80
SPUN120308 WP15CT	B80
SPUN120308T00520 CW2015	B191
SPUN120312 THM	B80
SPUN120312 WK20CT	B80
SPUN120312T00520 CW2015	B191
SPUN120412 THM	B80
SPUN150412 THM	B80
SPUN150412 TTR	B80
SPUN190412 THM	B80
SPUN190416 THM	B80
SPUN250620T WP15CT	B80
SRDCN1616H06 WG	C45
SRDCN1616H08 WG	C45
SRDCN2020K06 WG	C45
SRDCN2020K08 WG	C45
SRDCN2020K10 WG	C45

Catalogue No.	Page(s)
SRDCN2525M06 WG	C45
SRDCN2525M08 WG	C45
SRDCN2525M10 WG	C45
SRDCN2525M12 WG	C45
SRDCN3225P12 WG	C45
SRDCN3225P16 WG	C45
SRGCL12CA10 WG	C119
SRGCR08CA06 WG	C119
SRGCR10CA08 WG	C119
SRS3	C42–49
SRS4	C42–47, C67, C73
SRS5	C45
SSA3T	F70–72, F74, F77
SSA4T	F70–72, F74, F77
SSA5T	F70–72, F74
SSBCL1616H09 WG	C46
SSBCL2020K12 WG	C46
SSBCL2525M12 WG	C46
SSBCR1616H09 WG	C46
SSBCR2020K12 WG	C46
SSBCR2525M12 WG	C46
SSBM202030L WG	D21
SSBM202030R WG	D21
SSBM202035L WG	D21
SSKCL12CA12 WG	C120
SSKCR10CA09 WG	C120
SSKCR12CA12 WG	C120
SSKCR16CA12 WG	C120
SSKPL10CA09 WG	C121
SSKPR10CA09 WG	C121
SSKPR12CA09 WG	C121
SSN2T	F70, F74, F77
SSOM1325380R WG	D22
SSOM1325385R WG	D22
SSOM1325630R WG	D22
SSOM1325635R WG	D22
SSP025016M	C8–19, C56–59
SSP025018M	C9, C12, C14, C56
SSP8	H64
SSRCL12CA12 WG	C122
SSRCR12CA12 WG	C122
SSRPL10CA09 WG	C123
SSRPR10CA09 WG	C123
SSSCL12CA12 WG	C124
SSSCL1616H09 WG	C47
SSSCL2020K12 WG	C47
SSSCL2525M12 WG	C47
SSSCR10CA09 WG	C124
SSSCR12CA12 WG	C124
SSSCR1616H09 WG	C47
SSSCR16CA12 WG	C124
SSSCR2020K12 WG	C47
SSSCR2525M12 WG	C47
SSSPL10CA09 WG	C125
SSSPR10CA09 WG	C125
SSY3T	F70–72, F74, F77
SSY4T	F70–72, F74, F77
SSY5T K9	F70–72, F74
STBIT WG	D59, D71, D84
STCM11	C108
STCM37	C102–103
STCM38	C92–94, C97–103, C106–109
STCM39	C102
STCM4	C36–39
STCM40	C95, C97–99
STCM5	C37
STCM8	C36–39, C65, C94, C97, C101, C109
STCM9	C36, C38–39, C65, C92–103
STFCL1616H16 WG	C48
STFCL2020K16 WG	C48
STFCL2525M16 WG	C48
STFCR1212F11 WG	C48
STFCR2020K16 WG	C48
STFCR2525M16 WG	C48
STFPL08CA09 WG	C126
STFPL10CA11 WG	C126
STFPL12CA16 WG	C126
STFPR08CA09 WG	C126
STFPR10CA11 WG	C126
STFPR12CA16 WG	C126
STGPL08CA09 WG	C127
STGPL10CA11 WG	C127
STGPR08CA09 WG	C127
STGPR10CA11 WG	C127
STGPR12CA16 WG	C127
STM31 WG	D59, D71, D84
STTPR08CA09 WG	C128
STTPR10CA11 WG	C128
STTPR12CA16 WG	C128
STWPL10CA11 WG	C129
STWPL12CA16 WG	C129
STWPR08CA09 WG	C129
STWPR10CA11 WG	C129
STWPR12CA16 WG	C129
SVHBL2020K16 WG	C48
SVHBL2525M16 WG	C48
SVHBL3225P16 WG	C48
SVHBR2020K16 WG	C48
SVHBR2525M16 WG	C48
SVHBR3225P16 WG	C48
SVJBL1616H16 WG	C49
SVJBL2020K16 WG	C49
SVJBL2525M16 WG	C49
SVJBL3225P16 WG	C49
SVJBR1616H16 WG	C49
SVJBR2020K16 WG	C49
SVJBR2525M16 WG	C49
SVJBR3225P16 WG	C49
SVVBN2020K16 WG	C49
SVVBN2525M16 WG	C49
SVVBN3225P16 WG	C49
SWSM515	H64
SWSM5155	H65
SXHX060204R20 WP20PH	U17
SXHX060208R20 WP20PH	U17
SXHX070304R20 WP20PH	U17
SXHX070308R20 WP20PH	U17
SXHX090304R20 WP20PH	U17
SXHX090308R20 WP20PH	U17
TBHB07S1X0 CG5	D47
TBHB110201 CG5	D47
TCAX1103ZZ18 TTM08	L12
TCAX1103ZZ21 THM	L12
TCAX1103ZZ21 TTM08	L12
TCAX1103ZZ26 THM	L12
TCAX1103ZZ26 TTM	L12
TCF040203ACV34 WU25CH	V20
TCF040203ACV34 WU40PH	V20
TCF040203ACV36 WU25CH	V21
TCF040203ACV36 WU40PH	V21
TCF040204APV34 WPK10CH	V22
TCF040204APV34 WU25CH	V22
TCF040204APV34 WU40PH	V22
TCF040204APV36 WU25CH	V23
TCF040204APV36 WU40PH	V23
TCF050204BPV34 WPK10CH	V22
TCF050204BPV34 WU25CH	V22
TCF050204BPV34 WU40PH	V22
TCF050204BPV36 WU25CH	V23
TCF050204BPV36 WU40PH	V23
TCF060203BCV34 WU25CH	V20
TCF060203BCV34 WU40PH	V20
TCF060203BCV36 WU25CH	V21
TCF060203BCV36 WU40PH	V21
TCF070304CCV34 WU25CH	V20
TCF070304CCV34 WU40PH	V20
TCF070304CCV36 WU25CH	V21
TCF070304CCV36 WU40PH	V21
TCF070306CPV34 WPK10CH	V22
TCF070306CPV34 WU25CH	V22
TCF070306CPV34 WU40PH	V22
TCF070306CPV36 WU25CH	V23
TCF070306CPV36 WU40PH	V23
TCF080308DPV34 WPK10CH	V22
TCF080308DPV34 WU25CH	V22
TCF080308DPV34 WU40PH	V22
TCF080308DPV36 WU25CH	V23
TCF080308DPV36 WU40PH	V23
TCF090305DCV34 WU25CH	V20
TCF090305DCV34 WU40PH	V20
TCF090305DCV36 WU25CH	V21
TCF090305DCV36 WU40PH	V21
TCF100408EPV34 WPK10CH	V22
TCF100408EPV34 WU25CH	V22
TCF100408EPV34 WU40PH	V22
TCF100408EPV36 WU25CH	V23
TCF100408EPV36 WU40PH	V23
TCF120405ECV34 WU25CH	V20
TCF120405ECV34 WU40PH	V20
TCF120405ECV36 WU25CH	V21
TCF120405ECV36 WU40PH	V21
TCF120412FPV34 WPK10CH	V22
TCF120412FPV34 WU25CH	V22
TCF120412FPV34 WU40PH	V22
TCF120412FPV36 WU25CH	V23
TCF120412FPV36 WU40PH	V23
TCF120R2SL20MA	V8
TCF120R3SL20MA	V11
TCF120R4SL20MA	V14
TCF120R5SL20MA	V17
TCF125R2SL20MA	V8
TCF125R3SL20MA	V11
TCF125R4SL20MA	V14
TCF125R5SL20MA	V17
TCF127R2SL20MA	V8
TCF127R3SL20MA	V11
TCF127R4SL20MA	V14
TCF127R5SL20MA	V17
TCF130R2SL20MA	V8
TCF130R3SL20MA	V11
TCF130R4SL20MA	V14
TCF130R5SL20MA	V17
TCF135R2SL20MA	V8, V10
TCF135R3SL20MA	V11, V13
TCF135R4SL20MA	V14, V16
TCF135R5SL20MA	V17, V19
TCF140R2SL25MB	V8
TCF140R3SL25MB	V11
TCF140R4SL25MB	V14
TCF140R5SL25MB	V17
TCF145R2SL25MB	V8
TCF145R3SL25MB	V11
TCF145R4SL25MB	V14
TCF145R5SL25MB	V17
TCF150406FCV34 WU25CH	V20
TCF150406FCV34 WU40PH	V20
TCF150406FCV36 WU25CH	V21
TCF150406FCV36 WU40PH	V21
TCF150512GPV34 WPK10CH	V22
TCF150512GPV34 WU25CH	V22
TCF150512GPV34 WU40PH	V22
TCF150512GPV36 WU25CH	V23
TCF150512GPV36 WU40PH	V23
TCF150R2SL25MB	V8
TCF150R3SL25MB	V11
TCF150R4SL25MB	V14
TCF150R5SL25MB	V17
TCF155R2SL25MB	V8
TCF155R3SL25MB	V11
TCF155R4SL25MB	V14
TCF155R5SL25MB	V17
TCF160R2SL25MB	V8
TCF160R3SL25MB	V11
TCF160R4SL25MB	V14
TCF160R5SL25MB	V17
TCF165R2SL25MB	V8
TCF165R3SL25MB	V11
TCF165R4SL25MB	V14
TCF165R5SL25MB	V17
TCF170R2SL25MB	V8
TCF170R3SL25MB	V11
TCF170R4SL25MB	V14
TCF170R5SL25MB	V17
TCF175R2SL25MB	V8
TCF175R3SL25MB	V11
TCF175R4SL25MB	V14
TCF175R5SL25MB	V17
TCF180508GCV34 WU25CH	V20
TCF180508GCV34 WU40PH	V20
TCF180508GCV36 WU25CH	V21
TCF180508GCV36 WU40PH	V21
TCF180614HPV34 WPK10CH	V22
TCF180614HPV34 WU25CH	V22
TCF180614HPV34 WU40PH	V22
TCF180614HPV36 WU25CH	V23
TCF180614HPV36 WU40PH	V23
TCF180R2SL25MB	V8
TCF180R3SL25MB	V11
TCF180R4SL25MB	V14
TCF180R5SL25MB	V17
TCF185R2SL25MB	V8, V10
TCF185R3SL25MB	V11, V13
TCF185R4SL25MB	V14, V16
TCF185R5SL25MB	V17, V19
TCF190R2SL25MC	V8
TCF190R3SL25MC	V11
TCF190R4SL25MC	V14
TCF190R5SL25MC	V17
TCF195R2SL25MC	V8
TCF195R3SL25MC	V11
TCF195R4SL25MC	V14
TCF195R5SL25MC	V17
TCF200R2SL25MC	V8
TCF200R3SL25MC	V11
TCF200R4SL25MC	V14
TCF200R5SL25MC	V17
TCF205R2SL25MC	V8
TCF205R3SL25MC	V11
TCF205R4SL25MC	V14
TCF205R5SL25MC	V17
TCF210608HCV34 WU25CH	V20
TCF210608HCV34 WU40PH	V20

Catalogue No.	Page(s)
TCF210608HCV36 WU25CH	V21
TCF210608HCV36 WU40PH	V21
TCF210R2SL25MC	V8
TCF210R3SL25MC	V11
TCF210R4SL25MC	V14
TCF210R5SL25MC	V17
TCF220R2SL25MC	V8
TCF220R3SL25MC	V11
TCF220R4SL25MC	V14
TCF220R5SL25MC	V17
TCF225R2SL25MC	V8
TCF225R3SL25MC	V11
TCF225R4SL25MC	V14
TCF225R5SL25MC	V17
TCF230R2SL25MC	V8, V10
TCF230R3SL25MC	V11, V13
TCF230R4SL25MC	V14, V16
TCF230R5SL25MC	V17, V19
TCF240R2SL25MD	V8, V10
TCF240R3SL25MD	V11, V13
TCF240R4SL25MD	V14, V16
TCF240R5SL25MD	V17, V19
TCF250R2SL32MD	V8
TCF250R3SL32MD	V11
TCF250R4SL32MD	V14
TCF250R5SL32MD	V17
TCF260R2SL32MD	V8
TCF260R3SL32MD	V11
TCF260R4SL32MD	V14
TCF260R5SL32MD	V17
TCF265R2SL32MD	V8
TCF265R3SL32MD	V11
TCF265R4SL32MD	V14
TCF265R5SL32MD	V17
TCF270R2SL32MD	V8
TCF270R3SL32MD	V11
TCF270R4SL32MD	V14
TCF270R5SL32MD	V17
TCF280R2SL32MD	V8
TCF280R3SL32MD	V11
TCF280R4SL32MD	V14
TCF280R5SL32MD	V17
TCF290R2SL32MD	V8, V10
TCF290R3SL32MD	V11, V13
TCF290R4SL32MD	V14, V16
TCF290R5SL32MD	V17, V19
TCF300R2SL32ME	V8
TCF300R3SL32ME	V11
TCF300R4SL32ME	V14
TCF300R5SL32ME	V17
TCF310R2SL32ME	V8
TCF310R3SL32ME	V11
TCF310R4SL32ME	V14
TCF310R5SL32ME	V17
TCF320R2SL32ME	V9–10
TCF320R3SL32ME	V12–13
TCF320R4SL32ME	V15–16
TCF320R5SL32ME	V18–19
TCF330R2SL40ME	V9
TCF330R3SL40ME	V12
TCF330R4SL40ME	V15
TCF330R5SL40ME	V18
TCF340R2SL40ME	V9
TCF340R3SL40ME	V12
TCF340R4SL40ME	V15
TCF340R5SL40ME	V18
TCF350R2SL40ME	V9
TCF350R3SL40ME	V12
TCF350R4SL40ME	V15
TCF350R5SL40ME	V18
TCF360R2SL40ME	V9–10
TCF360R3SL40ME	V12–13
TCF360R4SL40ME	V15–16
TCF360R5SL40ME	V18–19
TCF370R2SL40MF	V9
TCF370R3SL40MF	V12
TCF370R4SL40MF	V15
TCF370R5SL40MF	V18
TCF375R2SL40MF	V9
TCF375R3SL40MF	V12
TCF375R4SL40MF	V15
TCF375R5SL40MF	V18
TCF380R2SL40MF	V9
TCF380R3SL40MF	V12
TCF380R4SL40MF	V15
TCF380R5SL40MF	V18
TCF390R2SL40MF	V9
TCF390R3SL40MF	V12
TCF390R4SL40MF	V15
TCF390R5SL40MF	V18
TCF400R2SL40MF	V9
TCF400R3SL40MF	V12
TCF400R4SL40MF	V15
TCF400R5SL40MF	V18
TCF410R2SL40MF	V9
TCF410R3SL40MF	V12
TCF410R4SL40MF	V15
TCF410R5SL40MF	V18
TCF420R2SL40MF	V9
TCF420R3SL40MF	V12
TCF420R4SL40MF	V15
TCF420R5SL40MF	V18
TCF430R2SL40MF	V9
TCF430R3SL40MF	V12
TCF430R4SL40MF	V15
TCF430R5SL40MF	V18
TCF440R2SL40MF	V9–10
TCF440R3SL40MF	V12–13
TCF440R4SL40MF	V15–16
TCF440R5SL40MF	V18–19
TCF450R2SL50MF	V9–10
TCF450R3SL50MF	V12–13
TCF450R4SL50MF	V15–16
TCF450R5SL50MF	V18–19
TCF460R2SL50MG	V9
TCF460R3SL50MG	V12
TCF460R4SL50MG	V15
TCF460R5SL50MG	V18
TCF470R2SL50MG	V9
TCF470R3SL50MG	V12
TCF470R4SL50MG	V15
TCF470R5SL50MG	V18
TCF480R2SL50MG	V9
TCF480R3SL50MG	V12
TCF480R4SL50MG	V15
TCF480R5SL50MG	V18
TCF490R2SL50MG	V9
TCF490R3SL50MG	V12
TCF490R4SL50MG	V15
TCF490R5SL50MG	V18
TCF500R2SL50MG	V9
TCF500R3SL50MG	V12
TCF500R4SL50MG	V15
TCF500R5SL50MG	V18
TCF505R2SL50MG	V9
TCF505R3SL50MG	V12
TCF505R4SL50MG	V15
TCF505R5SL50MG	V18
TCF510R2SL50MG	V9
TCF510R3SL50MG	V12
TCF510R4SL50MG	V15
TCF510R5SL50MG	V18
TCF520R2SL50MG	V9
TCF520R3SL50MG	V12
TCF520R4SL50MG	V15
TCF520R5SL50MG	V18
TCF530R2SL50MG	V9
TCF530R3SL50MG	V12
TCF530R4SL50MG	V15
TCF530R5SL50MG	V18
TCF540R2SL50MG	V9
TCF540R3SL50MG	V12
TCF540R4SL50MG	V15
TCF540R5SL50MG	V18
TCF550R2SL50MG	V9
TCF550R3SL50MG	V12
TCF550R4SL50MG	V15
TCF550R5SL50MG	V18
TCF560R2SL50MG	V9–10
TCF560R3SL50MG	V12–13
TCF560R4SL50MG	V15–16
TCF560R5SL50MG	V18–19
TCF570R2SL50MH	V9
TCF570R3SL50MH	V12
TCF570R4SL50MH	V15
TCF570R5SL50MH	V18
TCF580R2SL50MH	V9
TCF580R3SL50MH	V12
TCF580R4SL50MH	V15
TCF580R5SL50MH	V18
TCF590R2SL50MH	V9
TCF590R3SL50MH	V12
TCF590R4SL50MH	V15
TCF590R5SL50MH	V18
TCF600R2SL50MH	V9
TCF600R3SL50MH	V12
TCF600R4SL50MH	V15
TCF600R5SL50MH	V18
TCF610R2SL50MH	V9
TCF610R3SL50MH	V12
TCF610R4SL50MH	V15
TCF610R5SL50MH	V18
TCF620R2SL50MH	V9
TCF620R3SL50MH	V12
TCF620R4SL50MH	V15
TCF620R5SL50MH	V18
TCF630R2SL50MH	V9
TCF630R3SL50MH	V12
TCF630R4SL50MH	V15
TCF630R5SL50MH	V18
TCF640R2SL50MH	V9
TCF640R3SL50MH	V12
TCF640R4SL50MH	V15
TCF640R5SL50MH	V18
TCF650R2SL50MH	V9
TCF650R3SL50MH	V12
TCF650R4SL50MH	V15
TCF650R5SL50MH	V18
TCF660R2SL50MH	V9
TCF660R3SL50MH	V12
TCF660R4SL50MH	V15
TCF660R5SL50MH	V18
TCF670R2SL50MH	V9
TCF670R3SL50MH	V12
TCF670R4SL50MH	V15
TCF670R5SL50MH	V18
TCF680R2SL50MH	V9–10
TCF680R3SL50MH	V12–13
TCF680R4SL50MH	V15–16
TCF680R5SL50MH	V18–19
TCGT1102011P TN10U	B138
TCGT1102011P TN15U	B138
TCGT1102041P TN10U	B138
TCGT1102041P TN15U	B138
TCGT110204AL1 HWK10	B157
TCGT16T3021P TN10U	B138
TCGT16T3041P TN10U	B138
TCGT16T3041P TN15U	B138
TCGT16T3081P TN10U	B138
TCGT16T308AL1 HWK10	B157
TCGW110202EC WBH25P	B212
TCGW110204FST WDN25U	B213
TCGW110204S01015C WBH10U	B212
TCGW110204S01015C WBH25P	B212
TCGW16T304FST WDN25U	B213
TCMT110202 THM	B81
TCMT1102021P TN10P	B139
TCMT1102021P TN10U	B139
TCMT1102021P TN20K	B139
TCMT110202FP WM25CT	B82
TCMT110204 THM	B81
TCMT110204 TTR	B81
TCMT1102041P TN10P	B139
TCMT1102041P TN10U	B139
TCMT1102041P TN15M	B139
TCMT1102041P TN20K	B139
TCMT1102041P TN20P	B139
TCMT1102041P TN30M	B139
TCMT1102042 TTI15	B81
TCMT110204FP WK20CT	B82
TCMT110204FP WM15CT	B82
TCMT110204FP WM25CT	B82
TCMT110204FP WP15CT	B82
TCMT110204FP WP25CT	B82
TCMT1102081P TN10P	B139
TCMT1102081P TN10U	B139
TCMT1102081P TN20K	B139
TCMT1102081P TN20P	B139
TCMT110208FP WK20CT	B82
TCMT110208FP WM15CT	B82
TCMT110208FP WM25CT	B82
TCMT110208FP WP15CT	B82
TCMT110208FP WP25CT	B82
TCMT110208MP WK20CT	B82
TCMT110208MP WP25CT	B82
TCMT16T3021P TN10U	B139
TCMT16T304 THM	B81
TCMT16T3041P TN10P	B139
TCMT16T3041P TN10U	B139
TCMT16T3041P TN15M	B139
TCMT16T3041P TN20K	B139
TCMT16T3041P TN20P	B139
TCMT16T3041P TN30M	B139
TCMT16T304FP WK20CT	B82
TCMT16T304FP WM15CT	B82
TCMT16T304FP WM25CT	B82
TCMT16T304FP WP15CT	B82
TCMT16T304FP WP25CT	B82
TCMT16T304MP WK20CT	B82
TCMT16T304MP WM15CT	B82
TCMT16T304MP WM25CT	B82
TCMT16T304MP WP25CT	B82

Catalogue No.	Page(s)
TCMT16T304MU TN7115	B83
TCMT16T304MU WK20CT	B83
TCMT16T304MU WM25CT	B83
TCMT16T304MU WP15CT	B83
TCMT16T304MU WP25CT	B83
TCMT16T304MU WS25PT	B83
TCMT16T308 THM	B81
TCMT16T308 TTR	B81
TCMT16T3081P TN10P	B139
TCMT16T3081P TN10U	B139
TCMT16T3081P TN15M	B139
TCMT16T3081P TN20K	B139
TCMT16T3081P TN20P	B139
TCMT16T3081P TN30M	B139
TCMT16T308FP WK20CT	B82
TCMT16T308FP WM15CT	B82
TCMT16T308FP WM25CT	B82
TCMT16T308FP WP15CT	B82
TCMT16T308FP WP25CT	B82
TCMT16T308MP WK20CT	B82
TCMT16T308MP WM15CT	B82
TCMT16T308MP WM25CT	B82
TCMT16T308MP WP15CT	B82
TCMT16T308MP WP25CT	B82
TCMT16T308MU TN5105	B83
TCMT16T308MU WK20CT	B83
TCMT16T308MU WM25CT	B83
TCMT16T308MU WP15CT	B83
TCMT16T308MU WP25CT	B83
TCMT16T308MU WS10PT	B83
TCMT16T3121P TN10U	B139
TCMT16T312FP WK20CT	B82
TCMT16T312FP WM25CT	B82
TCMT16T312FP WP15CT	B82
TCMT16T312MP WK20CT	B82
TCMT16T312MP WM25CT	B82
TCMT16T312MP WP25CT	B82
TCMT220408 THM	B81
TCMT2204081P TN10P	B139
TCMT2204081P TN10U	B139
TCMT2204081P TN15M	B139
TCMT2204081P TN20K	B139
TCMT2204081P TN20P	B139
TCMT2204081P TN30M	B139
TCMT220408FP WK20CT	B82
TCMT220408FP WM25CT	B82
TCMT220408FP WP15CT	B82
TCMT220408FP WP25CT	B82
TCMW110204 THM	B83
TCMW110204 WK05CT	B83
TCMW110204 WK20CT	B83
TCMW110204FST WBK45U	B213
TCMW110204FST WDN25U	B213
TCMW16T304 THM	B83
TCMW16T304 WK05CT	B83
TCMW16T304 WK20CT	B83
TDD105Z03000 WU20PD	T106
TDD105Z03175 WU20PD	T106
TDD105Z03500 WU20PD	T106
TDD105Z03571 WU20PD	T106
TDD105Z03800 WU20PD	T106
TDD105Z03970 WU20PD	T106
TDD105Z04000 WU20PD	T106
TDD105Z04039 WU20PD	T106
TDD105Z04300 WU20PD	T106
TDD105Z04500 WU20PD	T106
TDD105Z04623 WU20PD	T106
TDD105Z04763 WU20PD	T106
TDD105Z05000 WU20PD	T106
TDD105Z05159 WU20PD	T106
TDD105Z05410 WU20PD	T106
TDD105Z05500 WU20PD	T106
TDD105Z05558 WU20PD	T106
TDD105Z05800 WU20PD	T106
TDD105Z06000 WU20PD	T106
TDD105Z06200 WU20PD	T106
TDD105Z06350 WU20PD	T106
TDD105Z06500 WU20PD	T106
TDD105Z06528 WU20PD	T106
TDD105Z06746 WU20PD	T106
TDD105Z06800 WU20PD	T107
TDD105Z06909 WU20PD	T107
TDD105Z07000 WU20PD	T107
TDD105Z07145 WU20PD	T107
TDD105Z07500 WU20PD	T107
TDD105Z07541 WU20PD	T107
TDD105Z07938 WU20PD	T107
TDD105Z08000 WU20PD	T107
TDD105Z08334 WU20PD	T107
TDD105Z08433 WU20PD	T107
TDD105Z08500 WU20PD	T107
TDD105Z08733 WU20PD	T107
TDD105Z09000 WU20PD	T107
TDD105Z09347 WU20PD	T107
TDD105Z09500 WU20PD	T107
TDD105Z09525 WU20PD	T107
TDD105Z09750 WU20PD	T107
TDD105Z10000 WU20PD	T107
TDD105Z10200 WU20PD	T107
TDD105Z10320 WU20PD	T107
TDD105Z10500 WU20PD	T107
TDD105Z10716 WU20PD	T107
TDD105Z11000 WU20PD	T107
TDD105Z11113 WU20PD	T107
TDD105Z11500 WU20PD	T107
TDD105Z12000 WU20PD	T107
TDD105Z12304 WU20PD	T107
TDD105Z12500 WU20PD	T107
TDD105Z12700 WU20PD	T107
TDD105Z13000 WU20PD	T107
TDD106Z03000 WU20PD	T108
TDD106Z03175 WU20PD	T108
TDD106Z03500 WU20PD	T108
TDD106Z03571 WU20PD	T108
TDD106Z03800 WU20PD	T108
TDD106Z03970 WU20PD	T108
TDD106Z04000 WU20PD	T108
TDD106Z04039 WU20PD	T108
TDD106Z04300 WU20PD	T108
TDD106Z04500 WU20PD	T108
TDD106Z04623 WU20PD	T108
TDD106Z04763 WU20PD	T108
TDD106Z05000 WU20PD	T108
TDD106Z05159 WU20PD	T108
TDD106Z05410 WU20PD	T108
TDD106Z05500 WU20PD	T108
TDD106Z05558 WU20PD	T108
TDD106Z05800 WU20PD	T108
TDD106Z06000 WU20PD	T108
TDD106Z06200 WU20PD	T108
TDD106Z06350 WU20PD	T108
TDD106Z06500 WU20PD	T108
TDD106Z06528 WU20PD	T108
TDD106Z06746 WU20PD	T108
TDD106Z06800 WU20PD	T109
TDD106Z06909 WU20PD	T109
TDD106Z07000 WU20PD	T109
TDD106Z07145 WU20PD	T109
TDD106Z07500 WU20PD	T107
TDD106Z07541 WU20PD	T109
TDD106Z07938 WU20PD	T109
TDD106Z08000 WU20PD	T109
TDD106Z08334 WU20PD	T109
TDD106Z08433 WU20PD	T109
TDD106Z08500 WU20PD	T109
TDD106Z08733 WU20PD	T109
TDD106Z09000 WU20PD	T109
TDD106Z09347 WU20PD	T109
TDD106Z09500 WU20PD	T109
TDD106Z09525 WU20PD	T109
TDD106Z09750 WU20PD	T109
TDD106Z09921 WU20PD	T109
TDD106Z10000 WU20PD	T109
TDD106Z10200 WU20PD	T109
TDD106Z10320 WU20PD	T109
TDD106Z10500 WU20PD	T109
TDD106Z10716 WU20PD	T109
TDD106Z11000 WU20PD	T109
TDD106Z11113 WU20PD	T109
TDD106Z11500 WU20PD	T109
TDD106Z12000 WU20PD	T109
TDD106Z12500 WU20PD	T109
TDD106Z12700 WU20PD	T109
TDD106Z13000 WU20PD	T109
TDD107Z03000 WU20PD	T110
TDD107Z03175 WU20PD	T110
TDD107Z03500 WU20PD	T110
TDD107Z03800 WU20PD	T110
TDD107Z03970 WU20PD	T110
TDD107Z04000 WU20PD	T110
TDD107Z04039 WU20PD	T110
TDD107Z04500 WU20PD	T110
TDD107Z04763 WU20PD	T110
TDD107Z05000 WU20PD	T110
TDD107Z05500 WU20PD	T110
TDD107Z05558 WU20PD	T110
TDD107Z05800 WU20PD	T110
TDD107Z06000 WU20PD	T110
TDD107Z06350 WU20PD	T110
TDD107Z06500 WU20PD	T110
TDD107Z06528 WU20PD	T110
TDD107Z06746 WU20PD	T110
TDD107Z06909 WU20PD	T110
TDD107Z07000 WU20PD	T110
TDD107Z07541 WU20PD	T110
TDD107Z07938 WU20PD	T110
TDD107Z08000 WU20PD	T110
TDD107Z08433 WU20PD	T110
TDD107Z08500 WU20PD	T111
TDD107Z08733 WU20PD	T111
TDD107Z09000 WU20PD	T111
TDD107Z09347 WU20PD	T111
TDD107Z09500 WU20PD	T111
TDD107Z09525 WU20PD	T111
TDD107Z10000 WU20PD	T111
TDD107Z10300 WU20PD	T111
TDD107Z10320 WU20PD	T111
TDD107Z10500 WU20PD	T111
TDD107Z10716 WU20PD	T111
TDD107Z11000 WU20PD	T111
TDD107Z11113 WU20PD	T111
TDD107Z11500 WU20PD	T111
TDD107Z12000 WU20PD	T111
TDD107Z12500 WU20PD	T111
TDD107Z12700 WU20PD	T111
TDD107Z13000 WU20PD	T111
TDD108Z03000 WU20PD	T112
TDD108Z03175 WU20PD	T112
TDD108Z03500 WU20PD	T112
TDD108Z03571 WU20PD	T112
TDD108Z03800 WU20PD	T112
TDD108Z03970 WU20PD	T112
TDD108Z04000 WU20PD	T112
TDD108Z04039 WU20PD	T112
TDD108Z04300 WU20PD	T112
TDD108Z04500 WU20PD	T112
TDD108Z04623 WU20PD	T112
TDD108Z04763 WU20PD	T112
TDD108Z05000 WU20PD	T112
TDD108Z05159 WU20PD	T112
TDD108Z05410 WU20PD	T112
TDD108Z05500 WU20PD	T112
TDD108Z05558 WU20PD	T112
TDD108Z05800 WU20PD	T112
TDD108Z06000 WU20PD	T112
TDD108Z06200 WU20PD	T112
TDD108Z06350 WU20PD	T112
TDD108Z06500 WU20PD	T112
TDD108Z06528 WU20PD	T112
TDD108Z06746 WU20PD	T112
TDD108Z06800 WU20PD	T113
TDD108Z06909 WU20PD	T113
TDD108Z07000 WU20PD	T113
TDD108Z07145 WU20PD	T113
TDD108Z07500 WU20PD	T113
TDD108Z07938 WU20PD	T113
TDD108Z08000 WU20PD	T113
TDD108Z08334 WU20PD	T113
TDD108Z08500 WU20PD	T113
TDD108Z08733 WU20PD	T113
TDD108Z09000 WU20PD	T113
TDD108Z09500 WU20PD	T113
TDD108Z09525 WU20PD	T113
TDD108Z09750 WU20PD	T113
TDD108Z10000 WU20PD	T113
TDD108Z10200 WU20PD	T113
TDD108Z10320 WU20PD	T113
TDD108Z10500 WU20PD	T113
TDD108Z11000 WU20PD	T113
TDD108Z11113 WU20PD	T113
TDD108Z11500 WU20PD	T113
TDD108Z12000 WU20PD	T113
TDD108Z12304 WU20PD	T113
TDD108Z12500 WU20PD	T113
TDD108Z12700 WU20PD	T113
TDD108Z13000 WU20PD	T113
TDG532A03000 WN10HD	T120
TDG532A03048 WN10HD	T120
TDG532A03100 WN10HD	T120
TDG532A03175 WN10HD	T120
TDG532A03200 WN10HD	T120
TDG532A03264 WN10HD	T120
TDG532A03300 WN10HD	T120
TDG532A03400 WN10HD	T120
TDG532A03455 WN10HD	T120
TDG532A03500 WN10HD	T120
TDG532A03571 WN10HD	T120
TDG532A03600 WN10HD	T120
TDG532A03658 WN10HD	T120
TDG532A03700 WN10HD	T120
TDG532A03734 WN10HD	T120
TDG532A03800 WN10HD	T120

Catalogue No.	Page(s)
TDG532A03900 WN10HD	T120
TDG532A03970 WN10HD	T120
TDG532A04000 WN10HD	T120
TDG532A04039 WN10HD	T120
TDG532A04090 WN10HD	T120
TDG532A04100 WN10HD	T120
TDG532A04200 WN10HD	T120
TDG532A04217 WN10HD	T120
TDG532A04300 WN10HD	T121
TDG532A04366 WN10HD	T121
TDG532A04400 WN10HD	T121
TDG532A04500 WN10HD	T121
TDG532A04600 WN10HD	T121
TDG532A04623 WN10HD	T121
TDG532A04700 WN10HD	T121
TDG532A04763 WN10HD	T121
TDG532A04800 WN10HD	T121
TDG532A04852 WN10HD	T121
TDG532A04900 WN10HD	T121
TDG532A05000 WN10HD	T121
TDG532A05100 WN10HD	T121
TDG532A05106 WN10HD	T121
TDG532A05159 WN10HD	T121
TDG532A05200 WN10HD	T121
TDG532A05300 WN10HD	T121
TDG532A05400 WN10HD	T121
TDG532A05410 WN10HD	T121
TDG532A05500 WN10HD	T121
TDG532A05558 WN10HD	T121
TDG532A05600 WN10HD	T121
TDG532A05616 WN10HD	T121
TDG532A05700 WN10HD	T121
TDG532A05800 WN10HD	T121
TDG532A05900 WN10HD	T121
TDG532A05954 WN10HD	T121
TDG532A06000 WN10HD	T121
TDG532A06100 WN10HD	T121
TDG532A06200 WN10HD	T121
TDG532A06300 WN10HD	T121
TDG532A06350 WN10HD	T121
TDG532A06400 WN10HD	T121
TDG532A06500 WN10HD	T121
TDG532A06528 WN10HD	T121
TDG532A06600 WN10HD	T121
TDG532A06630 WN10HD	T121
TDG532A06700 WN10HD	T121
TDG532A06746 WN10HD	T121
TDG532A06800 WN10HD	T121
TDG532A06900 WN10HD	T122
TDG532A07000 WN10HD	T122
TDG532A07100 WN10HD	T122
TDG532A07145 WN10HD	T122
TDG532A07200 WN10HD	T122
TDG532A07300 WN10HD	T122
TDG532A07400 WN10HD	T122
TDG532A07500 WN10HD	T122
TDG532A07541 WN10HD	T122
TDG532A07600 WN10HD	T122
TDG532A07700 WN10HD	T122
TDG532A07800 WN10HD	T122
TDG532A07900 WN10HD	T122
TDG532A07938 WN10HD	T122
TDG532A08000 WN10HD	T122
TDG532A08100 WN10HD	T122
TDG532A08200 WN10HD	T122
TDG532A08300 WN10HD	T122
TDG532A08334 WN10HD	T122
TDG532A08400 WN10HD	T122
TDG532A08433 WN10HD	T122
TDG532A08500 WN10HD	T122
TDG532A08600 WN10HD	T122
TDG532A08700 WN10HD	T122
TDG532A08733 WN10HD	T122
TDG532A08800 WN10HD	T122
TDG532A08900 WN10HD	T122
TDG532A09000 WN10HD	T122
TDG532A09100 WN10HD	T122
TDG532A09129 WN10HD	T122
TDG532A09200 WN10HD	T122
TDG532A09300 WN10HD	T122
TDG532A09347 WN10HD	T122
TDG532A09400 WN10HD	T122
TDG532A09500 WN10HD	T122
TDG532A09525 WN10HD	T122
TDG532A09600 WN10HD	T122
TDG532A09700 WN10HD	T122
TDG532A09800 WN10HD	T122
TDG532A09900 WN10HD	T122
TDG532A09921 WN10HD	T123
TDG532A10000 WN10HD	T123
TDG532A10100 WN10HD	T123
TDG532A10200 WN10HD	T123
TDG532A10300 WN10HD	T123
TDG532A10320 WN10HD	T123
TDG532A10400 WN10HD	T123
TDG532A10500 WN10HD	T123
TDG532A10600 WN10HD	T123
TDG532A10700 WN10HD	T123
TDG532A10716 WN10HD	T123
TDG532A10800 WN10HD	T123
TDG532A10900 WN10HD	T123
TDG532A11000 WN10HD	T123
TDG532A11100 WN10HD	T123
TDG532A11113 WN10HD	T123
TDG532A11200 WN10HD	T123
TDG532A11300 WN10HD	T123
TDG532A11400 WN10HD	T123
TDG532A11500 WN10HD	T123
TDG532A11509 WN10HD	T123
TDG532A11600 WN10HD	T123
TDG532A11700 WN10HD	T123
TDG532A11800 WN10HD	T123
TDG532A11900 WN10HD	T123
TDG532A11908 WN10HD	T123
TDG532A12000 WN10HD	T123
TDG532A12100 WN10HD	T123
TDG532A12200 WN10HD	T123
TDG532A12300 WN10HD	T123
TDG532A12304 WN10HD	T123
TDG532A12400 WN10HD	T123
TDG532A12500 WN10HD	T123
TDG532A12600 WN10HD	T123
TDG532A12700 WN10HD	T123
TDG532A12800 WN10HD	T123
TDG532A12900 WN10HD	T123
TDG532A13000 WN10HD	T123
TDG532A13096 WN10HD	T123
TDG532A13100 WN10HD	T123
TDG532A13200 WN10HD	T124
TDG532A13300 WN10HD	T124
TDG532A13400 WN10HD	T124
TDG532A13490 WN10HD	T124
TDG532A13500 WN10HD	T124
TDG532A13600 WN10HD	T124
TDG532A13700 WN10HD	T124
TDG532A13800 WN10HD	T124
TDG532A13891 WN10HD	T124
TDG532A13900 WN10HD	T124
TDG532A14000 WN10HD	T124
TDG532A14100 WN10HD	T124
TDG532A14200 WN10HD	T124
TDG532A14288 WN10HD	T124
TDG532A14300 WN10HD	T124
TDG532A14400 WN10HD	T124
TDG532A14500 WN10HD	T124
TDG532A14600 WN10HD	T124
TDG532A14684 WN10HD	T124
TDG532A14700 WN10HD	T124
TDG532A14800 WN10HD	T124
TDG532A14900 WN10HD	T124
TDG532A15000 WN10HD	T124
TDG532A15083 WN10HD	T124
TDG532A15100 WN10HD	T124
TDG532A15200 WN10HD	T124
TDG532A15300 WN10HD	T124
TDG532A15400 WN10HD	T124
TDG532A15479 WN10HD	T124
TDG532A15500 WN10HD	T124
TDG532A15600 WN10HD	T124
TDG532A15700 WN10HD	T124
TDG532A15800 WN10HD	T124
TDG532A15875 WN10HD	T124
TDG532A15900 WN10HD	T124
TDG532A16000 WN10HD	T124
TDG532A16100 WN10HD	T124
TDG532A16200 WN10HD	T124
TDG532A16271 WN10HD	T124
TDG532A16300 WN10HD	T124
TDG532A16400 WN10HD	T125
TDG532A16500 WN10HD	T125
TDG532A16600 WN10HD	T125
TDG532A16670 WN10HD	T125
TDG532A16700 WN10HD	T125
TDG532A16800 WN10HD	T125
TDG532A16900 WN10HD	T125
TDG532A17000 WN10HD	T125
TDG532A17100 WN10HD	T125
TDG532A17200 WN10HD	T125
TDG532A17300 WN10HD	T125
TDG532A17400 WN10HD	T125
TDG532A17463 WN10HD	T125
TDG532A17500 WN10HD	T125
TDG532A17600 WN10HD	T125
TDG532A17700 WN10HD	T125
TDG532A17800 WN10HD	T125
TDG532A17859 WN10HD	T125
TDG532A17900 WN10HD	T125
TDG532A18000 WN10HD	T125
TDG532A18100 WN10HD	T125
TDG532A18200 WN10HD	T125
TDG532A18258 WN10HD	T125
TDG532A18300 WN10HD	T125
TDG532A18400 WN10HD	T125
TDG532A18500 WN10HD	T125
TDG532A18600 WN10HD	T125
TDG532A18654 WN10HD	T125
TDG532A18700 WN10HD	T125
TDG532A18800 WN10HD	T125
TDG532A18900 WN10HD	T125
TDG532A19000 WN10HD	T125
TDG532A19050 WN10HD	T125
TDG532A19100 WN10HD	T125
TDG532A19200 WN10HD	T125
TDG532A19300 WN10HD	T125
TDG532A19400 WN10HD	T125
TDG532A19500 WN10HD	T125
TDG532A19600 WN10HD	T125
TDG532A19700 WN10HD	T125
TDG532A19800 WN10HD	T126
TDG532A19900 WN10HD	T126
TDG532A20000 WN10HD	T126
TDG532A21000 WN10HD	T126
TDG532A22000 WN10HD	T126
TDG532A23000 WN10HD	T126
TDG533A03000 WN10HD	T127
TDG533A03048 WN10HD	T127
TDG533A03100 WN10HD	T127
TDG533A03175 WN10HD	T127
TDG533A03200 WN10HD	T127
TDG533A03264 WN10HD	T127
TDG533A03300 WN10HD	T127
TDG533A03400 WN10HD	T127
TDG533A03455 WN10HD	T127
TDG533A03500 WN10HD	T127
TDG533A03571 WN10HD	T127
TDG533A03600 WN10HD	T127
TDG533A03658 WN10HD	T127
TDG533A03700 WN10HD	T127
TDG533A03734 WN10HD	T127
TDG533A03800 WN10HD	T127
TDG533A03900 WN10HD	T127
TDG533A03970 WN10HD	T127
TDG533A04000 WN10HD	T127
TDG533A04039 WN10HD	T127
TDG533A04090 WN10HD	T127
TDG533A04100 WN10HD	T127
TDG533A04200 WN10HD	T127
TDG533A04217 WN10HD	T127
TDG533A04300 WN10HD	T128
TDG533A04366 WN10HD	T128
TDG533A04400 WN10HD	T128
TDG533A04500 WN10HD	T128
TDG533A04600 WN10HD	T128
TDG533A04623 WN10HD	T128
TDG533A04700 WN10HD	T128
TDG533A04763 WN10HD	T128
TDG533A04800 WN10HD	T128
TDG533A04852 WN10HD	T128
TDG533A04900 WN10HD	T128
TDG533A05000 WN10HD	T128
TDG533A05100 WN10HD	T128
TDG533A05106 WN10HD	T128
TDG533A05159 WN10HD	T128
TDG533A05200 WN10HD	T128
TDG533A05300 WN10HD	T128
TDG533A05400 WN10HD	T128
TDG533A05410 WN10HD	T128
TDG533A05500 WN10HD	T128
TDG533A05558 WN10HD	T128
TDG533A05600 WN10HD	T128
TDG533A05616 WN10HD	T128
TDG533A05700 WN10HD	T128
TDG533A05800 WN10HD	T128
TDG533A05900 WN10HD	T128
TDG533A05954 WN10HD	T128
TDG533A06000 WN10HD	T128
TDG533A06100 WN10HD	T128
TDG533A06200 WN10HD	T128
TDG533A06300 WN10HD	T128
TDG533A06350 WN10HD	T128
TDG533A06400 WN10HD	T128
TDG533A06500 WN10HD	T128

Catalogue No.	Page(s)
TDG533A06528 WN10HD	T128
TDG533A06600 WN10HD	T128
TDG533A06630 WN10HD	T128
TDG533A06700 WN10HD	T128
TDG533A06746 WN10HD	T128
TDG533A06800 WN10HD	T128
TDG533A06900 WN10HD	T129
TDG533A07000 WN10HD	T129
TDG533A07100 WN10HD	T129
TDG533A07145 WN10HD	T129
TDG533A07200 WN10HD	T129
TDG533A07300 WN10HD	T129
TDG533A07400 WN10HD	T129
TDG533A07500 WN10HD	T129
TDG533A07541 WN10HD	T129
TDG533A07600 WN10HD	T129
TDG533A07700 WN10HD	T129
TDG533A07800 WN10HD	T129
TDG533A07900 WN10HD	T129
TDG533A07938 WN10HD	T129
TDG533A08000 WN10HD	T129
TDG533A08100 WN10HD	T129
TDG533A08200 WN10HD	T129
TDG533A08300 WN10HD	T129
TDG533A08334 WN10HD	T129
TDG533A08400 WN10HD	T129
TDG533A08433 WN10HD	T129
TDG533A08500 WN10HD	T129
TDG533A08600 WN10HD	T129
TDG533A08700 WN10HD	T129
TDG533A08733 WN10HD	T129
TDG533A08800 WN10HD	T129
TDG533A08900 WN10HD	T129
TDG533A09000 WN10HD	T129
TDG533A09100 WN10HD	T129
TDG533A09129 WN10HD	T129
TDG533A09200 WN10HD	T129
TDG533A09300 WN10HD	T129
TDG533A09347 WN10HD	T129
TDG533A09400 WN10HD	T129
TDG533A09500 WN10HD	T129
TDG533A09525 WN10HD	T129
TDG533A09600 WN10HD	T129
TDG533A09700 WN10HD	T129
TDG533A09800 WN10HD	T129
TDG533A09900 WN10HD	T129
TDG533A09921 WN10HD	T130
TDG533A10000 WN10HD	T130
TDG533A10100 WN10HD	T130
TDG533A10200 WN10HD	T130
TDG533A10300 WN10HD	T130
TDG533A10320 WN10HD	T130
TDG533A10400 WN10HD	T130
TDG533A10500 WN10HD	T130
TDG533A10600 WN10HD	T130
TDG533A10700 WN10HD	T130
TDG533A10716 WN10HD	T130
TDG533A10800 WN10HD	T130
TDG533A10900 WN10HD	T130
TDG533A11000 WN10HD	T130
TDG533A11100 WN10HD	T130
TDG533A11113 WN10HD	T130
TDG533A11200 WN10HD	T130
TDG533A11300 WN10HD	T130
TDG533A11400 WN10HD	T130
TDG533A11500 WN10HD	T130
TDG533A11509 WN10HD	T130
TDG533A11600 WN10HD	T130
TDG533A11700 WN10HD	T130
TDG533A11800 WN10HD	T130
TDG533A11900 WN10HD	T130
TDG533A11908 WN10HD	T130
TDG533A12000 WN10HD	T130
TDG533A12100 WN10HD	T130
TDG533A12200 WN10HD	T130
TDG533A12300 WN10HD	T130
TDG533A12304 WN10HD	T130
TDG533A12400 WN10HD	T130
TDG533A12500 WN10HD	T130
TDG533A12600 WN10HD	T130
TDG533A12700 WN10HD	T130
TDG533A12800 WN10HD	T130
TDG533A12900 WN10HD	T130
TDG533A13000 WN10HD	T130
TDG533A13096 WN10HD	T130
TDG533A13100 WN10HD	T130
TDG533A13200 WN10HD	T131
TDG533A13300 WN10HD	T131
TDG533A13400 WN10HD	T131
TDG533A13490 WN10HD	T131
TDG533A13500 WN10HD	T131
TDG533A13600 WN10HD	T131
TDG533A13700 WN10HD	T131
TDG533A13800 WN10HD	T131
TDG533A13891 WN10HD	T131
TDG533A13900 WN10HD	T131
TDG533A14000 WN10HD	T131
TDG533A14100 WN10HD	T131
TDG533A14200 WN10HD	T131
TDG533A14288 WN10HD	T131
TDG533A14300 WN10HD	T131
TDG533A14400 WN10HD	T131
TDG533A14500 WN10HD	T131
TDG533A14600 WN10HD	T131
TDG533A14684 WN10HD	T131
TDG533A14700 WN10HD	T131
TDG533A14800 WN10HD	T131
TDG533A14900 WN10HD	T131
TDG533A15000 WN10HD	T131
TDG533A15083 WN10HD	T131
TDG533A15100 WN10HD	T131
TDG533A15200 WN10HD	T131
TDG533A15300 WN10HD	T131
TDG533A15400 WN10HD	T131
TDG533A15479 WN10HD	T131
TDG533A15500 WN10HD	T131
TDG533A15600 WN10HD	T131
TDG533A15700 WN10HD	T131
TDG533A15800 WN10HD	T131
TDG533A15875 WN10HD	T131
TDG533A15900 WN10HD	T131
TDG533A16000 WN10HD	T131
TDG533A16100 WN10HD	T131
TDG533A16200 WN10HD	T131
TDG533A16271 WN10HD	T131
TDG533A16300 WN10HD	T131
TDG533A16400 WN10HD	T132
TDG533A16500 WN10HD	T132
TDG533A16600 WN10HD	T132
TDG533A16670 WN10HD	T132
TDG533A16700 WN10HD	T132
TDG533A16800 WN10HD	T132
TDG533A16900 WN10HD	T132
TDG533A17000 WN10HD	T132
TDG533A17100 WN10HD	T132
TDG533A17200 WN10HD	T132
TDG533A17300 WN10HD	T132
TDG533A17400 WN10HD	T132
TDG533A17463 WN10HD	T132
TDG533A17500 WN10HD	T132
TDG533A17600 WN10HD	T132
TDG533A17700 WN10HD	T132
TDG533A17800 WN10HD	T132
TDG533A17859 WN10HD	T132
TDG533A17900 WN10HD	T132
TDG533A18000 WN10HD	T132
TDG533A18100 WN10HD	T132
TDG533A18200 WN10HD	T132
TDG533A18258 WN10HD	T132
TDG533A18300 WN10HD	T132
TDG533A18400 WN10HD	T132
TDG533A18500 WN10HD	T132
TDG533A18600 WN10HD	T132
TDG533A18654 WN10HD	T132
TDG533A18700 WN10HD	T132
TDG533A18800 WN10HD	T132
TDG533A18900 WN10HD	T132
TDG533A19000 WN10HD	T132
TDG533A19050 WN10HD	T132
TDG533A19100 WN10HD	T132
TDG533A19200 WN10HD	T132
TDG533A19300 WN10HD	T132
TDG533A19400 WN10HD	T132
TDG533A19500 WN10HD	T132
TDG533A19600 WN10HD	T132
TDG533A19700 WN10HD	T132
TDG533A19800 WN10HD	T132
TDG533A19900 WN10HD	T132
TDG533A20000 WN10HD	T132
TDG534A03000 WN10HD	T133
TDG534A03048 WN10HD	T133
TDG534A03100 WN10HD	T133
TDG534A03175 WN10HD	T133
TDG534A03200 WN10HD	T133
TDG534A03264 WN10HD	T133
TDG534A03300 WN10HD	T133
TDG534A03400 WN10HD	T133
TDG534A03455 WN10HD	T133
TDG534A03500 WN10HD	T133
TDG534A03571 WN10HD	T133
TDG534A03600 WN10HD	T133
TDG534A03658 WN10HD	T133
TDG534A03700 WN10HD	T133
TDG534A03734 WN10HD	T133
TDG534A03800 WN10HD	T133
TDG534A03900 WN10HD	T133
TDG534A03970 WN10HD	T133
TDG534A04000 WN10HD	T133
TDG534A04039 WN10HD	T133
TDG534A04090 WN10HD	T133
TDG534A04100 WN10HD	T133
TDG534A04200 WN10HD	T133
TDG534A04217 WN10HD	T133
TDG534A04300 WN10HD	T134
TDG534A04366 WN10HD	T134
TDG534A04400 WN10HD	T134
TDG534A04500 WN10HD	T134
TDG534A04600 WN10HD	T134
TDG534A04623 WN10HD	T134
TDG534A04700 WN10HD	T134
TDG534A04763 WN10HD	T134
TDG534A04800 WN10HD	T134
TDG534A04852 WN10HD	T134
TDG534A04900 WN10HD	T134
TDG534A05000 WN10HD	T134
TDG534A05100 WN10HD	T134
TDG534A05106 WN10HD	T134
TDG534A05159 WN10HD	T134
TDG534A05200 WN10HD	T134
TDG534A05300 WN10HD	T134
TDG534A05400 WN10HD	T134
TDG534A05410 WN10HD	T134
TDG534A05500 WN10HD	T134
TDG534A05558 WN10HD	T134
TDG534A05600 WN10HD	T134
TDG534A05616 WN10HD	T134
TDG534A05700 WN10HD	T134
TDG534A05800 WN10HD	T134
TDG534A05900 WN10HD	T134
TDG534A05954 WN10HD	T134
TDG534A06000 WN10HD	T134
TDG534A06100 WN10HD	T134
TDG534A06200 WN10HD	T134
TDG534A06300 WN10HD	T134
TDG534A06350 WN10HD	T134
TDG534A06400 WN10HD	T134
TDG534A06500 WN10HD	T134
TDG534A06528 WN10HD	T134
TDG534A06600 WN10HD	T134
TDG534A06630 WN10HD	T134
TDG534A06700 WN10HD	T134
TDG534A06746 WN10HD	T134
TDG534A06800 WN10HD	T134
TDG534A06900 WN10HD	T135
TDG534A07000 WN10HD	T135
TDG534A07100 WN10HD	T135
TDG534A07145 WN10HD	T135
TDG534A07200 WN10HD	T135
TDG534A07300 WN10HD	T135
TDG534A07400 WN10HD	T135
TDG534A07500 WN10HD	T135
TDG534A07541 WN10HD	T135
TDG534A07600 WN10HD	T135
TDG534A07700 WN10HD	T135
TDG534A07800 WN10HD	T135
TDG534A07900 WN10HD	T135
TDG534A07938 WN10HD	T135
TDG534A08000 WN10HD	T135
TDG534A08100 WN10HD	T135
TDG534A08200 WN10HD	T135
TDG534A08300 WN10HD	T135
TDG534A08334 WN10HD	T135
TDG534A08400 WN10HD	T135
TDG534A08433 WN10HD	T135
TDG534A08500 WN10HD	T135
TDG534A08600 WN10HD	T135
TDG534A08700 WN10HD	T135
TDG534A08733 WN10HD	T135
TDG534A08800 WN10HD	T135
TDG534A08900 WN10HD	T135
TDG534A09000 WN10HD	T135
TDG534A09100 WN10HD	T135
TDG534A09129 WN10HD	T135
TDG534A09200 WN10HD	T135
TDG534A09300 WN10HD	T135
TDG534A09347 WN10HD	T135
TDG534A09400 WN10HD	T135
TDG534A09500 WN10HD	T135
TDG534A09525 WN10HD	T135
TDG534A09600 WN10HD	T135
TDG534A09700 WN10HD	T135
TDG534A09800 WN10HD	T135

Catalogue No.	Page(s)
TDG534A09900 WN10HD	T135
TDG534A09921 WN10HD	T136
TDG534A10000 WN10HD	T136
TDG534A10100 WN10HD	T136
TDG534A10200 WN10HD	T136
TDG534A10300 WN10HD	T136
TDG534A10320 WN10HD	T136
TDG534A10400 WN10HD	T136
TDG534A10500 WN10HD	T136
TDG534A10600 WN10HD	T136
TDG534A10700 WN10HD	T136
TDG534A10716 WN10HD	T136
TDG534A10800 WN10HD	T136
TDG534A10900 WN10HD	T136
TDG534A11000 WN10HD	T136
TDG534A11100 WN10HD	T136
TDG534A11113 WN10HD	T136
TDG534A11200 WN10HD	T136
TDG534A11300 WN10HD	T136
TDG534A11400 WN10HD	T136
TDG534A11500 WN10HD	T136
TDG534A11509 WN10HD	T136
TDG534A11600 WN10HD	T136
TDG534A11700 WN10HD	T136
TDG534A11800 WN10HD	T136
TDG534A11900 WN10HD	T136
TDG534A11908 WN10HD	T136
TDG534A12000 WN10HD	T136
TDG534A12100 WN10HD	T136
TDG534A12200 WN10HD	T136
TDG534A12300 WN10HD	T136
TDG534A12304 WN10HD	T136
TDG534A12400 WN10HD	T136
TDG534A12500 WN10HD	T136
TDG534A12600 WN10HD	T136
TDG534A12700 WN10HD	T136
TDG534A12800 WN10HD	T136
TDG534A12900 WN10HD	T136
TDG534A13000 WN10HD	T136
TDG534A13096 WN10HD	T136
TDG534A13100 WN10HD	T136
TDG534A13200 WN10HD	T137
TDG534A13300 WN10HD	T137
TDG534A13400 WN10HD	T137
TDG534A13490 WN10HD	T137
TDG534A13500 WN10HD	T137
TDG534A13600 WN10HD	T137
TDG534A13700 WN10HD	T137
TDG534A13800 WN10HD	T137
TDG534A13891 WN10HD	T137
TDG534A13900 WN10HD	T137
TDG534A14000 WN10HD	T137
TDG534A14100 WN10HD	T137
TDG534A14200 WN10HD	T137
TDG534A14288 WN10HD	T137
TDG534A14300 WN10HD	T137
TDG534A14400 WN10HD	T137
TDG534A14500 WN10HD	T137
TDG534A14600 WN10HD	T137
TDG534A14684 WN10HD	T137
TDG534A14700 WN10HD	T137
TDG534A14800 WN10HD	T137
TDG534A14900 WN10HD	T137
TDG534A15000 WN10HD	T137
TDG534A15083 WN10HD	T137
TDG534A15100 WN10HD	T137
TDG534A15200 WN10HD	T137
TDG534A15300 WN10HD	T137
TDG534A15400 WN10HD	T137
TDG534A15479 WN10HD	T137
TDG534A15500 WN10HD	T137
TDG534A15600 WN10HD	T137
TDG534A15700 WN10HD	T137
TDG534A15800 WN10HD	T137
TDG534A15875 WN10HD	T137
TDG534A15900 WN10HD	T137
TDG534A16000 WN10HD	T137
TDG534A16100 WN10HD	T137
TDG534A16200 WN10HD	T137
TDG534A16271 WN10HD	T137
TDG534A16300 WN10HD	T137
TDG534A16400 WN10HD	T138
TDG534A16500 WN10HD	T138
TDG534A16600 WN10HD	T138
TDG534A16670 WN10HD	T138
TDG534A16700 WN10HD	T138
TDG534A16800 WN10HD	T138
TDG534A16900 WN10HD	T138
TDG534A17000 WN10HD	T138
TDG534A17100 WN10HD	T138
TDG534A17200 WN10HD	T138
TDG534A17300 WN10HD	T138
TDG534A17400 WN10HD	T138
TDG534A17463 WN10HD	T138
TDG534A17500 WN10HD	T138
TDG534A17600 WN10HD	T138
TDG534A17700 WN10HD	T138
TDG534A17800 WN10HD	T138
TDG534A17859 WN10HD	T138
TDG534A17900 WN10HD	T138
TDG534A18000 WN10HD	T138
TDG534A18100 WN10HD	T138
TDG534A18200 WN10HD	T138
TDG534A18258 WN10HD	T138
TDG534A18300 WN10HD	T138
TDG534A18400 WN10HD	T138
TDG534A18500 WN10HD	T138
TDG534A18600 WN10HD	T138
TDG534A18654 WN10HD	T138
TDG534A18700 WN10HD	T138
TDG534A18800 WN10HD	T138
TDG534A18900 WN10HD	T138
TDG534A19000 WN10HD	T138
TDG534A19050 WN10HD	T138
TDG534A19100 WN10HD	T138
TDG534A19200 WN10HD	T138
TDG534A19300 WN10HD	T138
TDG534A19400 WN10HD	T138
TDG534A19500 WN10HD	T138
TDG534A19600 WN10HD	T138
TDG534A19700 WN10HD	T138
TDG534A19800 WN10HD	T138
TDG534A19900 WN10HD	T138
TDG534A20000 WN10HD	T138
TDHB07S102 ALO	D48
TDHB07S102 C25	D48
TDHB07S102 CG5	D48
TDHB07S102 CG6	D48
TDHB07S102 CM1	D48
TDHB07S102 TN7	D48
TDHB07S102M CBN6	D48
TDHB07S104 C25	D48
TDHB07S104 CG5	D48
TDHB07S104 CG6	D48
TDHB07S104 CM1	D48
TDHB07S104 TN7	D48
TDHB07S104M CBN6	D48
TDHB07S108 CG5	D48
TDHB07S1X0 C25	D48
TDHB07S1X0 CG5	D48
TDHB07S1X0 CM1	D48
TDHB07S1X0M CPD1	D48
TDHH07S102 CG5	D49
TDHH07S102L CG5	D49
TDHH07S102L CG6	D49
TDHH07S102L CM1	D49
TDHH07S102L TN7	D49
TDHH07S102R CG5	D49
TDHH07S104 CG5	D49
TDHH07S104L CG5	D49
TDHH07S104L CM1	D49
TDHH07S104L TN7	D49
TDHH07S104R CG5	D49
TDM0794UPM WU25PD	U10
TDM0800UPM WU25PD	U10
TDM080R3SCF12M WG	U6
TDM080R5SCF12M WG	U7
TDM080R8SCF12M WG	U8
TDM0810UPM WU25PD	U10
TDM0816UPM WU25PD	U10
TDM0820UPM WU25PD	U10
TDM0830UPM WU25PD	U10
TDM0833UPM WU25PD	U10
TDM0840UPM WU25PD	U10
TDM0843UPM WU25PD	U10
TDM0850UPM WU25PD	U10
TDM085R3SCF12M WG	U6
TDM085R5SCF12M WG	U7
TDM085R8SCF12M WG	U8
TDM0860UPM WU25PD	U10
TDM0861UPM WU25PD	U10
TDM0870UPM WU25PD	U10
TDM0873UPM WU25PD	U10
TDM0880UPM WU25PD	U10
TDM0884UPM WU25PD	U10
TDM0890UPM WU25PD	U10
TDM0900UPM WU25PD	U10
TDM0909UPM WU25PD	U10
TDM090R3SCF12M WG	U6
TDM090R5SCF12M WG	U7
TDM090R8SCF12M WG	U8
TDM0910UPM WU25PD	U10
TDM0913UPM WU25PD	U10
TDM0920UPM WU25PD	U10
TDM0930UPM WU25PD	U10
TDM0935UPM WU25PD	U10
TDM0940UPM WU25PD	U11
TDM0950UPM WU25PD	U11
TDM0953UPM WU25PD	U11
TDM0956UPM WU25PD	U11
TDM0958UPM WU25PD	U11
TDM095R3SCF12M WG	U6
TDM095R5SCF12M WG	U7
TDM095R8SCF12M WG	U8
TDM0960UPM WU25PD	U11
TDM0970UPM WU25PD	U11
TDM0980UPM WU25PD	U11
TDM0990UPM WU25PD	U11
TDM0992UPM WU25PD	U11
TDM1000UPM WU25PD	U11
TDM1002UPM WU25PD	U11
TDM1008UPM WU25PD	U11
TDM100R3SCF16M WG	U6
TDM100R5SCF16M WG	U7
TDM100R8SCF16M WG	U8
TDM1010UPM WU25PD	U11
TDM1020UPM WU25PD	U11
TDM1026UPM WU25PD	U11
TDM1030UPM WU25PD	U11
TDM1032UPM WU25PD	U11
TDM1040UPM WU25PD	U11
TDM1049UPM WU25PD	U11
TDM1050UPM WU25PD	U11
TDM105R3SCF16M WG	U6
TDM105R5SCF16M WG	U7
TDM105R8SCF16M WG	U8
TDM1060UPM WU25PD	U11
TDM1070UPM WU25PD	U11
TDM1072UPM WU25PD	U11
TDM1080UPM WU25PD	U11
TDM1090UPM WU25PD	U11
TDM1100UPM WU25PD	U11
TDM110R3SCF16M WG	U6
TDM110R5SCF16M WG	U7
TDM110R8SCF16M WG	U8
TDM1110UPM WU25PD	U11
TDM1111UPM WU25PD	U11
TDM1120UPM WU25PD	U11
TDM1130UPM WU25PD	U11
TDM1140UPM WU25PD	U11
TDM1150UPM WU25PD	U11
TDM1151UPM WU25PD	U11
TDM115R3SCF16M WG	U6
TDM115R5SCF16M WG	U7
TDM115R8SCF16M WG	U8
TDM1160UPM WU25PD	U11
TDM1161UPM WU25PD	U11
TDM1170UPM WU25PD	U11
TDM1180UPM WU25PD	U11
TDM1190UPM WU25PD	U11
TDM1191UPM WU25PD	U11
TDM1200UPM WU25PD	U12
TDM120R3SCF16M WG	U6
TDM120R5SCF16M WG	U7
TDM120R8SCF16M WG	U8
TDM1210UPM WU25PD	U12
TDM1220UPM WU25PD	U12
TDM1230UPM WU25PD	U12
TDM1240UPM WU25PD	U12
TDM1247UPM WU25PD	U12
TDM1250UPM WU25PD	U12
TDM125R3SCF16M WG	U6
TDM125R5SCF16M WG	U7
TDM125R8SCF16M WG	U8
TDM1260UPM WU25PD	U12
TDM1270UPM WU25PD	U12
TDM1280UPM WU25PD	U12
TDM1290UPM WU25PD	U12
TDM1300UPM WU25PD	U12
TDM130R3SCF16M WG	U6
TDM130R5SCF16M WG	U7
TDM130R8SCF16M WG	U8
TDM1310UPM WU25PD	U12
TDM1320UPM WU25PD	U12
TDM1330UPM WU25PD	U12
TDM1340UPM WU25PD	U12
TDM1349UPM WU25PD	U12
TDM1350UPM WU25PD	U12
TDM135R3SCF16M WG	U6
TDM135R5SCF16M WG	U7
TDM135R8SCF16M WG	U8
TDM1360UPM WU25PD	U12

Catalogue No.	Page(s)
TDM1370UPM WU25PD	U12
TDM1380UPM WU25PD	U12
TDM1389UPM WU25PD	U12
TDM1390UPM WU25PD	U12
TDM1400UPM WU25PD	U12
TDM140R3SCF16M WG	U6
TDM140R5SCF16M WG	U7
TDM140R8SCF16M WG	U8
TDM1410UPM WU25PD	U12
TDM1420UPM WU25PD	U12
TDM1429UPM WU25PD	U12
TDM1430UPM WU25PD	U12
TDM1440UPM WU25PD	U12
TDM1450UPM WU25PD	U12
TDM145R3SCF16M WG	U6
TDM145R5SCF16M WG	U7
TDM145R8SCF16M WG	U8
TDM1460UPM WU25PD	U12
TDM1467UPM WU25PD	U12
TDM1468UPM WU25PD	U12
TDM1470UPM WU25PD	U12
TDM1480UPM WU25PD	U12
TDM1490UPM WU25PD	U12
TDM1500UPM WU25PD	U12
TDM1508UPM WU25PD	U12
TDM150R3SCF20M WG	U6
TDM150R5SCF20M WG	U7
TDM150R8SCF20M WG	U8
TDM1510UPM WU25PD	U12
TDM1520UPM WU25PD	U12
TDM1530UPM WU25PD	U13
TDM1540UPM WU25PD	U13
TDM1548UPM WU25PD	U13
TDM1550UPM WU25PD	U13
TDM1560UPM WU25PD	U13
TDM1570UPM WU25PD	U13
TDM1580UPM WU25PD	U13
TDM1588UPM WU25PD	U13
TDM1600UPM WU25PD	U13
TDM1603UPM WU25PD	U13
TDM1608UPM WU25PD	U13
TDM160R3SCF20M WG	U6
TDM160R5SCF20M WG	U7
TDM160R8SCF20M WG	U8
TDM1610UPM WU25PD	U13
TDM1618UPM WU25PD	U13
TDM1620UPM WU25PD	U13
TDM1627UPM WU25PD	U13
TDM1630UPM WU25PD	U13
TDM1640UPM WU25PD	U13
TDM1650UPM WU25PD	U13
TDM1660UPM WU25PD	U13
TDM1667UPM WU25PD	U13
TDM1670UPM WU25PD	U13
TDM1680UPM WU25PD	U13
TDM1687UPM WU25PD	U13
TDM1690UPM WU25PD	U13
TDM1700UPM WU25PD	U13
TDM1707UPM WU25PD	U13
TDM170R3SCF20M WG	U6
TDM170R5SCF20M WG	U7
TDM170R8SCF20M WG	U8
TDM1710UPM WU25PD	U13
TDM1720UPM WU25PD	U13
TDM1730UPM WU25PD	U13
TDM1740UPM WU25PD	U13
TDM1746UPM WU25PD	U13
TDM1750UPM WU25PD	U13
TDM1760UPM WU25PD	U13
TDM1770UPM WU25PD	U13
TDM1780UPM WU25PD	U13
TDM1786UPM WU25PD	U13
TDM1790UPM WU25PD	U13
TDM1800UPM WU25PD	U13
TDM180R3SCF25M WG	U6
TDM180R5SCF25M WG	U7
TDM180R8SCF25M WG	U8
TDM1810UPM WU25PD	U13
TDM1820UPM WU25PD	U13
TDM1826UPM WU25PD	U14
TDM1830UPM WU25PD	U14
TDM1840UPM WU25PD	U14
TDM1850UPM WU25PD	U14
TDM1860UPM WU25PD	U14
TDM1865UPM WU25PD	U14
TDM1870UPM WU25PD	U14
TDM1880UPM WU25PD	U14
TDM1890UPM WU25PD	U14
TDM1900UPM WU25PD	U14
TDM1905UPM WU25PD	U14
TDM190R3SCF25M WG	U6
TDM190R5SCF25M WG	U7
TDM190R8SCF25M WG	U8
TDM1910UPM WU25PD	U14
TDM1920UPM WU25PD	U14
TDM1923UPM WU25PD	U14
TDM1925UPM WU25PD	U14
TDM1928UPM WU25PD	U14
TDM1930UPM WU25PD	U14
TDM1935UPM WU25PD	U14
TDM1940UPM WU25PD	U14
TDM1945UPM WU25PD	U14
TDM1950UPM WU25PD	U14
TDM1960UPM WU25PD	U14
TDM1970UPM WU25PD	U14
TDM1980UPM WU25PD	U14
TDM1984UPM WU25PD	U14
TDM1990UPM WU25PD	U14
TDM2000UPM WU25PD	U14
TDM200R3SCF25M WG	U6
TDM200R5SCF25M WG	U7
TDM200R8SCF25M WG	U8
TDM2010UPM WU25PD	U14
TDM2020UPM WU25PD	U14
TDM2024UPM WU25PD	U14
TDM2030UPM WU25PD	U14
TDM2040UPM WU25PD	U14
TDM2050UPM WU25PD	U14
TDM2060UPM WU25PD	U14
TDM2064UPM WU25PD	U14
TDM2070UPM WU25PD	U14
TDM2080UPM WU25PD	U14
TDM2090UPM WU25PD	U14
TDM2099UPM WU25PD	U14
TDM2100UPM WU25PD	U14
TDM210R3SCF25M WG	U6
TDM210R5SCF25M WG	U7
TDM210R8SCF25M WG	U8
TDM2144UPM WU25PD	U15
TDM2150UPM WU25PD	U15
TDM2200UPM WU25PD	U15
TDM220R3SCF25M WG	U6
TDM220R5SCF25M WG	U7
TDM220R8SCF25M WG	U8
TDM2223UPM WU25PD	U15
TDM2245UPM WU25PD	U15
TDM2250UPM WU25PD	U15
TDM2300UPM WU25PD	U15
TDM230R3SCF25M WG	U6
TDM230R5SCF25M WG	U7
TDM230R8SCF25M WG	U8
TDM2350UPM WU25PD	U15
TDM2381UPM WU25PD	U15
TDM2400UPM WU25PD	U15
TDM240R3SCF25M WG	U6
TDM240R5SCF25M WG	U7
TDM240R8SCF25M WG	U8
TDM2450UPM WU25PD	U15
TDM2461UPM WU25PD	U15
TDM2500UPM WU25PD	U15
TDM250R3SCF25M WG	U6
TDM250R5SCF25M WG	U7
TDM250R8SCF25M WG	U8
TDM2540UPM WU25PD	U15
TDM2550UPM WU25PD	U15
TDM2568UPM WU25PD	U15
TDM2581UPM WU25PD	U15
TDM2599UPM WU25PD	U15
TDS202A03000 WP20PD	T50
TDS202A03048 WP20PD	T50
TDS202A03100 WP20PD	T50
TDS202A03175 WP20PD	T50
TDS202A03200 WP20PD	T50
TDS202A03264 WP20PD	T50
TDS202A03300 WP20PD	T50
TDS202A03400 WP20PD	T50
TDS202A03455 WP20PD	T50
TDS202A03500 WP20PD	T50
TDS202A03571 WP20PD	T50
TDS202A03600 WP20PD	T50
TDS202A03658 WP20PD	T50
TDS202A03700 WP20PD	T50
TDS202A03734 WP20PD	T50
TDS202A03800 WP20PD	T50
TDS202A03900 WP20PD	T50
TDS202A03970 WP20PD	T50
TDS202A04000 WP20PD	T50
TDS202A04039 WP20PD	T50
TDS202A04090 WP20PD	T50
TDS202A04100 WP20PD	T50
TDS202A04200 WP20PD	T50
TDS202A04217 WP20PD	T50
TDS202A04300 WP20PD	T51
TDS202A04366 WP20PD	T51
TDS202A04400 WP20PD	T51
TDS202A04500 WP20PD	T51
TDS202A04600 WP20PD	T51
TDS202A04623 WP20PD	T51
TDS202A04700 WP20PD	T51
TDS202A04763 WP20PD	T51
TDS202A04800 WP20PD	T51
TDS202A04852 WP20PD	T51
TDS202A04900 WP20PD	T51
TDS202A05000 WP20PD	T51
TDS202A05100 WP20PD	T51
TDS202A05106 WP20PD	T51
TDS202A05159 WP20PD	T51
TDS202A05200 WP20PD	T51
TDS202A05300 WP20PD	T51
TDS202A05400 WP20PD	T51
TDS202A05410 WP20PD	T51
TDS202A05500 WP20PD	T51
TDS202A05558 WP20PD	T51
TDS202A05600 WP20PD	T51
TDS202A05616 WP20PD	T51
TDS202A05700 WP20PD	T51
TDS202A05800 WP20PD	T51
TDS202A05900 WP20PD	T51
TDS202A05954 WP20PD	T51
TDS202A06000 WP20PD	T51
TDS202A06100 WP20PD	T51
TDS202A06200 WP20PD	T51
TDS202A06300 WP20PD	T51
TDS202A06350 WP20PD	T51
TDS202A06400 WP20PD	T51
TDS202A06500 WP20PD	T51
TDS202A06528 WP20PD	T51
TDS202A06600 WP20PD	T51
TDS202A06630 WP20PD	T51
TDS202A06700 WP20PD	T51
TDS202A06746 WP20PD	T51
TDS202A06800 WP20PD	T51
TDS202A06900 WP20PD	T52
TDS202A07000 WP20PD	T52
TDS202A07100 WP20PD	T52
TDS202A07145 WP20PD	T52
TDS202A07200 WP20PD	T52
TDS202A07300 WP20PD	T52
TDS202A07400 WP20PD	T52
TDS202A07500 WP20PD	T52
TDS202A07541 WP20PD	T52
TDS202A07600 WP20PD	T52
TDS202A07700 WP20PD	T52
TDS202A07800 WP20PD	T52
TDS202A07900 WP20PD	T52
TDS202A07938 WP20PD	T52
TDS202A08000 WP20PD	T52
TDS202A08100 WP20PD	T52
TDS202A08200 WP20PD	T52
TDS202A08300 WP20PD	T52
TDS202A08334 WP20PD	T52
TDS202A08400 WP20PD	T52
TDS202A08433 WP20PD	T52
TDS202A08500 WP20PD	T52
TDS202A08600 WP20PD	T52
TDS202A08700 WP20PD	T52
TDS202A08733 WP20PD	T52
TDS202A08800 WP20PD	T52
TDS202A08900 WP20PD	T52
TDS202A09000 WP20PD	T52
TDS202A09100 WP20PD	T52
TDS202A09129 WP20PD	T52
TDS202A09200 WP20PD	T52
TDS202A09300 WP20PD	T52
TDS202A09347 WP20PD	T52
TDS202A09400 WP20PD	T52
TDS202A09500 WP20PD	T52
TDS202A09525 WP20PD	T52
TDS202A09600 WP20PD	T52
TDS202A09700 WP20PD	T52
TDS202A09800 WP20PD	T52
TDS202A09900 WP20PD	T52
TDS202A09921 WP20PD	T53
TDS202A10000 WP20PD	T53
TDS202A10100 WP20PD	T53
TDS202A10200 WP20PD	T53
TDS202A10300 WP20PD	T53
TDS202A10320 WP20PD	T53
TDS202A10400 WP20PD	T53
TDS202A10500 WP20PD	T53
TDS202A10600 WP20PD	T53
TDS202A10700 WP20PD	T53

Catalogue No.	Page(s)
TDS202A10716 WP20PD	T53
TDS202A10800 WP20PD	T53
TDS202A10900 WP20PD	T53
TDS202A11000 WP20PD	T53
TDS202A11100 WP20PD	T53
TDS202A11113 WP20PD	T53
TDS202A11200 WP20PD	T53
TDS202A11300 WP20PD	T53
TDS202A11400 WP20PD	T53
TDS202A11500 WP20PD	T53
TDS202A11509 WP20PD	T53
TDS202A11600 WP20PD	T53
TDS202A11700 WP20PD	T53
TDS202A11800 WP20PD	T53
TDS202A11900 WP20PD	T53
TDS202A11908 WP20PD	T53
TDS202A12000 WP20PD	T53
TDS202A12100 WP20PD	T53
TDS202A12200 WP20PD	T53
TDS202A12300 WP20PD	T53
TDS202A12304 WP20PD	T53
TDS202A12400 WP20PD	T53
TDS202A12500 WP20PD	T53
TDS202A12600 WP20PD	T53
TDS202A12700 WP20PD	T53
TDS202A12800 WP20PD	T53
TDS202A12900 WP20PD	T53
TDS202A13000 WP20PD	T53
TDS202A13096 WP20PD	T53
TDS202A13100 WP20PD	T53
TDS202A13200 WP20PD	T54
TDS202A13300 WP20PD	T54
TDS202A13400 WP20PD	T54
TDS202A13500 WP20PD	T54
TDS202A13600 WP20PD	T54
TDS202A13700 WP20PD	T54
TDS202A13800 WP20PD	T54
TDS202A13891 WP20PD	T54
TDS202A13900 WP20PD	T54
TDS202A14000 WP20PD	T54
TDS202A14100 WP20PD	T54
TDS202A14200 WP20PD	T54
TDS202A14288 WP20PD	T54
TDS202A14300 WP20PD	T54
TDS202A14400 WP20PD	T54
TDS202A14500 WP20PD	T54
TDS202A14600 WP20PD	T54
TDS202A14684 WP20PD	T54
TDS202A14700 WP20PD	T54
TDS202A14800 WP20PD	T54
TDS202A14900 WP20PD	T54
TDS202A15000 WP20PD	T54
TDS202A15083 WP20PD	T54
TDS202A15100 WP20PD	T54
TDS202A15200 WP20PD	T54
TDS202A15300 WP20PD	T54
TDS202A15400 WP20PD	T54
TDS202A15479 WP20PD	T54
TDS202A15500 WP20PD	T54
TDS202A15600 WP20PD	T54
TDS202A15700 WP20PD	T54
TDS202A15800 WP20PD	T54
TDS202A15875 WP20PD	T54
TDS202A15900 WP20PD	T54
TDS202A16000 WP20PD	T54
TDS202A16100 WP20PD	T54
TDS202A16200 WP20PD	T54
TDS202A16271 WP20PD	T54
TDS202A16300 WP20PD	T54
TDS202A16400 WP20PD	T54
TDS202A16500 WP20PD	T55
TDS202A16600 WP20PD	T55
TDS202A16670 WP20PD	T55
TDS202A16700 WP20PD	T55
TDS202A16800 WP20PD	T55
TDS202A16900 WP20PD	T55
TDS202A17000 WP20PD	T55
TDS202A17100 WP20PD	T55
TDS202A17200 WP20PD	T55
TDS202A17300 WP20PD	T55
TDS202A17400 WP20PD	T55
TDS202A17463 WP20PD	T55
TDS202A17500 WP20PD	T55
TDS202A17600 WP20PD	T55
TDS202A17700 WP20PD	T55
TDS202A17800 WP20PD	T55
TDS202A17859 WP20PD	T55
TDS202A17900 WP20PD	T55
TDS202A18000 WP20PD	T55
TDS202A18100 WP20PD	T55
TDS202A18200 WP20PD	T55
TDS202A18258 WP20PD	T55
TDS202A18300 WP20PD	T55
TDS202A18400 WP20PD	T55
TDS202A18500 WP20PD	T55
TDS202A18600 WP20PD	T55
TDS202A18654 WP20PD	T55
TDS202A18700 WP20PD	T55
TDS202A18800 WP20PD	T55
TDS202A18900 WP20PD	T55
TDS202A19000 WP20PD	T55
TDS202A19050 WP20PD	T55
TDS202A19100 WP20PD	T55
TDS202A19200 WP20PD	T55
TDS202A19300 WP20PD	T55
TDS202A19400 WP20PD	T55
TDS202A19500 WP20PD	T55
TDS202A19600 WP20PD	T55
TDS202A19700 WP20PD	T55
TDS202A19800 WP20PD	T55
TDS202A19900 WP20PD	T55
TDS202A20000 WP20PD	T55
TDS212A03000 WK15PD	T50
TDS212A03048 WK15PD	T50
TDS212A03100 WK15PD	T50
TDS212A03175 WK15PD	T50
TDS212A03200 WK15PD	T50
TDS212A03264 WK15PD	T50
TDS212A03300 WK15PD	T50
TDS212A03400 WK15PD	T50
TDS212A03455 WK15PD	T50
TDS212A03500 WK15PD	T50
TDS212A03571 WK15PD	T50
TDS212A03600 WK15PD	T50
TDS212A03658 WK15PD	T50
TDS212A03700 WK15PD	T50
TDS212A03734 WK15PD	T50
TDS212A03800 WK15PD	T50
TDS212A03900 WK15PD	T50
TDS212A03970 WK15PD	T50
TDS212A04000 WK15PD	T50
TDS212A04039 WK15PD	T50
TDS212A04090 WK15PD	T50
TDS212A04100 WK15PD	T50
TDS212A04200 WK15PD	T50
TDS212A04217 WK15PD	T50
TDS212A04300 WK15PD	T51
TDS212A04366 WK15PD	T51
TDS212A04400 WK15PD	T51
TDS212A04500 WK15PD	T51
TDS212A04600 WK15PD	T51
TDS212A04623 WK15PD	T51
TDS212A04700 WK15PD	T51
TDS212A04763 WK15PD	T51
TDS212A04800 WK15PD	T51
TDS212A04852 WK15PD	T51
TDS212A04900 WK15PD	T51
TDS212A05000 WK15PD	T51
TDS212A05100 WK15PD	T51
TDS212A05106 WK15PD	T51
TDS212A05159 WK15PD	T51
TDS212A05200 WK15PD	T51
TDS212A05300 WK15PD	T51
TDS212A05400 WK15PD	T51
TDS212A05410 WK15PD	T51
TDS212A05500 WK15PD	T51
TDS212A05558 WK15PD	T51
TDS212A05600 WK15PD	T51
TDS212A05616 WK15PD	T51
TDS212A05700 WK15PD	T51
TDS212A05800 WK15PD	T51
TDS212A05900 WK15PD	T51
TDS212A05954 WK15PD	T51
TDS212A06000 WK15PD	T51
TDS212A06100 WK15PD	T51
TDS212A06200 WK15PD	T51
TDS212A06300 WK15PD	T51
TDS212A06350 WK15PD	T51
TDS212A06400 WK15PD	T51
TDS212A06500 WK15PD	T51
TDS212A06528 WK15PD	T51
TDS212A06600 WK15PD	T51
TDS212A06630 WK15PD	T51
TDS212A06700 WK15PD	T51
TDS212A06746 WK15PD	T51
TDS212A06800 WK15PD	T51
TDS212A06900 WK15PD	T52
TDS212A07000 WK15PD	T52
TDS212A07100 WK15PD	T52
TDS212A07145 WK15PD	T52
TDS212A07200 WK15PD	T52
TDS212A07300 WK15PD	T52
TDS212A07400 WK15PD	T52
TDS212A07500 WK15PD	T52
TDS212A07541 WK15PD	T52
TDS212A07600 WK15PD	T52
TDS212A07700 WK15PD	T52
TDS212A07800 WK15PD	T52
TDS212A07900 WK15PD	T52
TDS212A07938 WK15PD	T52
TDS212A08000 WK15PD	T52
TDS212A08100 WK15PD	T52
TDS212A08200 WK15PD	T52
TDS212A08300 WK15PD	T52
TDS212A08334 WK15PD	T52
TDS212A08400 WK15PD	T52
TDS212A08433 WK15PD	T52
TDS212A08500 WK15PD	T52
TDS212A08600 WK15PD	T52
TDS212A08700 WK15PD	T52
TDS212A08733 WK15PD	T52
TDS212A08800 WK15PD	T52
TDS212A08900 WK15PD	T52
TDS212A09000 WK15PD	T52
TDS212A09100 WK15PD	T52
TDS212A09129 WK15PD	T52
TDS212A09200 WK15PD	T52
TDS212A09300 WK15PD	T52
TDS212A09347 WK15PD	T52
TDS212A09400 WK15PD	T52
TDS212A09500 WK15PD	T52
TDS212A09525 WK15PD	T52
TDS212A09600 WK15PD	T52
TDS212A09700 WK15PD	T52
TDS212A09800 WK15PD	T52
TDS212A09900 WK15PD	T52
TDS212A09921 WK15PD	T53
TDS212A10000 WK15PD	T53
TDS212A10100 WK15PD	T53
TDS212A10200 WK15PD	T53
TDS212A10300 WK15PD	T53
TDS212A10320 WK15PD	T53
TDS212A10400 WK15PD	T53
TDS212A10500 WK15PD	T53
TDS212A10600 WK15PD	T53
TDS212A10700 WK15PD	T53
TDS212A10716 WK15PD	T53
TDS212A10800 WK15PD	T53
TDS212A10900 WK15PD	T53
TDS212A11000 WK15PD	T53
TDS212A11100 WK15PD	T53
TDS212A11113 WK15PD	T53
TDS212A11200 WK15PD	T53
TDS212A11300 WK15PD	T53
TDS212A11400 WK15PD	T53
TDS212A11500 WK15PD	T53
TDS212A11509 WK15PD	T53
TDS212A11600 WK15PD	T53
TDS212A11700 WK15PD	T53
TDS212A11800 WK15PD	T53
TDS212A11900 WK15PD	T53
TDS212A11908 WK15PD	T53
TDS212A12000 WK15PD	T53
TDS212A12100 WK15PD	T53
TDS212A12200 WK15PD	T53
TDS212A12300 WK15PD	T53
TDS212A12304 WK15PD	T53
TDS212A12400 WK15PD	T53
TDS212A12500 WK15PD	T53
TDS212A12600 WK15PD	T53
TDS212A12700 WK15PD	T53
TDS212A12800 WK15PD	T53
TDS212A12900 WK15PD	T53
TDS212A13000 WK15PD	T53
TDS212A13096 WK15PD	T53
TDS212A13100 WK15PD	T53
TDS212A13200 WK15PD	T54
TDS212A13300 WK15PD	T54
TDS212A13400 WK15PD	T54
TDS212A13500 WK15PD	T54
TDS212A13600 WK15PD	T54
TDS212A13700 WK15PD	T54
TDS212A13800 WK15PD	T54
TDS212A13891 WK15PD	T54
TDS212A13900 WK15PD	T54
TDS212A14000 WK15PD	T54
TDS212A14100 WK15PD	T54
TDS212A14200 WK15PD	T54
TDS212A14288 WK15PD	T54
TDS212A14300 WK15PD	T54
TDS212A14400 WK15PD	T54
TDS212A14500 WK15PD	T54

Catalogue No.	Page(s)
TDS212A14600 WK15PD	T54
TDS212A14684 WK15PD	T54
TDS212A14700 WK15PD	T54
TDS212A14800 WK15PD	T54
TDS212A14900 WK15PD	T54
TDS212A15000 WK15PD	T54
TDS212A15083 WK15PD	T54
TDS212A15100 WK15PD	T54
TDS212A15200 WK15PD	T54
TDS212A15300 WK15PD	T54
TDS212A15400 WK15PD	T54
TDS212A15479 WK15PD	T54
TDS212A15500 WK15PD	T54
TDS212A15600 WK15PD	T54
TDS212A15700 WK15PD	T54
TDS212A15800 WK15PD	T54
TDS212A15875 WK15PD	T54
TDS212A15900 WK15PD	T54
TDS212A16000 WK15PD	T54
TDS212A16100 WK15PD	T54
TDS212A16200 WK15PD	T54
TDS212A16271 WK15PD	T54
TDS212A16300 WK15PD	T54
TDS212A16400 WK15PD	T54
TDS212A16500 WK15PD	T55
TDS212A16600 WK15PD	T55
TDS212A16670 WK15PD	T55
TDS212A16700 WK15PD	T55
TDS212A16800 WK15PD	T55
TDS212A16900 WK15PD	T55
TDS212A17000 WK15PD	T55
TDS212A17100 WK15PD	T55
TDS212A17200 WK15PD	T55
TDS212A17300 WK15PD	T55
TDS212A17400 WK15PD	T55
TDS212A17463 WK15PD	T55
TDS212A17500 WK15PD	T55
TDS212A17600 WK15PD	T55
TDS212A17700 WK15PD	T55
TDS212A17800 WK15PD	T55
TDS212A17859 WK15PD	T55
TDS212A17900 WK15PD	T55
TDS212A18000 WK15PD	T55
TDS212A18100 WK15PD	T55
TDS212A18200 WK15PD	T55
TDS212A18258 WK15PD	T55
TDS212A18300 WK15PD	T55
TDS212A18400 WK15PD	T55
TDS212A18500 WK15PD	T55
TDS212A18600 WK15PD	T55
TDS212A18654 WK15PD	T55
TDS212A18700 WK15PD	T55
TDS212A18800 WK15PD	T55
TDS212A18900 WK15PD	T55
TDS212A19000 WK15PD	T55
TDS212A19050 WK15PD	T55
TDS212A19100 WK15PD	T55
TDS212A19200 WK15PD	T55
TDS212A19300 WK15PD	T55
TDS212A19400 WK15PD	T55
TDS212A19500 WK15PD	T55
TDS212A19600 WK15PD	T55
TDS212A19700 WK15PD	T55
TDS212A19800 WK15PD	T55
TDS212A19900 WK15PD	T55
TDS212A20000 WK15PD	T55
TDS301A03000 WU25PD	T78
TDS301A03100 WU25PD	T78
TDS301A03200 WU25PD	T78
TDS301A03250 WU25PD	T78
TDS301A03300 WU25PD	T78
TDS301A03400 WU25PD	T78
TDS301A03500 WU25PD	T78
TDS301A03600 WU25PD	T78
TDS301A03700 WU25PD	T78
TDS301A03800 WU25PD	T78
TDS301A03900 WU25PD	T78
TDS301A04000 WU25PD	T78
TDS301A04100 WU25PD	T78
TDS301A04200 WU25PD	T78
TDS301A04300 WU25PD	T78
TDS301A04370 WU25PD	T78
TDS301A04400 WU25PD	T78
TDS301A04500 WU25PD	T78
TDS301A04600 WU25PD	T78
TDS301A04650 WU25PD	T78
TDS301A04700 WU25PD	T78
TDS301A04760 WU25PD	T78
TDS301A04800 WU25PD	T78
TDS301A04900 WU25PD	T78
TDS301A05000 WU25PD	T79
TDS301A05100 WU25PD	T79
TDS301A05160 WU25PD	T79
TDS301A05200 WU25PD	T79
TDS301A05300 WU25PD	T79
TDS301A05400 WU25PD	T79
TDS301A05500 WU25PD	T79
TDS301A05550 WU25PD	T79
TDS301A05560 WU25PD	T79
TDS301A05600 WU25PD	T79
TDS301A05700 WU25PD	T79
TDS301A05800 WU25PD	T79
TDS301A05900 WU25PD	T79
TDS301A05950 WU25PD	T79
TDS301A06000 WU25PD	T79
TDS301A06100 WU25PD	T79
TDS301A06200 WU25PD	T79
TDS301A06300 WU25PD	T79
TDS301A06350 WU25PD	T79
TDS301A06400 WU25PD	T79
TDS301A06500 WU25PD	T79
TDS301A06600 WU25PD	T79
TDS301A06700 WU25PD	T79
TDS301A06750 WU25PD	T79
TDS301A06800 WU25PD	T79
TDS301A06900 WU25PD	T79
TDS301A07000 WU25PD	T79
TDS301A07100 WU25PD	T79
TDS301A07140 WU25PD	T79
TDS301A07200 WU25PD	T79
TDS301A07300 WU25PD	T79
TDS301A07400 WU25PD	T79
TDS301A07500 WU25PD	T79
TDS301A07540 WU25PD	T79
TDS301A07600 WU25PD	T79
TDS301A07700 WU25PD	T79
TDS301A07800 WU25PD	T79
TDS301A07900 WU25PD	T79
TDS301A07940 WU25PD	T79
TDS301A08000 WU25PD	T79
TDS301A08100 WU25PD	T80
TDS301A08200 WU25PD	T80
TDS301A08300 WU25PD	T80
TDS301A08330 WU25PD	T80
TDS301A08400 WU25PD	T80
TDS301A08500 WU25PD	T80
TDS301A08600 WU25PD	T80
TDS301A08700 WU25PD	T80
TDS301A08800 WU25PD	T80
TDS301A08900 WU25PD	T80
TDS301A09000 WU25PD	T80
TDS301A09100 WU25PD	T80
TDS301A09130 WU25PD	T80
TDS301A09200 WU25PD	T80
TDS301A09300 WU25PD	T80
TDS301A09400 WU25PD	T80
TDS301A09500 WU25PD	T80
TDS301A09520 WU25PD	T80
TDS301A09600 WU25PD	T80
TDS301A09700 WU25PD	T80
TDS301A09800 WU25PD	T80
TDS301A09900 WU25PD	T80
TDS301A09920 WU25PD	T80
TDS301A10000 WU25PD	T80
TDS301A10100 WU25PD	T80
TDS301A10200 WU25PD	T80
TDS301A10300 WU25PD	T80
TDS301A10320 WU25PD	T80
TDS301A10400 WU25PD	T80
TDS301A10500 WU25PD	T80
TDS301A10600 WU25PD	T80
TDS301A10700 WU25PD	T80
TDS301A10720 WU25PD	T80
TDS301A10800 WU25PD	T80
TDS301A10900 WU25PD	T80
TDS301A11000 WU25PD	T80
TDS301A11100 WU25PD	T80
TDS301A11110 WU25PD	T80
TDS301A11200 WU25PD	T80
TDS301A11300 WU25PD	T80
TDS301A11400 WU25PD	T81
TDS301A11500 WU25PD	T81
TDS301A11600 WU25PD	T81
TDS301A11700 WU25PD	T81
TDS301A11800 WU25PD	T81
TDS301A11900 WU25PD	T81
TDS301A11910 WU25PD	T81
TDS301A12000 WU25PD	T81
TDS301A12300 WU25PD	T81
TDS301A12500 WU25PD	T81
TDS301A12700 WU25PD	T81
TDS301A12800 WU25PD	T81
TDS301A13000 WU25PD	T81
TDS301A13500 WU25PD	T81
TDS301A13800 WU25PD	T81
TDS301A14000 WU25PD	T81
TDS301A14290 WU25PD	T81
TDS301A14500 WU25PD	T81
TDS301A14800 WU25PD	T81
TDS301A15000 WU25PD	T81
TDS301A15500 WU25PD	T81
TDS301A15800 WU25PD	T81
TDS301A15870 WU25PD	T81
TDS301A16000 WU25PD	T81
TDS301A16500 WU25PD	T81
TDS301A16670 WU25PD	T81
TDS301A16800 WU25PD	T81
TDS301A17000 WU25PD	T81
TDS301A17500 WU25PD	T81
TDS301A17800 WU25PD	T81
TDS301A18000 WU25PD	T81
TDS301A18500 WU25PD	T81
TDS301A18800 WU25PD	T81
TDS301A19000 WU25PD	T81
TDS301A19050 WU25PD	T81
TDS301A19500 WU25PD	T81
TDS301A19800 WU25PD	T81
TDS301A20000 WU25PD	T81
TDS401A03000 WP20PD	T56
TDS401A03048 WP20PD	T56
TDS401A03100 WP20PD	T56
TDS401A03175 WP20PD	T56
TDS401A03200 WP20PD	T56
TDS401A03264 WP20PD	T56
TDS401A03300 WP20PD	T56
TDS401A03400 WP20PD	T56
TDS401A03455 WP20PD	T56
TDS401A03500 WP20PD	T56
TDS401A03571 WP20PD	T56
TDS401A03600 WP20PD	T56
TDS401A03658 WP20PD	T56
TDS401A03700 WP20PD	T56
TDS401A03734 WP20PD	T56
TDS401A03800 WP20PD	T56
TDS401A03900 WP20PD	T56
TDS401A03970 WP20PD	T56
TDS401A04000 WP20PD	T56
TDS401A04039 WP20PD	T56
TDS401A04090 WP20PD	T56
TDS401A04100 WP20PD	T56
TDS401A04200 WP20PD	T56
TDS401A04217 WP20PD	T56
TDS401A04300 WP20PD	T57
TDS401A04366 WP20PD	T57
TDS401A04400 WP20PD	T57
TDS401A04500 WP20PD	T57
TDS401A04600 WP20PD	T57
TDS401A04623 WP20PD	T57
TDS401A04700 WP20PD	T57
TDS401A04763 WP20PD	T57
TDS401A04800 WP20PD	T57
TDS401A04852 WP20PD	T57
TDS401A04900 WP20PD	T57
TDS401A05000 WP20PD	T57
TDS401A05100 WP20PD	T57
TDS401A05106 WP20PD	T57
TDS401A05159 WP20PD	T57
TDS401A05200 WP20PD	T57
TDS401A05300 WP20PD	T57
TDS401A05400 WP20PD	T57
TDS401A05410 WP20PD	T57
TDS401A05500 WP20PD	T57
TDS401A05558 WP20PD	T57
TDS401A05600 WP20PD	T57
TDS401A05616 WP20PD	T57
TDS401A05700 WP20PD	T57
TDS401A05800 WP20PD	T57
TDS401A05900 WP20PD	T57
TDS401A05954 WP20PD	T57
TDS401A06000 WP20PD	T57
TDS401A06100 WP20PD	T57
TDS401A06200 WP20PD	T57
TDS401A06300 WP20PD	T57
TDS401A06350 WP20PD	T57
TDS401A06400 WP20PD	T57
TDS401A06500 WP20PD	T57
TDS401A06528 WP20PD	T57
TDS401A06600 WP20PD	T57
TDS401A06630 WP20PD	T57
TDS401A06700 WP20PD	T57
TDS401A06746 WP20PD	T57
TDS401A06800 WP20PD	T57

Catalogue No.	Page(s)
TDS401A06900 WP20PD	T58
TDS401A07000 WP20PD	T58
TDS401A07100 WP20PD	T58
TDS401A07145 WP20PD	T58
TDS401A07200 WP20PD	T58
TDS401A07300 WP20PD	T58
TDS401A07400 WP20PD	T58
TDS401A07500 WP20PD	T58
TDS401A07541 WP20PD	T58
TDS401A07600 WP20PD	T58
TDS401A07700 WP20PD	T58
TDS401A07800 WP20PD	T58
TDS401A07900 WP20PD	T58
TDS401A07938 WP20PD	T58
TDS401A08000 WP20PD	T58
TDS401A08100 WP20PD	T58
TDS401A08200 WP20PD	T58
TDS401A08300 WP20PD	T58
TDS401A08334 WP20PD	T58
TDS401A08400 WP20PD	T58
TDS401A08433 WP20PD	T58
TDS401A08500 WP20PD	T58
TDS401A08600 WP20PD	T58
TDS401A08700 WP20PD	T58
TDS401A08733 WP20PD	T58
TDS401A08800 WP20PD	T58
TDS401A08900 WP20PD	T58
TDS401A09000 WP20PD	T58
TDS401A09100 WP20PD	T58
TDS401A09129 WP20PD	T58
TDS401A09200 WP20PD	T58
TDS401A09300 WP20PD	T58
TDS401A09347 WP20PD	T58
TDS401A09400 WP20PD	T58
TDS401A09500 WP20PD	T58
TDS401A09525 WP20PD	T58
TDS401A09600 WP20PD	T58
TDS401A09700 WP20PD	T58
TDS401A09800 WP20PD	T58
TDS401A09900 WP20PD	T58
TDS401A09921 WP20PD	T59
TDS401A10000 WP20PD	T59
TDS401A10100 WP20PD	T59
TDS401A10200 WP20PD	T59
TDS401A10300 WP20PD	T59
TDS401A10320 WP20PD	T59
TDS401A10400 WP20PD	T59
TDS401A10500 WP20PD	T59
TDS401A10600 WP20PD	T59
TDS401A10700 WP20PD	T59
TDS401A10716 WP20PD	T59
TDS401A10800 WP20PD	T59
TDS401A10900 WP20PD	T59
TDS401A11000 WP20PD	T59
TDS401A11100 WP20PD	T59
TDS401A11113 WP20PD	T59
TDS401A11200 WP20PD	T59
TDS401A11300 WP20PD	T59
TDS401A11400 WP20PD	T59
TDS401A11500 WP20PD	T59
TDS401A11509 WP20PD	T59
TDS401A11600 WP20PD	T59
TDS401A11700 WP20PD	T59
TDS401A11800 WP20PD	T59
TDS401A11900 WP20PD	T59
TDS401A11908 WP20PD	T59
TDS401A12000 WP20PD	T59
TDS401A12100 WP20PD	T59
TDS401A12200 WP20PD	T59
TDS401A12300 WP20PD	T59
TDS401A12304 WP20PD	T59
TDS401A12400 WP20PD	T59
TDS401A12500 WP20PD	T59
TDS401A12600 WP20PD	T59
TDS401A12700 WP20PD	T59
TDS401A12800 WP20PD	T59
TDS401A12900 WP20PD	T59
TDS401A13000 WP20PD	T59
TDS401A13096 WP20PD	T59
TDS401A13100 WP20PD	T59
TDS401A13200 WP20PD	T60
TDS401A13300 WP20PD	T60
TDS401A13400 WP20PD	T60
TDS401A13500 WP20PD	T60
TDS401A13600 WP20PD	T60
TDS401A13700 WP20PD	T60
TDS401A13800 WP20PD	T60
TDS401A13891 WP20PD	T60
TDS401A13900 WP20PD	T60
TDS401A14000 WP20PD	T60
TDS401A14100 WP20PD	T60
TDS401A14200 WP20PD	T60
TDS401A14288 WP20PD	T60
TDS401A14300 WP20PD	T60
TDS401A14400 WP20PD	T60
TDS401A14500 WP20PD	T60
TDS401A14600 WP20PD	T60
TDS401A14684 WP20PD	T60
TDS401A14700 WP20PD	T60
TDS401A14800 WP20PD	T60
TDS401A14900 WP20PD	T60
TDS401A15000 WP20PD	T60
TDS401A15083 WP20PD	T60
TDS401A15100 WP20PD	T60
TDS401A15200 WP20PD	T60
TDS401A15300 WP20PD	T60
TDS401A15400 WP20PD	T60
TDS401A15479 WP20PD	T60
TDS401A15500 WP20PD	T60
TDS401A15600 WP20PD	T60
TDS401A15700 WP20PD	T60
TDS401A15800 WP20PD	T60
TDS401A15875 WP20PD	T60
TDS401A15900 WP20PD	T60
TDS401A16000 WP20PD	T60
TDS401A16100 WP20PD	T60
TDS401A16200 WP20PD	T60
TDS401A16271 WP20PD	T60
TDS401A16300 WP20PD	T60
TDS401A16400 WP20PD	T60
TDS401A16500 WP20PD	T61
TDS401A16600 WP20PD	T61
TDS401A16670 WP20PD	T61
TDS401A16700 WP20PD	T61
TDS401A16800 WP20PD	T61
TDS401A16900 WP20PD	T61
TDS401A17000 WP20PD	T61
TDS401A17100 WP20PD	T61
TDS401A17200 WP20PD	T61
TDS401A17300 WP20PD	T61
TDS401A17400 WP20PD	T61
TDS401A17463 WP20PD	T61
TDS401A17500 WP20PD	T61
TDS401A17600 WP20PD	T61
TDS401A17700 WP20PD	T61
TDS401A17800 WP20PD	T61
TDS401A17859 WP20PD	T61
TDS401A17900 WP20PD	T61
TDS401A18000 WP20PD	T61
TDS401A18100 WP20PD	T61
TDS401A18200 WP20PD	T61
TDS401A18258 WP20PD	T61
TDS401A18300 WP20PD	T61
TDS401A18400 WP20PD	T61
TDS401A18500 WP20PD	T61
TDS401A18600 WP20PD	T61
TDS401A18654 WP20PD	T61
TDS401A18700 WP20PD	T61
TDS401A18800 WP20PD	T61
TDS401A18900 WP20PD	T61
TDS401A19000 WP20PD	T61
TDS401A19050 WP20PD	T61
TDS401A19100 WP20PD	T61
TDS401A19200 WP20PD	T61
TDS401A19300 WP20PD	T61
TDS401A19400 WP20PD	T61
TDS401A19500 WP20PD	T61
TDS401A19600 WP20PD	T61
TDS401A19700 WP20PD	T61
TDS401A19800 WP20PD	T61
TDS401A19900 WP20PD	T61
TDS401A20000 WP20PD	T61
TDS402A03000 WP20PD	T62
TDS402A03048 WP20PD	T62
TDS402A03100 WP20PD	T62
TDS402A03175 WP20PD	T62
TDS402A03200 WP20PD	T62
TDS402A03264 WP20PD	T62
TDS402A03300 WP20PD	T62
TDS402A03400 WP20PD	T62
TDS402A03455 WP20PD	T62
TDS402A03500 WP20PD	T62
TDS402A03571 WP20PD	T62
TDS402A03600 WP20PD	T62
TDS402A03658 WP20PD	T62
TDS402A03700 WP20PD	T62
TDS402A03734 WP20PD	T62
TDS402A03800 WP20PD	T62
TDS402A03900 WP20PD	T62
TDS402A03970 WP20PD	T62
TDS402A04000 WP20PD	T62
TDS402A04039 WP20PD	T62
TDS402A04090 WP20PD	T62
TDS402A04100 WP20PD	T62
TDS402A04200 WP20PD	T62
TDS402A04217 WP20PD	T62
TDS402A04300 WP20PD	T63
TDS402A04366 WP20PD	T63
TDS402A04400 WP20PD	T63
TDS402A04500 WP20PD	T63
TDS402A04600 WP20PD	T63
TDS402A04623 WP20PD	T63
TDS402A04700 WP20PD	T63
TDS402A04763 WP20PD	T63
TDS402A04800 WP20PD	T63
TDS402A04852 WP20PD	T63
TDS402A04900 WP20PD	T63
TDS402A05000 WP20PD	T63
TDS402A05100 WP20PD	T63
TDS402A05106 WP20PD	T63
TDS402A05159 WP20PD	T63
TDS402A05200 WP20PD	T63
TDS402A05300 WP20PD	T63
TDS402A05400 WP20PD	T63
TDS402A05410 WP20PD	T63
TDS402A05500 WP20PD	T63
TDS402A05558 WP20PD	T63
TDS402A05600 WP20PD	T63
TDS402A05616 WP20PD	T63
TDS402A05700 WP20PD	T63
TDS402A05800 WP20PD	T63
TDS402A05900 WP20PD	T63
TDS402A05954 WP20PD	T63
TDS402A06000 WP20PD	T63
TDS402A06100 WP20PD	T63
TDS402A06200 WP20PD	T63
TDS402A06300 WP20PD	T63
TDS402A06350 WP20PD	T63
TDS402A06400 WP20PD	T63
TDS402A06500 WP20PD	T63
TDS402A06528 WP20PD	T63
TDS402A06600 WP20PD	T63
TDS402A06630 WP20PD	T63
TDS402A06700 WP20PD	T63
TDS402A06746 WP20PD	T63
TDS402A06800 WP20PD	T63
TDS402A06900 WP20PD	T64
TDS402A07000 WP20PD	T64
TDS402A07100 WP20PD	T64
TDS402A07145 WP20PD	T64
TDS402A07200 WP20PD	T64
TDS402A07300 WP20PD	T64
TDS402A07400 WP20PD	T64
TDS402A07500 WP20PD	T64
TDS402A07541 WP20PD	T64
TDS402A07600 WP20PD	T64
TDS402A07700 WP20PD	T64
TDS402A07800 WP20PD	T64
TDS402A07900 WP20PD	T64
TDS402A07938 WP20PD	T64
TDS402A08000 WP20PD	T64
TDS402A08100 WP20PD	T64
TDS402A08200 WP20PD	T64
TDS402A08300 WP20PD	T64
TDS402A08334 WP20PD	T64
TDS402A08400 WP20PD	T64
TDS402A08433 WP20PD	T64
TDS402A08500 WP20PD	T64
TDS402A08600 WP20PD	T64
TDS402A08700 WP20PD	T64
TDS402A08733 WP20PD	T64
TDS402A08800 WP20PD	T64
TDS402A08900 WP20PD	T64
TDS402A09000 WP20PD	T64
TDS402A09100 WP20PD	T64
TDS402A09129 WP20PD	T64
TDS402A09200 WP20PD	T64
TDS402A09300 WP20PD	T64
TDS402A09347 WP20PD	T64
TDS402A09400 WP20PD	T64
TDS402A09500 WP20PD	T64
TDS402A09525 WP20PD	T64
TDS402A09600 WP20PD	T64
TDS402A09700 WP20PD	T64
TDS402A09800 WP20PD	T64
TDS402A09900 WP20PD	T64
TDS402A09921 WP20PD	T65
TDS402A10000 WP20PD	T65
TDS402A10100 WP20PD	T65
TDS402A10200 WP20PD	T65
TDS402A10300 WP20PD	T65
TDS402A10320 WP20PD	T65

Catalogue No.	Page(s)
TDS402A10400 WP20PD	T65
TDS402A10500 WP20PD	T65
TDS402A10600 WP20PD	T65
TDS402A10700 WP20PD	T65
TDS402A10716 WP20PD	T65
TDS402A10800 WP20PD	T65
TDS402A10900 WP20PD	T65
TDS402A11000 WP20PD	T65
TDS402A11100 WP20PD	T65
TDS402A11113 WP20PD	T65
TDS402A11200 WP20PD	T65
TDS402A11300 WP20PD	T65
TDS402A11400 WP20PD	T65
TDS402A11500 WP20PD	T65
TDS402A11509 WP20PD	T65
TDS402A11600 WP20PD	T65
TDS402A11700 WP20PD	T65
TDS402A11800 WP20PD	T65
TDS402A11900 WP20PD	T65
TDS402A11908 WP20PD	T65
TDS402A12000 WP20PD	T65
TDS402A12100 WP20PD	T65
TDS402A12200 WP20PD	T65
TDS402A12300 WP20PD	T65
TDS402A12304 WP20PD	T65
TDS402A12400 WP20PD	T65
TDS402A12500 WP20PD	T65
TDS402A12600 WP20PD	T65
TDS402A12700 WP20PD	T65
TDS402A12800 WP20PD	T65
TDS402A12900 WP20PD	T65
TDS402A13000 WP20PD	T65
TDS402A13096 WP20PD	T65
TDS402A13100 WP20PD	T65
TDS402A13200 WP20PD	T66
TDS402A13300 WP20PD	T66
TDS402A13400 WP20PD	T66
TDS402A13500 WP20PD	T66
TDS402A13600 WP20PD	T66
TDS402A13700 WP20PD	T66
TDS402A13800 WP20PD	T66
TDS402A13891 WP20PD	T66
TDS402A13900 WP20PD	T66
TDS402A14000 WP20PD	T66
TDS402A14100 WP20PD	T66
TDS402A14200 WP20PD	T66
TDS402A14288 WP20PD	T66
TDS402A14300 WP20PD	T66
TDS402A14400 WP20PD	T66
TDS402A14500 WP20PD	T66
TDS402A14600 WP20PD	T66
TDS402A14684 WP20PD	T66
TDS402A14700 WP20PD	T66
TDS402A14800 WP20PD	T66
TDS402A14900 WP20PD	T66
TDS402A15000 WP20PD	T66
TDS402A15083 WP20PD	T66
TDS402A15100 WP20PD	T66
TDS402A15200 WP20PD	T66
TDS402A15300 WP20PD	T66
TDS402A15400 WP20PD	T66
TDS402A15479 WP20PD	T66
TDS402A15500 WP20PD	T66
TDS402A15600 WP20PD	T66
TDS402A15700 WP20PD	T66
TDS402A15800 WP20PD	T66
TDS402A15875 WP20PD	T66
TDS402A15900 WP20PD	T66
TDS402A16000 WP20PD	T66
TDS402A16100 WP20PD	T66
TDS402A16200 WP20PD	T66
TDS402A16271 WP20PD	T66
TDS402A16300 WP20PD	T66
TDS402A16400 WP20PD	T66
TDS402A16500 WP20PD	T67
TDS402A16600 WP20PD	T67
TDS402A16670 WP20PD	T67
TDS402A16700 WP20PD	T67
TDS402A16800 WP20PD	T67
TDS402A16900 WP20PD	T67
TDS402A17000 WP20PD	T67
TDS402A17100 WP20PD	T67
TDS402A17200 WP20PD	T67
TDS402A17300 WP20PD	T67
TDS402A17400 WP20PD	T67
TDS402A17463 WP20PD	T67
TDS402A17500 WP20PD	T67
TDS402A17600 WP20PD	T67
TDS402A17700 WP20PD	T67
TDS402A17800 WP20PD	T67
TDS402A17859 WP20PD	T67
TDS402A17900 WP20PD	T67
TDS402A18000 WP20PD	T67
TDS402A18100 WP20PD	T67
TDS402A18200 WP20PD	T67
TDS402A18258 WP20PD	T67
TDS402A18300 WP20PD	T67
TDS402A18400 WP20PD	T67
TDS402A18500 WP20PD	T67
TDS402A18600 WP20PD	T67
TDS402A18654 WP20PD	T67
TDS402A18700 WP20PD	T67
TDS402A18800 WP20PD	T67
TDS402A18900 WP20PD	T67
TDS402A19000 WP20PD	T67
TDS402A19050 WP20PD	T67
TDS402A19100 WP20PD	T67
TDS402A19200 WP20PD	T67
TDS402A19300 WP20PD	T67
TDS402A19400 WP20PD	T67
TDS402A19500 WP20PD	T67
TDS402A19600 WP20PD	T67
TDS402A19700 WP20PD	T67
TDS402A19800 WP20PD	T67
TDS402A19900 WP20PD	T67
TDS402A20000 WP20PD	T67
TDS403A03000 WP20PD	T68
TDS403A03048 WP20PD	T68
TDS403A03100 WP20PD	T68
TDS403A03175 WP20PD	T68
TDS403A03200 WP20PD	T68
TDS403A03264 WP20PD	T68
TDS403A03300 WP20PD	T68
TDS403A03400 WP20PD	T68
TDS403A03455 WP20PD	T68
TDS403A03500 WP20PD	T68
TDS403A03571 WP20PD	T68
TDS403A03600 WP20PD	T68
TDS403A03658 WP20PD	T68
TDS403A03700 WP20PD	T68
TDS403A03734 WP20PD	T68
TDS403A03800 WP20PD	T68
TDS403A03900 WP20PD	T68
TDS403A03970 WP20PD	T68
TDS403A04000 WP20PD	T68
TDS403A04039 WP20PD	T68
TDS403A04090 WP20PD	T68
TDS403A04100 WP20PD	T68
TDS403A04200 WP20PD	T68
TDS403A04217 WP20PD	T68
TDS403A04300 WP20PD	T68
TDS403A04366 WP20PD	T68
TDS403A04400 WP20PD	T68
TDS403A04500 WP20PD	T68
TDS403A04600 WP20PD	T69
TDS403A04623 WP20PD	T69
TDS403A04700 WP20PD	T69
TDS403A04763 WP20PD	T69
TDS403A04800 WP20PD	T69
TDS403A04852 WP20PD	T69
TDS403A04900 WP20PD	T69
TDS403A05000 WP20PD	T69
TDS403A05100 WP20PD	T69
TDS403A05106 WP20PD	T69
TDS403A05159 WP20PD	T69
TDS403A05200 WP20PD	T69
TDS403A05300 WP20PD	T69
TDS403A05400 WP20PD	T69
TDS403A05410 WP20PD	T69
TDS403A05500 WP20PD	T69
TDS403A05558 WP20PD	T69
TDS403A05600 WP20PD	T69
TDS403A05616 WP20PD	T69
TDS403A05700 WP20PD	T69
TDS403A05800 WP20PD	T69
TDS403A05900 WP20PD	T69
TDS403A05954 WP20PD	T69
TDS403A06000 WP20PD	T69
TDS403A06100 WP20PD	T69
TDS403A06200 WP20PD	T69
TDS403A06300 WP20PD	T69
TDS403A06350 WP20PD	T69
TDS403A06400 WP20PD	T69
TDS403A06500 WP20PD	T69
TDS403A06528 WP20PD	T69
TDS403A06600 WP20PD	T69
TDS403A06630 WP20PD	T69
TDS403A06700 WP20PD	T69
TDS403A06746 WP20PD	T69
TDS403A06800 WP20PD	T69
TDS403A06900 WP20PD	T69
TDS403A07000 WP20PD	T69
TDS403A07100 WP20PD	T69
TDS403A07145 WP20PD	T69
TDS403A07200 WP20PD	T70
TDS403A07300 WP20PD	T70
TDS403A07400 WP20PD	T70
TDS403A07500 WP20PD	T70
TDS403A07541 WP20PD	T70
TDS403A07600 WP20PD	T70
TDS403A07700 WP20PD	T70
TDS403A07800 WP20PD	T70
TDS403A07900 WP20PD	T70
TDS403A07938 WP20PD	T70
TDS403A08000 WP20PD	T70
TDS403A08100 WP20PD	T70
TDS403A08200 WP20PD	T70
TDS403A08300 WP20PD	T70
TDS403A08334 WP20PD	T70
TDS403A08400 WP20PD	T70
TDS403A08433 WP20PD	T70
TDS403A08500 WP20PD	T70
TDS403A08600 WP20PD	T70
TDS403A08700 WP20PD	T70
TDS403A08733 WP20PD	T70
TDS403A08800 WP20PD	T70
TDS403A08900 WP20PD	T70
TDS403A09000 WP20PD	T70
TDS403A09100 WP20PD	T70
TDS403A09129 WP20PD	T70
TDS403A09200 WP20PD	T70
TDS403A09300 WP20PD	T70
TDS403A09347 WP20PD	T70
TDS403A09400 WP20PD	T70
TDS403A09500 WP20PD	T70
TDS403A09525 WP20PD	T70
TDS403A09600 WP20PD	T70
TDS403A09700 WP20PD	T70
TDS403A09800 WP20PD	T70
TDS403A09900 WP20PD	T70
TDS403A09921 WP20PD	T70
TDS403A10000 WP20PD	T70
TDS403A10100 WP20PD	T70
TDS403A10200 WP20PD	T70
TDS403A10300 WP20PD	T71
TDS403A10320 WP20PD	T71
TDS403A10400 WP20PD	T71
TDS403A10500 WP20PD	T71
TDS403A10600 WP20PD	T71
TDS403A10700 WP20PD	T71
TDS403A10716 WP20PD	T71
TDS403A10800 WP20PD	T71
TDS403A10900 WP20PD	T71
TDS403A11000 WP20PD	T71
TDS403A11100 WP20PD	T71
TDS403A11113 WP20PD	T71
TDS403A11200 WP20PD	T71
TDS403A11300 WP20PD	T71
TDS403A11400 WP20PD	T71
TDS403A11500 WP20PD	T71
TDS403A11509 WP20PD	T71
TDS403A11600 WP20PD	T71
TDS403A11700 WP20PD	T71
TDS403A11800 WP20PD	T71
TDS403A11900 WP20PD	T71
TDS403A11908 WP20PD	T71
TDS403A12000 WP20PD	T71
TDS403A12100 WP20PD	T71
TDS403A12200 WP20PD	T71
TDS403A12300 WP20PD	T71
TDS403A12304 WP20PD	T71
TDS403A12400 WP20PD	T71
TDS403A12500 WP20PD	T71
TDS403A12600 WP20PD	T71
TDS403A12700 WP20PD	T71
TDS403A12800 WP20PD	T71
TDS403A12900 WP20PD	T71
TDS403A13000 WP20PD	T71
TDS403A13096 WP20PD	T71
TDS403A13100 WP20PD	T71
TDS403A13200 WP20PD	T71
TDS403A13300 WP20PD	T71
TDS403A13400 WP20PD	T71
TDS403A13500 WP20PD	T71
TDS403A13600 WP20PD	T72
TDS403A13700 WP20PD	T72
TDS403A13800 WP20PD	T72
TDS403A13891 WP20PD	T72
TDS403A13900 WP20PD	T72
TDS403A14000 WP20PD	T72
TDS403A14100 WP20PD	T72
TDS403A14200 WP20PD	T72

Catalogue No.	Page(s)
TDS403A14288 WP20PD	T72
TDS403A14300 WP20PD	T72
TDS403A14400 WP20PD	T72
TDS403A14500 WP20PD	T72
TDS403A14600 WP20PD	T72
TDS403A14684 WP20PD	T72
TDS403A14700 WP20PD	T72
TDS403A14800 WP20PD	T72
TDS403A14900 WP20PD	T72
TDS403A15000 WP20PD	T72
TDS403A15083 WP20PD	T72
TDS403A15100 WP20PD	T72
TDS403A15200 WP20PD	T72
TDS403A15300 WP20PD	T72
TDS403A15400 WP20PD	T72
TDS403A15479 WP20PD	T72
TDS403A15500 WP20PD	T72
TDS403A15600 WP20PD	T72
TDS403A15700 WP20PD	T72
TDS403A15800 WP20PD	T72
TDS403A15875 WP20PD	T72
TDS403A15900 WP20PD	T72
TDS403A16000 WP20PD	T72
TDS403A16100 WP20PD	T72
TDS403A16200 WP20PD	T72
TDS403A16271 WP20PD	T72
TDS403A16300 WP20PD	T72
TDS403A16400 WP20PD	T72
TDS403A16500 WP20PD	T72
TDS403A16600 WP20PD	T72
TDS403A16670 WP20PD	T72
TDS403A16700 WP20PD	T72
TDS403A16800 WP20PD	T73
TDS403A16900 WP20PD	T73
TDS403A17000 WP20PD	T73
TDS403A17100 WP20PD	T73
TDS403A17200 WP20PD	T73
TDS403A17300 WP20PD	T73
TDS403A17400 WP20PD	T73
TDS403A17463 WP20PD	T73
TDS403A17500 WP20PD	T73
TDS403A17600 WP20PD	T73
TDS403A17700 WP20PD	T73
TDS403A17800 WP20PD	T73
TDS403A17859 WP20PD	T73
TDS403A17900 WP20PD	T73
TDS403A18000 WP20PD	T73
TDS403A18100 WP20PD	T73
TDS403A18200 WP20PD	T73
TDS403A18258 WP20PD	T73
TDS403A18300 WP20PD	T73
TDS403A18400 WP20PD	T73
TDS403A18500 WP20PD	T73
TDS403A18600 WP20PD	T73
TDS403A18654 WP20PD	T73
TDS403A18700 WP20PD	T73
TDS403A18800 WP20PD	T73
TDS403A18900 WP20PD	T73
TDS403A19000 WP20PD	T73
TDS403A19050 WP20PD	T73
TDS403A19100 WP20PD	T73
TDS403A19200 WP20PD	T73
TDS403A19300 WP20PD	T73
TDS403A19400 WP20PD	T73
TDS403A19500 WP20PD	T73
TDS403A19600 WP20PD	T73
TDS403A19700 WP20PD	T73
TDS403A19800 WP20PD	T73
TDS403A19900 WP20PD	T73
TDS403A20000 WP20PD	T73
TDS411A03000 WK15PD	T56
TDS411A03048 WK15PD	T56
TDS411A03100 WK15PD	T56
TDS411A03175 WK15PD	T56
TDS411A03200 WK15PD	T56
TDS411A03264 WK15PD	T56
TDS411A03300 WK15PD	T56
TDS411A03400 WK15PD	T56
TDS411A03455 WK15PD	T56
TDS411A03500 WK15PD	T56
TDS411A03571 WK15PD	T56
TDS411A03600 WK15PD	T56
TDS411A03658 WK15PD	T56
TDS411A03700 WK15PD	T56
TDS411A03734 WK15PD	T56
TDS411A03800 WK15PD	T56
TDS411A03900 WK15PD	T56
TDS411A03970 WK15PD	T56
TDS411A04000 WK15PD	T56
TDS411A04039 WK15PD	T56
TDS411A04090 WK15PD	T56
TDS411A04100 WK15PD	T56
TDS411A04200 WK15PD	T56
TDS411A04217 WK15PD	T56
TDS411A04300 WK15PD	T57
TDS411A04366 WK15PD	T57
TDS411A04400 WK15PD	T57
TDS411A04500 WK15PD	T57
TDS411A04600 WK15PD	T57
TDS411A04623 WK15PD	T57
TDS411A04700 WK15PD	T57
TDS411A04763 WK15PD	T57
TDS411A04800 WK15PD	T57
TDS411A04852 WK15PD	T57
TDS411A04900 WK15PD	T57
TDS411A05000 WK15PD	T57
TDS411A05100 WK15PD	T57
TDS411A05106 WK15PD	T57
TDS411A05159 WK15PD	T57
TDS411A05200 WK15PD	T57
TDS411A05300 WK15PD	T57
TDS411A05400 WK15PD	T57
TDS411A05410 WK15PD	T57
TDS411A05500 WK15PD	T57
TDS411A05558 WK15PD	T57
TDS411A05600 WK15PD	T57
TDS411A05616 WK15PD	T57
TDS411A05700 WK15PD	T57
TDS411A05800 WK15PD	T57
TDS411A05900 WK15PD	T57
TDS411A05954 WK15PD	T57
TDS411A06000 WK15PD	T57
TDS411A06100 WK15PD	T57
TDS411A06200 WK15PD	T57
TDS411A06300 WK15PD	T57
TDS411A06350 WK15PD	T57
TDS411A06400 WK15PD	T57
TDS411A06500 WK15PD	T57
TDS411A06528 WK15PD	T57
TDS411A06600 WK15PD	T57
TDS411A06630 WK15PD	T57
TDS411A06700 WK15PD	T57
TDS411A06746 WK15PD	T57
TDS411A06800 WK15PD	T57
TDS411A06900 WK15PD	T58
TDS411A07000 WK15PD	T58
TDS411A07100 WK15PD	T58
TDS411A07145 WK15PD	T58
TDS411A07200 WK15PD	T58
TDS411A07300 WK15PD	T58
TDS411A07400 WK15PD	T58
TDS411A07500 WK15PD	T58
TDS411A07541 WK15PD	T58
TDS411A07600 WK15PD	T58
TDS411A07700 WK15PD	T58
TDS411A07800 WK15PD	T58
TDS411A07900 WK15PD	T58
TDS411A07938 WK15PD	T58
TDS411A08000 WK15PD	T58
TDS411A08100 WK15PD	T58
TDS411A08200 WK15PD	T58
TDS411A08300 WK15PD	T58
TDS411A08334 WK15PD	T58
TDS411A08400 WK15PD	T58
TDS411A08433 WK15PD	T58
TDS411A08500 WK15PD	T58
TDS411A08600 WK15PD	T58
TDS411A08700 WK15PD	T58
TDS411A08733 WK15PD	T58
TDS411A08800 WK15PD	T58
TDS411A08900 WK15PD	T58
TDS411A09000 WK15PD	T58
TDS411A09100 WK15PD	T58
TDS411A09129 WK15PD	T58
TDS411A09200 WK15PD	T58
TDS411A09300 WK15PD	T58
TDS411A09347 WK15PD	T58
TDS411A09400 WK15PD	T58
TDS411A09500 WK15PD	T58
TDS411A09525 WK15PD	T58
TDS411A09600 WK15PD	T58
TDS411A09700 WK15PD	T58
TDS411A09800 WK15PD	T58
TDS411A09900 WK15PD	T58
TDS411A09921 WK15PD	T59
TDS411A10000 WK15PD	T59
TDS411A10100 WK15PD	T59
TDS411A10200 WK15PD	T59
TDS411A10300 WK15PD	T59
TDS411A10320 WK15PD	T59
TDS411A10400 WK15PD	T59
TDS411A10500 WK15PD	T59
TDS411A10600 WK15PD	T59
TDS411A10700 WK15PD	T59
TDS411A10716 WK15PD	T59
TDS411A10800 WK15PD	T59
TDS411A10900 WK15PD	T59
TDS411A11000 WK15PD	T59
TDS411A11100 WK15PD	T59
TDS411A11113 WK15PD	T59
TDS411A11200 WK15PD	T59
TDS411A11300 WK15PD	T59
TDS411A11400 WK15PD	T59
TDS411A11500 WK15PD	T59
TDS411A11509 WK15PD	T59
TDS411A11600 WK15PD	T59
TDS411A11700 WK15PD	T59
TDS411A11800 WK15PD	T59
TDS411A11900 WK15PD	T59
TDS411A11908 WK15PD	T59
TDS411A12000 WK15PD	T59
TDS411A12100 WK15PD	T59
TDS411A12200 WK15PD	T59
TDS411A12300 WK15PD	T59
TDS411A12304 WK15PD	T59
TDS411A12400 WK15PD	T59
TDS411A12500 WK15PD	T59
TDS411A12600 WK15PD	T59
TDS411A12700 WK15PD	T59
TDS411A12800 WK15PD	T59
TDS411A12900 WK15PD	T59
TDS411A13000 WK15PD	T59
TDS411A13096 WK15PD	T59
TDS411A13100 WK15PD	T59
TDS411A13200 WK15PD	T60
TDS411A13300 WK15PD	T60
TDS411A13400 WK15PD	T60
TDS411A13500 WK15PD	T60
TDS411A13600 WK15PD	T60
TDS411A13700 WK15PD	T60
TDS411A13800 WK15PD	T60
TDS411A13891 WK15PD	T60
TDS411A13900 WK15PD	T60
TDS411A14000 WK15PD	T60
TDS411A14100 WK15PD	T60
TDS411A14200 WK15PD	T60
TDS411A14288 WK15PD	T60
TDS411A14300 WK15PD	T60
TDS411A14400 WK15PD	T60
TDS411A14500 WK15PD	T60
TDS411A14600 WK15PD	T60
TDS411A14684 WK15PD	T60
TDS411A14700 WK15PD	T60
TDS411A14800 WK15PD	T60
TDS411A14900 WK15PD	T60
TDS411A15000 WK15PD	T60
TDS411A15083 WK15PD	T60
TDS411A15100 WK15PD	T60
TDS411A15200 WK15PD	T60
TDS411A15300 WK15PD	T60
TDS411A15400 WK15PD	T60
TDS411A15479 WK15PD	T60
TDS411A15500 WK15PD	T60
TDS411A15600 WK15PD	T60
TDS411A15700 WK15PD	T60
TDS411A15800 WK15PD	T60
TDS411A15875 WK15PD	T60
TDS411A15900 WK15PD	T60
TDS411A16000 WK15PD	T60
TDS411A16100 WK15PD	T60
TDS411A16200 WK15PD	T60
TDS411A16271 WK15PD	T60
TDS411A16300 WK15PD	T60
TDS411A16400 WK15PD	T60
TDS411A16500 WK15PD	T61
TDS411A16600 WK15PD	T61
TDS411A16670 WK15PD	T61
TDS411A16700 WK15PD	T61
TDS411A16800 WK15PD	T61
TDS411A16900 WK15PD	T61
TDS411A17000 WK15PD	T61
TDS411A17100 WK15PD	T61
TDS411A17200 WK15PD	T61
TDS411A17300 WK15PD	T61
TDS411A17400 WK15PD	T61
TDS411A17463 WK15PD	T61
TDS411A17500 WK15PD	T61
TDS411A17600 WK15PD	T61
TDS411A17700 WK15PD	T61
TDS411A17800 WK15PD	T61
TDS411A17859 WK15PD	T61
TDS411A17900 WK15PD	T61

Catalogue No.	Page(s)
TDS411A18000 WK15PD	T61
TDS411A18100 WK15PD	T61
TDS411A18200 WK15PD	T61
TDS411A18258 WK15PD	T61
TDS411A18300 WK15PD	T61
TDS411A18400 WK15PD	T61
TDS411A18500 WK15PD	T61
TDS411A18600 WK15PD	T61
TDS411A18654 WK15PD	T61
TDS411A18700 WK15PD	T61
TDS411A18800 WK15PD	T61
TDS411A18900 WK15PD	T61
TDS411A19000 WK15PD	T61
TDS411A19050 WK15PD	T61
TDS411A19100 WK15PD	T61
TDS411A19200 WK15PD	T61
TDS411A19300 WK15PD	T61
TDS411A19400 WK15PD	T61
TDS411A19500 WK15PD	T61
TDS411A19600 WK15PD	T61
TDS411A19700 WK15PD	T61
TDS411A19800 WK15PD	T61
TDS411A19900 WK15PD	T61
TDS411A20000 WK15PD	T61
TDS412A03000 WK15PD	T62
TDS412A03048 WK15PD	T62
TDS412A03100 WK15PD	T62
TDS412A03175 WK15PD	T62
TDS412A03200 WK15PD	T62
TDS412A03264 WK15PD	T62
TDS412A03300 WK15PD	T62
TDS412A03400 WK15PD	T62
TDS412A03455 WK15PD	T62
TDS412A03500 WK15PD	T62
TDS412A03571 WK15PD	T62
TDS412A03600 WK15PD	T62
TDS412A03658 WK15PD	T62
TDS412A03700 WK15PD	T62
TDS412A03734 WK15PD	T62
TDS412A03800 WK15PD	T62
TDS412A03900 WK15PD	T62
TDS412A03970 WK15PD	T62
TDS412A04000 WK15PD	T62
TDS412A04039 WK15PD	T62
TDS412A04090 WK15PD	T62
TDS412A04100 WK15PD	T62
TDS412A04200 WK15PD	T62
TDS412A04217 WK15PD	T62
TDS412A04300 WK15PD	T63
TDS412A04366 WK15PD	T63
TDS412A04400 WK15PD	T63
TDS412A04500 WK15PD	T63
TDS412A04600 WK15PD	T63
TDS412A04623 WK15PD	T63
TDS412A04700 WK15PD	T63
TDS412A04763 WK15PD	T63
TDS412A04800 WK15PD	T63
TDS412A04852 WK15PD	T63
TDS412A04900 WK15PD	T63
TDS412A05000 WK15PD	T63
TDS412A05100 WK15PD	T63
TDS412A05106 WK15PD	T63
TDS412A05159 WK15PD	T63
TDS412A05200 WK15PD	T63
TDS412A05300 WK15PD	T63
TDS412A05400 WK15PD	T63
TDS412A05410 WK15PD	T63
TDS412A05500 WK15PD	T63
TDS412A05558 WK15PD	T63
TDS412A05600 WK15PD	T63
TDS412A05616 WK15PD	T63
TDS412A05700 WK15PD	T63
TDS412A05800 WK15PD	T63
TDS412A05900 WK15PD	T63
TDS412A05954 WK15PD	T63
TDS412A06000 WK15PD	T63
TDS412A06100 WK15PD	T63
TDS412A06200 WK15PD	T63
TDS412A06300 WK15PD	T63
TDS412A06350 WK15PD	T63
TDS412A06400 WK15PD	T63
TDS412A06500 WK15PD	T63
TDS412A06528 WK15PD	T63
TDS412A06600 WK15PD	T63
TDS412A06630 WK15PD	T63
TDS412A06700 WK15PD	T63
TDS412A06746 WK15PD	T63
TDS412A06800 WK15PD	T63
TDS412A06900 WK15PD	T64
TDS412A07000 WK15PD	T64
TDS412A07100 WK15PD	T64
TDS412A07145 WK15PD	T64
TDS412A07200 WK15PD	T64
TDS412A07300 WK15PD	T64
TDS412A07400 WK15PD	T64
TDS412A07500 WK15PD	T64
TDS412A07541 WK15PD	T64
TDS412A07600 WK15PD	T64
TDS412A07700 WK15PD	T64
TDS412A07800 WK15PD	T64
TDS412A07900 WK15PD	T64
TDS412A07938 WK15PD	T64
TDS412A08000 WK15PD	T64
TDS412A08100 WK15PD	T64
TDS412A08200 WK15PD	T64
TDS412A08300 WK15PD	T64
TDS412A08334 WK15PD	T64
TDS412A08400 WK15PD	T64
TDS412A08433 WK15PD	T64
TDS412A08500 WK15PD	T64
TDS412A08600 WK15PD	T64
TDS412A08700 WK15PD	T64
TDS412A08733 WK15PD	T64
TDS412A08800 WK15PD	T64
TDS412A08900 WK15PD	T64
TDS412A09000 WK15PD	T64
TDS412A09100 WK15PD	T64
TDS412A09129 WK15PD	T64
TDS412A09200 WK15PD	T64
TDS412A09300 WK15PD	T64
TDS412A09347 WK15PD	T64
TDS412A09400 WK15PD	T64
TDS412A09500 WK15PD	T64
TDS412A09525 WK15PD	T64
TDS412A09600 WK15PD	T64
TDS412A09700 WK15PD	T64
TDS412A09800 WK15PD	T64
TDS412A09900 WK15PD	T64
TDS412A09921 WK15PD	T65
TDS412A10000 WK15PD	T65
TDS412A10100 WK15PD	T65
TDS412A10200 WK15PD	T65
TDS412A10300 WK15PD	T65
TDS412A10320 WK15PD	T65
TDS412A10400 WK15PD	T65
TDS412A10500 WK15PD	T65
TDS412A10600 WK15PD	T65
TDS412A10700 WK15PD	T65
TDS412A10716 WK15PD	T65
TDS412A10800 WK15PD	T65
TDS412A10900 WK15PD	T65
TDS412A11000 WK15PD	T65
TDS412A11100 WK15PD	T65
TDS412A11113 WK15PD	T65
TDS412A11200 WK15PD	T65
TDS412A11300 WK15PD	T65
TDS412A11400 WK15PD	T65
TDS412A11500 WK15PD	T65
TDS412A11509 WK15PD	T65
TDS412A11600 WK15PD	T65
TDS412A11700 WK15PD	T65
TDS412A11800 WK15PD	T65
TDS412A11900 WK15PD	T65
TDS412A11908 WK15PD	T65
TDS412A12000 WK15PD	T65
TDS412A12100 WK15PD	T65
TDS412A12200 WK15PD	T65
TDS412A12300 WK15PD	T65
TDS412A12304 WK15PD	T65
TDS412A12400 WK15PD	T65
TDS412A12500 WK15PD	T65
TDS412A12600 WK15PD	T65
TDS412A12700 WK15PD	T65
TDS412A12800 WK15PD	T65
TDS412A12900 WK15PD	T65
TDS412A13000 WK15PD	T65
TDS412A13096 WK15PD	T65
TDS412A13100 WK15PD	T65
TDS412A13200 WK15PD	T66
TDS412A13300 WK15PD	T66
TDS412A13400 WK15PD	T66
TDS412A13500 WK15PD	T66
TDS412A13600 WK15PD	T66
TDS412A13700 WK15PD	T66
TDS412A13800 WK15PD	T66
TDS412A13891 WK15PD	T66
TDS412A13900 WK15PD	T66
TDS412A14000 WK15PD	T66
TDS412A14100 WK15PD	T66
TDS412A14200 WK15PD	T66
TDS412A14288 WK15PD	T66
TDS412A14300 WK15PD	T66
TDS412A14400 WK15PD	T66
TDS412A14500 WK15PD	T66
TDS412A14600 WK15PD	T66
TDS412A14684 WK15PD	T66
TDS412A14700 WK15PD	T66
TDS412A14800 WK15PD	T66
TDS412A14900 WK15PD	T66
TDS412A15000 WK15PD	T66
TDS412A15083 WK15PD	T66
TDS412A15100 WK15PD	T66
TDS412A15200 WK15PD	T66
TDS412A15300 WK15PD	T66
TDS412A15400 WK15PD	T66
TDS412A15479 WK15PD	T66
TDS412A15500 WK15PD	T66
TDS412A15600 WK15PD	T66
TDS412A15700 WK15PD	T66
TDS412A15800 WK15PD	T66
TDS412A15875 WK15PD	T66
TDS412A15900 WK15PD	T66
TDS412A16000 WK15PD	T66
TDS412A16100 WK15PD	T66
TDS412A16200 WK15PD	T66
TDS412A16271 WK15PD	T66
TDS412A16300 WK15PD	T66
TDS412A16400 WK15PD	T66
TDS412A16500 WK15PD	T67
TDS412A16600 WK15PD	T67
TDS412A16670 WK15PD	T67
TDS412A16700 WK15PD	T67
TDS412A16800 WK15PD	T67
TDS412A16900 WK15PD	T67
TDS412A17000 WK15PD	T67
TDS412A17100 WK15PD	T67
TDS412A17200 WK15PD	T67
TDS412A17300 WK15PD	T67
TDS412A17400 WK15PD	T67
TDS412A17463 WK15PD	T67
TDS412A17500 WK15PD	T67
TDS412A17600 WK15PD	T67
TDS412A17700 WK15PD	T67
TDS412A17800 WK15PD	T67
TDS412A17859 WK15PD	T67
TDS412A17900 WK15PD	T67
TDS412A18000 WK15PD	T67
TDS412A18100 WK15PD	T67
TDS412A18200 WK15PD	T67
TDS412A18258 WK15PD	T67
TDS412A18300 WK15PD	T67
TDS412A18400 WK15PD	T67
TDS412A18500 WK15PD	T67
TDS412A18600 WK15PD	T67
TDS412A18654 WK15PD	T67
TDS412A18700 WK15PD	T67
TDS412A18800 WK15PD	T67
TDS412A18900 WK15PD	T67
TDS412A19000 WK15PD	T67
TDS412A19050 WK15PD	T67
TDS412A19100 WK15PD	T67
TDS412A19200 WK15PD	T67
TDS412A19300 WK15PD	T67
TDS412A19400 WK15PD	T67
TDS412A19500 WK15PD	T67
TDS412A19600 WK15PD	T67
TDS412A19700 WK15PD	T67
TDS412A19800 WK15PD	T67
TDS412A19900 WK15PD	T67
TDS412A20000 WK15PD	T67
TDS413A03000 WK15PD	T68
TDS413A03048 WK15PD	T68
TDS413A03100 WK15PD	T68
TDS413A03175 WK15PD	T68
TDS413A03200 WK15PD	T68
TDS413A03264 WK15PD	T68
TDS413A03300 WK15PD	T68
TDS413A03400 WK15PD	T68
TDS413A03455 WK15PD	T68
TDS413A03500 WK15PD	T68
TDS413A03571 WK15PD	T68
TDS413A03600 WK15PD	T68
TDS413A03658 WK15PD	T68
TDS413A03700 WK15PD	T68
TDS413A03734 WK15PD	T68
TDS413A03800 WK15PD	T68
TDS413A03900 WK15PD	T68
TDS413A03970 WK15PD	T68
TDS413A04000 WK15PD	T68
TDS413A04039 WK15PD	T68
TDS413A04090 WK15PD	T68
TDS413A04100 WK15PD	T68

Catalogue No.	Page(s)
TDS413A04200 WK15PD	T68
TDS413A04217 WK15PD	T68
TDS413A04300 WK15PD	T68
TDS413A04366 WK15PD	T68
TDS413A04400 WK15PD	T68
TDS413A04500 WK15PD	T68
TDS413A04600 WK15PD	T69
TDS413A04623 WK15PD	T69
TDS413A04700 WK15PD	T69
TDS413A04763 WK15PD	T69
TDS413A04800 WK15PD	T69
TDS413A04852 WK15PD	T69
TDS413A04900 WK15PD	T69
TDS413A05000 WK15PD	T69
TDS413A05100 WK15PD	T69
TDS413A05106 WK15PD	T69
TDS413A05159 WK15PD	T69
TDS413A05200 WK15PD	T69
TDS413A05300 WK15PD	T69
TDS413A05400 WK15PD	T69
TDS413A05410 WK15PD	T69
TDS413A05500 WK15PD	T69
TDS413A05558 WK15PD	T69
TDS413A05600 WK15PD	T69
TDS413A05616 WK15PD	T69
TDS413A05700 WK15PD	T69
TDS413A05800 WK15PD	T69
TDS413A05900 WK15PD	T69
TDS413A05954 WK15PD	T69
TDS413A06000 WK15PD	T69
TDS413A06100 WK15PD	T69
TDS413A06200 WK15PD	T69
TDS413A06300 WK15PD	T69
TDS413A06350 WK15PD	T69
TDS413A06400 WK15PD	T69
TDS413A06500 WK15PD	T69
TDS413A06528 WK15PD	T69
TDS413A06600 WK15PD	T69
TDS413A06630 WK15PD	T69
TDS413A06700 WK15PD	T69
TDS413A06746 WK15PD	T69
TDS413A06800 WK15PD	T69
TDS413A06900 WK15PD	T69
TDS413A07000 WK15PD	T69
TDS413A07100 WK15PD	T69
TDS413A07145 WK15PD	T69
TDS413A07200 WK15PD	T70
TDS413A07300 WK15PD	T70
TDS413A07400 WK15PD	T70
TDS413A07500 WK15PD	T70
TDS413A07541 WK15PD	T70
TDS413A07600 WK15PD	T70
TDS413A07700 WK15PD	T70
TDS413A07800 WK15PD	T70
TDS413A07900 WK15PD	T70
TDS413A07938 WK15PD	T70
TDS413A08000 WK15PD	T70
TDS413A08100 WK15PD	T70
TDS413A08200 WK15PD	T70
TDS413A08300 WK15PD	T70
TDS413A08334 WK15PD	T70
TDS413A08400 WK15PD	T70
TDS413A08433 WK15PD	T70
TDS413A08500 WK15PD	T70
TDS413A08600 WK15PD	T70
TDS413A08700 WK15PD	T70
TDS413A08733 WK15PD	T70
TDS413A08800 WK15PD	T70
TDS413A08900 WK15PD	T70
TDS413A09000 WK15PD	T70
TDS413A09100 WK15PD	T70
TDS413A09129 WK15PD	T70
TDS413A09200 WK15PD	T70
TDS413A09300 WK15PD	T70
TDS413A09347 WK15PD	T70
TDS413A09400 WK15PD	T70
TDS413A09500 WK15PD	T70
TDS413A09525 WK15PD	T70
TDS413A09600 WK15PD	T70
TDS413A09700 WK15PD	T70
TDS413A09800 WK15PD	T70
TDS413A09900 WK15PD	T70
TDS413A09921 WK15PD	T70
TDS413A10000 WK15PD	T70
TDS413A10100 WK15PD	T70
TDS413A10200 WK15PD	T70
TDS413A10300 WK15PD	T71
TDS413A10320 WK15PD	T71
TDS413A10400 WK15PD	T71
TDS413A10500 WK15PD	T71
TDS413A10600 WK15PD	T71
TDS413A10700 WK15PD	T71
TDS413A10716 WK15PD	T71
TDS413A10800 WK15PD	T71
TDS413A10900 WK15PD	T71
TDS413A11000 WK15PD	T71
TDS413A11100 WK15PD	T71
TDS413A11113 WK15PD	T71
TDS413A11200 WK15PD	T71
TDS413A11300 WK15PD	T71
TDS413A11400 WK15PD	T71
TDS413A11500 WK15PD	T71
TDS413A11509 WK15PD	T71
TDS413A11600 WK15PD	T71
TDS413A11700 WK15PD	T71
TDS413A11800 WK15PD	T71
TDS413A11900 WK15PD	T71
TDS413A11908 WK15PD	T71
TDS413A12000 WK15PD	T71
TDS413A12100 WK15PD	T71
TDS413A12200 WK15PD	T71
TDS413A12300 WK15PD	T71
TDS413A12304 WK15PD	T71
TDS413A12400 WK15PD	T71
TDS413A12500 WK15PD	T71
TDS413A12600 WK15PD	T71
TDS413A12700 WK15PD	T71
TDS413A12800 WK15PD	T71
TDS413A12900 WK15PD	T71
TDS413A13000 WK15PD	T71
TDS413A13096 WK15PD	T71
TDS413A13100 WK15PD	T71
TDS413A13200 WK15PD	T71
TDS413A13300 WK15PD	T71
TDS413A13400 WK15PD	T71
TDS413A13500 WK15PD	T71
TDS413A13600 WK15PD	T72
TDS413A13700 WK15PD	T72
TDS413A13800 WK15PD	T72
TDS413A13891 WK15PD	T72
TDS413A13900 WK15PD	T72
TDS413A14000 WK15PD	T72
TDS413A14100 WK15PD	T72
TDS413A14200 WK15PD	T72
TDS413A14288 WK15PD	T72
TDS413A14300 WK15PD	T72
TDS413A14400 WK15PD	T72
TDS413A14500 WK15PD	T72
TDS413A14600 WK15PD	T72
TDS413A14684 WK15PD	T72
TDS413A14700 WK15PD	T72
TDS413A14800 WK15PD	T72
TDS413A14900 WK15PD	T72
TDS413A15000 WK15PD	T72
TDS413A15083 WK15PD	T72
TDS413A15100 WK15PD	T72
TDS413A15200 WK15PD	T72
TDS413A15300 WK15PD	T72
TDS413A15400 WK15PD	T72
TDS413A15479 WK15PD	T72
TDS413A15500 WK15PD	T72
TDS413A15600 WK15PD	T72
TDS413A15700 WK15PD	T72
TDS413A15800 WK15PD	T72
TDS413A15875 WK15PD	T72
TDS413A15900 WK15PD	T72
TDS413A16000 WK15PD	T72
TDS413A16100 WK15PD	T72
TDS413A16200 WK15PD	T72
TDS413A16271 WK15PD	T72
TDS413A16300 WK15PD	T72
TDS413A16400 WK15PD	T72
TDS413A16500 WK15PD	T72
TDS413A16600 WK15PD	T72
TDS413A16670 WK15PD	T72
TDS413A16700 WK15PD	T72
TDS413A16800 WK15PD	T73
TDS413A16900 WK15PD	T73
TDS413A17000 WK15PD	T73
TDS413A17100 WK15PD	T73
TDS413A17200 WK15PD	T73
TDS413A17300 WK15PD	T73
TDS413A17400 WK15PD	T73
TDS413A17463 WK15PD	T73
TDS413A17500 WK15PD	T73
TDS413A17600 WK15PD	T73
TDS413A17700 WK15PD	T73
TDS413A17800 WK15PD	T73
TDS413A17859 WK15PD	T73
TDS413A17900 WK15PD	T73
TDS413A18000 WK15PD	T73
TDS413A18100 WK15PD	T73
TDS413A18200 WK15PD	T73
TDS413A18258 WK15PD	T73
TDS413A18300 WK15PD	T73
TDS413A18400 WK15PD	T73
TDS413A18500 WK15PD	T73
TDS413A18600 WK15PD	T73
TDS413A18654 WK15PD	T73
TDS413A18700 WK15PD	T73
TDS413A18800 WK15PD	T73
TDS413A18900 WK15PD	T73
TDS413A19000 WK15PD	T73
TDS413A19050 WK15PD	T73
TDS413A19100 WK15PD	T73
TDS413A19200 WK15PD	T73
TDS413A19300 WK15PD	T73
TDS413A19400 WK15PD	T73
TDS413A19500 WK15PD	T73
TDS413A19600 WK15PD	T73
TDS413A19700 WK15PD	T73
TDS413A19800 WK15PD	T73
TDS413A19900 WK15PD	T73
TDS413A20000 WK15PD	T73
TDS501A03000 WU25PD	T82
TDS501A03100 WU25PD	T82
TDS501A03175 WU25PD	T82
TDS501A03200 WU25PD	T82
TDS501A03250 WU25PD	T82
TDS501A03300 WU25PD	T82
TDS501A03400 WU25PD	T82
TDS501A03455 WU25PD	T82
TDS501A03500 WU25PD	T82
TDS501A03571 WU25PD	T82
TDS501A03600 WU25PD	T82
TDS501A03700 WU25PD	T82
TDS501A03800 WU25PD	T82
TDS501A03900 WU25PD	T82
TDS501A04000 WU25PD	T82
TDS501A04100 WU25PD	T82
TDS501A04200 WU25PD	T82
TDS501A04300 WU25PD	T82
TDS501A04370 WU25PD	T82
TDS501A04400 WU25PD	T82
TDS501A04500 WU25PD	T82
TDS501A04600 WU25PD	T82
TDS501A04623 WU25PD	T82
TDS501A04650 WU25PD	T82
TDS501A04700 WU25PD	T83
TDS501A04763 WU25PD	T83
TDS501A04800 WU25PD	T83
TDS501A04900 WU25PD	T83
TDS501A05000 WU25PD	T83
TDS501A05100 WU25PD	T83
TDS501A05160 WU25PD	T83
TDS501A05200 WU25PD	T83
TDS501A05300 WU25PD	T83
TDS501A05400 WU25PD	T83
TDS501A05410 WU25PD	T83
TDS501A05500 WU25PD	T83
TDS501A05550 WU25PD	T83
TDS501A05558 WU25PD	T83
TDS501A05600 WU25PD	T83
TDS501A05700 WU25PD	T83
TDS501A05800 WU25PD	T83
TDS501A05900 WU25PD	T83
TDS501A05950 WU25PD	T83
TDS501A06000 WU25PD	T83
TDS501A06100 WU25PD	T83
TDS501A06200 WU25PD	T83
TDS501A06300 WU25PD	T83
TDS501A06350 WU25PD	T83
TDS501A06400 WU25PD	T83
TDS501A06500 WU25PD	T83
TDS501A06528 WU25PD	T83
TDS501A06600 WU25PD	T83
TDS501A06700 WU25PD	T83
TDS501A06746 WU25PD	T83
TDS501A06800 WU25PD	T83
TDS501A06900 WU25PD	T83
TDS501A07000 WU25PD	T83
TDS501A07100 WU25PD	T83
TDS501A07145 WU25PD	T83
TDS501A07200 WU25PD	T83
TDS501A07300 WU25PD	T83
TDS501A07400 WU25PD	T83
TDS501A07500 WU25PD	T83
TDS501A07541 WU25PD	T83
TDS501A07600 WU25PD	T84
TDS501A07700 WU25PD	T84
TDS501A07800 WU25PD	T84
TDS501A07900 WU25PD	T84

Catalogue No.	Page(s)
TDS501A07938 WU25PD	T84
TDS501A08000 WU25PD	T84
TDS501A08100 WU25PD	T84
TDS501A08200 WU25PD	T84
TDS501A08300 WU25PD	T84
TDS501A08334 WU25PD	T84
TDS501A08400 WU25PD	T84
TDS501A08433 WU25PD	T84
TDS501A08500 WU25PD	T84
TDS501A08600 WU25PD	T84
TDS501A08700 WU25PD	T84
TDS501A08733 WU25PD	T84
TDS501A08800 WU25PD	T84
TDS501A08900 WU25PD	T84
TDS501A09000 WU25PD	T84
TDS501A09100 WU25PD	T84
TDS501A09129 WU25PD	T84
TDS501A09200 WU25PD	T84
TDS501A09300 WU25PD	T84
TDS501A09347 WU25PD	T84
TDS501A09400 WU25PD	T84
TDS501A09500 WU25PD	T84
TDS501A09600 WU25PD	T84
TDS501A09700 WU25PD	T84
TDS501A09750 WU25PD	T84
TDS501A09800 WU25PD	T84
TDS501A09900 WU25PD	T84
TDS501A09921 WU25PD	T84
TDS501A10000 WU25PD	T84
TDS501A10100 WU25PD	T84
TDS501A10200 WU25PD	T84
TDS501A10300 WU25PD	T84
TDS501A10320 WU25PD	T84
TDS501A10400 WU25PD	T84
TDS501A10500 WU25PD	T84
TDS501A10600 WU25PD	T84
TDS501A10700 WU25PD	T85
TDS501A10716 WU25PD	T85
TDS501A10800 WU25PD	T85
TDS501A10900 WU25PD	T85
TDS501A11000 WU25PD	T85
TDS501A11100 WU25PD	T85
TDS501A11113 WU25PD	T85
TDS501A11200 WU25PD	T85
TDS501A11300 WU25PD	T85
TDS501A11400 WU25PD	T85
TDS501A11500 WU25PD	T85
TDS501A11600 WU25PD	T85
TDS501A11700 WU25PD	T85
TDS501A11800 WU25PD	T85
TDS501A11900 WU25PD	T85
TDS501A11910 WU25PD	T85
TDS501A12000 WU25PD	T85
TDS501A12300 WU25PD	T85
TDS501A12304 WU25PD	T85
TDS501A12500 WU25PD	T85
TDS501A12700 WU25PD	T85
TDS501A12800 WU25PD	T85
TDS501A13000 WU25PD	T85
TDS501A13100 WU25PD	T85
TDS501A13500 WU25PD	T85
TDS501A13800 WU25PD	T85
TDS501A14000 WU25PD	T85
TDS501A14290 WU25PD	T85
TDS501A14500 WU25PD	T85
TDS501A14800 WU25PD	T85
TDS501A15000 WU25PD	T85
TDS501A15500 WU25PD	T85
TDS501A15800 WU25PD	T85
TDS501A15870 WU25PD	T85
TDS501A16000 WU25PD	T85
TDS501A16500 WU25PD	T85
TDS501A16670 WU25PD	T85
TDS501A16800 WU25PD	T85
TDS501A17000 WU25PD	T85
TDS501A17500 WU25PD	T85
TDS501A17800 WU25PD	T86
TDS501A18000 WU25PD	T86
TDS501A18500 WU25PD	T86
TDS501A18800 WU25PD	T86
TDS501A19000 WU25PD	T86
TDS501A19050 WU25PD	T86
TDS501A19500 WU25PD	T86
TDS501A19800 WU25PD	T86
TDS501A20000 WU25PD	T86
TDS502A03000 WU25PD	T87
TDS502A03100 WU25PD	T87
TDS502A03175 WU25PD	T87
TDS502A03200 WU25PD	T87
TDS502A03250 WU25PD	T87
TDS502A03300 WU25PD	T87
TDS502A03400 WU25PD	T87
TDS502A03455 WU25PD	T87
TDS502A03500 WU25PD	T87
TDS502A03600 WU25PD	T87
TDS502A03700 WU25PD	T87
TDS502A03800 WU25PD	T87
TDS502A03900 WU25PD	T87
TDS502A04000 WU25PD	T87
TDS502A04100 WU25PD	T87
TDS502A04200 WU25PD	T87
TDS502A04300 WU25PD	T87
TDS502A04370 WU25PD	T87
TDS502A04400 WU25PD	T87
TDS502A04500 WU25PD	T87
TDS502A04600 WU25PD	T87
TDS502A04650 WU25PD	T87
TDS502A04700 WU25PD	T87
TDS502A04760 WU25PD	T87
TDS502A04800 WU25PD	T88
TDS502A04900 WU25PD	T88
TDS502A05000 WU25PD	T88
TDS502A05100 WU25PD	T88
TDS502A05160 WU25PD	T88
TDS502A05200 WU25PD	T88
TDS502A05300 WU25PD	T88
TDS502A05400 WU25PD	T88
TDS502A05500 WU25PD	T88
TDS502A05550 WU25PD	T88
TDS502A05560 WU25PD	T88
TDS502A05600 WU25PD	T88
TDS502A05700 WU25PD	T88
TDS502A05800 WU25PD	T88
TDS502A05900 WU25PD	T88
TDS502A05950 WU25PD	T88
TDS502A06000 WU25PD	T88
TDS502A06100 WU25PD	T88
TDS502A06200 WU25PD	T88
TDS502A06300 WU25PD	T88
TDS502A06350 WU25PD	T88
TDS502A06400 WU25PD	T88
TDS502A06500 WU25PD	T88
TDS502A06600 WU25PD	T88
TDS502A06700 WU25PD	T88
TDS502A06750 WU25PD	T88
TDS502A06800 WU25PD	T88
TDS502A06900 WU25PD	T88
TDS502A07000 WU25PD	T88
TDS502A07100 WU25PD	T88
TDS502A07140 WU25PD	T88
TDS502A07200 WU25PD	T88
TDS502A07300 WU25PD	T88
TDS502A07400 WU25PD	T88
TDS502A07500 WU25PD	T88
TDS502A07540 WU25PD	T88
TDS502A07600 WU25PD	T88
TDS502A07700 WU25PD	T88
TDS502A07800 WU25PD	T88
TDS502A07900 WU25PD	T88
TDS502A07940 WU25PD	T89
TDS502A08000 WU25PD	T89
TDS502A08100 WU25PD	T89
TDS502A08200 WU25PD	T89
TDS502A08300 WU25PD	T89
TDS502A08330 WU25PD	T89
TDS502A08400 WU25PD	T89
TDS502A08500 WU25PD	T89
TDS502A08600 WU25PD	T89
TDS502A08700 WU25PD	T89
TDS502A08800 WU25PD	T89
TDS502A08900 WU25PD	T89
TDS502A09000 WU25PD	T89
TDS502A09100 WU25PD	T89
TDS502A09130 WU25PD	T89
TDS502A09200 WU25PD	T89
TDS502A09300 WU25PD	T89
TDS502A09400 WU25PD	T89
TDS502A09500 WU25PD	T89
TDS502A09520 WU25PD	T89
TDS502A09600 WU25PD	T89
TDS502A09700 WU25PD	T89
TDS502A09800 WU25PD	T89
TDS502A09900 WU25PD	T89
TDS502A09920 WU25PD	T89
TDS502A10000 WU25PD	T89
TDS502A10100 WU25PD	T89
TDS502A10200 WU25PD	T89
TDS502A10300 WU25PD	T89
TDS502A10320 WU25PD	T89
TDS502A10400 WU25PD	T89
TDS502A10500 WU25PD	T89
TDS502A10600 WU25PD	T89
TDS502A10700 WU25PD	T89
TDS502A10720 WU25PD	T89
TDS502A10800 WU25PD	T89
TDS502A10900 WU25PD	T89
TDS502A11000 WU25PD	T89
TDS502A11100 WU25PD	T89
TDS502A11110 WU25PD	T89
TDS502A11200 WU25PD	T90
TDS502A11300 WU25PD	T90
TDS502A11400 WU25PD	T90
TDS502A11500 WU25PD	T90
TDS502A11600 WU25PD	T90
TDS502A11700 WU25PD	T90
TDS502A11800 WU25PD	T90
TDS502A11900 WU25PD	T90
TDS502A11910 WU25PD	T90
TDS502A12000 WU25PD	T90
TDS502A12300 WU25PD	T90
TDS502A12500 WU25PD	T90
TDS502A12700 WU25PD	T90
TDS502A12800 WU25PD	T90
TDS502A13000 WU25PD	T90
TDS502A13100 WU25PD	T90
TDS502A13500 WU25PD	T90
TDS502A13800 WU25PD	T90
TDS502A14000 WU25PD	T90
TDS502A14290 WU25PD	T90
TDS502A14500 WU25PD	T90
TDS502A14800 WU25PD	T90
TDS502A15000 WU25PD	T90
TDS502A15500 WU25PD	T90
TDS502A15800 WU25PD	T90
TDS502A15870 WU25PD	T90
TDS502A16000 WU25PD	T90
TDS502A16500 WU25PD	T90
TDS502A16670 WU25PD	T90
TDS502A16800 WU25PD	T90
TDS502A17000 WU25PD	T90
TDS502A17500 WU25PD	T90
TDS502A17800 WU25PD	T90
TDS502A18000 WU25PD	T90
TDS502A18500 WU25PD	T90
TDS502A18800 WU25PD	T90
TDS502A19000 WU25PD	T90
TDS502A19050 WU25PD	T90
TDS502A19500 WU25PD	T90
TDS502A19800 WU25PD	T90
TDS502A20000 WU25PD	T90
TDS503A03000 WU25PD	T91
TDS503A03100 WU25PD	T91
TDS503A03175 WU25PD	T91
TDS503A03200 WU25PD	T91
TDS503A03250 WU25PD	T91
TDS503A03300 WU25PD	T91
TDS503A03400 WU25PD	T91
TDS503A03455 WU25PD	T91
TDS503A03500 WU25PD	T91
TDS503A03700 WU25PD	T91
TDS503A03800 WU25PD	T91
TDS503A03900 WU25PD	T91
TDS503A04000 WU25PD	T91
TDS503A04100 WU25PD	T91
TDS503A04200 WU25PD	T91
TDS503A04300 WU25PD	T91
TDS503A04370 WU25PD	T91
TDS503A04400 WU25PD	T91
TDS503A04500 WU25PD	T91
TDS503A04600 WU25PD	T91
TDS503A04650 WU25PD	T91
TDS503A04700 WU25PD	T91
TDS503A04760 WU25PD	T91
TDS503A04800 WU25PD	T91
TDS503A04900 WU25PD	T92
TDS503A05000 WU25PD	T92
TDS503A05100 WU25PD	T92
TDS503A05160 WU25PD	T92
TDS503A05200 WU25PD	T92
TDS503A05300 WU25PD	T92
TDS503A05400 WU25PD	T92
TDS503A05500 WU25PD	T92
TDS503A05550 WU25PD	T92
TDS503A05560 WU25PD	T92
TDS503A05600 WU25PD	T92
TDS503A05700 WU25PD	T92
TDS503A05800 WU25PD	T92
TDS503A05900 WU25PD	T92
TDS503A05950 WU25PD	T92
TDS503A06000 WU25PD	T92
TDS503A06100 WU25PD	T92
TDS503A06200 WU25PD	T92

Catalogue No.	Page(s)
TDS503A06300 WU25PD	T92
TDS503A06350 WU25PD	T92
TDS503A06400 WU25PD	T92
TDS503A06500 WU25PD	T92
TDS503A06600 WU25PD	T92
TDS503A06700 WU25PD	T92
TDS503A06750 WU25PD	T92
TDS503A06800 WU25PD	T92
TDS503A06900 WU25PD	T92
TDS503A07000 WU25PD	T92
TDS503A07100 WU25PD	T92
TDS503A07140 WU25PD	T92
TDS503A07200 WU25PD	T92
TDS503A07300 WU25PD	T92
TDS503A07400 WU25PD	T92
TDS503A07500 WU25PD	T92
TDS503A07540 WU25PD	T92
TDS503A07600 WU25PD	T92
TDS503A07700 WU25PD	T92
TDS503A07800 WU25PD	T92
TDS503A07900 WU25PD	T92
TDS503A07940 WU25PD	T92
TDS503A08000 WU25PD	T93
TDS503A08100 WU25PD	T93
TDS503A08200 WU25PD	T93
TDS503A08300 WU25PD	T93
TDS503A08330 WU25PD	T93
TDS503A08400 WU25PD	T93
TDS503A08500 WU25PD	T93
TDS503A08600 WU25PD	T93
TDS503A08700 WU25PD	T93
TDS503A08800 WU25PD	T93
TDS503A08900 WU25PD	T93
TDS503A09000 WU25PD	T93
TDS503A09100 WU25PD	T93
TDS503A09130 WU25PD	T93
TDS503A09200 WU25PD	T93
TDS503A09300 WU25PD	T93
TDS503A09400 WU25PD	T93
TDS503A09500 WU25PD	T93
TDS503A09520 WU25PD	T93
TDS503A09600 WU25PD	T93
TDS503A09700 WU25PD	T93
TDS503A09800 WU25PD	T93
TDS503A09900 WU25PD	T93
TDS503A09920 WU25PD	T93
TDS503A10000 WU25PD	T93
TDS503A10100 WU25PD	T93
TDS503A10200 WU25PD	T93
TDS503A10300 WU25PD	T93
TDS503A10320 WU25PD	T93
TDS503A10400 WU25PD	T93
TDS503A10500 WU25PD	T93
TDS503A10600 WU25PD	T93
TDS503A10700 WU25PD	T93
TDS503A10720 WU25PD	T93
TDS503A10800 WU25PD	T93
TDS503A10900 WU25PD	T93
TDS503A11000 WU25PD	T93
TDS503A11100 WU25PD	T93
TDS503A11110 WU25PD	T93
TDS503A11200 WU25PD	T93
TDS503A11300 WU25PD	T94
TDS503A11400 WU25PD	T94
TDS503A11500 WU25PD	T94
TDS503A11600 WU25PD	T94
TDS503A11700 WU25PD	T94
TDS503A11800 WU25PD	T94
TDS503A11900 WU25PD	T94
TDS503A11910 WU25PD	T94
TDS503A12000 WU25PD	T94
TDS503A12300 WU25PD	T94
TDS503A12500 WU25PD	T94
TDS503A12700 WU25PD	T94
TDS503A12800 WU25PD	T94
TDS503A13000 WU25PD	T94
TDS503A13100 WU25PD	T94
TDS503A13500 WU25PD	T94
TDS503A13800 WU25PD	T94
TDS503A14000 WU25PD	T94
TDS503A14290 WU25PD	T94
TDS503A14500 WU25PD	T94
TDS503A14800 WU25PD	T94
TDS503A15000 WU25PD	T94
TDS503A15500 WU25PD	T94
TDS503A15800 WU25PD	T94
TDS503A15870 WU25PD	T94
TDS503A16000 WU25PD	T94
TDS503A16500 WU25PD	T94
TDS503A16670 WU25PD	T94
TDS503A16800 WU25PD	T94
TDS503A17000 WU25PD	T94
TDS503A17500 WU25PD	T94
TDS503A17800 WU25PD	T94
TDS503A18000 WU25PD	T94
TDS503A18500 WU25PD	T94
TDS503A18800 WU25PD	T94
TDS503A19000 WU25PD	T94
TDS503A19050 WU25PD	T94
TDS503A19500 WU25PD	T94
TDS503A19800 WU25PD	T94
TDS503A20000 WU25PD	T94
TDS504A03000 WU20PD	T100
TDS504A03175 WU20PD	T100
TDS504A03264 WU20PD	T100
TDS504A03455 WU20PD	T100
TDS504A03500 WU20PD	T100
TDS504A03734 WU20PD	T100
TDS504A03970 WU20PD	T100
TDS504A04000 WU20PD	T100
TDS504A04500 WU20PD	T100
TDS504A04600 WU20PD	T100
TDS504A04763 WU20PD	T100
TDS504A04800 WU20PD	T100
TDS504A05000 WU20PD	T100
TDS504A05100 WU20PD	T100
TDS504A05200 WU20PD	T100
TDS504A05300 WU20PD	T100
TDS504A05410 WU20PD	T100
TDS504A05500 WU20PD	T100
TDS504A05558 WU20PD	T100
TDS504A05600 WU20PD	T100
TDS504A05700 WU20PD	T100
TDS504A05800 WU20PD	T100
TDS504A06000 WU20PD	T100
TDS504A06200 WU20PD	T100
TDS504A06350 WU20PD	T101
TDS504A06500 WU20PD	T101
TDS504A06528 WU20PD	T101
TDS504A06600 WU20PD	T101
TDS504A06746 WU20PD	T101
TDS504A06800 WU20PD	T101
TDS504A06909 WU20PD	T101
TDS504A07000 WU20PD	T101
TDS504A07145 WU20PD	T101
TDS504A07500 WU20PD	T101
TDS504A07541 WU20PD	T101
TDS504A07700 WU20PD	T101
TDS504A07800 WU20PD	T101
TDS504A07938 WU20PD	T101
TDS504A08000 WU20PD	T101
TDS504A08100 WU20PD	T101
TDS504A08334 WU20PD	T101
TDS504A08433 WU20PD	T101
TDS504A08500 WU20PD	T101
TDS504A08700 WU20PD	T101
TDS504A08733 WU20PD	T101
TDS504A09000 WU20PD	T101
TDS504A09100 WU20PD	T101
TDS504A09129 WU20PD	T101
TDS504A09347 WU20PD	T101
TDS504A09500 WU20PD	T101
TDS504A09525 WU20PD	T101
TDS504A09921 WU20PD	T101
TDS504A10000 WU20PD	T101
TDS504A10200 WU20PD	T101
TDS504A10300 WU20PD	T101
TDS504A10320 WU20PD	T101
TDS504A10500 WU20PD	T101
TDS504A10716 WU20PD	T101
TDS504A10800 WU20PD	T101
TDS504A11000 WU20PD	T101
TDS504A11113 WU20PD	T101
TDS504A11500 WU20PD	T101
TDS504A11800 WU20PD	T101
TDS504A12000 WU20PD	T101
TDS504A12100 WU20PD	T102
TDS504A12304 WU20PD	T102
TDS504A12500 WU20PD	T102
TDS504A12700 WU20PD	T102
TDS504A13000 WU20PD	T102
TDS504A13100 WU20PD	T102
TDS504A13500 WU20PD	T102
TDS504A14000 WU20PD	T102
TDS504A14100 WU20PD	T102
TDS504A14288 WU20PD	T102
TDS504A14500 WU20PD	T102
TDS504A14684 WU20PD	T102
TDS504A15000 WU20PD	T102
TDS504A15500 WU20PD	T102
TDS504A15875 WU20PD	T102
TDS504A16000 WU20PD	T102
TDS504A16500 WU20PD	T102
TDS504A17000 WU20PD	T102
TDS504A17463 WU20PD	T102
TDS504A17500 WU20PD	T102
TDS504A18000 WU20PD	T102
TDS504A18500 WU20PD	T102
TDS504A19000 WU20PD	T102
TDS504A19050 WU20PD	T102
TDS504A19500 WU20PD	T102
TDS504A20000 WU20PD	T102
TNAX1604ZZ26 THM	L12
TNAX1604ZZ26 TTM08	L12
TNAX1604ZZ31 THM	L12
TNAX1604ZZ31 TTM08	L12
TNAX1604ZZ41 THM	L12
TNAX1604ZZ41 TTM	L12
TNAX2206ZZ41 TTM	L13
TNAX2206ZZ51 TTM	L13
TNGA160404S01025MT WBH25P	B214
TNGA160408EFWMT WBH25P	B213
TNGA160408S01025MT WBH10U	B214
TNGA160408S01025MT WBH25P	B214
TNGA160408T02020 CW2015	B193
TNGA160408T02020 CW5025	B193
TNGA160412EFWMT WBH25P	B213
TNGA160412S01025MT WBH10U	B214
TNGA160412S01025MT WBH25P	B214
TNGA160412T02020 CW2015	B193
TNGA160412T02020 CW5025	B193
TNGA160416T02020 CW2015	B193
TNGA160416T02020 CW5025	B193
TNGA220408T02020 CW2015	B193
TNGG160404FS WS10PT	B83
TNGG160404FS WS25PT	B83
TNGG160404FS WU10HT	B83
TNGG220408FS WS10PT	B83
TNGN160404T02020 CW2015	B192
TNGN160408T01020 CW3020	B192
TNGN160408T02020 CW2015	B192
TNGN160408T02020 CW5025	B192
TNGN160412T02020 CW2015	B192
TNGN160412T02020 CW5025	B192
TNGN160416T02020 CW2015	B192
TNGN160708T02020 CW2015	B192
TNGN160712T02020 CW2015	B192
TNGN220408T02020 CW2015	B192
TNGN220416T02020 CW5025	B192
TNGP160402 TN10U	B140
TNGP160402 TN15U	B140
TNGP160404 TN10U	B140
TNGP160404 TN15U	B140
TNGP160408 TN10U	B140
TNMA160408 TN20K	B140
TNMA160408 WK05CT	B84
TNMA160408 WK20CT	B84
TNMA160412 TN20K	B140
TNMA160412 WK05CT	B84
TNMA160412 WK20CT	B84
TNMA160416 WK20CT	B84
TNMA220408 TN20K	B140
TNMA220408 WK05CT	B84
TNMA220408 WK20CT	B84
TNMA220412 WK05CT	B84
TNMA220412 WK20CT	B84
TNMA220416 WK05CT	B84
TNMA220416 WK20CT	B84
TNMA270616 WK20CT	B84
TNMG110304FF WK20CT	B84
TNMG110304FF WS10PT	B84
TNMG110304ML WK20CT	B85
TNMG110304ML WP25CT	B85
TNMG110308FF WK20CT	B84
TNMG110308FF WS10PT	B84
TNMG110308ML WK20CT	B85
TNMG1604042P TN10P	B141
TNMG1604042P TN10U	B141
TNMG1604042P TN15M	B141
TNMG1604042P TN15U	B141
TNMG1604042P TN20K	B141
TNMG1604042P TN20P	B141
TNMG1604042P TN30M	B141
TNMG1604044P TN15M	B141
TNMG1604044P TN20P	B141
TNMG1604044P TN30M	B141
TNMG1604046P TN10P	B142
TNMG1604046P TN15M	B142
TNMG1604046P TN20P	B142
TNMG1604046P TN30M	B142
TNMG1604047N TN20P	B143
TNMG160404FF WK20CT	B84

Catalogue No.	Page(s)
TNMG160404FF WM25CT	B84
TNMG160404FF WP15CT	B84
TNMG160404ML WK05CT	B85
TNMG160404ML WK20CT	B85
TNMG160404ML WP15CT	B85
TNMG160404ML WP25CT	B85
TNMG160404MR WP15CT	B86
TNMG160404MR WP25CT	B86
TNMG160404MR WP35CT	B86
TNMG160404MS WS10PT	B86
TNMG160404MS WS25PT	B86
TNMG160404MS WU10HT	B86
TNMG160404UF WM15CT	B88
TNMG160404UF WM25CT	B88
TNMG160404UF WS10PT	B88
TNMG160404UM WM15CT	B88
TNMG160404UM WM25CT	B88
TNMG160404UM WM35CT	B88
TNMG160404UM WS10PT	B88
TNMG1604082P TN10P	B141
TNMG1604082P TN10U	B141
TNMG1604082P TN15M	B141
TNMG1604082P TN15U	B141
TNMG1604082P TN20K	B141
TNMG1604082P TN20P	B141
TNMG1604084P TN15M	B141
TNMG1604084P TN20P	B141
TNMG1604084P TN30M	B141
TNMG1604086P TN10P	B142
TNMG1604086P TN15M	B142
TNMG1604086P TN20P	B142
TNMG1604086P TN30M	B142
TNMG1604086P TN30P	B142
TNMG1604087N TN10P	B143
TNMG1604087N TN20K	B143
TNMG1604087N TN20P	B143
TNMG1604087N TN30P	B143
TNMG160408FF WK20CT	B84
TNMG160408FF WM25CT	B84
TNMG160408FF WP15CT	B84
TNMG160408ML WK05CT	B85
TNMG160408ML WK20CT	B85
TNMG160408ML WP15CT	B85
TNMG160408ML WP25CT	B85
TNMG160408MR WP15CT	B86
TNMG160408MR WP25CT	B86
TNMG160408MR WP35CT	B86
TNMG160408MS WS10PT	B86
TNMG160408MS WS25PT	B86
TNMG160408MS WU10HT	B86
TNMG160408RH WK20CT	B87
TNMG160408RH WM25CT	B87
TNMG160408RH WP15CT	B87
TNMG160408RH WP25CT	B87
TNMG160408RH WP35CT	B87
TNMG160408UF WM15CT	B88
TNMG160408UF WM25CT	B88
TNMG160408UF WP15CT	B88
TNMG160408UF WS10PT	B88
TNMG160408UM WM15CT	B88
TNMG160408UM WM25CT	B88
TNMG160408UM WM35CT	B88
TNMG160408UM WS10PT	B88
TNMG160408UR WK20CT	B89
TNMG160408UR WM15CT	B89
TNMG160408UR WM25CT	B89
TNMG160408UR WP15CT	B89
TNMG160408UR WP25CT	B89
TNMG160408UR WP35CT	B89
TNMG160408UR WS25PT	B89
TNMG1604122P TN10P	B141
TNMG1604122P TN10U	B141
TNMG1604122P TN15M	B141
TNMG1604122P TN20K	B141
TNMG1604122P TN20P	B141
TNMG1604122P TN30M	B141
TNMG1604124P TN15M	B141
TNMG1604124P TN30M	B141
TNMG1604126P TN10P	B142
TNMG1604126P TN15M	B142
TNMG1604126P TN20P	B142
TNMG1604126P TN30M	B142
TNMG1604127N TN10P	B143
TNMG1604127N TN20K	B143
TNMG1604127N TN20P	B143
TNMG1604127N TN30P	B143
TNMG160412FF WK20CT	B84
TNMG160412FF WM25CT	B84
TNMG160412FF WP15CT	B84
TNMG160412ML WK05CT	B85
TNMG160412ML WK20CT	B85
TNMG160412ML WP15CT	B85
TNMG160412ML WP25CT	B85
TNMG160412MR WP15CT	B86
TNMG160412MR WP25CT	B86
TNMG160412MR WP35CT	B86
TNMG160412RH WK20CT	B87
TNMG160412RH WM25CT	B87
TNMG160412RH WP15CT	B87
TNMG160412RH WP25CT	B87
TNMG160412RH WP35CT	B87
TNMG160412UF WM15CT	B88
TNMG160412UF WM25CT	B88
TNMG160412UF WS10PT	B88
TNMG160412UM WM15CT	B88
TNMG160412UM WM25CT	B88
TNMG160412UM WM35CT	B88
TNMG160412UR WK20CT	B89
TNMG160412UR WM25CT	B89
TNMG160412UR WM35CT	B89
TNMG160412UR WP15CT	B89
TNMG160412UR WP25CT	B89
TNMG160412UR WS25PT	B89
TNMG160416UM WM25CT	B88
TNMG160416UM WM35CT	B88
TNMG160416UR WK20CT	B89
TNMG160416UR WM25CT	B89
TNMG160416UR WP15CT	B89
TNMG2204044P TN15M	B141
TNMG2204044P TN20P	B141
TNMG2204044P TN30M	B141
TNMG2204046P TN10P	B142
TNMG2204046P TN15M	B142
TNMG2204046P TN20P	B142
TNMG2204046P TN30M	B142
TNMG2204047N TN10P	B143
TNMG2204047N TN20P	B143
TNMG220404ML WK20CT	B85
TNMG220404ML WP15CT	B85
TNMG220404MR WP15CT	B86
TNMG220404MR WP25CT	B86
TNMG220404MR WP35CT	B86
TNMG220404MS WS10PT	B86
TNMG220404MS WS25PT	B86
TNMG220404MS WU10HT	B86
TNMG220404UF WM15CT	B88
TNMG220404UF WM25CT	B88
TNMG220404UF WS10PT	B88
TNMG220404UM WM15CT	B88
TNMG220404UM WM25CT	B88
TNMG220404UM WM35CT	B88
TNMG2204082P TN10P	B141
TNMG2204082P TN10U	B141
TNMG2204082P TN15M	B141
TNMG2204082P TN15U	B141
TNMG2204082P TN20K	B141
TNMG2204082P TN20P	B141
TNMG2204084P TN15M	B141
TNMG2204084P TN20P	B141
TNMG2204084P TN30M	B141
TNMG2204086P TN10P	B142
TNMG2204086P TN15M	B142
TNMG2204086P TN20P	B142
TNMG2204086P TN30M	B142
TNMG2204086P TN30P	B142
TNMG2204087N TN10P	B143
TNMG2204087N TN20K	B143
TNMG2204087N TN20P	B143
TNMG2204087N TN30P	B143
TNMG220408ML WP15CT	B85
TNMG220408ML WP25CT	B85
TNMG220408MR WP15CT	B86
TNMG220408MR WP25CT	B86
TNMG220408MR WP35CT	B86
TNMG220408MS WS10PT	B86
TNMG220408MS WS25PT	B86
TNMG220408MS WU10HT	B86
TNMG220408RH WK20CT	B87
TNMG220408RH WM25CT	B87
TNMG220408RH WP15CT	B87
TNMG220408RH WP25CT	B87
TNMG220408RH WP35CT	B87
TNMG220408UF WM15CT	B88
TNMG220408UF WM25CT	B88
TNMG220408UF WS10PT	B88
TNMG220408UM WM15CT	B88
TNMG220408UM WM25CT	B88
TNMG220408UM WM35CT	B88
TNMG220408UM WP15CT	B88
TNMG220408UM WS10PT	B88
TNMG220408UR WK20CT	B89
TNMG220408UR WM15CT	B89
TNMG220408UR WM25CT	B89
TNMG220408UR WM35CT	B89
TNMG220408UR WP15CT	B89
TNMG220408UR WP25CT	B89
TNMG220408UR WP35CT	B89
TNMG220408UR WS25PT	B89
TNMG2204124P TN20P	B141
TNMG2204127N TN20K	B143
TNMG2204127N TN20P	B143
TNMG2204127N TN30P	B143
TNMG220412MR WP15CT	B86
TNMG220412MR WP25CT	B86
TNMG220412MR WP35CT	B86
TNMG220412MS WS10PT	B86
TNMG220412MS WS25PT	B86
TNMG220412MS WU10HT	B86
TNMG220412RH WK20CT	B87
TNMG220412RH WM25CT	B87
TNMG220412RH WP15CT	B87
TNMG220412RH WP25CT	B87
TNMG220412RH WP35CT	B87
TNMG220412UM WM15CT	B88
TNMG220412UM WM25CT	B88
TNMG220412UM WS10PT	B88
TNMG220412UR WK20CT	B89
TNMG220412UR WM15CT	B89
TNMG220412UR WM25CT	B89
TNMG220412UR WM35CT	B89
TNMG220412UR WP15CT	B89
TNMG220412UR WP25CT	B89
TNMG220412UR WP35CT	B89
TNMG220412UR WS25PT	B89
TNMG220416MR WP15CT	B86
TNMG220416MR WP25CT	B86
TNMG220416MR WP35CT	B86
TNMG220416RH WK20CT	B87
TNMG220416RH WM25CT	B87
TNMG220416RH WP15CT	B87
TNMG220416RH WP25CT	B87
TNMG220416RH WP35CT	B87
TNMG220416UR WK20CT	B89
TNMG220416UR WM25CT	B89
TNMG220416UR WM35CT	B89
TNMG220416UR WP15CT	B89
TNMG220416UR WP25CT	B89
TNMG270608MS WS25PT	B86
TNMG270608MS WU10HT	B86
TNMG2706127N TN10P	B143
TNMG2706127N TN20K	B143
TNMG2706127N TN20P	B143
TNMG2706127N TN30P	B143
TNMG270612RH WP15CT	B87
TNMG270612RH WP25CT	B87
TNMG270612RH WP35CT	B87
TNMG270612UR WK20CT	B89
TNMG270612UR WM15CT	B89
TNMG270612UR WM25CT	B89
TNMG270612UR WM35CT	B89
TNMG270612UR WP15CT	B89
TNMG270612UR WP25CT	B89
TNMG270612UR WS25PT	B89
TNMG270616RH WP15CT	B87
TNMG270616RH WP25CT	B87
TNMG270616RH WP35CT	B87
TNMG270616UR WK20CT	B89
TNMG270616UR WM15CT	B89
TNMG270616UR WM25CT	B89
TNMG270616UR WM35CT	B89
TNMG270616UR WP15CT	B89
TNMG270616UR WP25CT	B89
TNMG3309247N TN10P	B143
TNMG3309247N TN20K	B143
TNMG3309247N TN20P	B143
TNMG3309247N TN30P	B143
TNMG330924RH WP15CT	B87
TNMG330924RH WP25CT	B87
TNMG330924RH WP35CT	B87
TNMM16040865 TN7125	B90
TNMM16040865 WP25CT	B90
TNMM16040865 WP35CT	B90
TNMM16041265 TN8025	B90
TNMM16041265 WP35CT	B90
TNMM22040865 TN7015	B90
TNMM22040865 WP15CT	B90
TNMM22040865 WP25CT	B90
TNMM22040865 WP35CT	B90
TNMM22041265 WM25CT	B90
TNMM22041265 WP25CT	B90
TNMM22041265 WP35CT	B90
TNMM22041665 TN8025	B90

Catalogue No.	Page(s)
TNMM22041665 WM25CT	B90
TNMM22041665 WP15CT	B90
TNMM22041665 WP25CT	B90
TNMP160404 WM15CT	B90
TNMP160404 WM25CT	B90
TNMP160404 WM35CT	B90
TNMP160404 WS10PT	B90
TNMP160408 WM15CT	B90
TNMP160408 WM25CT	B90
TNMP160408 WM35CT	B90
TNMP160408 WS10PT	B90
TNMP160408 WS25PT	B90
TNMP160412 WM15CT	B90
TNMP160412 WM25CT	B90
TNMP160412 WM35CT	B90
TNMP160412 WS10PT	B90
TNMP160412 WS25PT	B90
TNMP220404 WM15CT	B90
TNMP220404 WM25CT	B90
TNMP220404 WM35CT	B90
TNMP220404 WS10PT	B90
TNMP220408 WM15CT	B90
TNMP220408 WM25CT	B90
TNMP220408 WM35CT	B90
TNMP220408 WS10PT	B90
TNMP220408 WS25PT	B90
TNMP220412 WM15CT	B90
TNMP220412 WM25CT	B90
TNMP220412 WM35CT	B90
TNMP220412 WS10PT	B90
TNMP220412 WS25PT	B90
TNMS160404FST WDN25U	B214
TNMS160408FST WDN25U	B214
TNUN160408 WK20CT	B91
TPCB160302 CG6	D50
TPCH110204 CG6	D52
TPGA110204 THM	B91
TPGA110208 THM	B91
TPGN110304F WDN25U	B215
TPGN110304T01020 CW2015	B194
TPGN110308 WK20CT	B91
TPGN110308F WDN25U	B215
TPGN110308T01020 CW2015	B194
TPGN110312T01020 CW2015	B194
TPGN160304F WDN25U	B215
TPGN160304T00520 CW2015	B194
TPGN160304T01020 CW2015	B194
TPGN160308 WK20CT	B91
TPGN160308F WDN25U	B215
TPGN160308T00520 CW2015	B194
TPGN160308T01020 CW2015	B194
TPGN160308T02020 CW5025	B194
TPGN160312T01020 CW2015	B194
TPGN160312T02020 CW5025	B194
TPGN220408F WDN25U	B215
TPGT110202HP CG5	D53
TPGT110204HP CG5	D53
TPGT110204HP CM1	D53
TPGT16T304HP CG5	D53
TPGW110202EC WBH25P	B215
TPGW110204FST WDN25U	B216
TPGW110204S01015C WBH10P	B215
TPGW110204S01015C WBH25P	B215
TPGW110204S01015C WBH30P	B215
TPGW110208FST WDN25U	B216
TPGW110208S01015C WBH10P	B215
TPGW110208S01015C WBH25P	B215
TPGW110208S01015C WBH30P	B215
TPGW16T304FST WDN25U	B216
TPGW16T308FST WDN25U	B216
TPHB110202 C3	D50
TPHB110202 CG5	D50
TPHB110202 CG6	D50
TPHB110202 CM1	D50
TPHB110202 TN7	D50
TPHB110202M CBN6	D50
TPHB110202M CPD1	D50
TPHB110204 C3	D50
TPHB110204 CG5	D50
TPHB110204 CG6	D50
TPHB110204 CM1	D50
TPHB110204 TN7	D50
TPHB110204M CBN6	D50
TPHB110204M CPD1	D50
TPHB110208 CG5	D50
TPHB110208 CM1	D50
TPHB110208 TN7	D50
TPHB1102X0 C3	D50
TPHB1102X0 CG5	D50
TPHB1102X0 CM1	D50
TPHB1102X0M CBN6	D50
TPHB160302 C2	D50
TPHB160302 CG5	D50
TPHB160302 CM1	D50
TPHB160304 C2	D50
TPHB160304 CG5	D50
TPHB160304 CG6	D50
TPHB160304 CM1	D50
TPHB160304 TN7	D50
TPHB160308 C2	D50
TPHB160308 CG5	D50
TPHB160308 CG6	D50
TPHB160308 CM1	D50
TPHB160308 TN7	D50
TPHB1603X0 CG5	D50
TPHB1603X0 CM1	D50
TPHH110202 CG5	D52
TPHH110202 CG6	D52
TPHH110202L CG5	D51
TPHH110202L TN7	D51
TPHH110202R CG5	D51
TPHH110204 CG5	D52
TPHH110204L CG5	D51
TPHH110204L CG6	D51
TPHH160302L CG5	D51
TPHH160302R CG5	D51
TPHH160304 CG5	D52
TPHH160304 CG6	D52
TPHH160304L CG5	D51
TPHH160304L CG6	D51
TPHH160304LF C25	D52
TPHH160304R CG5	D51
TPHH160308 ALO	D52
TPHH160308 CG5	D52
TPHH160308 CG6	D52
TPHH160308L CG5	D51
TPHH160308R CG5	D51
TPHH17T309LF CG5	D52
TPMR110304 WP15CT	B92
TPMR110304 WP35CT	B92
TPMR110308 WK20CT	B92
TPMR110308 WP15CT	B92
TPMR110308 WP35CT	B92
TPMR160304 WK20CT	B92
TPMR160304 WP15CT	B92
TPMR160304 WP35CT	B92
TPMR160308 WK20CT	B92
TPMR160308 WP15CT	B92
TPMR160308 WP35CT	B92
TPMR160312 WK20CT	B92
TPMR160312 WP15CT	B92
TPMR160312 WP35CT	B92
TPMT090208FP WK20CT	B92
TPMT090208FP WM15CT	B92
TPMT090208FP WM25CT	B92
TPMT090208FP WP15CT	B92
TPMT090208FP WP25CT	B92
TPMT110202LF CG5	D53
TPMT110204FP WK20CT	B92
TPMT110204FP WM15CT	B92
TPMT110204FP WM25CT	B92
TPMT110204FP WP15CT	B92
TPMT110204FP WP25CT	B92
TPMT110204LF CG5	D53
TPMT110204LF CG6	D53
TPMT110208FP WK20CT	B92
TPMT110208FP WM15CT	B92
TPMT110208FP WM25CT	B92
TPMT110208FP WP15CT	B92
TPMT110208FP WP25CT	B92
TPMT110208MP WK20CT	B93
TPMT110208MP WP25CT	B93
TPMT160304LF CG5	D53
TPMT160304LF CG6	D53
TPMT160308LF CG5	D53
TPMT16T304FP WK20CT	B92
TPMT16T304FP WM25CT	B92
TPMT16T304FP WP15CT	B92
TPMT16T304FP WP25CT	B92
TPMT16T308FP WK20CT	B92
TPMT16T308FP WM25CT	B92
TPMT16T308FP WP15CT	B92
TPMT16T308FP WP25CT	B92
TPMT16T308MP WK20CT	B93
TPMT16T308MP WP25CT	B93
TPMT16T312FP WM25CT	B92
TPMT16T312MP WK20CT	B93
TPMT16T312MP WP25CT	B93
TPMT220408FP WP25CT	B92
TPUN110304 THM	B93
TPUN110304 WP15CT	B93
TPUN110304 WP35CT	B93
TPUN110308 THM	B93
TPUN110308 WP15CT	B93
TPUN160304 THM	B93
TPUN160304 WK20CT	B93
TPUN160304 WP15CT	B93
TPUN160304 WP25CT	B93
TPUN160308 HK1500	B93
TPUN160308 THM	B93
TPUN160308 TTR	B93
TPUN160308 WK20CT	B93
TPUN160308 WP15CT	B93
TPUN160308 WP25CT	B93
TPUN160312 THM	B93
TPUN160312 WK20CT	B93
TPUN160312 WP25CT	B93
TPUN220408 WP15CT	B93
TPUN220408 WP25CT	B93
TPUN220408 WP35CT	B93
TPUN220412 THM	B93
TPUN220412 TTR	B93
TPUN220412 WK20CT	B93
TPUN220412 WP25CT	B93
TPUN220412 WP35CT	B93
TT25	V10, V13, V16, V19
VBGT1103011P TN10U	B144
VBGT1103011P TN15U	B144
VBGT1103021P TN10U	B144
VBGT1103021P TN15U	B144
VBGT1103041P TN10U	B144
VBGT1604011P TN10U	B144
VBGT1604021P TN10U	B144
VBGT1604021P TN15U	B144
VBGT1604041P TN10U	B144
VBGT1604041P TN15U	B144
VBGW110304FST WDN25U	B216
VBGW160404FST WDN25U	B216
VBGW160404S01015MT WBH10P	B216
VBGW160404S01015MT WBH30P	B216
VBGW160408S01015MT WBH10P	B216
VBGW160408S01015MT WBH30P	B216
VBMT1103021P TN10U	B144
VBMT1103021P TN15U	B144
VBMT110302FP WP25CT	B94
VBMT1103041P TN10P	B144
VBMT1103041P TN10U	B144
VBMT1103041P TN15M	B144
VBMT1103041P TN15U	B144
VBMT1103041P TN20K	B144
VBMT1103041P TN20P	B144
VBMT1103041P TN30M	B144
VBMT110304FP WM15CT	B94
VBMT110304FP WM25CT	B94
VBMT110304FP WP15CT	B94
VBMT110304FP WP25CT	B94
VBMT1103081P TN10P	B144
VBMT1103081P TN10U	B144
VBMT1103081P TN15M	B144
VBMT1103081P TN20K	B144
VBMT1103081P TN20P	B144
VBMT110308FP WM15CT	B94
VBMT110308FP WM25CT	B94
VBMT110308FP WP25CT	B94
VBMT1604021P TN10P	B144
VBMT1604021P TN10U	B144
VBMT1604021P TN15U	B144
VBMT1604021P TN20K	B144
VBMT1604021P TN30M	B144
VBMT160402FP WM25CT	B94
VBMT160402FP WP25CT	B94
VBMT160404 WP15CT	B94
VBMT160404 WP25CT	B94
VBMT160404 WP35CT	B94
VBMT1604041P TN10P	B144
VBMT1604041P TN10U	B144
VBMT1604041P TN15M	B144
VBMT1604041P TN15U	B144
VBMT1604041P TN20K	B144
VBMT1604041P TN20P	B144
VBMT1604041P TN30M	B144
VBMT160404FP WK20CT	B94
VBMT160404FP WM15CT	B94
VBMT160404FP WM25CT	B94
VBMT160404FP WP15CT	B94
VBMT160404FP WP25CT	B94
VBMT160404MP WK20CT	B95
VBMT160404MP WM25CT	B95
VBMT160404MP WP25CT	B95
VBMT160408 WP15CT	B94
VBMT160408 WP25CT	B94
VBMT160408 WP35CT	B94

Catalogue No.	Page(s)
VBMT1604081P TN10P	B144
VBMT1604081P TN10U	B144
VBMT1604081P TN15M	B144
VBMT1604081P TN15U	B144
VBMT1604081P TN20K	B144
VBMT1604081P TN20P	B144
VBMT1604081P TN30M	B144
VBMT160408FP WK20CT	B94
VBMT160408FP WM15CT	B94
VBMT160408FP WM25CT	B94
VBMT160408FP WP15CT	B94
VBMT160408FP WP25CT	B94
VBMT160408MP WK20CT	B95
VBMT160408MP WM25CT	B95
VBMT160408MP WP25CT	B95
VBMT160412 WP15CT	B94
VBMT160412 WP25CT	B94
VBMT160412 WP35CT	B94
VBMT160412FP WP25CT	B94
VCGT110302AL3 HWK15	B157
VCGT110304AL3 HWK15	B157
VCGT160404AL3 HCK10	B157
VCGT160404AL3 HWK15	B157
VCGT160408AL3 HCK10	B157
VCGT160408AL3 HWK15	B157
VCGT160412AL3 HCK10	B157
VCGT160412AL3 HWK15	B157
VCGT220530AL3 HCK10	B157
VCGT220530AL3 HWK15	B157
VCMW110304FST WDN25U	B217
VDS201A01000 WU25PD	T8
VDS201A01016 WU25PD	T8
VDS201A01041 WU25PD	T8
VDS201A01067 WU25PD	T8
VDS201A01092 WU25PD	T8
VDS201A01100 WU25PD	T8
VDS201A01181 WU25PD	T8
VDS201A01191 WU25PD	T8
VDS201A01200 WU25PD	T8
VDS201A01300 WU25PD	T8
VDS201A01321 WU25PD	T8
VDS201A01397 WU25PD	T8
VDS201A01400 WU25PD	T8
VDS201A01500 WU25PD	T8
VDS201A01600 WU25PD	T8
VDS201A01700 WU25PD	T8
VDS201A01800 WU25PD	T8
VDS201A01900 WU25PD	T8
VDS201A01984 WU25PD	T8
VDS201A02000 WU25PD	T8
VDS201A02100 WU25PD	T8
VDS201A02200 WU25PD	T8
VDS201A02300 WU25PD	T8
VDS201A02383 WU25PD	T8
VDS201A02400 WU25PD	T9
VDS201A02439 WU25PD	T9
VDS201A02489 WU25PD	T9
VDS201A02500 WU25PD	T9
VDS201A02578 WU25PD	T9
VDS201A02600 WU25PD	T9
VDS201A02642 WU25PD	T9
VDS201A02700 WU25PD	T9
VDS201A02705 WU25PD	T9
VDS201A02779 WU25PD	T9
VDS201A02800 WU25PD	T9
VDS201A02820 WU25PD	T9
VDS201A02870 WU25PD	T9
VDS201A02900 WU25PD	T9
VDS201A02947 WU25PD	T9
VDS201A03000 WU25PD	T9
VDS201A03048 WU25PD	T9
VDS201A03100 WU25PD	T9
VDS201A03175 WU25PD	T9
VDS201A03200 WU25PD	T9
VDS201A03264 WU25PD	T9
VDS201A03300 WU25PD	T9
VDS201A03400 WU25PD	T9
VDS201A03455 WU25PD	T9
VDS201A03500 WU25PD	T9
VDS201A03571 WU25PD	T9
VDS201A03600 WU25PD	T9
VDS201A03658 WU25PD	T9
VDS201A03700 WU25PD	T9
VDS201A03734 WU25PD	T9
VDS201A03800 WU25PD	T9
VDS201A03900 WU25PD	T9
VDS201A03970 WU25PD	T9
VDS201A04000 WU25PD	T9
VDS201A04039 WU25PD	T9
VDS201A04090 WU25PD	T9
VDS201A04100 WU25PD	T9
VDS201A04200 WU25PD	T9
VDS201A04217 WU25PD	T9
VDS201A04300 WU25PD	T9
VDS201A04366 WU25PD	T10
VDS201A04400 WU25PD	T10
VDS201A04500 WU25PD	T10
VDS201A04600 WU25PD	T10
VDS201A04623 WU25PD	T10
VDS201A04700 WU25PD	T10
VDS201A04763 WU25PD	T10
VDS201A04800 WU25PD	T10
VDS201A04852 WU25PD	T10
VDS201A04900 WU25PD	T10
VDS201A05000 WU25PD	T10
VDS201A05100 WU25PD	T10
VDS201A05106 WU25PD	T10
VDS201A05159 WU25PD	T10
VDS201A05200 WU25PD	T10
VDS201A05300 WU25PD	T10
VDS201A05400 WU25PD	T10
VDS201A05410 WU25PD	T10
VDS201A05500 WU25PD	T10
VDS201A05558 WU25PD	T10
VDS201A05600 WU25PD	T10
VDS201A05616 WU25PD	T10
VDS201A05700 WU25PD	T10
VDS201A05800 WU25PD	T10
VDS201A05900 WU25PD	T10
VDS201A05954 WU25PD	T10
VDS201A06000 WU25PD	T10
VDS201A06100 WU25PD	T10
VDS201A06200 WU25PD	T10
VDS201A06300 WU25PD	T10
VDS201A06350 WU25PD	T10
VDS201A06400 WU25PD	T10
VDS201A06500 WU25PD	T10
VDS201A06528 WU25PD	T10
VDS201A06600 WU25PD	T10
VDS201A06630 WU25PD	T10
VDS201A06700 WU25PD	T10
VDS201A06746 WU25PD	T10
VDS201A06800 WU25PD	T10
VDS201A06900 WU25PD	T10
VDS201A07000 WU25PD	T11
VDS201A07100 WU25PD	T11
VDS201A07145 WU25PD	T11
VDS201A07200 WU25PD	T11
VDS201A07300 WU25PD	T11
VDS201A07400 WU25PD	T11
VDS201A07500 WU25PD	T11
VDS201A07541 WU25PD	T11
VDS201A07600 WU25PD	T11
VDS201A07700 WU25PD	T11
VDS201A07800 WU25PD	T11
VDS201A07900 WU25PD	T11
VDS201A07938 WU25PD	T11
VDS201A08000 WU25PD	T11
VDS201A08100 WU25PD	T11
VDS201A08200 WU25PD	T11
VDS201A08300 WU25PD	T11
VDS201A08334 WU25PD	T11
VDS201A08400 WU25PD	T11
VDS201A08433 WU25PD	T11
VDS201A08500 WU25PD	T11
VDS201A08600 WU25PD	T11
VDS201A08700 WU25PD	T11
VDS201A08733 WU25PD	T11
VDS201A08800 WU25PD	T11
VDS201A08900 WU25PD	T11
VDS201A09000 WU25PD	T11
VDS201A09100 WU25PD	T11
VDS201A09129 WU25PD	T11
VDS201A09200 WU25PD	T11
VDS201A09300 WU25PD	T11
VDS201A09347 WU25PD	T11
VDS201A09400 WU25PD	T11
VDS201A09500 WU25PD	T11
VDS201A09525 WU25PD	T11
VDS201A09600 WU25PD	T11
VDS201A09700 WU25PD	T11
VDS201A09800 WU25PD	T11
VDS201A09900 WU25PD	T11
VDS201A09921 WU25PD	T11
VDS201A10000 WU25PD	T12
VDS201A10100 WU25PD	T12
VDS201A10200 WU25PD	T12
VDS201A10300 WU25PD	T12
VDS201A10320 WU25PD	T12
VDS201A10400 WU25PD	T12
VDS201A10500 WU25PD	T12
VDS201A10600 WU25PD	T12
VDS201A10700 WU25PD	T12
VDS201A10716 WU25PD	T12
VDS201A10800 WU25PD	T12
VDS201A10900 WU25PD	T12
VDS201A11000 WU25PD	T12
VDS201A11100 WU25PD	T12
VDS201A11113 WU25PD	T12
VDS201A11200 WU25PD	T12
VDS201A11300 WU25PD	T12
VDS201A11400 WU25PD	T12
VDS201A11500 WU25PD	T12
VDS201A11509 WU25PD	T12
VDS201A11600 WU25PD	T12
VDS201A11700 WU25PD	T12
VDS201A11800 WU25PD	T12
VDS201A11900 WU25PD	T12
VDS201A11908 WU25PD	T12
VDS201A12000 WU25PD	T12
VDS201A12100 WU25PD	T12
VDS201A12200 WU25PD	T12
VDS201A12300 WU25PD	T12
VDS201A12304 WU25PD	T12
VDS201A12400 WU25PD	T12
VDS201A12500 WU25PD	T12
VDS201A12600 WU25PD	T12
VDS201A12700 WU25PD	T12
VDS201A12800 WU25PD	T12
VDS201A12900 WU25PD	T12
VDS201A13000 WU25PD	T12
VDS201A13096 WU25PD	T12
VDS201A13100 WU25PD	T12
VDS201A13200 WU25PD	T12
VDS201A13300 WU25PD	T13
VDS201A13400 WU25PD	T13
VDS201A13500 WU25PD	T13
VDS201A13600 WU25PD	T13
VDS201A13700 WU25PD	T13
VDS201A13800 WU25PD	T13
VDS201A13891 WU25PD	T13
VDS201A13900 WU25PD	T13
VDS201A14000 WU25PD	T13
VDS201A14100 WU25PD	T13
VDS201A14200 WU25PD	T13
VDS201A14288 WU25PD	T13
VDS201A14300 WU25PD	T13
VDS201A14400 WU25PD	T13
VDS201A14500 WU25PD	T13
VDS201A14600 WU25PD	T13
VDS201A14684 WU25PD	T13
VDS201A14700 WU25PD	T13
VDS201A14800 WU25PD	T13
VDS201A14900 WU25PD	T13
VDS201A15000 WU25PD	T13
VDS201A15083 WU25PD	T13
VDS201A15100 WU25PD	T13
VDS201A15200 WU25PD	T13
VDS201A15300 WU25PD	T13
VDS201A15400 WU25PD	T13
VDS201A15479 WU25PD	T13
VDS201A15500 WU25PD	T13
VDS201A15600 WU25PD	T13
VDS201A15700 WU25PD	T13
VDS201A15800 WU25PD	T13
VDS201A15875 WU25PD	T13
VDS201A15900 WU25PD	T13
VDS201A16000 WU25PD	T13
VDS201A16100 WU25PD	T13
VDS201A16200 WU25PD	T13
VDS201A16271 WU25PD	T13
VDS201A16300 WU25PD	T13
VDS201A16400 WU25PD	T13
VDS201A16500 WU25PD	T13
VDS201A16600 WU25PD	T14
VDS201A16670 WU25PD	T14
VDS201A16700 WU25PD	T14
VDS201A16800 WU25PD	T14
VDS201A16900 WU25PD	T14
VDS201A17000 WU25PD	T14
VDS201A17100 WU25PD	T14
VDS201A17200 WU25PD	T14
VDS201A17300 WU25PD	T14
VDS201A17400 WU25PD	T14
VDS201A17463 WU25PD	T14
VDS201A17500 WU25PD	T14
VDS201A17600 WU25PD	T14
VDS201A17700 WU25PD	T14
VDS201A17800 WU25PD	T14
VDS201A17859 WU25PD	T14
VDS201A17900 WU25PD	T14
VDS201A18000 WU25PD	T14

Catalogue No.	Page(s)
VDS201A18100 WU25PD	T14
VDS201A18200 WU25PD	T14
VDS201A18258 WU25PD	T14
VDS201A18300 WU25PD	T14
VDS201A18400 WU25PD	T14
VDS201A18500 WU25PD	T14
VDS201A18600 WU25PD	T14
VDS201A18654 WU25PD	T14
VDS201A18700 WU25PD	T14
VDS201A18800 WU25PD	T14
VDS201A18900 WU25PD	T14
VDS201A19000 WU25PD	T14
VDS201A19050 WU25PD	T14
VDS201A19100 WU25PD	T14
VDS201A19200 WU25PD	T14
VDS201A19300 WU25PD	T14
VDS201A19400 WU25PD	T14
VDS201A19500 WU25PD	T14
VDS201A19600 WU25PD	T14
VDS201A19700 WU25PD	T14
VDS201A19800 WU25PD	T14
VDS201A19900 WU25PD	T14
VDS201A20000 WU25PD	T14
VDS201F03000 WU25PD	T29
VDS201F03100 WU25PD	T29
VDS201F03200 WU25PD	T29
VDS201F03300 WU25PD	T29
VDS201F03400 WU25PD	T29
VDS201F03500 WU25PD	T29
VDS201F03600 WU25PD	T29
VDS201F03700 WU25PD	T29
VDS201F03800 WU25PD	T29
VDS201F03900 WU25PD	T29
VDS201F04000 WU25PD	T29
VDS201F04100 WU25PD	T29
VDS201F04200 WU25PD	T29
VDS201F04300 WU25PD	T29
VDS201F04400 WU25PD	T29
VDS201F04500 WU25PD	T29
VDS201F04600 WU25PD	T29
VDS201F04700 WU25PD	T29
VDS201F04800 WU25PD	T29
VDS201F04900 WU25PD	T29
VDS201F05000 WU25PD	T29
VDS201F05100 WU25PD	T29
VDS201F05200 WU25PD	T29
VDS201F05300 WU25PD	T29
VDS201F05400 WU25PD	T30
VDS201F05500 WU25PD	T30
VDS201F05600 WU25PD	T30
VDS201F05700 WU25PD	T30
VDS201F05800 WU25PD	T30
VDS201F05900 WU25PD	T30
VDS201F06000 WU25PD	T30
VDS201F06100 WU25PD	T30
VDS201F06200 WU25PD	T30
VDS201F06300 WU25PD	T30
VDS201F06400 WU25PD	T30
VDS201F06500 WU25PD	T30
VDS201F06600 WU25PD	T30
VDS201F06700 WU25PD	T30
VDS201F06800 WU25PD	T30
VDS201F06900 WU25PD	T30
VDS201F07000 WU25PD	T30
VDS201F07100 WU25PD	T30
VDS201F07200 WU25PD	T30
VDS201F07300 WU25PD	T30
VDS201F07400 WU25PD	T30
VDS201F07500 WU25PD	T30
VDS201F07600 WU25PD	T30
VDS201F07700 WU25PD	T30
VDS201F07800 WU25PD	T30
VDS201F07900 WU25PD	T30
VDS201F08000 WU25PD	T30
VDS201F08100 WU25PD	T30
VDS201F08200 WU25PD	T30
VDS201F08300 WU25PD	T30
VDS201F08400 WU25PD	T30
VDS201F08500 WU25PD	T30
VDS201F08600 WU25PD	T30
VDS201F08700 WU25PD	T30
VDS201F08800 WU25PD	T30
VDS201F08900 WU25PD	T30
VDS201F09000 WU25PD	T30
VDS201F09100 WU25PD	T30
VDS201F09200 WU25PD	T30
VDS201F09300 WU25PD	T30
VDS201F09400 WU25PD	T31
VDS201F09500 WU25PD	T31
VDS201F09600 WU25PD	T31
VDS201F09700 WU25PD	T31
VDS201F09800 WU25PD	T31
VDS201F09900 WU25PD	T31
VDS201F10000 WU25PD	T31
VDS201F10100 WU25PD	T31
VDS201F10200 WU25PD	T31
VDS201F10300 WU25PD	T31
VDS201F10400 WU25PD	T31
VDS201F10500 WU25PD	T31
VDS201F10600 WU25PD	T31
VDS201F10700 WU25PD	T31
VDS201F10800 WU25PD	T31
VDS201F10900 WU25PD	T31
VDS201F11000 WU25PD	T31
VDS201F11100 WU25PD	T31
VDS201F11200 WU25PD	T31
VDS201F11300 WU25PD	T31
VDS201F11400 WU25PD	T31
VDS201F11500 WU25PD	T31
VDS201F11600 WU25PD	T31
VDS201F11700 WU25PD	T31
VDS201F11800 WU25PD	T31
VDS201F11900 WU25PD	T31
VDS201F12000 WU25PD	T31
VDS201F12100 WU25PD	T31
VDS201F12200 WU25PD	T31
VDS201F12300 WU25PD	T31
VDS201F12400 WU25PD	T31
VDS201F12500 WU25PD	T31
VDS201F12600 WU25PD	T31
VDS201F12700 WU25PD	T31
VDS201F12800 WU25PD	T31
VDS201F12900 WU25PD	T31
VDS201F13000 WU25PD	T31
VDS201F13100 WU25PD	T31
VDS201F13200 WU25PD	T31
VDS201F13300 WU25PD	T31
VDS201F13400 WU25PD	T32
VDS201F13500 WU25PD	T32
VDS201F13600 WU25PD	T32
VDS201F13700 WU25PD	T32
VDS201F13800 WU25PD	T32
VDS201F13900 WU25PD	T32
VDS201F14000 WU25PD	T32
VDS201F14100 WU25PD	T32
VDS201F14200 WU25PD	T32
VDS201F14300 WU25PD	T32
VDS201F14400 WU25PD	T32
VDS201F14500 WU25PD	T32
VDS201F14600 WU25PD	T32
VDS201F14700 WU25PD	T32
VDS201F14800 WU25PD	T32
VDS201F14900 WU25PD	T32
VDS201F15000 WU25PD	T32
VDS201F15100 WU25PD	T32
VDS201F15200 WU25PD	T32
VDS201F15300 WU25PD	T32
VDS201F15400 WU25PD	T32
VDS201F15500 WU25PD	T32
VDS201F15600 WU25PD	T32
VDS201F15700 WU25PD	T32
VDS201F15800 WU25PD	T32
VDS201F15900 WU25PD	T32
VDS201F16000 WU25PD	T32
VDS201F16100 WU25PD	T32
VDS201F16200 WU25PD	T32
VDS201F16300 WU25PD	T32
VDS201F16400 WU25PD	T32
VDS201F16500 WU25PD	T32
VDS201F16600 WU25PD	T32
VDS201F16700 WU25PD	T32
VDS201F16800 WU25PD	T32
VDS201F16900 WU25PD	T32
VDS201F17000 WU25PD	T32
VDS201F17100 WU25PD	T32
VDS201F17200 WU25PD	T32
VDS201F17300 WU25PD	T32
VDS201F17400 WU25PD	T33
VDS201F17500 WU25PD	T33
VDS201F17600 WU25PD	T33
VDS201F17700 WU25PD	T33
VDS201F17800 WU25PD	T33
VDS201F17900 WU25PD	T33
VDS201F18000 WU25PD	T33
VDS201F18100 WU25PD	T33
VDS201F18200 WU25PD	T33
VDS201F18300 WU25PD	T33
VDS201F18400 WU25PD	T33
VDS201F18500 WU25PD	T33
VDS201F18600 WU25PD	T33
VDS201F18700 WU25PD	T33
VDS201F18800 WU25PD	T33
VDS201F18900 WU25PD	T33
VDS201F19000 WU25PD	T33
VDS201F19100 WU25PD	T33
VDS201F19200 WU25PD	T33
VDS201F19300 WU25PD	T33
VDS201F19400 WU25PD	T33
VDS201F19500 WU25PD	T33
VDS201F19600 WU25PD	T33
VDS201F19700 WU25PD	T33
VDS201F19800 WU25PD	T33
VDS201F19900 WU25PD	T33
VDS201F20000 WU25PD	T33
VDS202A01000 WU25PD	T15
VDS202A01016 WU25PD	T15
VDS202A01041 WU25PD	T15
VDS202A01067 WU25PD	T15
VDS202A01092 WU25PD	T15
VDS202A01100 WU25PD	T15
VDS202A01181 WU25PD	T15
VDS202A01191 WU25PD	T15
VDS202A01200 WU25PD	T15
VDS202A01300 WU25PD	T15
VDS202A01321 WU25PD	T15
VDS202A01397 WU25PD	T15
VDS202A01400 WU25PD	T15
VDS202A01500 WU25PD	T15
VDS202A01600 WU25PD	T15
VDS202A01700 WU25PD	T15
VDS202A01800 WU25PD	T15
VDS202A01900 WU25PD	T15
VDS202A01984 WU25PD	T15
VDS202A02000 WU25PD	T15
VDS202A02100 WU25PD	T15
VDS202A02200 WU25PD	T15
VDS202A02300 WU25PD	T15
VDS202A02383 WU25PD	T15
VDS202A02400 WU25PD	T16
VDS202A02439 WU25PD	T16
VDS202A02489 WU25PD	T16
VDS202A02500 WU25PD	T16
VDS202A02578 WU25PD	T16
VDS202A02600 WU25PD	T16
VDS202A02642 WU25PD	T16
VDS202A02700 WU25PD	T16
VDS202A02705 WU25PD	T16
VDS202A02779 WU25PD	T16
VDS202A02800 WU25PD	T16
VDS202A02820 WU25PD	T16
VDS202A02870 WU25PD	T16
VDS202A02900 WU25PD	T16
VDS202A02947 WU25PD	T16
VDS202A03000 WU25PD	T16
VDS202A03048 WU25PD	T16
VDS202A03100 WU25PD	T16
VDS202A03175 WU25PD	T16
VDS202A03200 WU25PD	T16
VDS202A03264 WU25PD	T16
VDS202A03300 WU25PD	T16
VDS202A03400 WU25PD	T16
VDS202A03455 WU25PD	T16
VDS202A03500 WU25PD	T16
VDS202A03571 WU25PD	T16
VDS202A03600 WU25PD	T16
VDS202A03658 WU25PD	T16
VDS202A03700 WU25PD	T16
VDS202A03734 WU25PD	T16
VDS202A03800 WU25PD	T16
VDS202A03900 WU25PD	T16
VDS202A03970 WU25PD	T16
VDS202A04000 WU25PD	T16
VDS202A04039 WU25PD	T16
VDS202A04090 WU25PD	T16
VDS202A04100 WU25PD	T16
VDS202A04200 WU25PD	T16
VDS202A04217 WU25PD	T16
VDS202A04300 WU25PD	T16
VDS202A04366 WU25PD	T17
VDS202A04400 WU25PD	T17
VDS202A04500 WU25PD	T17
VDS202A04600 WU25PD	T17
VDS202A04623 WU25PD	T17
VDS202A04700 WU25PD	T17
VDS202A04763 WU25PD	T17
VDS202A04800 WU25PD	T17
VDS202A04852 WU25PD	T17
VDS202A04900 WU25PD	T17
VDS202A05000 WU25PD	T17
VDS202A05100 WU25PD	T17
VDS202A05106 WU25PD	T17
VDS202A05159 WU25PD	T17

Catalogue No.	Page(s)
VDS202A05200 WU25PD	T17
VDS202A05300 WU25PD	T17
VDS202A05400 WU25PD	T17
VDS202A05410 WU25PD	T17
VDS202A05500 WU25PD	T17
VDS202A05558 WU25PD	T17
VDS202A05600 WU25PD	T17
VDS202A05616 WU25PD	T17
VDS202A05700 WU25PD	T17
VDS202A05800 WU25PD	T17
VDS202A05900 WU25PD	T17
VDS202A05954 WU25PD	T17
VDS202A06000 WU25PD	T17
VDS202A06100 WU25PD	T17
VDS202A06200 WU25PD	T17
VDS202A06300 WU25PD	T17
VDS202A06350 WU25PD	T17
VDS202A06400 WU25PD	T17
VDS202A06500 WU25PD	T17
VDS202A06528 WU25PD	T17
VDS202A06600 WU25PD	T17
VDS202A06630 WU25PD	T17
VDS202A06700 WU25PD	T17
VDS202A06746 WU25PD	T17
VDS202A06800 WU25PD	T17
VDS202A06900 WU25PD	T17
VDS202A07000 WU25PD	T18
VDS202A07100 WU25PD	T18
VDS202A07145 WU25PD	T18
VDS202A07200 WU25PD	T18
VDS202A07300 WU25PD	T18
VDS202A07400 WU25PD	T18
VDS202A07500 WU25PD	T18
VDS202A07541 WU25PD	T18
VDS202A07600 WU25PD	T18
VDS202A07700 WU25PD	T18
VDS202A07800 WU25PD	T18
VDS202A07900 WU25PD	T18
VDS202A07938 WU25PD	T18
VDS202A08000 WU25PD	T18
VDS202A08100 WU25PD	T18
VDS202A08200 WU25PD	T18
VDS202A08300 WU25PD	T18
VDS202A08334 WU25PD	T18
VDS202A08400 WU25PD	T18
VDS202A08433 WU25PD	T18
VDS202A08500 WU25PD	T18
VDS202A08600 WU25PD	T18
VDS202A08700 WU25PD	T18
VDS202A08733 WU25PD	T18
VDS202A08800 WU25PD	T18
VDS202A08900 WU25PD	T18
VDS202A09000 WU25PD	T18
VDS202A09100 WU25PD	T18
VDS202A09129 WU25PD	T18
VDS202A09200 WU25PD	T18
VDS202A09300 WU25PD	T18
VDS202A09347 WU25PD	T18
VDS202A09400 WU25PD	T18
VDS202A09500 WU25PD	T18
VDS202A09525 WU25PD	T18
VDS202A09600 WU25PD	T18
VDS202A09700 WU25PD	T18
VDS202A09800 WU25PD	T18
VDS202A09900 WU25PD	T18
VDS202A09921 WU25PD	T18
VDS202A10000 WU25PD	T19
VDS202A10100 WU25PD	T19
VDS202A10200 WU25PD	T19
VDS202A10300 WU25PD	T19
VDS202A10320 WU25PD	T19
VDS202A10400 WU25PD	T19
VDS202A10500 WU25PD	T19
VDS202A10600 WU25PD	T19
VDS202A10700 WU25PD	T19
VDS202A10716 WU25PD	T19
VDS202A10800 WU25PD	T19
VDS202A10900 WU25PD	T19
VDS202A11000 WU25PD	T19
VDS202A11100 WU25PD	T19
VDS202A11113 WU25PD	T19
VDS202A11200 WU25PD	T19
VDS202A11300 WU25PD	T19
VDS202A11400 WU25PD	T19
VDS202A11500 WU25PD	T19
VDS202A11509 WU25PD	T19
VDS202A11600 WU25PD	T19
VDS202A11700 WU25PD	T19
VDS202A11800 WU25PD	T19
VDS202A11900 WU25PD	T19
VDS202A11908 WU25PD	T19
VDS202A12000 WU25PD	T19
VDS202A12100 WU25PD	T19
VDS202A12200 WU25PD	T19
VDS202A12300 WU25PD	T19
VDS202A12304 WU25PD	T19
VDS202A12400 WU25PD	T19
VDS202A12500 WU25PD	T19
VDS202A12600 WU25PD	T19
VDS202A12700 WU25PD	T19
VDS202A12800 WU25PD	T19
VDS202A12900 WU25PD	T19
VDS202A13000 WU25PD	T19
VDS202A13096 WU25PD	T19
VDS202A13100 WU25PD	T19
VDS202A13200 WU25PD	T19
VDS202A13300 WU25PD	T20
VDS202A13400 WU25PD	T20
VDS202A13500 WU25PD	T20
VDS202A13600 WU25PD	T20
VDS202A13700 WU25PD	T20
VDS202A13800 WU25PD	T20
VDS202A13891 WU25PD	T20
VDS202A13900 WU25PD	T20
VDS202A14000 WU25PD	T20
VDS202A14100 WU25PD	T20
VDS202A14200 WU25PD	T20
VDS202A14288 WU25PD	T20
VDS202A14300 WU25PD	T20
VDS202A14400 WU25PD	T20
VDS202A14500 WU25PD	T20
VDS202A14600 WU25PD	T20
VDS202A14684 WU25PD	T20
VDS202A14700 WU25PD	T20
VDS202A14800 WU25PD	T20
VDS202A14900 WU25PD	T20
VDS202A15000 WU25PD	T20
VDS202A15083 WU25PD	T20
VDS202A15100 WU25PD	T20
VDS202A15200 WU25PD	T20
VDS202A15300 WU25PD	T20
VDS202A15400 WU25PD	T20
VDS202A15479 WU25PD	T20
VDS202A15500 WU25PD	T20
VDS202A15600 WU25PD	T20
VDS202A15700 WU25PD	T20
VDS202A15800 WU25PD	T20
VDS202A15875 WU25PD	T20
VDS202A15900 WU25PD	T20
VDS202A16000 WU25PD	T20
VDS202A16100 WU25PD	T20
VDS202A16200 WU25PD	T20
VDS202A16271 WU25PD	T20
VDS202A16300 WU25PD	T20
VDS202A16400 WU25PD	T20
VDS202A16500 WU25PD	T20
VDS202A16600 WU25PD	T21
VDS202A16670 WU25PD	T21
VDS202A16700 WU25PD	T21
VDS202A16800 WU25PD	T21
VDS202A16900 WU25PD	T21
VDS202A17000 WU25PD	T21
VDS202A17100 WU25PD	T21
VDS202A17200 WU25PD	T21
VDS202A17300 WU25PD	T21
VDS202A17400 WU25PD	T21
VDS202A17463 WU25PD	T21
VDS202A17500 WU25PD	T21
VDS202A17600 WU25PD	T21
VDS202A17700 WU25PD	T21
VDS202A17800 WU25PD	T21
VDS202A17859 WU25PD	T21
VDS202A17900 WU25PD	T21
VDS202A18000 WU25PD	T21
VDS202A18100 WU25PD	T21
VDS202A18200 WU25PD	T21
VDS202A18258 WU25PD	T21
VDS202A18300 WU25PD	T21
VDS202A18400 WU25PD	T21
VDS202A18500 WU25PD	T21
VDS202A18600 WU25PD	T21
VDS202A18654 WU25PD	T21
VDS202A18700 WU25PD	T21
VDS202A18800 WU25PD	T21
VDS202A18900 WU25PD	T21
VDS202A19000 WU25PD	T21
VDS202A19050 WU25PD	T21
VDS202A19100 WU25PD	T21
VDS202A19200 WU25PD	T21
VDS202A19300 WU25PD	T21
VDS202A19400 WU25PD	T21
VDS202A19500 WU25PD	T21
VDS202A19600 WU25PD	T21
VDS202A19700 WU25PD	T21
VDS202A19800 WU25PD	T21
VDS202A19900 WU25PD	T21
VDS202A20000 WU25PD	T21
VDS202F03000 WU25PD	T34
VDS202F03100 WU25PD	T34
VDS202F03200 WU25PD	T34
VDS202F03300 WU25PD	T34
VDS202F03400 WU25PD	T34
VDS202F03500 WU25PD	T34
VDS202F03600 WU25PD	T34
VDS202F03700 WU25PD	T34
VDS202F03800 WU25PD	T34
VDS202F03900 WU25PD	T34
VDS202F04000 WU25PD	T34
VDS202F04100 WU25PD	T34
VDS202F04200 WU25PD	T34
VDS202F04300 WU25PD	T34
VDS202F04400 WU25PD	T34
VDS202F04500 WU25PD	T34
VDS202F04600 WU25PD	T34
VDS202F04700 WU25PD	T34
VDS202F04800 WU25PD	T34
VDS202F04900 WU25PD	T34
VDS202F05000 WU25PD	T34
VDS202F05100 WU25PD	T34
VDS202F05200 WU25PD	T34
VDS202F05300 WU25PD	T34
VDS202F05400 WU25PD	T35
VDS202F05500 WU25PD	T35
VDS202F05600 WU25PD	T35
VDS202F05700 WU25PD	T35
VDS202F05800 WU25PD	T35
VDS202F05900 WU25PD	T35
VDS202F06000 WU25PD	T35
VDS202F06100 WU25PD	T35
VDS202F06200 WU25PD	T35
VDS202F06300 WU25PD	T35
VDS202F06400 WU25PD	T35
VDS202F06500 WU25PD	T35
VDS202F06600 WU25PD	T35
VDS202F06700 WU25PD	T35
VDS202F06800 WU25PD	T35
VDS202F06900 WU25PD	T35
VDS202F07000 WU25PD	T35
VDS202F07100 WU25PD	T35
VDS202F07200 WU25PD	T35
VDS202F07300 WU25PD	T35
VDS202F07400 WU25PD	T35
VDS202F07500 WU25PD	T35
VDS202F07600 WU25PD	T35
VDS202F07700 WU25PD	T35
VDS202F07800 WU25PD	T35
VDS202F07900 WU25PD	T35
VDS202F08000 WU25PD	T35
VDS202F08100 WU25PD	T35
VDS202F08200 WU25PD	T35
VDS202F08300 WU25PD	T35
VDS202F08400 WU25PD	T35
VDS202F08500 WU25PD	T35
VDS202F08600 WU25PD	T35
VDS202F08700 WU25PD	T35
VDS202F08800 WU25PD	T35
VDS202F08900 WU25PD	T35
VDS202F09000 WU25PD	T35
VDS202F09100 WU25PD	T35
VDS202F09200 WU25PD	T35
VDS202F09300 WU25PD	T35
VDS202F09400 WU25PD	T36
VDS202F09500 WU25PD	T36
VDS202F09600 WU25PD	T36
VDS202F09700 WU25PD	T36
VDS202F09800 WU25PD	T36
VDS202F09900 WU25PD	T36
VDS202F10000 WU25PD	T36
VDS202F10100 WU25PD	T36
VDS202F10200 WU25PD	T36
VDS202F10300 WU25PD	T36
VDS202F10400 WU25PD	T36
VDS202F10500 WU25PD	T36
VDS202F10600 WU25PD	T36
VDS202F10700 WU25PD	T36
VDS202F10800 WU25PD	T36
VDS202F10900 WU25PD	T36
VDS202F11000 WU25PD	T36
VDS202F11100 WU25PD	T36
VDS202F11200 WU25PD	T36
VDS202F11300 WU25PD	T36
VDS202F11400 WU25PD	T36

Catalogue No.	Page(s)
VDS202F11500 WU25PD	T36
VDS202F11600 WU25PD	T36
VDS202F11700 WU25PD	T36
VDS202F11800 WU25PD	T36
VDS202F11900 WU25PD	T36
VDS202F12000 WU25PD	T36
VDS202F12100 WU25PD	T36
VDS202F12200 WU25PD	T36
VDS202F12300 WU25PD	T36
VDS202F12400 WU25PD	T36
VDS202F12500 WU25PD	T36
VDS202F12600 WU25PD	T36
VDS202F12700 WU25PD	T36
VDS202F12800 WU25PD	T36
VDS202F12900 WU25PD	T36
VDS202F13000 WU25PD	T36
VDS202F13100 WU25PD	T36
VDS202F13200 WU25PD	T36
VDS202F13300 WU25PD	T36
VDS202F13400 WU25PD	T37
VDS202F13500 WU25PD	T37
VDS202F13600 WU25PD	T37
VDS202F13700 WU25PD	T37
VDS202F13800 WU25PD	T37
VDS202F13900 WU25PD	T37
VDS202F14000 WU25PD	T37
VDS202F14100 WU25PD	T37
VDS202F14200 WU25PD	T37
VDS202F14300 WU25PD	T37
VDS202F14400 WU25PD	T37
VDS202F14500 WU25PD	T37
VDS202F14600 WU25PD	T37
VDS202F14700 WU25PD	T37
VDS202F14800 WU25PD	T37
VDS202F14900 WU25PD	T37
VDS202F15000 WU25PD	T37
VDS202F15100 WU25PD	T37
VDS202F15200 WU25PD	T37
VDS202F15300 WU25PD	T37
VDS202F15400 WU25PD	T37
VDS202F15500 WU25PD	T37
VDS202F15600 WU25PD	T37
VDS202F15700 WU25PD	T37
VDS202F15800 WU25PD	T37
VDS202F15900 WU25PD	T37
VDS202F16000 WU25PD	T37
VDS202F16100 WU25PD	T37
VDS202F16200 WU25PD	T37
VDS202F16300 WU25PD	T37
VDS202F16400 WU25PD	T37
VDS202F16500 WU25PD	T37
VDS202F16600 WU25PD	T37
VDS202F16700 WU25PD	T37
VDS202F16800 WU25PD	T37
VDS202F16900 WU25PD	T37
VDS202F17000 WU25PD	T37
VDS202F17100 WU25PD	T37
VDS202F17200 WU25PD	T37
VDS202F17300 WU25PD	T37
VDS202F17400 WU25PD	T38
VDS202F17500 WU25PD	T38
VDS202F17600 WU25PD	T38
VDS202F17700 WU25PD	T38
VDS202F17800 WU25PD	T38
VDS202F17900 WU25PD	T38
VDS202F18000 WU25PD	T38
VDS202F18100 WU25PD	T38
VDS202F18200 WU25PD	T38
VDS202F18300 WU25PD	T38
VDS202F18400 WU25PD	T38
VDS202F18500 WU25PD	T38
VDS202F18600 WU25PD	T38
VDS202F18700 WU25PD	T38
VDS202F18800 WU25PD	T38
VDS202F18900 WU25PD	T38
VDS202F19000 WU25PD	T38
VDS202F19100 WU25PD	T38
VDS202F19200 WU25PD	T38
VDS202F19300 WU25PD	T38
VDS202F19400 WU25PD	T38
VDS202F19500 WU25PD	T38
VDS202F19600 WU25PD	T38
VDS202F19700 WU25PD	T38
VDS202F19800 WU25PD	T38
VDS202F19900 WU25PD	T38
VDS202F20000 WU25PD	T38
VDS401A01500 WU25PD	T8
VDS401A01600 WU25PD	T8
VDS401A01700 WU25PD	T8
VDS401A01800 WU25PD	T8
VDS401A01900 WU25PD	T8
VDS401A01984 WU25PD	T8
VDS401A02000 WU25PD	T8
VDS401A02100 WU25PD	T8
VDS401A02200 WU25PD	T8
VDS401A02300 WU25PD	T8
VDS401A02383 WU25PD	T8
VDS401A02400 WU25PD	T9
VDS401A02439 WU25PD	T9
VDS401A02489 WU25PD	T9
VDS401A02500 WU25PD	T9
VDS401A02578 WU25PD	T9
VDS401A02600 WU25PD	T9
VDS401A02642 WU25PD	T9
VDS401A02700 WU25PD	T9
VDS401A02705 WU25PD	T9
VDS401A02779 WU25PD	T9
VDS401A02800 WU25PD	T9
VDS401A02820 WU25PD	T9
VDS401A02870 WU25PD	T9
VDS401A02900 WU25PD	T9
VDS401A02947 WU25PD	T9
VDS401A03000 WU25PD	T9
VDS401A03048 WU25PD	T9
VDS401A03100 WU25PD	T9
VDS401A03175 WU25PD	T9
VDS401A03200 WU25PD	T9
VDS401A03264 WU25PD	T9
VDS401A03300 WU25PD	T9
VDS401A03400 WU25PD	T9
VDS401A03455 WU25PD	T9
VDS401A03500 WU25PD	T9
VDS401A03571 WU25PD	T9
VDS401A03600 WU25PD	T9
VDS401A03658 WU25PD	T9
VDS401A03700 WU25PD	T9
VDS401A03734 WU25PD	T9
VDS401A03800 WU25PD	T9
VDS401A03900 WU25PD	T9
VDS401A03970 WU25PD	T9
VDS401A04000 WU25PD	T9
VDS401A04039 WU25PD	T9
VDS401A04090 WU25PD	T9
VDS401A04100 WU25PD	T9
VDS401A04200 WU25PD	T9
VDS401A04217 WU25PD	T9
VDS401A04300 WU25PD	T9
VDS401A04366 WU25PD	T10
VDS401A04400 WU25PD	T10
VDS401A04500 WU25PD	T10
VDS401A04600 WU25PD	T10
VDS401A04623 WU25PD	T10
VDS401A04700 WU25PD	T10
VDS401A04763 WU25PD	T10
VDS401A04800 WU25PD	T10
VDS401A04852 WU25PD	T10
VDS401A04900 WU25PD	T10
VDS401A05000 WU25PD	T10
VDS401A05100 WU25PD	T10
VDS401A05106 WU25PD	T10
VDS401A05159 WU25PD	T10
VDS401A05200 WU25PD	T10
VDS401A05300 WU25PD	T10
VDS401A05400 WU25PD	T10
VDS401A05410 WU25PD	T10
VDS401A05500 WU25PD	T10
VDS401A05558 WU25PD	T10
VDS401A05600 WU25PD	T10
VDS401A05616 WU25PD	T10
VDS401A05700 WU25PD	T10
VDS401A05800 WU25PD	T10
VDS401A05900 WU25PD	T10
VDS401A05954 WU25PD	T10
VDS401A06000 WU25PD	T10
VDS401A06100 WU25PD	T10
VDS401A06200 WU25PD	T10
VDS401A06300 WU25PD	T10
VDS401A06350 WU25PD	T10
VDS401A06400 WU25PD	T10
VDS401A06500 WU25PD	T10
VDS401A06528 WU25PD	T10
VDS401A06600 WU25PD	T10
VDS401A06630 WU25PD	T10
VDS401A06700 WU25PD	T10
VDS401A06746 WU25PD	T10
VDS401A06800 WU25PD	T10
VDS401A06900 WU25PD	T10
VDS401A07000 WU25PD	T11
VDS401A07100 WU25PD	T11
VDS401A07145 WU25PD	T11
VDS401A07200 WU25PD	T11
VDS401A07300 WU25PD	T11
VDS401A07400 WU25PD	T11
VDS401A07500 WU25PD	T11
VDS401A07541 WU25PD	T11
VDS401A07600 WU25PD	T11
VDS401A07700 WU25PD	T11
VDS401A07800 WU25PD	T11
VDS401A07900 WU25PD	T11
VDS401A07938 WU25PD	T11
VDS401A08000 WU25PD	T11
VDS401A08100 WU25PD	T11
VDS401A08200 WU25PD	T11
VDS401A08300 WU25PD	T11
VDS401A08334 WU25PD	T11
VDS401A08400 WU25PD	T11
VDS401A08433 WU25PD	T11
VDS401A08500 WU25PD	T11
VDS401A08600 WU25PD	T11
VDS401A08700 WU25PD	T11
VDS401A08733 WU25PD	T11
VDS401A08800 WU25PD	T11
VDS401A08900 WU25PD	T11
VDS401A09000 WU25PD	T11
VDS401A09100 WU25PD	T11
VDS401A09129 WU25PD	T11
VDS401A09200 WU25PD	T11
VDS401A09300 WU25PD	T11
VDS401A09347 WU25PD	T11
VDS401A09400 WU25PD	T11
VDS401A09500 WU25PD	T11
VDS401A09525 WU25PD	T11
VDS401A09600 WU25PD	T11
VDS401A09700 WU25PD	T11
VDS401A09800 WU25PD	T11
VDS401A09900 WU25PD	T11
VDS401A09921 WU25PD	T11
VDS401A10000 WU25PD	T12
VDS401A10100 WU25PD	T12
VDS401A10200 WU25PD	T12
VDS401A10300 WU25PD	T12
VDS401A10320 WU25PD	T12
VDS401A10400 WU25PD	T12
VDS401A10500 WU25PD	T12
VDS401A10600 WU25PD	T12
VDS401A10700 WU25PD	T12
VDS401A10716 WU25PD	T12
VDS401A10800 WU25PD	T12
VDS401A10900 WU25PD	T12
VDS401A11000 WU25PD	T12
VDS401A11100 WU25PD	T12
VDS401A11113 WU25PD	T12
VDS401A11200 WU25PD	T12
VDS401A11300 WU25PD	T12
VDS401A11400 WU25PD	T12
VDS401A11500 WU25PD	T12
VDS401A11509 WU25PD	T12
VDS401A11600 WU25PD	T12
VDS401A11700 WU25PD	T12
VDS401A11800 WU25PD	T12
VDS401A11900 WU25PD	T12
VDS401A11908 WU25PD	T12
VDS401A12000 WU25PD	T12
VDS401A12100 WU25PD	T12
VDS401A12200 WU25PD	T12
VDS401A12300 WU25PD	T12
VDS401A12304 WU25PD	T12
VDS401A12400 WU25PD	T12
VDS401A12500 WU25PD	T12
VDS401A12600 WU25PD	T12
VDS401A12700 WU25PD	T12
VDS401A12800 WU25PD	T12
VDS401A12900 WU25PD	T12
VDS401A13000 WU25PD	T12
VDS401A13096 WU25PD	T12
VDS401A13100 WU25PD	T12
VDS401A13200 WU25PD	T12
VDS401A13300 WU25PD	T13
VDS401A13400 WU25PD	T13
VDS401A13500 WU25PD	T13
VDS401A13600 WU25PD	T13
VDS401A13700 WU25PD	T13
VDS401A13800 WU25PD	T13
VDS401A13891 WU25PD	T13
VDS401A13900 WU25PD	T13
VDS401A14000 WU25PD	T13
VDS401A14100 WU25PD	T13
VDS401A14200 WU25PD	T13
VDS401A14288 WU25PD	T13
VDS401A14300 WU25PD	T13
VDS401A14400 WU25PD	T13
VDS401A14500 WU25PD	T13

Catalogue No.	Page(s)
VDS401A14600 WU25PD	T13
VDS401A14684 WU25PD	T13
VDS401A14700 WU25PD	T13
VDS401A14800 WU25PD	T13
VDS401A14900 WU25PD	T13
VDS401A15000 WU25PD	T13
VDS401A15083 WU25PD	T13
VDS401A15100 WU25PD	T13
VDS401A15200 WU25PD	T13
VDS401A15300 WU25PD	T13
VDS401A15400 WU25PD	T13
VDS401A15479 WU25PD	T13
VDS401A15500 WU25PD	T13
VDS401A15600 WU25PD	T13
VDS401A15700 WU25PD	T13
VDS401A15800 WU25PD	T13
VDS401A15875 WU25PD	T13
VDS401A15900 WU25PD	T13
VDS401A16000 WU25PD	T13
VDS401A16100 WU25PD	T13
VDS401A16200 WU25PD	T13
VDS401A16271 WU25PD	T13
VDS401A16300 WU25PD	T13
VDS401A16400 WU25PD	T13
VDS401A16500 WU25PD	T13
VDS401A16600 WU25PD	T14
VDS401A16670 WU25PD	T14
VDS401A16700 WU25PD	T14
VDS401A16800 WU25PD	T14
VDS401A16900 WU25PD	T14
VDS401A17000 WU25PD	T14
VDS401A17100 WU25PD	T14
VDS401A17200 WU25PD	T14
VDS401A17300 WU25PD	T14
VDS401A17400 WU25PD	T14
VDS401A17463 WU25PD	T14
VDS401A17500 WU25PD	T14
VDS401A17600 WU25PD	T14
VDS401A17700 WU25PD	T14
VDS401A17800 WU25PD	T14
VDS401A17859 WU25PD	T14
VDS401A17900 WU25PD	T14
VDS401A18000 WU25PD	T14
VDS401A18100 WU25PD	T14
VDS401A18200 WU25PD	T14
VDS401A18258 WU25PD	T14
VDS401A18300 WU25PD	T14
VDS401A18400 WU25PD	T14
VDS401A18500 WU25PD	T14
VDS401A18600 WU25PD	T14
VDS401A18654 WU25PD	T14
VDS401A18700 WU25PD	T14
VDS401A18800 WU25PD	T14
VDS401A18900 WU25PD	T14
VDS401A19000 WU25PD	T14
VDS401A19050 WU25PD	T14
VDS401A19100 WU25PD	T14
VDS401A19200 WU25PD	T14
VDS401A19300 WU25PD	T14
VDS401A19400 WU25PD	T14
VDS401A19500 WU25PD	T14
VDS401A19600 WU25PD	T14
VDS401A19700 WU25PD	T14
VDS401A19800 WU25PD	T14
VDS401A19900 WU25PD	T14
VDS401A20000 WU25PD	T14
VDS401F03000 WU25PD	T29
VDS401F03100 WU25PD	T29
VDS401F03200 WU25PD	T29
VDS401F03300 WU25PD	T29
VDS401F03400 WU25PD	T29
VDS401F03500 WU25PD	T29
VDS401F03600 WU25PD	T29
VDS401F03700 WU25PD	T29
VDS401F03800 WU25PD	T29
VDS401F03900 WU25PD	T29
VDS401F04000 WU25PD	T29
VDS401F04100 WU25PD	T29
VDS401F04200 WU25PD	T29
VDS401F04300 WU25PD	T29
VDS401F04400 WU25PD	T29
VDS401F04500 WU25PD	T29
VDS401F04600 WU25PD	T29
VDS401F04700 WU25PD	T29
VDS401F04800 WU25PD	T29
VDS401F04900 WU25PD	T29
VDS401F05000 WU25PD	T29
VDS401F05100 WU25PD	T29
VDS401F05200 WU25PD	T29
VDS401F05300 WU25PD	T29
VDS401F05400 WU25PD	T30
VDS401F05500 WU25PD	T30
VDS401F05600 WU25PD	T30
VDS401F05700 WU25PD	T30
VDS401F05800 WU25PD	T30
VDS401F05900 WU25PD	T30
VDS401F06000 WU25PD	T30
VDS401F06100 WU25PD	T30
VDS401F06200 WU25PD	T30
VDS401F06300 WU25PD	T30
VDS401F06400 WU25PD	T30
VDS401F06500 WU25PD	T30
VDS401F06600 WU25PD	T30
VDS401F06700 WU25PD	T30
VDS401F06800 WU25PD	T30
VDS401F06900 WU25PD	T30
VDS401F07000 WU25PD	T30
VDS401F07100 WU25PD	T30
VDS401F07200 WU25PD	T30
VDS401F07300 WU25PD	T30
VDS401F07400 WU25PD	T30
VDS401F07500 WU25PD	T30
VDS401F07600 WU25PD	T30
VDS401F07700 WU25PD	T30
VDS401F07800 WU25PD	T30
VDS401F07900 WU25PD	T30
VDS401F08000 WU25PD	T30
VDS401F08100 WU25PD	T30
VDS401F08200 WU25PD	T30
VDS401F08300 WU25PD	T30
VDS401F08400 WU25PD	T30
VDS401F08500 WU25PD	T30
VDS401F08600 WU25PD	T30
VDS401F08700 WU25PD	T30
VDS401F08800 WU25PD	T30
VDS401F08900 WU25PD	T30
VDS401F09000 WU25PD	T30
VDS401F09100 WU25PD	T30
VDS401F09200 WU25PD	T30
VDS401F09300 WU25PD	T30
VDS401F09400 WU25PD	T31
VDS401F09500 WU25PD	T31
VDS401F09600 WU25PD	T31
VDS401F09700 WU25PD	T31
VDS401F09800 WU25PD	T31
VDS401F09900 WU25PD	T31
VDS401F10000 WU25PD	T31
VDS401F10100 WU25PD	T31
VDS401F10200 WU25PD	T31
VDS401F10300 WU25PD	T31
VDS401F10400 WU25PD	T31
VDS401F10500 WU25PD	T31
VDS401F10600 WU25PD	T31
VDS401F10700 WU25PD	T31
VDS401F10800 WU25PD	T31
VDS401F10900 WU25PD	T31
VDS401F11000 WU25PD	T31
VDS401F11100 WU25PD	T31
VDS401F11200 WU25PD	T31
VDS401F11300 WU25PD	T31
VDS401F11400 WU25PD	T31
VDS401F11500 WU25PD	T31
VDS401F11600 WU25PD	T31
VDS401F11700 WU25PD	T31
VDS401F11800 WU25PD	T31
VDS401F11900 WU25PD	T31
VDS401F12000 WU25PD	T31
VDS401F12100 WU25PD	T31
VDS401F12200 WU25PD	T31
VDS401F12300 WU25PD	T31
VDS401F12400 WU25PD	T31
VDS401F12500 WU25PD	T31
VDS401F12600 WU25PD	T31
VDS401F12700 WU25PD	T31
VDS401F12800 WU25PD	T31
VDS401F12900 WU25PD	T31
VDS401F13000 WU25PD	T31
VDS401F13100 WU25PD	T31
VDS401F13200 WU25PD	T31
VDS401F13300 WU25PD	T31
VDS401F13400 WU25PD	T32
VDS401F13500 WU25PD	T32
VDS401F13600 WU25PD	T32
VDS401F13700 WU25PD	T32
VDS401F13800 WU25PD	T32
VDS401F13900 WU25PD	T32
VDS401F14000 WU25PD	T32
VDS401F14100 WU25PD	T32
VDS401F14200 WU25PD	T32
VDS401F14300 WU25PD	T32
VDS401F14400 WU25PD	T32
VDS401F14500 WU25PD	T32
VDS401F14600 WU25PD	T32
VDS401F14700 WU25PD	T32
VDS401F14800 WU25PD	T32
VDS401F14900 WU25PD	T32
VDS401F15000 WU25PD	T32
VDS401F15100 WU25PD	T32
VDS401F15200 WU25PD	T32
VDS401F15300 WU25PD	T32
VDS401F15400 WU25PD	T32
VDS401F15500 WU25PD	T32
VDS401F15600 WU25PD	T32
VDS401F15700 WU25PD	T32
VDS401F15800 WU25PD	T32
VDS401F15900 WU25PD	T32
VDS401F16000 WU25PD	T32
VDS401F16100 WU25PD	T32
VDS401F16200 WU25PD	T32
VDS401F16300 WU25PD	T32
VDS401F16400 WU25PD	T32
VDS401F16500 WU25PD	T32
VDS401F16600 WU25PD	T32
VDS401F16700 WU25PD	T32
VDS401F16800 WU25PD	T32
VDS401F16900 WU25PD	T32
VDS401F17000 WU25PD	T32
VDS401F17100 WU25PD	T32
VDS401F17200 WU25PD	T32
VDS401F17300 WU25PD	T32
VDS401F17400 WU25PD	T33
VDS401F17500 WU25PD	T33
VDS401F17600 WU25PD	T33
VDS401F17700 WU25PD	T33
VDS401F17800 WU25PD	T33
VDS401F17900 WU25PD	T33
VDS401F18000 WU25PD	T33
VDS401F18100 WU25PD	T33
VDS401F18200 WU25PD	T33
VDS401F18300 WU25PD	T33
VDS401F18400 WU25PD	T33
VDS401F18500 WU25PD	T33
VDS401F18600 WU25PD	T33
VDS401F18700 WU25PD	T33
VDS401F18800 WU25PD	T33
VDS401F18900 WU25PD	T33
VDS401F19000 WU25PD	T33
VDS401F19100 WU25PD	T33
VDS401F19200 WU25PD	T33
VDS401F19300 WU25PD	T33
VDS401F19400 WU25PD	T33
VDS401F19500 WU25PD	T33
VDS401F19600 WU25PD	T33
VDS401F19700 WU25PD	T33
VDS401F19800 WU25PD	T33
VDS401F19900 WU25PD	T33
VDS401F20000 WU25PD	T33
VDS402A01500 WU25PD	T15
VDS402A01600 WU25PD	T15
VDS402A01700 WU25PD	T15
VDS402A01800 WU25PD	T15
VDS402A01900 WU25PD	T15
VDS402A01984 WU25PD	T15
VDS402A02000 WU25PD	T15
VDS402A02100 WU25PD	T15
VDS402A02200 WU25PD	T15
VDS402A02300 WU25PD	T15
VDS402A02383 WU25PD	T15
VDS402A02400 WU25PD	T16
VDS402A02439 WU25PD	T16
VDS402A02489 WU25PD	T16
VDS402A02500 WU25PD	T16
VDS402A02578 WU25PD	T16
VDS402A02600 WU25PD	T16
VDS402A02642 WU25PD	T16
VDS402A02700 WU25PD	T16
VDS402A02705 WU25PD	T16
VDS402A02779 WU25PD	T16
VDS402A02800 WU25PD	T16
VDS402A02820 WU25PD	T16
VDS402A02870 WU25PD	T16
VDS402A02900 WU25PD	T16
VDS402A02947 WU25PD	T16
VDS402A03000 WU25PD	T16
VDS402A03048 WU25PD	T16
VDS402A03100 WU25PD	T16
VDS402A03175 WU25PD	T16
VDS402A03200 WU25PD	T16
VDS402A03264 WU25PD	T16
VDS402A03300 WU25PD	T16
VDS402A03400 WU25PD	T16
VDS402A03455 WU25PD	T16

Catalogue No.	Page(s)
VDS402A03500 WU25PD	T16
VDS402A03571 WU25PD	T16
VDS402A03600 WU25PD	T16
VDS402A03658 WU25PD	T16
VDS402A03700 WU25PD	T16
VDS402A03734 WU25PD	T16
VDS402A03800 WU25PD	T16
VDS402A03900 WU25PD	T16
VDS402A03970 WU25PD	T16
VDS402A04000 WU25PD	T16
VDS402A04039 WU25PD	T16
VDS402A04090 WU25PD	T16
VDS402A04100 WU25PD	T16
VDS402A04200 WU25PD	T16
VDS402A04217 WU25PD	T16
VDS402A04300 WU25PD	T16
VDS402A04366 WU25PD	T17
VDS402A04400 WU25PD	T17
VDS402A04500 WU25PD	T17
VDS402A04600 WU25PD	T17
VDS402A04623 WU25PD	T17
VDS402A04700 WU25PD	T17
VDS402A04763 WU25PD	T17
VDS402A04800 WU25PD	T17
VDS402A04852 WU25PD	T17
VDS402A04900 WU25PD	T17
VDS402A05000 WU25PD	T17
VDS402A05100 WU25PD	T17
VDS402A05106 WU25PD	T17
VDS402A05159 WU25PD	T17
VDS402A05200 WU25PD	T17
VDS402A05300 WU25PD	T17
VDS402A05400 WU25PD	T17
VDS402A05410 WU25PD	T17
VDS402A05500 WU25PD	T17
VDS402A05558 WU25PD	T17
VDS402A05600 WU25PD	T17
VDS402A05616 WU25PD	T17
VDS402A05700 WU25PD	T17
VDS402A05800 WU25PD	T17
VDS402A05900 WU25PD	T17
VDS402A05954 WU25PD	T17
VDS402A06000 WU25PD	T17
VDS402A06100 WU25PD	T17
VDS402A06200 WU25PD	T17
VDS402A06300 WU25PD	T17
VDS402A06350 WU25PD	T17
VDS402A06400 WU25PD	T17
VDS402A06500 WU25PD	T17
VDS402A06528 WU25PD	T17
VDS402A06600 WU25PD	T17
VDS402A06630 WU25PD	T17
VDS402A06700 WU25PD	T17
VDS402A06746 WU25PD	T17
VDS402A06800 WU25PD	T17
VDS402A06900 WU25PD	T17
VDS402A07000 WU25PD	T18
VDS402A07100 WU25PD	T18
VDS402A07145 WU25PD	T18
VDS402A07200 WU25PD	T18
VDS402A07300 WU25PD	T18
VDS402A07400 WU25PD	T18
VDS402A07500 WU25PD	T18
VDS402A07541 WU25PD	T18
VDS402A07600 WU25PD	T18
VDS402A07700 WU25PD	T18
VDS402A07800 WU25PD	T18
VDS402A07900 WU25PD	T18
VDS402A07938 WU25PD	T18
VDS402A08000 WU25PD	T18
VDS402A08100 WU25PD	T18
VDS402A08200 WU25PD	T18
VDS402A08300 WU25PD	T18
VDS402A08334 WU25PD	T18
VDS402A08400 WU25PD	T18
VDS402A08433 WU25PD	T18
VDS402A08500 WU25PD	T18
VDS402A08600 WU25PD	T18
VDS402A08700 WU25PD	T18
VDS402A08733 WU25PD	T18
VDS402A08800 WU25PD	T18
VDS402A08900 WU25PD	T18
VDS402A09000 WU25PD	T18
VDS402A09100 WU25PD	T18
VDS402A09129 WU25PD	T18
VDS402A09200 WU25PD	T18
VDS402A09300 WU25PD	T18
VDS402A09347 WU25PD	T18
VDS402A09400 WU25PD	T18
VDS402A09500 WU25PD	T18
VDS402A09525 WU25PD	T18
VDS402A09600 WU25PD	T18
VDS402A09700 WU25PD	T18
VDS402A09800 WU25PD	T18
VDS402A09900 WU25PD	T18
VDS402A09921 WU25PD	T18
VDS402A10000 WU25PD	T19
VDS402A10100 WU25PD	T19
VDS402A10200 WU25PD	T19
VDS402A10300 WU25PD	T19
VDS402A10320 WU25PD	T19
VDS402A10400 WU25PD	T19
VDS402A10500 WU25PD	T19
VDS402A10600 WU25PD	T19
VDS402A10700 WU25PD	T19
VDS402A10716 WU25PD	T19
VDS402A10800 WU25PD	T19
VDS402A10900 WU25PD	T19
VDS402A11000 WU25PD	T19
VDS402A11100 WU25PD	T19
VDS402A11113 WU25PD	T19
VDS402A11200 WU25PD	T19
VDS402A11300 WU25PD	T19
VDS402A11400 WU25PD	T19
VDS402A11500 WU25PD	T19
VDS402A11509 WU25PD	T19
VDS402A11600 WU25PD	T19
VDS402A11700 WU25PD	T19
VDS402A11800 WU25PD	T19
VDS402A11900 WU25PD	T19
VDS402A11908 WU25PD	T19
VDS402A12000 WU25PD	T19
VDS402A12100 WU25PD	T19
VDS402A12200 WU25PD	T19
VDS402A12300 WU25PD	T19
VDS402A12304 WU25PD	T19
VDS402A12400 WU25PD	T19
VDS402A12500 WU25PD	T19
VDS402A12600 WU25PD	T19
VDS402A12700 WU25PD	T19
VDS402A12800 WU25PD	T19
VDS402A12900 WU25PD	T19
VDS402A13000 WU25PD	T19
VDS402A13096 WU25PD	T19
VDS402A13100 WU25PD	T19
VDS402A13200 WU25PD	T19
VDS402A13300 WU25PD	T20
VDS402A13400 WU25PD	T20
VDS402A13500 WU25PD	T20
VDS402A13600 WU25PD	T20
VDS402A13700 WU25PD	T20
VDS402A13800 WU25PD	T20
VDS402A13891 WU25PD	T20
VDS402A13900 WU25PD	T20
VDS402A14000 WU25PD	T20
VDS402A14100 WU25PD	T20
VDS402A14200 WU25PD	T20
VDS402A14288 WU25PD	T20
VDS402A14300 WU25PD	T20
VDS402A14400 WU25PD	T20
VDS402A14500 WU25PD	T20
VDS402A14600 WU25PD	T20
VDS402A14684 WU25PD	T20
VDS402A14700 WU25PD	T20
VDS402A14800 WU25PD	T20
VDS402A14900 WU25PD	T20
VDS402A15000 WU25PD	T20
VDS402A15083 WU25PD	T20
VDS402A15100 WU25PD	T20
VDS402A15200 WU25PD	T20
VDS402A15300 WU25PD	T20
VDS402A15400 WU25PD	T20
VDS402A15479 WU25PD	T20
VDS402A15500 WU25PD	T20
VDS402A15600 WU25PD	T20
VDS402A15700 WU25PD	T20
VDS402A15800 WU25PD	T20
VDS402A15875 WU25PD	T20
VDS402A15900 WU25PD	T20
VDS402A16000 WU25PD	T20
VDS402A16100 WU25PD	T20
VDS402A16200 WU25PD	T20
VDS402A16271 WU25PD	T20
VDS402A16300 WU25PD	T20
VDS402A16400 WU25PD	T20
VDS402A16500 WU25PD	T20
VDS402A16600 WU25PD	T21
VDS402A16670 WU25PD	T21
VDS402A16700 WU25PD	T21
VDS402A16800 WU25PD	T21
VDS402A16900 WU25PD	T21
VDS402A17000 WU25PD	T21
VDS402A17100 WU25PD	T21
VDS402A17200 WU25PD	T21
VDS402A17300 WU25PD	T21
VDS402A17400 WU25PD	T21
VDS402A17463 WU25PD	T21
VDS402A17500 WU25PD	T21
VDS402A17600 WU25PD	T21
VDS402A17700 WU25PD	T21
VDS402A17800 WU25PD	T21
VDS402A17859 WU25PD	T21
VDS402A17900 WU25PD	T21
VDS402A18000 WU25PD	T21
VDS402A18100 WU25PD	T21
VDS402A18200 WU25PD	T21
VDS402A18258 WU25PD	T21
VDS402A18300 WU25PD	T21
VDS402A18400 WU25PD	T21
VDS402A18500 WU25PD	T21
VDS402A18600 WU25PD	T21
VDS402A18654 WU25PD	T21
VDS402A18700 WU25PD	T21
VDS402A18800 WU25PD	T21
VDS402A18900 WU25PD	T21
VDS402A19000 WU25PD	T21
VDS402A19050 WU25PD	T21
VDS402A19100 WU25PD	T21
VDS402A19200 WU25PD	T21
VDS402A19300 WU25PD	T21
VDS402A19400 WU25PD	T21
VDS402A19500 WU25PD	T21
VDS402A19600 WU25PD	T21
VDS402A19700 WU25PD	T21
VDS402A19800 WU25PD	T21
VDS402A19900 WU25PD	T21
VDS402A20000 WU25PD	T21
VDS402F03000 WU25PD	T34
VDS402F03100 WU25PD	T34
VDS402F03200 WU25PD	T34
VDS402F03300 WU25PD	T34
VDS402F03400 WU25PD	T34
VDS402F03500 WU25PD	T34
VDS402F03600 WU25PD	T34
VDS402F03700 WU25PD	T34
VDS402F03800 WU25PD	T34
VDS402F03900 WU25PD	T34
VDS402F04000 WU25PD	T34
VDS402F04100 WU25PD	T34
VDS402F04200 WU25PD	T34
VDS402F04300 WU25PD	T34
VDS402F04400 WU25PD	T34
VDS402F04500 WU25PD	T34
VDS402F04600 WU25PD	T34
VDS402F04700 WU25PD	T34
VDS402F04800 WU25PD	T34
VDS402F04900 WU25PD	T34
VDS402F05000 WU25PD	T34
VDS402F05100 WU25PD	T34
VDS402F05200 WU25PD	T34
VDS402F05300 WU25PD	T34
VDS402F05400 WU25PD	T35
VDS402F05500 WU25PD	T35
VDS402F05600 WU25PD	T35
VDS402F05700 WU25PD	T35
VDS402F05800 WU25PD	T35
VDS402F05900 WU25PD	T35
VDS402F06000 WU25PD	T35
VDS402F06100 WU25PD	T35
VDS402F06200 WU25PD	T35
VDS402F06300 WU25PD	T35
VDS402F06400 WU25PD	T35
VDS402F06500 WU25PD	T35
VDS402F06600 WU25PD	T35
VDS402F06700 WU25PD	T35
VDS402F06800 WU25PD	T35
VDS402F06900 WU25PD	T35
VDS402F07000 WU25PD	T35
VDS402F07100 WU25PD	T35
VDS402F07200 WU25PD	T35
VDS402F07300 WU25PD	T35
VDS402F07400 WU25PD	T35
VDS402F07500 WU25PD	T35
VDS402F07600 WU25PD	T35
VDS402F07700 WU25PD	T35
VDS402F07800 WU25PD	T35
VDS402F07900 WU25PD	T35
VDS402F08000 WU25PD	T35
VDS402F08100 WU25PD	T35
VDS402F08200 WU25PD	T35
VDS402F08300 WU25PD	T35
VDS402F08400 WU25PD	T35

Catalogue No.	Page(s)
VDS402F08500 WU25PD	T35
VDS402F08600 WU25PD	T35
VDS402F08700 WU25PD	T35
VDS402F08800 WU25PD	T35
VDS402F08900 WU25PD	T35
VDS402F09000 WU25PD	T35
VDS402F09100 WU25PD	T35
VDS402F09200 WU25PD	T35
VDS402F09300 WU25PD	T35
VDS402F09400 WU25PD	T36
VDS402F09500 WU25PD	T36
VDS402F09600 WU25PD	T36
VDS402F09700 WU25PD	T36
VDS402F09800 WU25PD	T36
VDS402F09900 WU25PD	T36
VDS402F10000 WU25PD	T36
VDS402F10100 WU25PD	T36
VDS402F10200 WU25PD	T36
VDS402F10300 WU25PD	T36
VDS402F10400 WU25PD	T36
VDS402F10500 WU25PD	T36
VDS402F10600 WU25PD	T36
VDS402F10700 WU25PD	T36
VDS402F10800 WU25PD	T36
VDS402F10900 WU25PD	T36
VDS402F11000 WU25PD	T36
VDS402F11100 WU25PD	T36
VDS402F11200 WU25PD	T36
VDS402F11300 WU25PD	T36
VDS402F11400 WU25PD	T36
VDS402F11500 WU25PD	T36
VDS402F11600 WU25PD	T36
VDS402F11700 WU25PD	T36
VDS402F11800 WU25PD	T36
VDS402F11900 WU25PD	T36
VDS402F12000 WU25PD	T36
VDS402F12100 WU25PD	T36
VDS402F12200 WU25PD	T36
VDS402F12300 WU25PD	T36
VDS402F12400 WU25PD	T36
VDS402F12500 WU25PD	T36
VDS402F12600 WU25PD	T36
VDS402F12700 WU25PD	T36
VDS402F12800 WU25PD	T36
VDS402F12900 WU25PD	T36
VDS402F13000 WU25PD	T36
VDS402F13100 WU25PD	T36
VDS402F13200 WU25PD	T36
VDS402F13300 WU25PD	T36
VDS402F13400 WU25PD	T37
VDS402F13500 WU25PD	T37
VDS402F13600 WU25PD	T37
VDS402F13700 WU25PD	T37
VDS402F13800 WU25PD	T37
VDS402F13900 WU25PD	T37
VDS402F14000 WU25PD	T37
VDS402F14100 WU25PD	T37
VDS402F14200 WU25PD	T37
VDS402F14300 WU25PD	T37
VDS402F14400 WU25PD	T37
VDS402F14500 WU25PD	T37
VDS402F14600 WU25PD	T37
VDS402F14700 WU25PD	T37
VDS402F14800 WU25PD	T37
VDS402F14900 WU25PD	T37
VDS402F15000 WU25PD	T37
VDS402F15100 WU25PD	T37
VDS402F15200 WU25PD	T37
VDS402F15300 WU25PD	T37
VDS402F15400 WU25PD	T37
VDS402F15500 WU25PD	T37
VDS402F15600 WU25PD	T37
VDS402F15700 WU25PD	T37
VDS402F15800 WU25PD	T37
VDS402F15900 WU25PD	T37
VDS402F16000 WU25PD	T37
VDS402F16100 WU25PD	T37
VDS402F16200 WU25PD	T37
VDS402F16300 WU25PD	T37
VDS402F16400 WU25PD	T37
VDS402F16500 WU25PD	T37
VDS402F16600 WU25PD	T37
VDS402F16700 WU25PD	T37
VDS402F16800 WU25PD	T37
VDS402F16900 WU25PD	T37
VDS402F17000 WU25PD	T37
VDS402F17100 WU25PD	T37
VDS402F17200 WU25PD	T37
VDS402F17300 WU25PD	T37
VDS402F17400 WU25PD	T38
VDS402F17500 WU25PD	T38
VDS402F17600 WU25PD	T38
VDS402F17700 WU25PD	T38
VDS402F17800 WU25PD	T38
VDS402F17900 WU25PD	T38
VDS402F18000 WU25PD	T38
VDS402F18100 WU25PD	T38
VDS402F18200 WU25PD	T38
VDS402F18300 WU25PD	T38
VDS402F18400 WU25PD	T38
VDS402F18500 WU25PD	T38
VDS402F18600 WU25PD	T38
VDS402F18700 WU25PD	T38
VDS402F18800 WU25PD	T38
VDS402F18900 WU25PD	T38
VDS402F19000 WU25PD	T38
VDS402F19100 WU25PD	T38
VDS402F19200 WU25PD	T38
VDS402F19300 WU25PD	T38
VDS402F19400 WU25PD	T38
VDS402F19500 WU25PD	T38
VDS402F19600 WU25PD	T38
VDS402F19700 WU25PD	T38
VDS402F19800 WU25PD	T38
VDS402F19900 WU25PD	T38
VDS402F20000 WU25PD	T38
VDS403A01000 WU25PD	T22
VDS403A01016 WU25PD	T22
VDS403A01067 WU25PD	T22
VDS403A01100 WU25PD	T22
VDS403A01181 WU25PD	T22
VDS403A01191 WU25PD	T22
VDS403A01200 WU25PD	T22
VDS403A01300 WU25PD	T22
VDS403A01321 WU25PD	T22
VDS403A01397 WU25PD	T22
VDS403A01400 WU25PD	T22
VDS403A01500 WU25PD	T22
VDS403A01600 WU25PD	T22
VDS403A01700 WU25PD	T22
VDS403A01800 WU25PD	T22
VDS403A01900 WU25PD	T22
VDS403A01984 WU25PD	T22
VDS403A02000 WU25PD	T22
VDS403A02100 WU25PD	T22
VDS403A02200 WU25PD	T22
VDS403A02300 WU25PD	T22
VDS403A02383 WU25PD	T22
VDS403A02400 WU25PD	T22
VDS403A02439 WU25PD	T22
VDS403A02489 WU25PD	T22
VDS403A02500 WU25PD	T22
VDS403A02578 WU25PD	T22
VDS403A02600 WU25PD	T22
VDS403A02642 WU25PD	T23
VDS403A02700 WU25PD	T23
VDS403A02705 WU25PD	T23
VDS403A02779 WU25PD	T23
VDS403A02800 WU25PD	T23
VDS403A02820 WU25PD	T23
VDS403A02870 WU25PD	T23
VDS403A02900 WU25PD	T23
VDS403A02947 WU25PD	T23
VDS403A03000 WU25PD	T23
VDS403A03048 WU25PD	T23
VDS403A03100 WU25PD	T23
VDS403A03175 WU25PD	T23
VDS403A03200 WU25PD	T23
VDS403A03264 WU25PD	T23
VDS403A03300 WU25PD	T23
VDS403A03400 WU25PD	T23
VDS403A03455 WU25PD	T23
VDS403A03500 WU25PD	T23
VDS403A03571 WU25PD	T23
VDS403A03600 WU25PD	T23
VDS403A03658 WU25PD	T23
VDS403A03700 WU25PD	T23
VDS403A03734 WU25PD	T23
VDS403A03800 WU25PD	T23
VDS403A03900 WU25PD	T23
VDS403A03970 WU25PD	T23
VDS403A04000 WU25PD	T23
VDS403A04039 WU25PD	T23
VDS403A04090 WU25PD	T23
VDS403A04100 WU25PD	T23
VDS403A04200 WU25PD	T23
VDS403A04217 WU25PD	T23
VDS403A04300 WU25PD	T23
VDS403A04366 WU25PD	T23
VDS403A04400 WU25PD	T23
VDS403A04500 WU25PD	T23
VDS403A04600 WU25PD	T23
VDS403A04623 WU25PD	T23
VDS403A04700 WU25PD	T23
VDS403A04763 WU25PD	T24
VDS403A04800 WU25PD	T24
VDS403A04852 WU25PD	T24
VDS403A04900 WU25PD	T24
VDS403A05000 WU25PD	T24
VDS403A05100 WU25PD	T24
VDS403A05106 WU25PD	T24
VDS403A05159 WU25PD	T24
VDS403A05200 WU25PD	T24
VDS403A05300 WU25PD	T24
VDS403A05400 WU25PD	T24
VDS403A05410 WU25PD	T24
VDS403A05500 WU25PD	T24
VDS403A05558 WU25PD	T24
VDS403A05600 WU25PD	T24
VDS403A05616 WU25PD	T24
VDS403A05700 WU25PD	T24
VDS403A05800 WU25PD	T24
VDS403A05900 WU25PD	T24
VDS403A05954 WU25PD	T24
VDS403A06000 WU25PD	T24
VDS403A06100 WU25PD	T24
VDS403A06200 WU25PD	T24
VDS403A06300 WU25PD	T24
VDS403A06350 WU25PD	T24
VDS403A06400 WU25PD	T24
VDS403A06500 WU25PD	T24
VDS403A06528 WU25PD	T24
VDS403A06600 WU25PD	T24
VDS403A06630 WU25PD	T24
VDS403A06700 WU25PD	T24
VDS403A06746 WU25PD	T24
VDS403A06800 WU25PD	T24
VDS403A06900 WU25PD	T24
VDS403A07000 WU25PD	T24
VDS403A07100 WU25PD	T24
VDS403A07145 WU25PD	T24
VDS403A07200 WU25PD	T24
VDS403A07300 WU25PD	T24
VDS403A07400 WU25PD	T24
VDS403A07500 WU25PD	T25
VDS403A07541 WU25PD	T25
VDS403A07600 WU25PD	T25
VDS403A07700 WU25PD	T25
VDS403A07800 WU25PD	T25
VDS403A07900 WU25PD	T25
VDS403A07938 WU25PD	T25
VDS403A08000 WU25PD	T25
VDS403A08100 WU25PD	T25
VDS403A08200 WU25PD	T25
VDS403A08300 WU25PD	T25
VDS403A08334 WU25PD	T25
VDS403A08400 WU25PD	T25
VDS403A08433 WU25PD	T25
VDS403A08500 WU25PD	T25
VDS403A08600 WU25PD	T25
VDS403A08700 WU25PD	T25
VDS403A08733 WU25PD	T25
VDS403A08800 WU25PD	T25
VDS403A08900 WU25PD	T25
VDS403A09000 WU25PD	T25
VDS403A09100 WU25PD	T25
VDS403A09129 WU25PD	T25
VDS403A09200 WU25PD	T25
VDS403A09300 WU25PD	T25
VDS403A09347 WU25PD	T25
VDS403A09400 WU25PD	T25
VDS403A09500 WU25PD	T25
VDS403A09525 WU25PD	T25
VDS403A09600 WU25PD	T25
VDS403A09700 WU25PD	T25
VDS403A09800 WU25PD	T25
VDS403A09900 WU25PD	T25
VDS403A09921 WU25PD	T25
VDS403A10000 WU25PD	T25
VDS403A10100 WU25PD	T25
VDS403A10200 WU25PD	T25
VDS403A10300 WU25PD	T25
VDS403A10320 WU25PD	T25
VDS403A10400 WU25PD	T25
VDS403A10500 WU25PD	T26
VDS403A10600 WU25PD	T26
VDS403A10700 WU25PD	T26
VDS403A10716 WU25PD	T26
VDS403A10800 WU25PD	T26
VDS403A10900 WU25PD	T26
VDS403A11000 WU25PD	T26
VDS403A11100 WU25PD	T26

Catalogue No.	Page(s)
VDS403A11113 WU25PD	T26
VDS403A11200 WU25PD	T26
VDS403A11300 WU25PD	T26
VDS403A11400 WU25PD	T26
VDS403A11500 WU25PD	T26
VDS403A11509 WU25PD	T26
VDS403A11600 WU25PD	T26
VDS403A11700 WU25PD	T26
VDS403A11800 WU25PD	T26
VDS403A11900 WU25PD	T26
VDS403A11908 WU25PD	T26
VDS403A12000 WU25PD	T26
VDS403A12100 WU25PD	T26
VDS403A12200 WU25PD	T26
VDS403A12300 WU25PD	T26
VDS403A12304 WU25PD	T26
VDS403A12400 WU25PD	T26
VDS403A12500 WU25PD	T26
VDS403A12600 WU25PD	T26
VDS403A12700 WU25PD	T26
VDS403A12800 WU25PD	T26
VDS403A12900 WU25PD	T26
VDS403A13000 WU25PD	T26
VDS403A13096 WU25PD	T26
VDS403A13100 WU25PD	T26
VDS403A13200 WU25PD	T26
VDS403A13300 WU25PD	T26
VDS403A13400 WU25PD	T26
VDS403A13500 WU25PD	T26
VDS403A13600 WU25PD	T26
VDS403A13700 WU25PD	T26
VDS403A13800 WU25PD	T26
VDS403A13891 WU25PD	T27
VDS403A13900 WU25PD	T27
VDS403A14000 WU25PD	T27
VDS403A14100 WU25PD	T27
VDS403A14200 WU25PD	T27
VDS403A14288 WU25PD	T27
VDS403A14300 WU25PD	T27
VDS403A14400 WU25PD	T27
VDS403A14500 WU25PD	T27
VDS403A14600 WU25PD	T27
VDS403A14684 WU25PD	T27
VDS403A14700 WU25PD	T27
VDS403A14800 WU25PD	T27
VDS403A14900 WU25PD	T27
VDS403A15000 WU25PD	T27
VDS403A15083 WU25PD	T27
VDS403A15100 WU25PD	T27
VDS403A15200 WU25PD	T27
VDS403A15300 WU25PD	T27
VDS403A15400 WU25PD	T27
VDS403A15479 WU25PD	T27
VDS403A15500 WU25PD	T27
VDS403A15600 WU25PD	T27
VDS403A15700 WU25PD	T27
VDS403A15800 WU25PD	T27
VDS403A15875 WU25PD	T27
VDS403A15900 WU25PD	T27
VDS403A16000 WU25PD	T27
VDS403A16100 WU25PD	T27
VDS403A16200 WU25PD	T27
VDS403A16271 WU25PD	T27
VDS403A16300 WU25PD	T27
VDS403A16400 WU25PD	T27
VDS403A16500 WU25PD	T27
VDS403A16600 WU25PD	T27
VDS403A16670 WU25PD	T27
VDS403A16700 WU25PD	T27
VDS403A16800 WU25PD	T27
VDS403A16900 WU25PD	T27
VDS403A17000 WU25PD	T27
VDS403A17100 WU25PD	T28
VDS403A17200 WU25PD	T28
VDS403A17300 WU25PD	T28
VDS403A17400 WU25PD	T28
VDS403A17463 WU25PD	T28
VDS403A17500 WU25PD	T28
VDS403A17600 WU25PD	T28
VDS403A17700 WU25PD	T28
VDS403A17800 WU25PD	T28
VDS403A17859 WU25PD	T28
VDS403A17900 WU25PD	T28
VDS403A18000 WU25PD	T28
VDS403A18100 WU25PD	T28
VDS403A18200 WU25PD	T28
VDS403A18258 WU25PD	T28
VDS403A18300 WU25PD	T28
VDS403A18400 WU25PD	T28
VDS403A18500 WU25PD	T28
VDS403A18600 WU25PD	T28
VDS403A18654 WU25PD	T28
VDS403A18700 WU25PD	T28
VDS403A18800 WU25PD	T28
VDS403A18900 WU25PD	T28
VDS403A19000 WU25PD	T28
VDS403A19050 WU25PD	T28
VDS403A19100 WU25PD	T28
VDS403A19200 WU25PD	T28
VDS403A19300 WU25PD	T28
VDS403A19400 WU25PD	T28
VDS403A19500 WU25PD	T28
VDS403A19600 WU25PD	T28
VDS403A19700 WU25PD	T28
VDS403A19800 WU25PD	T28
VDS403A19900 WU25PD	T28
VDS403A20000 WU25PD	T28
VDS403F03000 WU25PD	T39
VDS403F03100 WU25PD	T39
VDS403F03200 WU25PD	T39
VDS403F03300 WU25PD	T39
VDS403F03400 WU25PD	T39
VDS403F03500 WU25PD	T39
VDS403F03600 WU25PD	T39
VDS403F03700 WU25PD	T39
VDS403F03800 WU25PD	T39
VDS403F03900 WU25PD	T39
VDS403F04000 WU25PD	T39
VDS403F04100 WU25PD	T39
VDS403F04200 WU25PD	T39
VDS403F04300 WU25PD	T39
VDS403F04400 WU25PD	T39
VDS403F04500 WU25PD	T39
VDS403F04600 WU25PD	T39
VDS403F04700 WU25PD	T39
VDS403F04800 WU25PD	T39
VDS403F04900 WU25PD	T39
VDS403F05000 WU25PD	T39
VDS403F05100 WU25PD	T39
VDS403F05200 WU25PD	T39
VDS403F05300 WU25PD	T39
VDS403F05400 WU25PD	T40
VDS403F05500 WU25PD	T40
VDS403F05600 WU25PD	T40
VDS403F05700 WU25PD	T40
VDS403F05800 WU25PD	T40
VDS403F05900 WU25PD	T40
VDS403F06000 WU25PD	T40
VDS403F06100 WU25PD	T40
VDS403F06200 WU25PD	T40
VDS403F06300 WU25PD	T40
VDS403F06400 WU25PD	T40
VDS403F06500 WU25PD	T40
VDS403F06600 WU25PD	T40
VDS403F06700 WU25PD	T40
VDS403F06800 WU25PD	T40
VDS403F06900 WU25PD	T40
VDS403F07000 WU25PD	T40
VDS403F07100 WU25PD	T40
VDS403F07200 WU25PD	T40
VDS403F07300 WU25PD	T40
VDS403F07400 WU25PD	T40
VDS403F07500 WU25PD	T40
VDS403F07600 WU25PD	T40
VDS403F07700 WU25PD	T40
VDS403F07800 WU25PD	T40
VDS403F07900 WU25PD	T40
VDS403F08000 WU25PD	T40
VDS403F08100 WU25PD	T40
VDS403F08200 WU25PD	T40
VDS403F08300 WU25PD	T40
VDS403F08400 WU25PD	T40
VDS403F08500 WU25PD	T40
VDS403F08600 WU25PD	T40
VDS403F08700 WU25PD	T40
VDS403F08800 WU25PD	T40
VDS403F08900 WU25PD	T40
VDS403F09000 WU25PD	T40
VDS403F09100 WU25PD	T40
VDS403F09200 WU25PD	T40
VDS403F09300 WU25PD	T40
VDS403F09400 WU25PD	T41
VDS403F09500 WU25PD	T41
VDS403F09600 WU25PD	T41
VDS403F09700 WU25PD	T41
VDS403F09800 WU25PD	T41
VDS403F09900 WU25PD	T41
VDS403F10000 WU25PD	T41
VDS403F10100 WU25PD	T41
VDS403F10200 WU25PD	T41
VDS403F10300 WU25PD	T41
VDS403F10400 WU25PD	T41
VDS403F10500 WU25PD	T41
VDS403F10600 WU25PD	T41
VDS403F10700 WU25PD	T41
VDS403F10800 WU25PD	T41
VDS403F10900 WU25PD	T41
VDS403F11000 WU25PD	T41
VDS403F11100 WU25PD	T41
VDS403F11200 WU25PD	T41
VDS403F11300 WU25PD	T41
VDS403F11400 WU25PD	T41
VDS403F11500 WU25PD	T41
VDS403F11600 WU25PD	T41
VDS403F11700 WU25PD	T41
VDS403F11800 WU25PD	T41
VDS403F11900 WU25PD	T41
VDS403F12000 WU25PD	T41
VDS403F12100 WU25PD	T41
VDS403F12200 WU25PD	T41
VDS403F12300 WU25PD	T41
VDS403F12400 WU25PD	T41
VDS403F12500 WU25PD	T41
VDS403F12600 WU25PD	T41
VDS403F12700 WU25PD	T41
VDS403F12800 WU25PD	T41
VDS403F12900 WU25PD	T41
VDS403F13000 WU25PD	T41
VDS403F13100 WU25PD	T41
VDS403F13200 WU25PD	T41
VDS403F13300 WU25PD	T41
VDS403F13400 WU25PD	T42
VDS403F13500 WU25PD	T42
VDS403F13600 WU25PD	T42
VDS403F13700 WU25PD	T42
VDS403F13800 WU25PD	T42
VDS403F13900 WU25PD	T42
VDS403F14000 WU25PD	T42
VDS403F14100 WU25PD	T42
VDS403F14200 WU25PD	T42
VDS403F14300 WU25PD	T42
VDS403F14400 WU25PD	T42
VDS403F14500 WU25PD	T42
VDS403F14600 WU25PD	T42
VDS403F14700 WU25PD	T42
VDS403F14800 WU25PD	T42
VDS403F14900 WU25PD	T42
VDS403F15000 WU25PD	T42
VDS403F15100 WU25PD	T42
VDS403F15200 WU25PD	T42
VDS403F15300 WU25PD	T42
VDS403F15400 WU25PD	T42
VDS403F15500 WU25PD	T42
VDS403F15600 WU25PD	T42
VDS403F15700 WU25PD	T42
VDS403F15800 WU25PD	T42
VDS403F15900 WU25PD	T42
VDS403F16000 WU25PD	T42
VDS403F16100 WU25PD	T42
VDS403F16200 WU25PD	T42
VDS403F16300 WU25PD	T42
VDS403F16400 WU25PD	T42
VDS403F16500 WU25PD	T42
VDS403F16600 WU25PD	T42
VDS403F16700 WU25PD	T42
VDS403F16800 WU25PD	T42
VDS403F16900 WU25PD	T42
VDS403F17000 WU25PD	T42
VDS403F17100 WU25PD	T42
VDS403F17200 WU25PD	T42
VDS403F17300 WU25PD	T42
VDS403F17400 WU25PD	T43
VDS403F17500 WU25PD	T43
VDS403F17600 WU25PD	T43
VDS403F17700 WU25PD	T43
VDS403F17800 WU25PD	T43
VDS403F17900 WU25PD	T43
VDS403F18000 WU25PD	T43
VDS403F18100 WU25PD	T43
VDS403F18200 WU25PD	T43
VDS403F18300 WU25PD	T43
VDS403F18400 WU25PD	T43
VDS403F18500 WU25PD	T43
VDS403F18600 WU25PD	T43
VDS403F18700 WU25PD	T43
VDS403F18800 WU25PD	T43
VDS403F18900 WU25PD	T43
VDS403F19000 WU25PD	T43
VDS403F19100 WU25PD	T43
VDS403F19200 WU25PD	T43
VDS403F19300 WU25PD	T43
VDS403F19400 WU25PD	T43

Catalogue No.	Page(s)
VDS403F19500 WU25PD	T43
VDS403F19600 WU25PD	T43
VDS403F19700 WU25PD	T43
VDS403F19800 WU25PD	T43
VDS403F19900 WU25PD	T43
VDS403F20000 WU25PD	T43
VNGA160404FST WDN25U	B217
VNGA160404S01025MT WBH10P	B217
VNGA160404S01025MT WBH25P	B217
VNGA160404S01025MT WBH30P	B217
VNGA160404T02020 CW2015	B195
VNGA160408FST WDN25U	B217
VNGA160408S01025MT WBH10P	B217
VNGA160408S01025MT WBH25P	B217
VNGA160408S01025MT WBH30P	B217
VNGA160408T02020 CW2015	B195
VNGA160408T02020 CW5025	B195
VNGA160412T02020 CW2015	B195
VNGA220408T02020 CW2015	B195
VNGG160401FS WS10PT	B95
VNGG160401FS WU10HT	B95
VNGG160402FS WS10PT	B95
VNGG160402FS WU10HT	B95
VNGG160404FS WS10PT	B95
VNGG160404FS WS25PT	B95
VNGG160404FS WU10HT	B95
VNGG160408FS WS10PT	B95
VNGG160408FS WS25PT	B95
VNGG160408FS WU10HT	B95
VNGP160401 TN10U	B96, B145
VNGP160401 TN15U	B145
VNGP160401 WS10PT	B96
VNGP160401 WU10HT	B96
VNGP160402 TN10U	B96, B145
VNGP160402 WS10PT	B96
VNGP220404 TN10U	B96, B145
VNGP220404 TN15U	B145
VNGP220404 WS10PT	B96
VNGP220408 TN10U	B96, B145
VNGP220408 TN15U	B145
VNGP220408 WS10PT	B96
VNGP220408 WU10HT	B96
VNMA160408 TN20K	B145
VNMA160408 WK05CT	B96
VNMA160408 WK20CT	B96
VNMG12T304 WS10PT	B96
VNMG12T304 WS25PT	B96
VNMG12T308 WK20CT	B96
VNMG12T308 WS10PT	B96
VNMG12T308 WS25PT	B96
VNMG1604042P TN10P	B146
VNMG1604042P TN10U	B146
VNMG1604042P TN15M	B146
VNMG1604042P TN15U	B146
VNMG1604042P TN20K	B146
VNMG1604042P TN20P	B146
VNMG1604042P TN30M	B146
VNMG1604044P TN10U	B146
VNMG1604044P TN15M	B146
VNMG1604044P TN20P	B146
VNMG1604044P TN30M	B146
VNMG160404FF WM25CT	B97
VNMG160404FF WP15CT	B97
VNMG160404FF WS10PT	B97
VNMG160404ML WK05CT	B97
VNMG160404ML WK20CT	B97
VNMG160404ML WP15CT	B97
VNMG160404ML WP25CT	B97
VNMG160404MS WS10PT	B98
VNMG160404MS WS25PT	B98
VNMG160404MS WU10HT	B98
VNMG160404UF WM15CT	B98
VNMG160404UF WM25CT	B98
VNMG160404UF WS10PT	B98
VNMG1604082P TN10P	B146
VNMG1604082P TN10U	B146
VNMG1604082P TN15M	B146
VNMG1604082P TN15U	B146
VNMG1604082P TN20K	B146
VNMG1604082P TN20P	B146
VNMG1604084P TN10U	B146
VNMG1604084P TN15M	B146
VNMG1604084P TN20P	B146
VNMG1604084P TN30M	B146
VNMG1604086P TN10P	B147
VNMG1604086P TN15M	B147
VNMG1604086P TN20P	B147
VNMG1604086P TN30M	B147
VNMG160408FF WM25CT	B97
VNMG160408FF WP15CT	B97
VNMG160408FF WS10PT	B97
VNMG160408ML WK05CT	B97
VNMG160408ML WK20CT	B97
VNMG160408ML WP15CT	B97
VNMG160408ML WP25CT	B97
VNMG160408MR WP15CT	B97
VNMG160408MR WP25CT	B97
VNMG160408MR WP35CT	B97
VNMG160408MS WS10PT	B98
VNMG160408MS WS25PT	B98
VNMG160408MS WU10HT	B98
VNMG160408RH WP15CT	B98
VNMG160408RH WP25CT	B98
VNMG160408RH WP35CT	B98
VNMG160408UF WM15CT	B98
VNMG160408UF WM25CT	B98
VNMG160408UF WP15CT	B98
VNMG160408UF WS10PT	B98
VNMG160408UR WK20CT	B99
VNMG160408UR WM15CT	B99
VNMG160408UR WM25CT	B99
VNMG160408UR WM35CT	B99
VNMG160408UR WP15CT	B99
VNMG160408UR WP25CT	B99
VNMG160408UR WP35CT	B99
VNMG160408UR WS25PT	B99
VNMG160412UR WK20CT	B99
VNMG160412UR WM15CT	B99
VNMG160412UR WM25CT	B99
VNMG160412UR WP15CT	B99
VNMG160412UR WP25CT	B99
VNMG160412UR WS10PT	B99
VNMG220404MS WS10PT	B98
VNMG220404MS WS25PT	B98
VNMG220404MS WU10HT	B98
VNMG220408MS WS10PT	B98
VNMG220408MS WS25PT	B98
VNMG220408MS WU10HT	B98
VNMG220408RH WP15CT	B98
VNMG220408RH WP25CT	B98
VNMG220408RH WP35CT	B98
VNMG220412RH WP15CT	B98
VNMG220412RH WP25CT	B98
VNMG220412RH WP35CT	B98
VNMP160404 WS10PT	B99
VNMP160408 WS10PT	B99
VNMS160404FST WDN25U	B218
VNMS160408FST WDN25U	B218
VSM11D012Z01A16XD11L100	J6, J15
VSM11D012Z01B16XD11	J5, J15
VSM11D016Z02A16XD11L100	J6, J15
VSM11D016Z02A16XD11L170	J7, J15
VSM11D016Z02B16XD11	J5, J15
VSM11D016Z02M08XD11	J4, J15
VSM11D018Z02A16XD11L170	J7, J15
VSM11D020Z02A20XD11L110	J6, J15
VSM11D020Z02A20XD11L170	J7, J15
VSM11D020Z02B20XD11	J5, J15
VSM11D020Z03A20XD11L110	J6, J15
VSM11D020Z03A20XD11L170	J7, J15
VSM11D020Z03B20XD11	J5, J15
VSM11D020Z03M10XD11	J4, J15
VSM11D022Z03A20XD11L170	J7, J15
VSM11D025Z03A25XD11L120	J6, J15
VSM11D025Z03A25XD11L210	J7, J15
VSM11D025Z03B25XD11	J5, J15
VSM11D025Z04A25XD11L120	J6, J15
VSM11D025Z04A25XD11L210	J7, J15
VSM11D025Z04B25XD11	J5, J15
VSM11D025Z04M12XD11	J4, J15
VSM11D030Z04B25XD11	J5, J15
VSM11D032Z03A32XD11L130	J6, J15
VSM11D032Z03A32XD11L250	J7, J15
VSM11D032Z04B32XD11	J5, J15
VSM11D032Z04M16XD11	J4, J15
VSM11D032Z05A32XD11L130	J6, J15
VSM11D032Z05B32XD11	J5, J15
VSM11D040Z04S016XD11	J8, J15
VSM11D040Z06M16XD11	J4, J15
VSM11D040Z06S016XD11	J8, J15
VSM11D050Z05S022XD11	J8, J15
VSM11D050Z08S022XD11	J8, J15
VSM11D063Z06S022XD11	J8, J15
VSM11D063Z09S022XD11	J8, J15
VSM11D080Z08S027XD11	J8, J15
VSM11D100Z09S032XD11	J8, J15
VSM11D125Z011S040XD11	J8, J15
VSM17D025Z02A25XD17L110	J22
VSM17D025Z02A25XD17L170	J22
VSM17D025Z02B25XD17	J21
VSM17D025Z02M12XD17	J20
VSM17D032Z02A32XD17L120	J22
VSM17D032Z02A32XD17L210	J23
VSM17D032Z02B32XD17	J21
VSM17D032Z03A32XD17L120	J22
VSM17D032Z03A32XD17L210	J23
VSM17D032Z03B32XD17	J21
VSM17D032Z03M16XD17	J20
VSM17D040Z03A32XD17L130	J22
VSM17D040Z03A32XD17L250	J23
VSM17D040Z03B40XD17	J21
VSM17D040Z04A32XD17L130	J22
VSM17D040Z04A32XD17L250	J23
VSM17D040Z04B40XD17	J21
VSM17D040Z04M16XD17	J20
VSM17D040Z04S16XD17	J24
VSM17D050Z04S22XD17	J24
VSM17D050Z05S22XD17	J24
VSM17D050Z06S22XD17	J24
VSM17D063Z05S22XD17	J24
VSM17D063Z06S22XD17	J24
VSM17D080Z06S27XD17	J24
VSM17D080Z07S27XD17	J24
VSM17D100Z08S32XD17	J24
VSM17D125Z09S40XD17	J24
VSM17D160Z12S40XD17	J24
VSM17D32Z02M016XD17	J20
VSM17D40Z03M016XD17	J20
VSM490D025Z02A25XN15L100	J34
VSM490D025Z02A25XN15L170	J34
VSM490D025Z02B25XN15	J33
VSM490D025Z02M12XN15	J32
VSM490D032Z03A32XN15L110	J34
VSM490D032Z03A32XN15L200	J34
VSM490D032Z03B32XN15	J33
VSM490D032Z03M16XN15	J32
VSM490D032Z04A32XN15L110	J34
VSM490D032Z04A32XN15L200	J34
VSM490D032Z04M16XN15	J32
VSM490D035Z04M16XN15	J32
VSM490D040Z03B32XN15	J33
VSM490D040Z04S16XN15	J35
VSM490D040Z05S16XN15	J35
VSM490D050Z04S22XN15	J35
VSM490D050Z05S22XN15	J35
VSM490D050Z06S22XN15	J35
VSM490D063Z05S22XN15	J35
VSM490D063Z06S22XN15	J35
VSM490D063Z07S22XN15	J35
VSM490D080Z05S27XN15	J35
VSM490D080Z07S27XN15	J35
VSM490D080Z09S27XN15	J35
VSM490D100Z08S32XN15	J35
VSM490D100Z11S32XN15	J35
VSM490D125Z09S40XN15	J35
VSM490D125Z12S40XN15	J35
VSM490D160Z12S40XN15	J35
VSM490KITCD25Z02WK15PM	J40
VSM490KITCD25Z02WP40PM	J39
VSM490KITCD25Z02WU35PM	J40
VSM490KITCD32Z03WK15PM	J40
VSM490KITCD32Z03WP40PM	J39
VSM490KITCD32Z03WU35PM	J40
VSM490KITSD100Z08WP40PM	J39
VSM490KITSD100Z11WK15PM	J40
VSM490KITSD40Z04WK15PM	J40
VSM490KITSD40Z04WP40PM	J39
VSM490KITSD40Z04WU35PM	J40
VSM490KITSD50Z05WK15PM	J40
VSM490KITSD50Z05WP40PM	J39
VSM490KITSD50Z05WU35PM	J40
VSM490KITSD50Z06WK15PM	J40
VSM490KITSD50Z06WP40PM	J39
VSM490KITSD50Z06WU35PM	J40
VSM490KITSD63Z06WP40PM	J39
VSM490KITSD63Z06WU35PM	J40
VSM490KITSD63Z07WK15PM	J40
VSM490KITSD80Z07WP40PM	J39
VSM490KITSD80Z07WU35PM	J40
VSM490KITSD80Z09WK15PM	J40
VTSFT6005 WP49EG	Y35
VTSFT6005 WU41EG	Y35
VTSFT6006 WP49EG	Y37
VTSFT6007 WP49EG	Y35
VTSFT6007 WU41EG	Y35
VTSFT6008 WP49EG	Y35
VTSFT6008 WU41EG	Y35
VTSFT6009 WP49EG	Y37
VTSFT6010 WP49EG	Y35
VTSFT6010 WU41EG	Y35
VTSFT6011 WP49EG	Y35
VTSFT6011 WU41EG	Y35

Catalogue No.	Page(s)
VTSFT6012 WP49EG	Y37
VTSFT6013 WP49EG	Y35
VTSFT6013 WU41EG	Y35
VTSFT6014 WP49EG	Y35
VTSFT6014 WU41EG	Y35
VTSFT6015 WP49EG	Y37
VTSFT6016 WP49EG	Y35
VTSFT6016 WU41EG	Y35
VTSFT6017 WP49EG	Y35
VTSFT6017 WU41EG	Y35
VTSFT6018 WP49EG	Y37
VTSFT6019 WP49EG	Y35
VTSFT6019 WU41EG	Y35
VTSFT6020 WP49EG	Y35
VTSFT6020 WU41EG	Y35
VTSFT6021 WP49EG	Y37
VTSFT6022 WP49EG	Y35
VTSFT6022 WU41EG	Y35
VTSFT6023 WP49EG	Y35
VTSFT6023 WU41EG	Y35
VTSFT6024 WP49EG	Y37
VTSFT6025 WP49EG	Y35
VTSFT6025 WU41EG	Y35
VTSFT6026 WP49EG	Y35
VTSFT6026 WU41EG	Y35
VTSFT6027 WP49EG	Y37
VTSFT6028 WP49EG	Y35
VTSFT6028 WU41EG	Y35
VTSFT6029 WP49EG	Y35
VTSFT6029 WU41EG	Y35
VTSFT6030 WP49EG	Y37
VTSFT6031 WP49EG	Y35
VTSFT6031 WU41EG	Y35
VTSFT6032 WP49EG	Y35
VTSFT6032 WU41EG	Y35
VTSFT6033 WP49EG	Y35
VTSFT6033 WU41EG	Y35
VTSFT6034 WP49EG	Y36
VTSFT6034 WU41EG	Y36
VTSFT6035 WP49EG	Y36
VTSFT6035 WU41EG	Y36
VTSFT6036 WP49EG	Y36
VTSFT6036 WU41EG	Y36
VTSFT6037 WP49EG	Y36
VTSFT6037 WU41EG	Y36
VTSFT6038 WP49EG	Y36
VTSFT6038 WU41EG	Y36
VTSFT6039 WP49EG	Y36
VTSFT6039 WU41EG	Y36
VTSFT6040 WP49EG	Y36
VTSFT6040 WU41EG	Y36
VTSFT6506 WP42EG	Y38
VTSFT6506 WP49EG	Y38
VTSFT6506 WU40EG	Y38
VTSFT6506 WU41EG	Y38
VTSFT6507 WP49EG	Y38
VTSFT6508 WP49EG	Y38
VTSFT6509 WP49EG	Y38
VTSFT6509 WU40EG	Y38
VTSFT6509 WU41EG	Y38
VTSFT6510 WP49EG	Y38
VTSFT6511 WP42EG	Y38
VTSFT6511 WP49EG	Y38
VTSFT6511 WU40EG	Y38
VTSFT6511 WU41EG	Y38
VTSFT6512 WP49EG	Y38
VTSFT6513 WP49EG	Y38
VTSFT6513 WU40EG	Y38
VTSFT6513 WU41EG	Y38
VTSFT6514 WP42EG	Y38
VTSFT6514 WP49EG	Y38
VTSFT6514 WU40EG	Y38
VTSFT6514 WU41EG	Y38
VTSFT6515 WP49EG	Y38
VTSFT6516 WP42EG	Y38
VTSFT6516 WP49EG	Y38
VTSFT6516 WU40EG	Y38
VTSFT6516 WU41EG	Y38
VTSFT6517 WP49EG	Y38
VTSFT6518 WP42EG	Y39
VTSFT6518 WP49EG	Y39
VTSFT6518 WU40EG	Y39
VTSFT6518 WU41EG	Y39
VTSFT6519 WP49EG	Y39
VTSFT6520 WP49EG	Y39
VTSFT6520 WU40EG	Y39
VTSFT6521 WP42EG	Y39
VTSFT6521 WP49EG	Y39
VTSFT6521 WU40EG	Y39
VTSFT6521 WU41EG	Y39
VTSFT6522 WP49EG	Y39
VTSFT6523 WP42EG	Y39
VTSFT6523 WP49EG	Y39
VTSFT6523 WU40EG	Y39
VTSFT6523 WU41EG	Y39
VTSFT6524 WP49EG	Y39
VTSFT6525 WP49EG	Y38
VTSFT6525 WU40EG	Y38
VTSFT6526 WP49EG	Y38
VTSFT6526 WU40EG	Y38
VTSFT6527 WP49EG	Y38
VTSFT6527 WU40EG	Y38
VTSFT6528 WP49EG	Y39
VTSFT6528 WU40EG	Y39
VTSFT6529 WP49EG	Y39
VTSFT6529 WU40EG	Y39
VTSFT6530 WP49EG	Y39
VTSFT6530 WU40EG	Y39
VTSFT6531 WP42EG	Y39
VTSFT6531 WP49EG	Y39
VTSFT6531 WU40EG	Y39
VTSFT6531 WU41EG	Y39
VTSFT6532 WP49EG	Y39
VTSFT6533 WP42EG	Y39
VTSFT6533 WP49EG	Y39
VTSFT6533 WU40EG	Y39
VTSFT6533 WU41EG	Y39
VTSFT6534 WP49EG	Y39
VTSFT6535 WP49EG	Y39
VTSFT6535 WU40EG	Y39
VTSFT6535 WU41EG	Y39
VTSFT6536 WP49EG	Y39
VTSFT6537 WP49EG	Y39
VTSFT6537 WU40EG	Y39
VTSFT6537 WU41EG	Y39
VTSFT6538 WP49EG	Y39
VTSFT6538 WU40EG	Y39
VTSFT6538 WU41EG	Y39
VTSFT6539 WP49EG	Y39
VTSFT6539 WU40EG	Y39
VTSFT6539 WU41EG	Y39
VTSFT6540 WP49EG	Y40
VTSFT6540 WU40EG	Y40
VTSFT6540 WU41EG	Y40
VTSFT6541 WP49EG	Y40
VTSFT6541 WU40EG	Y40
VTSFT6541 WU41EG	Y40
VTSFT6542 WP49EG	Y40
VTSFT6542 WU40EG	Y40
VTSFT6542 WU41EG	Y40
VTSFT6543 WP49EG	Y40
VTSFT6543 WU40EG	Y40
VTSFT6544 WP49EG	Y40
VTSFT6544 WU40EG	Y40
VTSFT6545 WP49EG	Y38
VTSFT6546 WP49EG	Y38
VTSFT6546 WU40EG	Y38
VTSFT6547 WP49EG	Y38
VTSFT6547 WU40EG	Y38
VTSFT6548 WP49EG	Y38
VTSFT6549 WP49EG	Y38
VTSFT6549 WU40EG	Y38
VTSFT6550 WP49EG	Y39
VTSFT6550 WU40EG	Y39
VTSFT6551 WP42EG	Y39
VTSFT6551 WP49EG	Y39
VTSFT6551 WU40EG	Y39
VTSFT6552 WU40EG	Y39
VTSFT6553 WP49EG	Y39
VTSFT6553 WU40EG	Y39
VTSFT6554 WP42EG	Y39
VTSFT6554 WP49EG	Y39
VTSFT6554 WU40EG	Y39
VTSFT6555 WP49EG	Y39
VTSFT6555 WU40EG	Y39
VTSFT6556 WP49EG	Y39
VTSFT6556 WU40EG	Y39
VTSFT6557 WP42EG	Y39
VTSFT6557 WP49EG	Y39
VTSFT6557 WU40EG	Y39
VTSFT6558 WU40EG	Y39
VTSFT6559 WU40EG	Y39
VTSFT6560 WP42EG	Y39
VTSFT6560 WP49EG	Y39
VTSFT6560 WU40EG	Y39
VTSFT6561 WU40EG	Y39
VTSFT6562 WP49EG	Y39
VTSFT6562 WU40EG	Y39
VTSFT6563 WU40EG	Y39
VTSFT6564 WP49EG	Y39
VTSFT6564 WU40EG	Y39
VTSFT6565 WU40EG	Y39
VTSFT6566 WU40EG	Y39
VTSFT6567 WP49EG	Y39
VTSFT6567 WU40EG	Y39
VTSFT6568 WU40EG	Y39
VTSFT6569 WP49EG	Y39
VTSFT6569 WU40EG	Y39
VTSFT6570 WU40EG	Y39
VTSFT6571 WP49EG	Y40
VTSFT6571 WU40EG	Y40
VTSFT6572 WU40EG	Y40
VTSFT6573 WU40EG	Y40
VTSFT6574 WP42EG	Y41
VTSFT6574 WP49EG	Y41
VTSFT6575 WP42EG	Y41
VTSFT6575 WP49EG	Y41
VTSFT6576 WP42EG	Y41
VTSFT6576 WP49EG	Y41
VTSFT6577 WP42EG	Y41
VTSFT6577 WP49EG	Y41
VTSFT6578 WP42EG	Y41
VTSFT6578 WP49EG	Y41
VTSFT6579 WP42EG	Y41
VTSFT6579 WP49EG	Y41
VTSFT6580 WP42EG	Y41
VTSFT6580 WP49EG	Y41
VTSFT6581 WP42EG	Y41
VTSFT6581 WP49EG	Y41
VTSFT6582 WP49EG	Y41
VTSFT6583 WP42EG	Y41
VTSFT6583 WP49EG	Y41
VTSFT6584 WP42EG	Y41
VTSFT6584 WP49EG	Y41
VTSFT6585 WP42EG	Y41
VTSFT6585 WP49EG	Y41
VTSFT6586 WP42EG	Y41
VTSFT6586 WP49EG	Y41
VTSFT6587 WP42EG	Y41
VTSFT6587 WP49EG	Y41
VTSFT6588 WP42EG	Y41
VTSFT6588 WP49EG	Y41
VTSFT7505 WU40EG	Y42
VTSFT7505 WU41EG	Y42
VTSFT7506 WU40EG	Y42
VTSFT7506 WU41EG	Y42
VTSFT7507 WU40EG	Y42
VTSFT7507 WU41EG	Y42
VTSFT7508 WU40EG	Y42
VTSFT7508 WU41EG	Y42
VTSFT7509 WU40EG	Y42
VTSFT7509 WU41EG	Y42
VTSFT7510 WU40EG	Y42
VTSFT7510 WU41EG	Y42
VTSFT7511 WU40EG	Y42
VTSFT7512 WU40EG	Y42
VTSFT7513 WU40EG	Y42
VTSFT7514 WU40EG	Y42
VTSFT7515 WU40EG	Y42
VTSFT7516 WU40EG	Y42
VTSFT7517 WU40EG	Y42
VTSFT7518 WU40EG	Y42
VTSFT7519 WU40EG	Y42
VTSPO6005 WP49EG	Y11
VTSPO6005 WU41EG	Y11
VTSPO6006 WP49EG	Y13
VTSPO6006 WU41EG	Y13
VTSPO6007 WP49EG	Y11
VTSPO6007 WU41EG	Y11
VTSPO6008 WP49EG	Y11
VTSPO6008 WU41EG	Y11
VTSPO6009 WP49EG	Y13
VTSPO6009 WU41EG	Y13
VTSPO6010 WP49EG	Y11
VTSPO6010 WU41EG	Y11
VTSPO6011 WP49EG	Y11
VTSPO6011 WU41EG	Y11
VTSPO6012 WP49EG	Y13
VTSPO6012 WU41EG	Y13
VTSPO6013 WP49EG	Y11
VTSPO6013 WU41EG	Y11
VTSPO6014 WP49EG	Y11
VTSPO6014 WU41EG	Y11
VTSPO6015 WP49EG	Y13
VTSPO6015 WU41EG	Y13
VTSPO6016 WP49EG	Y11
VTSPO6016 WU41EG	Y11
VTSPO6017 WP49EG	Y11
VTSPO6017 WU41EG	Y11
VTSPO6018 WP49EG	Y13
VTSPO6018 WU41EG	Y13
VTSPO6019 WP49EG	Y11

Catalogue No.	Page(s)
VTSP06019 WU41EG	Y11
VTSP06020 WP49EG	Y11
VTSP06020 WU41EG	Y11
VTSP06021 WP49EG	Y13
VTSP06021 WU41EG	Y13
VTSP06022 WP49EG	Y11
VTSP06022 WU41EG	Y11
VTSP06023 WP49EG	Y11
VTSP06023 WU41EG	Y11
VTSP06024 WP49EG	Y13
VTSP06024 WU41EG	Y13
VTSP06025 WP49EG	Y11
VTSP06025 WU41EG	Y11
VTSP06026 WP49EG	Y11
VTSP06026 WU41EG	Y11
VTSP06027 WP49EG	Y13
VTSP06027 WU41EG	Y13
VTSP06028 WP49EG	Y11
VTSP06028 WU41EG	Y11
VTSP06029 WP49EG	Y11
VTSP06029 WU41EG	Y11
VTSP06030 WP49EG	Y13
VTSP06030 WU41EG	Y13
VTSP06031 WP49EG	Y11
VTSP06031 WU41EG	Y11
VTSP06032 WP49EG	Y11
VTSP06032 WU41EG	Y11
VTSP06033 WP49EG	Y11
VTSP06033 WU41EG	Y11
VTSP06034 WP49EG	Y12
VTSP06034 WU41EG	Y12
VTSP06035 WP49EG	Y12
VTSP06035 WU41EG	Y12
VTSP06036 WP49EG	Y12
VTSP06036 WU41EG	Y12
VTSP06037 WP49EG	Y12
VTSP06037 WU41EG	Y12
VTSP06038 WP49EG	Y12
VTSP06038 WU41EG	Y12
VTSP06039 WP49EG	Y12
VTSP06039 WU41EG	Y12
VTSP06040 WP49EG	Y12
VTSP06040 WU41EG	Y12
VTSP06505 WP42EG	Y14
VTSP06505 WP49EG	Y14
VTSP06505 WU40EG	Y14
VTSP06505 WU41EG	Y14
VTSP06506 WP49EG	Y14
VTSP06507 WP49EG	Y14
VTSP06508 WP49EG	Y14
VTSP06508 WU40EG	Y14
VTSP06508 WU41EG	Y14
VTSP06509 WP49EG	Y14
VTSP06510 WP42EG	Y14
VTSP06510 WP49EG	Y14
VTSP06510 WU40EG	Y14
VTSP06510 WU41EG	Y14
VTSP06511 WP49EG	Y14
VTSP06512 WP49EG	Y14
VTSP06512 WU40EG	Y14
VTSP06512 WU41EG	Y14
VTSP06513 WP42EG	Y14
VTSP06513 WP49EG	Y14
VTSP06513 WU40EG	Y14
VTSP06513 WU41EG	Y14
VTSP06514 WP49EG	Y14
VTSP06515 WP42EG	Y14
VTSP06515 WP49EG	Y14
VTSP06515 WU40EG	Y14
VTSP06515 WU41EG	Y14
VTSP06516 WP49EG	Y14
VTSP06517 WP42EG	Y14
VTSP06517 WP49EG	Y14
VTSP06517 WU40EG	Y14
VTSP06517 WU41EG	Y14
VTSP06518 WP49EG	Y14
VTSP06519 WP42EG	Y15
VTSP06519 WP49EG	Y15
VTSP06519 WU40EG	Y15
VTSP06519 WU41EG	Y15
VTSP06520 WP49EG	Y15
VTSP06521 WP42EG	Y15
VTSP06521 WP49EG	Y15
VTSP06521 WU40EG	Y15
VTSP06521 WU41EG	Y15
VTSP06522 WP49EG	Y15
VTSP06523 WP42EG	Y15
VTSP06523 WP49EG	Y15
VTSP06523 WU40EG	Y15
VTSP06523 WU41EG	Y15
VTSP06524 WP49EG	Y15
VTSP06525 WP49EG	Y14
VTSP06525 WU40EG	Y14
VTSP06525 WU41EG	Y14
VTSP06526 WP49EG	Y14
VTSP06526 WU40EG	Y14
VTSP06526 WU41EG	Y14
VTSP06527 WP49EG	Y14
VTSP06527 WU40EG	Y14
VTSP06527 WU41EG	Y14
VTSP06528 WP49EG	Y14
VTSP06528 WU40EG	Y14
VTSP06528 WU41EG	Y14
VTSP06529 WP49EG	Y15
VTSP06529 WU40EG	Y15
VTSP06529 WU41EG	Y15
VTSP06530 WP49EG	Y15
VTSP06530 WU40EG	Y15
VTSP06530 WU41EG	Y15
VTSP06531 WP42EG	Y15
VTSP06531 WP49EG	Y15
VTSP06531 WU40EG	Y15
VTSP06531 WU41EG	Y15
VTSP06532 WP49EG	Y15
VTSP06533 WP42EG	Y15
VTSP06533 WP49EG	Y15
VTSP06533 WU40EG	Y15
VTSP06533 WU41EG	Y15
VTSP06534 WP49EG	Y15
VTSP06535 WP42EG	Y15
VTSP06535 WP49EG	Y15
VTSP06535 WU40EG	Y15
VTSP06535 WU41EG	Y15
VTSP06536 WP49EG	Y15
VTSP06537 WP42EG	Y15
VTSP06537 WP49EG	Y15
VTSP06537 WU40EG	Y15
VTSP06537 WU41EG	Y15
VTSP06538 WP42EG	Y15
VTSP06538 WP49EG	Y15
VTSP06538 WU40EG	Y15
VTSP06538 WU41EG	Y15
VTSP06539 WP42EG	Y16
VTSP06539 WP49EG	Y16
VTSP06539 WU40EG	Y16
VTSP06539 WU41EG	Y16
VTSP06540 WP42EG	Y16
VTSP06540 WP49EG	Y16
VTSP06540 WU40EG	Y16
VTSP06540 WU41EG	Y16
VTSP06541 WP49EG	Y16
VTSP06541 WU40EG	Y16
VTSP06541 WU41EG	Y16
VTSP06542 WP49EG	Y16
VTSP06542 WU40EG	Y16
VTSP06542 WU41EG	Y16
VTSP06543 WP49EG	Y16
VTSP06544 WP49EG	Y16
VTSP06545 WP49EG	Y14
VTSP06545 WU40EG	Y14
VTSP06546 WP49EG	Y14
VTSP06546 WU40EG	Y14
VTSP06547 WP49EG	Y14
VTSP06547 WU40EG	Y14
VTSP06548 WP49EG	Y14
VTSP06548 WU40EG	Y14
VTSP06549 WP49EG	Y14
VTSP06549 WU40EG	Y14
VTSP06550 WP49EG	Y14
VTSP06550 WU40EG	Y14
VTSP06551 WP49EG	Y15
VTSP06551 WU40EG	Y15
VTSP06552 WP49EG	Y15
VTSP06552 WU40EG	Y15
VTSP06553 WP49EG	Y15
VTSP06553 WU40EG	Y15
VTSP06554 WP49EG	Y15
VTSP06554 WU40EG	Y15
VTSP06555 WP49EG	Y15
VTSP06555 WU40EG	Y15
VTSP06556 WP49EG	Y15
VTSP06556 WU40EG	Y15
VTSP06557 WP49EG	Y15
VTSP06557 WU40EG	Y15
VTSP06558 WP49EG	Y15
VTSP06558 WU40EG	Y15
VTSP06559 WP49EG	Y15
VTSP06559 WU40EG	Y15
VTSP06560 WP49EG	Y15
VTSP06560 WU40EG	Y15
VTSP06561 WP49EG	Y15
VTSP06561 WU40EG	Y15
VTSP06562 WP49EG	Y15
VTSP06562 WU40EG	Y15
VTSP06563 WP49EG	Y15
VTSP06563 WU40EG	Y15
VTSP06564 WP49EG	Y15
VTSP06564 WU40EG	Y15
VTSP06565 WP49EG	Y15
VTSP06565 WU40EG	Y15
VTSP06566 WP49EG	Y15
VTSP06566 WU40EG	Y15
VTSP06567 WP49EG	Y15
VTSP06567 WU40EG	Y15
VTSP06568 WP49EG	Y15
VTSP06568 WU40EG	Y15
VTSP06569 WP49EG	Y15
VTSP06569 WU40EG	Y15
VTSP06570 WP49EG	Y15
VTSP06570 WU40EG	Y15
VTSP06571 WP49EG	Y16
VTSP06571 WU40EG	Y16
VTSP06572 WU40EG	Y16
VTSP06573 WP49EG	Y16
VTSP06573 WU40EG	Y16
VTSP06574 WU40EG	Y16
VTSP06575 WU40EG	Y16
VTSP07505 WU40EG	Y17
VTSP07505 WU41EG	Y17
VTSP07506 WU40EG	Y17
VTSP07506 WU41EG	Y17
VTSP07507 WU40EG	Y17
VTSP07507 WU41EG	Y17
VTSP07508 WU40EG	Y17
VTSP07508 WU41EG	Y17
VTSP07509 WU40EG	Y17
VTSP07509 WU41EG	Y17
VTSP07510 WU40EG	Y17
VTSP07510 WU41EG	Y17
VTSP07511 WU40EG	Y17
VTSP07512 WU40EG	Y17
VTSP07513 WU40EG	Y17
VTSP07514 WU40EG	Y17
VTSP07515 WU40EG	Y17
VTSP07516 WU40EG	Y17
VTSP07517 WU40EG	Y17
VTSP07518 WU40EG	Y17
VTSP07519 WU40EG	Y17
VXGX10030234 WP20PH	U17
WGMEL2525 W	E37
WGMEL3232 W	E37
WGMER2525 W	E37
WGMER3232 W	E37
WGMSL1620 W	E36
WGMSL2020 W	E36
WGMSL2525 W	E36
WGMSL3232 W	E36
WGMSR2020 W	E36
WGMSR2525 W	E36
WGMSR3232 W	E36
WMTAL2525M316-070-100	E34
WMTAL2525M319-100-205	E34
WMTAR2525M316-070-100	E34
WMTAR2525M319-100-205	E34
WMTAR2525M619-070-100	E34
WMTBL2525M313-038-052 WG	E33
WMTBL2525M316-052-070 WG	E33
WMTBL2525M316-070-100 WG	E33
WMTBL2525M319-100-205 WG	E33
WMTBL2525M412-032-052 W	E33
WMTBL2525M415-052-070 W	E33
WMTBL2525M415-070-100 W	E33
WMTBL2525M418-100-205 W	E33
WMTBL2525M519-052-070 WG	E33
WMTBL2525M519-070-100 WG	E33
WMTBL2525M525-100-205 WG	E33
WMTBL2525M616-038-052 WG	E33
WMTBL2525M625-100-205 WG	E33
WMTBR2525M313-038-052 WG	E33
WMTBR2525M316-052-070 WG	E33
WMTBR2525M316-070-100 WG	E33
WMTBR2525M319-100-205 WG	E33
WMTBR2525M412-032-052 W	E33
WMTBR2525M415-052-070 W	E33
WMTBR2525M418-100-205 W	E33
WMTBR2525M519-052-070 WG	E33
WMTBR2525M519-070-100 WG	E33
WMTBR2525M525-100-205 WG	E33
WMTBR2525M616-038-052 WG	E33
WMTBR2525M619-070-100 WG	E33
WMTBR2525M625-100-205 WG	E33
WMTC015L05CM08 WU25PT	E14

Catalogue No.	Page(s)
WMTC015N00CM08 WU25PT	E14
WMTC015N00CMW08 WU25PT	E16
WMTC015R05CM08 WU25PT	E15
WMTC015R12CM08 WU25PT	E15
WMTC020L05CM08 WU25PT	E14
WMTC020L12CM08 WU25PT	E14
WMTC020L12CMW08 WU25PT	E16
WMTC020N00CM08 WU25PT	E14
WMTC020N00CMW08 WU25PT	E16
WMTC020R05CM08 WU25PT	E15
WMTC020R05CMW08 WU25PT	E17
WMTC020R12CM08 WU25PT	E15
WMTC020R12CMW08 WU25PT	E17
WMTC030L05CM17 WU25PT	E14
WMTC030L05CMW17 WU25PT	E16
WMTC030L12CM17 WU25PT	E14
WMTC030L12CMW17 WU25PT	E16
WMTC030N00CM17 WU25PT	E14
WMTC030N00CMW17 WU25PT	E16
WMTC030R05CM17 WU25PT	E15
WMTC030R05CMW17 WU25PT	E17
WMTC030R12CM17 WU25PT	E15
WMTC030R12CMW17 WU25PT	E17
WMTC040L05CM17 WU25PT	E14
WMTC040L12CM17 WU25PT	E14
WMTC040N00CM17 WU25PT	E14
WMTC040N00CMW17 WU25PT	E16
WMTC040R05CM17 WU25PT	E15
WMTC040R12CM17 WU25PT	E15
WMTC094N00CM13 WU25PT	E14
WMTC094N00CMW13 WU25PT	E16
WMTC094R05CM13 WU25PT	E15
WMTC094R05CMW13 WU25PT	E17
WMTC094R12CM13 WU25PT	E15
WMTC094R12CMW13 WU25PT	E17
WMTC125N00CM17 WU25PT	E14
WMTC125N00CMW17 WU25PT	E16
WMTC125R05CM17 WU25PT	E15
WMTC125R05CMW17 WU25PT	E17
WMTC125R12CM17 WU25PT	E15
WMTC125R12CMW17 WU25PT	E17
WMTCL1010H110 WG	E32
WMTCL1010H210 WG	E32
WMTCL1212H110 WG	E32
WMTCL1212H210 WG	E32
WMTCL1212H2B16	E32
WMTCL1616K113 WG	E32
WMTCL1616K213 WG	E32
WMTCL2020K113 WG	E32
WMTCL2020K213 WG	E32
WMTCR1010H110 WG	E32
WMTCR1010H210 WG	E32
WMTCR1212H110 WG	E32
WMTCR1212H210 WG	E32
WMTCR1212H2B16	E32
WMTCR1616K113 WG	E32
WMTCR1616K213 WG	E32
WMTCR2020K113 WG	E32
WMTCR2020K213 WG	E32
WMTCR2525M2B19	E30
WMTR1885PPC WU10PT	E26
WMTR1885PPC WU25PT	E26
WMTR250I6PPC WU10PT	E26
WMTR250I6PPC WU25PT	E26
WMTR300M3PPC WU10HT	E26
WMTR300M3PPC WU10PT	E26
WMTR300M3PPC WU25PT	E26
WMTR305M3UPC WP10CT	E25
WMTR305M3UPC WU10PT	E25
WMTR305M3UPC WU25PT	E25
WMTR312I8PPC WU10PT	E26
WMTR312I8PPC WU25PT	E26
WMTR400M4PPC WU10HT	E26
WMTR400M4PPC WU10PT	E26
WMTR400M4PPC WU25PT	E26
WMTR405M4UPC WP10CT	E25
WMTR405M4UPC WU10PT	E25
WMTR405M4UPC WU25PT	E25
WMTR500M5PPC WU10PT	E26
WMTR500M5PPC WU25PT	E26
WMTR505M5UPC WP10CT	E25
WMTR505M5UPC WU10PT	E25
WMTR505M5UPC WU25PT	E25
WMTR600M6PPC WU10PT	E26
WMTR600M6PPC WU25PT	E26
WMTR605M6UPC WP10CT	E25
WMTR605M6UPC WU10PT	E25
WMTR605M6UPC WU25PT	E25
WMTR800M8PPC WU10PT	E26
WMTR800M8PPC WU25PT	E26
WMTR805M8UPC WP10CT	E25
WMTR805M8UPC WU10PT	E25
WMTR805M8UPC WU25PT	E25
WMTS094I2BP02PT WU10PT	E19
WMTS094I2BP02PT WU25PT	E19
WMTS094I2BP04PT WU10PT	E19
WMTS094I2BP04PT WU25PT	E19
WMTS125I3P03PH WU10PT	E19, E23
WMTS125I3P03PH WU25PT	E19, E23
WMTS125I3P03PT WU10PT	E19
WMTS125I3P03PT WU25PT	E19
WMTS125I3P08PH WU10PT	E19, E23
WMTS125I3P08PH WU25PT	E19, E23
WMTS125I3P08PT WU10PT	E19
WMTS125I3P08PT WU25PT	E19
WMTS156I4P03PH WU10PT	E19, E23
WMTS156I4P03PH WU25PT	E19, E23
WMTS156I4P08PH WU10PT	E19, E23
WMTS156I4P08PH WU25PT	E19, E23
WMTS188I5P03PH WU10PT	E20, E23
WMTS188I5P03PH WU25PT	E20, E23
WMTS188I5P03PT WU10PT	E20
WMTS188I5P03PT WU25PT	E20
WMTS188I5P08PH WU10PT	E20, E23
WMTS188I5P08PH WU25PT	E20, E23
WMTS188I5P08PT WU10PT	E20
WMTS188I5P08PT WU25PT	E20
WMTS200M2P02PT WU10PT	E19
WMTS200M2P02PT WU25PT	E19
WMTS205M2U02PT WP10CT	E18
WMTS205M2U02PT WP25CT	E18
WMTS205M2U02PT WU10PT	E18
WMTS205M2U02PT WU25PT	E18
WMTS250I6P03PH WU10PT	E21, E24
WMTS250I6P03PH WU25PT	E21, E24
WMTS250I6P03PT WU10PT	E21
WMTS250I6P03PT WU25PT	E21
WMTS250I6P08PH WU10PT	E20, E24
WMTS250I6P08PH WU25PT	E20, E24
WMTS250I6P08PT WU10PT	E21
WMTS250I6P08PT WU25PT	E21
WMTS300M3P03PH WU10HT	E19, E23
WMTS300M3P03PH WU10PT	E19, E23
WMTS300M3P03PH WU25PT	E19, E23
WMTS300M3P03PT WU10HT	E19
WMTS300M3P03PT WU10PT	E19
WMTS300M3P03PT WU25PT	E19
WMTS300M3P06PH WU10HT	E19, E23
WMTS300M3P06PH WU10PT	E19, E23
WMTS300M3P06PH WU25PT	E19, E23
WMTS300M3P06PT WU10PT	E19
WMTS300M3P06PT WU25PT	E19
WMTS305M3U03PH WU10PT	E22
WMTS305M3U03PH WU25PT	E22
WMTS305M3U03PT WP10CT	E18
WMTS305M3U03PT WP25CT	E18
WMTS305M3U03PT WU10PT	E18
WMTS305M3U03PT WU25PT	E18
WMTS305M3U06PH WU10PT	E22
WMTS305M3U06PH WU25PT	E22
WMTS305M3U06PT WP10CT	E18
WMTS305M3U06PT WP25CT	E18
WMTS305M3U06PT WU10PT	E18
WMTS305M3U06PT WU25PT	E18
WMTS312I8P03PH WU10PT	E21, E24
WMTS312I8P03PH WU25PT	E21, E24
WMTS312I8P08PH WU10PT	E21, E24
WMTS312I8P08PH WU25PT	E21, E24
WMTS400M4P03PH WU10HT	E19, E23
WMTS400M4P03PH WU10PT	E19, E23
WMTS400M4P03PH WU25PT	E19, E23
WMTS400M4P03PT WU10HT	E19
WMTS400M4P03PT WU10PT	E19
WMTS400M4P03PT WU25PT	E19
WMTS400M4P06PH WU10HT	E19, E23
WMTS400M4P06PH WU10PT	E19, E23
WMTS400M4P06PH WU25PT	E19, E23
WMTS400M4P06PT WU10PT	E20
WMTS400M4P06PT WU25PT	E20
WMTS405M4U03PH WU10PT	E22
WMTS405M4U03PH WU25PT	E22
WMTS405M4U03PT WP10CT	E18
WMTS405M4U03PT WP25CT	E18
WMTS405M4U03PT WU10PT	E18
WMTS405M4U03PT WU25PT	E18
WMTS405M4U06PH WU10PT	E22
WMTS405M4U06PH WU25PT	E22
WMTS405M4U06PT WP10CT	E18
WMTS405M4U06PT WP25CT	E18
WMTS405M4U06PT WU10PT	E18
WMTS405M4U06PT WU25PT	E18
WMTS500M5P03PH WU10HT	E20, E24
WMTS500M5P03PH WU10PT	E20, E24
WMTS500M5P03PH WU25PT	E20, E24
WMTS500M5P03PT WU10HT	E20
WMTS500M5P03PT WU10PT	E20
WMTS500M5P03PT WU25PT	E20
WMTS500M5P06PH WU10HT	E20, E24
WMTS500M5P06PH WU10PT	E20, E24
WMTS500M5P06PH WU25PT	E20, E24
WMTS500M5P06PT WU10PT	E20
WMTS500M5P06PT WU25PT	E20
WMTS505M5U03PH WU10PT	E22
WMTS505M5U03PH WU25PT	E22
WMTS505M5U03PT WP10CT	E18
WMTS505M5U03PT WP25CT	E18
WMTS505M5U03PT WU10PT	E18
WMTS505M5U03PT WU25PT	E18
WMTS505M5U06PH WU10PT	E22
WMTS505M5U06PH WU25PT	E22
WMTS505M5U06PT WP10CT	E18
WMTS505M5U06PT WP25CT	E18
WMTS505M5U06PT WU10PT	E18
WMTS505M5U06PT WU25PT	E18
WMTS600M6P03PH WU10PT	E20, E24
WMTS600M6P03PH WU25PT	E20, E24
WMTS600M6P03PT WU10PT	E20
WMTS600M6P03PT WU25PT	E20
WMTS600M6P06PH WU10PT	E20, E24
WMTS600M6P06PH WU25PT	E20, E24
WMTS600M6P06PT WU10PT	E20
WMTS600M6P06PT WU25PT	E20
WMTS605M6U03PH WU10PT	E22
WMTS605M6U03PH WU25PT	E22
WMTS605M6U03PT WP10CT	E18
WMTS605M6U03PT WP25CT	E18
WMTS605M6U03PT WU10PT	E18
WMTS605M6U03PT WU25PT	E18
WMTS605M6U06PH WU10PT	E22
WMTS605M6U06PH WU25PT	E22
WMTS605M6U06PT WP10CT	E18
WMTS605M6U06PT WP25CT	E18
WMTS605M6U06PT WU10PT	E18
WMTS605M6U06PT WU25PT	E18
WMTS800M8P03PH WU10PT	E21, E24
WMTS800M8P03PH WU25PT	E21, E24
WMTS800M8P06PH WU10PT	E21, E24
WMTS800M8P06PH WU25PT	E21, E24
WMTS800M8P06PT WU10PT	E21
WMTS800M8P06PT WU25PT	E21
WMTS800M8P15PT WU10PT	E21
WMTS800M8P15PT WU25PT	E21
WMTS805M8U03PH WU10PT	E22
WMTS805M8U03PH WU25PT	E22
WMTS805M8U06PH WU10PT	E22
WMTS805M8U06PH WU25PT	E22
WMTS805M8U06PT WP10CT	E18
WMTS805M8U06PT WP25CT	E18
WMTS805M8U06PT WU10PT	E18
WMTS805M8U06PT WU25PT	E18
WMTS805M8U15PT WP10CT	E18
WMTS805M8U15PT WP25CT	E18
WMTS805M8U15PT WU10PT	E18
WMTS805M8U15PT WU25PT	E18
WMTSL1616K216 WG	E31
WMTSL1616K2B19	E31
WMTSL1616K311 WG	E31
WMTSL1616K322 WG	E31
WMTSL1616K422 WG	E31
WMTSL1616K514 WG	E31
WMTSL2020K216 WG	E31
WMTSL2020K22 W	E31
WMTSL2020K2B19	E31
WMTSL2020K311 WG	E31
WMTSL2020K322 WG	E31
WMTSL2020K411 WG	E31
WMTSL2020K514 WG	E31
WMTSL2020L614 WG	E31
WMTSL2525M11 W	E31
WMTSL2525M116 WG	E31
WMTSL2525M216 WG	E31
WMTSL2525M311 WG	E31
WMTSL2525M322 WG	E31
WMTSL2525M422 WG	E31
WMTSL2525M514 WG	E31
WMTSL2525M525 WG	E31
WMTSL2525M614 WG	E31
WMTSL2525M625 WG	E31
WMTSL2525M814	E31
WMTSL2525M825 WG	E31
WMTSL3232M814 WG	E31
WMTSL3232M825 WG	E31

Catalogue No.	Page(s)
WMTSR1616411 WG	E30
WMTSR1616K216 WG	E30
WMTSR1616K2B19	E30
WMTSR1616K311 WG	E30
WMTSR1616K322 WG	E30
WMTSR1616K422 WG	E30
WMTSR1616K514 WG	E30
WMTSR2020K20 W	E30
WMTSR2020K216 WG	E30
WMTSR2020K2B19	E30
WMTSR2020K311 WG	E30
WMTSR2020K322 WG	E30
WMTSR2020K411 WG	E30
WMTSR2020K514 WG	E30
WMTSR2020L525 WG	E30
WMTSR2020L614 WG	E30
WMTSR2525M11 W	E30
WMTSR2525M116 WG	E30
WMTSR2525M216 WG	E30
WMTSR2525M311 WG	E30
WMTSR2525M322 WG	E30
WMTSR2525M422 WG	E30
WMTSR2525M514 WG	E30
WMTSR2525M525 WG	E30
WMTSR2525M614 WG	E30
WMTSR2525M625 WG	E30
WMTSR2525M814 WG	E30
WMTSR2525M825 WG	E30
WMTSR3232M814 WG	E30
WMTSR3232M825 WG	E30
WMTWGML114S W	E38
WMTWGML213S W	E38
WMTWGML2B16S W	E38
WMTWGML313B038-052 W	E39
WMTWGML316B052-070 W	E39
WMTWGML316B070-100 W	E39
WMTWGML319100-205 W	E39
WMTWGML319S W	E38
WMTWGML413B038-052 W	E39
WMTWGML416B052-070 W	E39
WMTWGML416B070-100 W	E39
WMTWGML419B100-205 W	E39
WMTWGML419S W	E38
WMTWGML516B038-052 W	E39
WMTWGML519B052-070 W	E39
WMTWGML519B070-100 W	E39
WMTWGML522B100-205 W	E39
WMTWGML522S W	E38
WMTWGML616B030-052 W	E39
WMTWGML619B052-070 W	E39
WMTWGML619B070-100 W	E39
WMTWGML622B100-205 W	E39
WMTWGML622S W	E38
WMTWGMR114S W	E38
WMTWGMR213S W	E38
WMTWGMR2B16S W	E38
WMTWGMR313B038-052 W	E39
WMTWGMR316B052-070 W	E39
WMTWGMR316B070-100 W	E39
WMTWGMR319B100-205 W	E39
WMTWGMR319S W	E38
WMTWGMR416B052-070 W	E39
WMTWGMR416B070-100 W	E39
WMTWGMR419B100-205 W	E39
WMTWGMR419S W	E38
WMTWGMR522B100-205 W	E39
WMTWGMR522S W	E38
WMTWGMR622B100-205 W	E39
WMTWGMR622S W	E38
WNGA080404FST WDN25U	B218
WNGA080408FST WDN25U	B218
WNGA080408T02020 CW5025	B195
WNGA080412T02020 CW5025	B195
WNGA080416T02020 CW5025	B195
WNGG080404FS WS10PT	B99
WNGG080404FS WS25PT	B99
WNGG080404FS WU10HT	B99
WNGG080408FS WS10PT	B99
WNGG080408FS WS25PT	B99
WNGG080408FS WU10HT	B99
WNGX080712T02020 CW5025	B196
WNMA060408 TN20K	B147
WNMA060408 WK05CT	B100
WNMA060408 WK20CT	B100
WNMA060412 WK20CT	B100
WNMA080408 TN20K	B147
WNMA080408 WK05CT	B100
WNMA080408 WK20CT	B100
WNMA080412 TN20K	B147
WNMA080412 WK05CT	B100
WNMA080412 WK20CT	B100
WNMA080416 WK05CT	B100
WNMA080416 WK20CT	B100
WNMG060404FF WK20CT	B100
WNMG060404FF WM25CT	B100
WNMG060404FF WP15CT	B100
WNMG060404FW WP15CT	B101
WNMG060404ML WK05CT	B101
WNMG060404ML WK20CT	B101
WNMG060404ML WP15CT	B101
WNMG060404UF WM15CT	B103
WNMG060404UF WM25CT	B103
WNMG060404UF WS10PT	B103
WNMG060404UM WM15CT	B104
WNMG060404UM WM25CT	B104
WNMG060404UM WM35CT	B104
WNMG060404UM WS10PT	B104
WNMG0604086P TN10P	B149
WNMG0604086P TN15M	B149
WNMG0604086P TN20P	B149
WNMG0604086P TN30M	B149
WNMG060408FF WK20CT	B100
WNMG060408FF WP15CT	B100
WNMG060408FW WP15CT	B101
WNMG060408ML WK05CT	B101
WNMG060408ML WK20CT	B101
WNMG060408ML WP15CT	B101
WNMG060408ML WP25CT	B101
WNMG060408MS WS10PT	B102
WNMG060408MS WS25PT	B102
WNMG060408MS WU10HT	B102
WNMG060408MW WP15CT	B102
WNMG060408MW WP25CT	B102
WNMG060408RH WM25CT	B103
WNMG060408RH WP15CT	B103
WNMG060408RH WP25CT	B103
WNMG060408RH WP35CT	B103
WNMG060408UF WM15CT	B103
WNMG060408UF WM25CT	B103
WNMG060408UF WS10PT	B103
WNMG060408UM WM15CT	B104
WNMG060408UM WM25CT	B104
WNMG060408UM WM35CT	B104
WNMG060408UM WS10PT	B104
WNMG060408UR WK20CT	B104
WNMG060408UR WM15CT	B104
WNMG060408UR WM25CT	B104
WNMG060408UR WM35CT	B104
WNMG060408UR WP15CT	B104
WNMG060408UR WP25CT	B104
WNMG060408UR WP35CT	B104
WNMG060408UR WS10PT	B104
WNMG060408UR WS25PT	B104
WNMG060408UR WU10HT	B104
WNMG060412UM WM25CT	B104
WNMG060412UM WM35CT	B104
WNMG060412UR WK20CT	B104
WNMG060412UR WP15CT	B104
WNMG060412UR WP25CT	B104
WNMG0804042P TN10P	B148
WNMG0804042P TN10U	B148
WNMG0804042P TN15M	B148
WNMG0804042P TN15U	B148
WNMG0804042P TN20K	B148
WNMG0804042P TN20P	B148
WNMG0804042P TN30M	B148
WNMG0804044P TN15M	B148
WNMG0804044P TN30M	B148
WNMG080404FF WM25CT	B100
WNMG080404FF WP15CT	B100
WNMG080404FF WS10PT	B100
WNMG080404FW WK05CT	B101
WNMG080404FW WM15CT	B101
WNMG080404FW WM25CT	B101
WNMG080404FW WP15CT	B101
WNMG080404ML WK05CT	B101
WNMG080404ML WK20CT	B101
WNMG080404ML WP15CT	B101
WNMG080404ML WP25CT	B101
WNMG080404MS WS10PT	B102
WNMG080404MS WS25PT	B102
WNMG080404MS WU10HT	B102
WNMG080404UF WM15CT	B103
WNMG080404UF WM25CT	B103
WNMG080404UF WS10PT	B103
WNMG080404UM WM15CT	B104
WNMG080404UM WM25CT	B104
WNMG080404UM WM35CT	B104
WNMG0804082P TN10P	B148
WNMG0804082P TN10U	B148
WNMG0804082P TN15M	B148
WNMG0804082P TN15U	B148
WNMG0804082P TN20K	B148
WNMG0804082P TN20P	B148
WNMG0804084P TN10U	B148
WNMG0804084P TN15M	B148
WNMG0804084P TN20P	B148
WNMG0804084P TN30M	B148
WNMG0804086P TN10P	B149
WNMG0804086P TN15M	B149
WNMG0804086P TN20P	B149
WNMG0804086P TN30M	B149
WNMG0804086P TN30P	B149
WNMG0804087N TN10P	B149
WNMG0804087N TN20K	B149
WNMG0804087N TN20P	B149
WNMG0804087N TN30P	B149
WNMG080408FF WM25CT	B100
WNMG080408FF WP15CT	B100
WNMG080408FF WS10PT	B100
WNMG080408FW WK05CT	B101
WNMG080408FW WM15CT	B101
WNMG080408FW WM25CT	B101
WNMG080408FW WP15CT	B101
WNMG080408ML WK05CT	B101
WNMG080408ML WK20CT	B101
WNMG080408ML WP15CT	B101
WNMG080408ML WP25CT	B101
WNMG080408MR WM25CT	B102
WNMG080408MR WM35CT	B102
WNMG080408MR WP15CT	B102
WNMG080408MR WP25CT	B102
WNMG080408MR WP35CT	B102
WNMG080408MS WS10PT	B102
WNMG080408MS WS25PT	B102
WNMG080408MS WU10HT	B102
WNMG080408MW WK05CT	B102
WNMG080408MW WM25CT	B102
WNMG080408MW WP15CT	B102
WNMG080408MW WP25CT	B102
WNMG080408RH WK20CT	B103
WNMG080408RH WM25CT	B103
WNMG080408RH WP15CT	B103
WNMG080408RH WP25CT	B103
WNMG080408RH WP35CT	B103
WNMG080408UF WM15CT	B103
WNMG080408UF WM25CT	B103
WNMG080408UF WS10PT	B103
WNMG080408UM WM15CT	B104
WNMG080408UM WM25CT	B104
WNMG080408UM WM35CT	B104
WNMG080408UM WP25CT	B104
WNMG080408UR WK05CT	B104
WNMG080408UR WK20CT	B104
WNMG080408UR WM15CT	B104
WNMG080408UR WM25CT	B104
WNMG080408UR WM35CT	B104
WNMG080408UR WP15CT	B104
WNMG080408UR WP25CT	B104
WNMG080408UR WP35CT	B104
WNMG0804124P TN30M	B148
WNMG0804126P TN10P	B149
WNMG0804126P TN15M	B149
WNMG0804126P TN20P	B149
WNMG0804126P TN30M	B149
WNMG0804126P TN30P	B149
WNMG0804127N TN10P	B149
WNMG0804127N TN20K	B149
WNMG0804127N TN20P	B149
WNMG0804127N TN30P	B149
WNMG080412FW WK05CT	B101
WNMG080412FW WM15CT	B101
WNMG080412FW WM25CT	B101
WNMG080412MR WM25CT	B102
WNMG080412MR WM35CT	B102
WNMG080412MR WP15CT	B102
WNMG080412MR WP25CT	B102
WNMG080412MR WP35CT	B102
WNMG080412MW WK05CT	B102
WNMG080412MW WM25CT	B102
WNMG080412RH WK20CT	B103
WNMG080412RH WM25CT	B103
WNMG080412RH WP15CT	B103
WNMG080412RH WP25CT	B103
WNMG080412RH WP35CT	B103
WNMG080412UF WM15CT	B103
WNMG080412UF WM25CT	B103
WNMG080412UF WS10PT	B103
WNMG080412UM WM15CT	B104
WNMG080412UM WM25CT	B104
WNMG080412UM WM35CT	B104
WNMG080412UM WP15CT	B104
WNMG080412UM WS10PT	B104
WNMG080412UR WK20CT	B104

Catalogue No.	Page(s)
WNMG080412UR WM15CT	B104
WNMG080412UR WM25CT	B104
WNMG080412UR WM35CT	B104
WNMG080412UR WP15CT	B104
WNMG080412UR WP25CT	B104
WNMG080412UR WP35CT	B104
WNMG080412UR WS10PT	B104
WNMG0804167N TN20K	B149
WNMG0804167N TN20P	B149
WNMG0804167N TN30P	B149
WNMG080416MR WP15CT	B102
WNMG080416MR WP25CT	B102
WNMG080416RH WK20CT	B103
WNMG080416RH WM25CT	B103
WNMG080416RH WP15CT	B103
WNMG080416RH WP25CT	B103
WNMG080416RH WP35CT	B103
WNMG080416UM WM25CT	B104
WNMG080416UM WM35CT	B104
WNMG080416UR WK20CT	B104
WNMG080416UR WM25CT	B104
WNMG080416UR WM35CT	B104
WNMG080416UR WP15CT	B104
WNMG080416UR WP25CT	B104
WNMG080416UR WP35CT	B104
WNMP080408 WS10PT	B105
WNMP080412 WS10PT	B105
WOEJ080412SRMH TN6520	M7
WOEJ080412SRMH TN6525	M7
WOEJ080412SRMH TN7535	M7
WOEJ080412SRMH WK15CM	M7
WOEJ080412SRMH WP25PM	M7
WOEJ080412SRMH WP40PM	M7
WOEJ080412SRMM TN6525	M7
WOEJ080412SRMM TN7535	M7
WOEJ080412SRMM WP25PM	M7
WOEJ080412SRMM WP40PM	M7
WOEJ080412SRMM WS30PM	M7
WOEJ120712SRMH WK15CM	M13
WOEJ120712SRMH WP20CM	M13
WOEJ120712SRMH WP25PM	M13
WOEJ120712SRMH WP35CM	M13
WOEJ120712SRMH WP40PM	M13
WOEJ120712SRMH WU35PM	M13
WOEJ120712SRMM WP20CM	M13
WOEJ120712SRMM WP25PM	M13
WOEJ120712SRMM WP35CM	M13
WOEJ120712SRMM WP40PM	M13
WOEJ120712SRMM WS30PM	M13
WOEJ120712SRMM WU35PM	M13
WOEJ120712SRMR WP25PM	M14
WOEJ120712SRMR WP40PM	M14
WPGT040202UF CG5	D54
WPHT040201 CG5	D54
WPHT040204 CG5	D54
WPHTS30101 CG5	D54
WPHTS30102 CG5	D54
WPHTS30102 CM1	D54
WPHTS30104 CG5	D54
WPHTS30104 CM1	D54
WPMT040204FP WP25CT	B105
WPMT040204LF CG55	D54
WPMT06T304FP WM15CT	B105
WPMT06T304FP WM25CT	B105
WPMT06T304FP WP15CT	B105
WPMT06T304LF CG55	D54
WPMT06T308FP WM25CT	B105
WPMT06T308FP WP15CT	B105
WPMT06T308FP WP25CT	B105
WPMT06T308LF CG55	D54
WPMTS3T104FP WM25CT	B105
WPMTS3T104FP WP25CT	B105
WPMTS3T104LF CG55	D54
WSSEM02502RH W	H65
WSSEM03203RH W	H65
WSSEM04004RH W	H65
WSSEM05005RH W	H65
XDCT110404PDERML WP25PM	J9
XDCT110404PDERML WP35CM	J9
XDCT110404PDERML WP40PM	J9
XDCT110404PDFRALP WN10HM	J11
XDCT110404PDFRALP WN25PM	J11
XDCT110408PDERML WK15CM	J9
XDCT110408PDERML WP25PM	J9
XDCT110408PDERML WP35CM	J9
XDCT110408PDERML WP40PM	J9
XDCT110408PDERML WS30PM	J9
XDCT110408PDERML WU35PM	J9
XDCT110408PDFRALP WN10HM	J11
XDCT110408PDFRALP WN25PM	J11
XDCT170404PEERML WP25PM	J25
XDCT170404PEFRALP WN10HM	J26
XDCT170404PEFRALP WN25PM	J26
XDCT170408PEERML WP25PM	J25
XDCT170408PEERML WP35CM	J25
XDCT170408PEERML WP40PM	J25
XDCT170408PEFRALP WN10HM	J26
XDCT170408PEFRALP WN25PM	J26
XDCT170412PEERML WP25PM	J25
XDCT170412PEERML WP35CM	J25
XDCT170412PEERML WP40PM	J25
XDCT170412PEFRALP WN10HM	J26
XDCT170412PEFRALP WN25PM	J26
XDCT170416PEERML WP25PM	J25
XDCT170416PEFRALP WN25PM	J26
XDCT170420PEERML WP25PM	J25
XDCT170420PEFRALP WN25PM	J26
XDCT170424PEERML WP25PM	J25
XDCT170424PEFRALP WN25PM	J26
XDCT170432PEERML WP25PM	J25
XDCT170432PEFRALP WN25PM	J26
XDCT170440PEERML WP25PM	J25
XDCT170440PEFRALP WN25PM	J26
XDCW110404PDFRPCD WDN10U	J11
XDCW110408PDFRPCD WDN10U	J11
XDPT110404PDSRMM WK15CM	J10
XDPT110404PDSRMM WP25PM	J10
XDPT110404PDSRMM WP35CM	J10
XDPT110404PDSRMM WP40PM	J10
XDPT110408PDSRMH WK15CM	J10
XDPT110408PDSRMH WP35CM	J10
XDPT110408PDSRMH WP40PM	J10
XDPT110408PDSRMH WU35PM	J10
XDPT110408PDSRMM WK15CM	J10
XDPT110408PDSRMM WP25PM	J10
XDPT110408PDSRMM WP35CM	J10
XDPT110408PDSRMM WP40PM	J10
XDPT110408PDSRMM WS30PM	J10
XDPT110408PDSRMM WU35PM	J10
XDPT110412PDSRMH WK15CM	J10
XDPT110412PDSRMH WP35CM	J10
XDPT110412PDSRMH WP40PM	J10
XDPT110412PDSRMM WK15CM	J10
XDPT110412PDSRMM WP25PM	J10
XDPT110412PDSRMM WP35CM	J10
XDPT110412PDSRMM WP40PM	J10
XDPT110412PDSRMM WU35PM	J10
XDPT110416PDSRMH WK15CM	J10
XDPT110416PDSRMH WP35CM	J10
XDPT110416PDSRMH WP40PM	J10
XDPT110416PDSRMM WK15CM	J10
XDPT110416PDSRMM WP25PM	J10
XDPT110416PDSRMM WP35CM	J10
XDPT110416PDSRMM WP40PM	J10
XDPT110420PDSRMM WP25PM	J10
XDPT110420PDSRMM WP35CM	J10
XDPT110420PDSRMM WP40PM	J10
XDPT110424PDSRMM WP25PM	J10
XDPT110424PDSRMM WP40PM	J10
XDPT110431PDSRMM WK15CM	J10
XDPT110431PDSRMM WP25PM	J10
XDPT110431PDSRMM WP35CM	J10
XDPT110431PDSRMM WP40PM	J10
XDPT110431PDSRMM WS30PM	J10
XDPT170404PESRMM WP40PM	J27
XDPT170404PESRMM WU35PM	J27
XDPT170408PESRMH WK15CM	J27
XDPT170408PESRMH WP35CM	J27
XDPT170408PESRMH WP40PM	J27
XDPT170408PESRMM WK15CM	J27
XDPT170408PESRMM WP25PM	J27
XDPT170408PESRMM WP35CM	J27
XDPT170408PESRMM WP40PM	J27
XDPT170408PESRMM WU35PM	J27
XDPT170412PESRMH WK15CM	J27
XDPT170412PESRMH WP35CM	J27
XDPT170412PESRMH WP40PM	J27
XDPT170412PESRMM WK15CM	J27
XDPT170412PESRMM WP25PM	J27
XDPT170412PESRMM WP35CM	J27
XDPT170412PESRMM WP40PM	J27
XDPT170412PESRMM WU35PM	J27
XDPT170416PESRMM WK15CM	J27
XDPT170416PESRMM WP25PM	J27
XDPT170416PESRMM WP35CM	J27
XDPT170416PESRMM WP40PM	J27
XDPT170420PESRMM WP25PM	J27
XDPT170420PESRMM WP35CM	J27
XDPT170420PESRMM WP40PM	J27
XDPT170424PESRMM WP25PM	J27
XDPT170424PESRMM WP40PM	J27
XDPT170432PESRMM WP25PM	J27
XDPT170432PESRMM WP35CM	J27
XDPT170432PESRMM WP40PM	J27
XDPT170440PESRMM WP25PM	J27
XDPT170440PESRMM WP40PM	J27
XNGJ0704ANENLD3W TN6510	H17
XNGJ0704ANENLD3W TN6520	H17
XNGJ0704ANENLD3W TN6525	H17
XNGJ0704ANENLD3W TN6540	H17
XNGJ0704ANENLD3W WK15CM	H17
XNGJ0704ANENLD3W WP25PM	H17
XNGJ0704ANENLD3W WP40PM	H17
XNGJ0704ANFNLDJ3W THM-U	H17
XNGJ0704ANFNLDJ3W TN6501	H17
XNGJ0905ANFNLDJ3W THM-U	H35
XNGJ0905ANFNLDJ3W TN6501	H35
XNGJ0905ANSNGD3W TN6510	H35
XNGJ0905ANSNGD3W TN6520	H35
XNGJ0905ANSNGD3W TN6525	H35
XNGJ0905ANSNGD3W TN6540	H35
XNGJ0905ANSNGD3W WK15CM	H35
XNGJ0905ANSNGD3W WP25PM	H35
XNGJ0905ANSNGD3W WP40PM	H35
XNGU15T604ERML WP25PM	J36
XNGU15T604ERML WP40PM	J36
XNGU15T604ERML WU35PM	J36
XNGU15T604SRMM WP25PM	J37
XNGU15T604SRMM WP40PM	J37
XNGU15T604SRMM WU35PM	J37
XNGU15T608ERML WP25PM	J36
XNGU15T608ERML WP40PM	J36
XNGU15T608ERML WU35PM	J36
XNGU15T608SRMH WK15CM	J37
XNGU15T608SRMH WK15PM	J37
XNGU15T608SRMH WP25PM	J37
XNGU15T608SRMH WP35CM	J37
XNGU15T608SRMH WP40PM	J37
XNGU15T608SRMH WU35PM	J37
XNGU15T608SRMM WP25PM	J37
XNGU15T608SRMM WP40PM	J37
XNGU15T608SRMM WU35PM	J37
XNGU15T616SRMH WK15CM	J37
XNGU15T616SRMH WK15PM	J37
XNGU15T616SRMH WP25PM	J37
XNGU15T616SRMH WP35CM	J37
XNKT1205AZER11 THM	H55
XNKT1205AZER11 TN7525	H55
XNKT1205AZER11 TTI25	H55
XNKT1205AZER11 WK15CM	H55
XNKT1205AZTR12 TN7525	H55
XNKT1205AZTR12 TTI25	H55
XNPU15T608ERML WP25PM	J37
XNPU15T608ERML WP40PM	J37
XNPU15T608ERML WU35PM	J37
XNPU15T608SRMM WK15CM	J37
XNPU15T608SRMM WK15PM	J37
XNPU15T608SRMM WP25PM	J37
XNPU15T608SRMM WP35CM	J37
XNPU15T608SRMM WP40PM	J37
XNPU15T608SRMM WU35PM	J37
XNPU15T612SRMM WK15CM	J37
XNPU15T612SRMM WK15PM	J37
XNPU15T612SRMM WP25PM	J37
XNPU15T612SRMM WP35CM	J37
XNPU15T612SRMM WP40PM	J37
XNPU15T612SRMM WU35PM	J37
XNPU15T616SRMM WK15CM	J37
XNPU15T616SRMM WK15PM	J37
XNPU15T616SRMM WP25PM	J37
XNPU15T616SRMM WP35CM	J37
XNPU15T616SRMM WP40PM	J37
XNPU15T616SRMM WU35PM	J37

Visit widia.com for additional contact information for locations.

North America

United States
General Sales: +1 800 979 4342
w-na.service@widia.com
Technical Support: +1 888 539 5145
na.techsupport@widia.com

Canada
General Sales: +1 800 979 4342
Technical Support: +1 888 539 5145
na.techsupport@widia.com

Mexico
General Sales: 001 888 402 4963
Technical Support: 888 539 5145
na.techsupport@widia.com

Central/South America

Argentina
General Sales: +54 11 4719 0700
w-ar.service@widia.com

Brazil
General Sales: +55 19 3936 9200
w-br.service@widia.com

Chile
General Sales: +56 2 2641177
w-cl.service@widia.com

El Salvador
General Sales: +503 2218 8096
prometca@salnet.net

Venezuela
General Sales: +58 305 595 5175
paxi@bellsouth.net

Africa

Egypt
General Sales: +20 2 263 9828
w-uk.service@widia.com

South Africa
General Sales: +27 11 748 9300
w-za.service@widia.com
Technical Support: 0800 981644

Europe

Austria
General Sales: +43 2236 379898
Technical Support: 0800 291630
w-at.service@widia.com

Belgium
General Sales: 0800 81372
Technical Support: 0800 80410
w-be.service@widia.com

Czech Republic
General Sales: 800 900 840
w-cz.service@widia.com

Denmark
Technical Support: +45 808 89295
na.techsupport@widia.com

Finland
Technical Support: 0800 919413
na.techsupport@widia.com

France
General Sales: +33 1 60 12 81 00
Technical Support: +33 080 5540 379
w-fr.service@widia.com

Germany
General Sales: 0800 7242999
Technical Support: 0800 1015774
w-de.service@widia.com

Great Britain
General Sales: 0800 072 4528
Technical Support: 0800 028 2996
w-uk.service@widia.com

Hungary
General Sales: +36 96 618 158
w-hu.service@widia.com

Italy
General Sales: +39 02 895 961
Technical Support: 800 916568
w-it.service@widia.com

Luxemborg
General Sales: +32 4 248 48 48
w-be.service@widia.com

Netherlands
General Sales: 0800 3500103
Technical Support: 0800 0201131
w-nl.service@widia.com

Norway
Technical Support: 800 10081
na.techsupport@widia.com

Poland
General Sales: 008004411941
w-pl.service@widia.com
Technical Support: 00800 4411943

Portugal
General Sales: +351 22 4119 400
w-pt.service@widia.com

Russia
General Sales: +7 81080021431044
w-ru.service@widia.com
Technical Support:
Landline: +7 8800 5556395
Cell Phone: +7 8005556395
eu.techsupport@widia.com

Slovakia
General Sales: 0800 044053
w-sk.service@widia.com

Spain
General Sales: +34 93706 06 10
w-es.service@widia.com

Sweden
Technical Support: +46 020798794
na.techsupport@widia.com

Turkey
General Sales: +90 216 574 4780
w-tr.service@widia.com

Ukraine
General Sales: +380 0048 616656573
w-ru.service@widia.com
Technical Support: 0800502665
eu.techsupport@widia.com

East/Asia Pacific

Australia
General Sales: +61 1300 094 342 (Local)
+61 7 3801 5844 (Overseas)
w-au.service@widia.com

China
General Sales: +86 400 889 2136
Technical Support: +86 400 889 2237
w-cn.service@widia.com

India
General Sales: +91 80 2219 8215
Technical Support: 1800 103 5227
in.techsupport@widia.com

Israel
General Sales: +972 3 5562211
w-il.sales@widia.com

Japan
General Sales: +81 3 3820 2855
w-jp.service@widia.com

Korea
General Sales: +82 2 2109 5505
w-kr-service@widia.com

Middle East*
General Sales: 0800 072 4528
Technical Support: 0800 028 2996
w-uk.service@widia.com

*Includes Bahrain, Dubai, and Kuwait.

Malaysia
General Sales: +60 03-5569 9080
w-my.service@widia.com

New Zealand
General Sales: 0800 536 626 (Local)
+61 1300 094 342 (Overseas)
w-nz.service@widia.com

Singapore*
General Sales: +65 65724466
w-sg.service@widia.com

*Vietnam, Philippines, and Indonesia individuals should contact the Singapore office.

Taiwan
General Sales: +886 4 2350 1920
w-tw.service@widia.com

Thailand
General Sales: +66 2 642 3455
w-th.service@widia.com



Turning Icons

 Shank: KM-TS™ (ISO 26622)	 ISO: 26622	 Through Coolant: 100 bar	 Through Coolant: 100 bar	 Turning
 Cut-off	 I.D. Turning	 I.D. Chamfering	 I.D. Grooving	 I.D. Face Grooving
 I.D. Internal Threading	 Profiling	 Facing	 Face Grooving	 Back Boring
 Threading	 Grooving			

Indexable Milling Icons

 Countersinking	 Face Milling	 Helical Milling	 Plunge Milling	 Ramping Blank
 Slotting: Ball Nose	 Slotting: Side Milling	 Slotting: Side Milling with AE/AP Dimensions	 Slotting: Square End	 Slotting: T
 Side Milling/Shoulder Milling: Ball Nose	 Side Milling/Shoulder Milling: Square End	 Side Milling: Square End with AE/AP Dimensions	 Chamfer Milling	 Side Milling: Roughing
 3D Profiling	 PCD Tool	 Pocketing	 Plain Shank	 Shell Mill Shank
 Weldon® Shank	 Weldon Shank: 2 Flat	 Screw-On Shank	 Shank	 Through Coolant: Radial: Indexable Milling

Solid End Milling Icons

 Plunge Milling	 Ramping Blank	 Slotting: Ball Nose	 Slotting: Ball Nose with AP Dimension	 Slotting: Square End
 Slotting: Square End with AP Dimension	 Trochoidal Milling	 Trochoidal Milling: Ball Nose	 Side Milling/ Shoulder Milling: Ball Nose	 Side Milling/Shoulder Milling: Ball Nose with AE/AP Dimension
 Side Milling/Shoulder Milling: Square End	 Side Milling/Shoulder Milling: Square End with AE/AP Dimension	 Chamfer Milling	 Chamfer Milling: Chamfer Milling with AE/AP Dimension	 3D Profiling
 PCD Tool	 HSS-PM Material	 HSS-M42	 Corner Style: Ball Nose	 Corner Style: Corner Chamfer
 Corner Style: Corner Radius	 Corner Style: Square End	 Corner Style: Torus	 Helix Angle: 0°	 Helix Angle: 15°

(continued)

(continued)

Solid End Milling Icons

 Helix Angle: 20°	 Helix Angle: 25°	 Helix Angle: 30°	 Helix Angle: 35°	 Helix Angle: 37°
 Helix Angle: 38°	 Helix Angle: 40°	 Helix Angle: 45°	 Helix Angle: 50°	 Helix Angle: 60°
 Helix Angle: 43°	 DIN 6528	 DIN 844	 DIN 1835B	 DIN 6527
 Through Coolant: Radial: Drilling	 Through Coolant: Axial: Solid End Mill	 Tool Dimensions: Flute Configuration: X (Variable)	 Tool Dimensions: Flute Configuration: 1	 Tool Dimensions: Flute Configuration: 2
 Tool Dimensions: Flute Configuration: 3	 Tool Dimensions: Flute Configuration: 4	 Tool Dimensions: Flute Configuration: 5	 Tool Dimensions: Flute Configuration: 6	 Tool Dimensions: Flute Configuration: 7
 Manufacturer's Specs: JIS				

Holemaking Icons

 Countersinking/ Stroke Chamfering	 Drilling	 Chain Drilling	 Drilling: Cross Hole	 Drilling: Half Cylinder
 Drilling: Corner Drilling 45°	 Drilling: Inclined Entry	 Drilling: Inclined Exit	 Drilling: Exit Offset	 Drilling: Stacked Plates
 Drilling: Convex	 Drilled Hole	 Reaming: Through Hole	 Reaming: Blind Hole	 Reaming: Through Cross
 Reaming: Blind and Cross Holes	 Drilling Depth: 3x	 Drilling Depth: 5x	 Drilling Depth: 8x	 Drilling Depth: 12x
 Shank: Cylindrical Plain ≤h6	 Shank: Cylindrical Whistle Notch 2°	 Flat Shank	 Shank: Cylindrical with flat	 KM™ Shank
 Helix Angle 0°	 Helix Angle 30°	 DIN Number 212	 DIN Number 6535	 DIN Number 6537
 Through Coolant: Radial: Drilling	 Through Coolant: Radial: Drilling	 Through Coolant: Radial: Indexable Drilling	 Flood Coolant: Reaming	 Through Coolant: MQL (Minimum Quantity Lubricant): Drilling
 Axial: Drilling	 Through Coolant: Axial Reaming	 Tool Dimensions: 2-Flute/2-Margin/ Coolant	 Tool Dimensions: 2-Flute/4-Margin/ Coolant	

(continued)

(continued)

Tapping Icons

Tapping: Blind Hole	Threading: Through Hole	Threading: Blind Hole	HSS-E: High-Speed Steel with Cobalt Alloy for Materials with Higher Hardness	HSS-E-PM: High-Speed Steel with Cobalt Alloy for Materials with Higher Hardness (PM = Power Metal Steel)
HM: (Carbide)	Square Shank	Chamfer Form C (2–3)	Chamfer Form D (3.5–5)	Chamfer Form E (1.5–2)
Plug Chamfer (3–5)	Tapping Helix: Angle: 0°	Tapping Helix: Angle: 10°	Tapping Helix: Angle: L8°	Tapping Helix: Angle: 15°
Tapping Helix: Angle: L15°	Tapping Helix: Angle: 25°	Tapping Helix: Angle: 30°	Tapping Helix: Angle: 42°	Tapping Helix: Angle: 45°
DIN Number 371	DIN Number 374	DIN Number 2174	DIN Number 376	Tapping: Through Coolant
Flood Coolant: Tapping	Through Coolant: Axial: Tapping	ISO 2	Manufacturer's Specs: JIS	Class of Fit: 2B
Class of Fit: 3B	Class of Fit: 6H	Class of Fit: 6HX	Class of Fit: 6G	ANSI
Unified Course Thread: J Profile	Unified Fine Thread: J Profile	Unified Fine Thread	Unified Course Thread	ISO Metric Coarse Thread
ISO Metric Fine Thread				

DIN — German Institute for Standardisation

P Steel	K Cast Iron	S High-Temp Alloys
M Stainless Steel	N Non-Ferrous	H Hardened Materials

material group	description	content	tensile strength RM (MPa)*	hardness (HB)	hardness (HRC)	material number
P0	Low-Carbon Steels, Long Chipping	C <0,25%	<530	<125	–	–
P1	Low-Carbon Steels, Short Chipping, Free Machining	C <0,25%	<530	<125	–	C15, Ck22, ST37-2, S235JR, 9SMnPb28, GS38
P2	Medium- and High-Carbon Steels	C >0,25%	>530	<220	<25	ST52, S355JR, C35, GS60, Cf53
P3	Alloy Steels and Tool Steels	C >0,25%	600–850	<330	<35	16MnCr5, Ck45, 21CrMoV5-7, 38SMn28
P4	Alloy Steels and Tool Steels	C >0,25%	850–1400	340–450	35–48	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P5	Ferritic, Martensitic, and PH Stainless Steels	–	600–900	<330	<35	100Cr6, 30CrNiMo8, 42CrMo4, C70W2, S6525, X120Mn12
P6	High-Strength Ferritic, Martensitic, and PH Stainless Steels	–	900–1350	350–450	35–48	X102CrMo17, G-X120Cr29
M1	Austenitic Stainless Steel	–	<600	130–200	–	X5CrNi 18 10, X2CrNiMo 17 13 2, G-X25CrNiSi18 9, X15CrNiSi 20 12
M2	High-Strength Austenitic Stainless and Cast Stainless Steels	–	600–800	150–230	<25	X2CrNiMo 13 4, X5NiCr 32 21, X5CrNiNb 18 10, G-X15CrNi 25-20
M3	Duplex Stainless Steel	–	<800	135–275	<30	X8CrNiMo27 5, X2CrNiMoN22 5 3, X20CrNiSi25 4, G-X40CrNiSi27 4
K1	Grey Cast Iron	–	125–500	120–290	<32	GG15, GG25, GG30, GG40, GTW40
K2	Low- and Medium-Strength Ductile Irons (Nodular Irons) and Compacted Graphite Irons (CGI)	–	<600	130–260	<28	GGG40, GTS35
K3	High-Strength Ductile Irons and Austempered Ductile Iron (ADI)	–	>600	180–350	<43	GGG60, GTW55, GTS65
N1	Wrought Aluminium	–	–	–	–	AlMg1, Al99.5, AlCuMg1, AlCuBiPb, AlMgSi1, ALMgSiPb
N2	Low-Silicon Aluminium Alloys and Magnesium Alloys	Si <12,2%	–	–	–	GAlSiCu4, GDAlSi10Mg
N3	High-Silicon Aluminium Alloys and Magnesium Alloys	Si >12,2%	–	–	–	G-ALSi12, G-AlSi17Cu4, G-AlSi21CuNiMg
N4	Copper-, Brass-, Zinc-Based on Machinability Index Range of 70–100	–	–	–	–	CuZn40, Ms60, G-CuSn5ZnPb, CuZn37, CuSi3Mn
N5	Nylon, Plastics, Rubbers, Phenolics, Resins, Fibreglass	–	–	–	–	Lexan®, Hostalen™, Polystyrol, Makrolon®
N6	Carbon, Graphite Composites, CFRP	–	–	–	–	CFK, GFK
N7	Metal Matrix Composites (MMC)	–	–	–	–	–
S1	Iron-Based, Heat-Resistant Alloys	–	500–1200	160–260	25–48	X1NiCrMoCu32 28 7, X12NiCrSi36 16, X5NiCrAlTi31 20, X40CoCrNi20 20
S2	Cobalt-Based, Heat-Resistant Alloys	–	1000–1450	250–450	25–48	Haynes® 188, Stellite® 6,21,31
S3	Nickel-Based, Heat-Resistant Alloys	–	600–1700	160–450	<48	INCONEL® 690, INCONEL 625, Hastelloy®, NIMONIC® 75
S4	Titanium and Titanium Alloys	–	900–1600	300–400	33–48	Ti1, TiAl5Sn2, TiAl6V4, TiAl4Mo4Sn2
H1	Hardened Materials	–	–	–	44–48	GX260NiCr42, GX330NiCr42, GX300CrNiSi952, GX300CrMo153, Hardox® 400
H2	Hardened Materials	–	–	–	48–55	–
H3	Hardened Materials	–	–	–	56–60	–
H4	Hardened Materials	–	–	–	>60	–



On the Web

We are here to serve you.

Visit our homepage at widia.com to:

- Find a Local WIDIA™ Authorised Distributor near you.
- Contact our Customer Application Support team for technical support and product recommendations.
- Log in to NOVO™ for instant access to inventory availability, application recommendations, CAD drawings, and 3D models.
- Purchase WIDIA-branded merchandise.
- Get social with us on Facebook, Twitter, Instagram, YouTube, and more!



NOVO™

You can also use our NOVO app to guide you to the correct choice!

For more information, please visit widia.com/novo.

NOVO: The Digital Source for Delivering Smart Machining Solutions

For more information, contact your local WIDIA Authorised Distributor or visit **widia.com/services**.

WIDIA™

Find your Local WIDIA Authorised Distributor

WIDIA™ brand cutting tools are available exclusively through a specialised network of Authorised Distributor partners whom you can count on to deliver much more than products. Our distributors know us, and more importantly, they know you. They know better than anyone in the industry how to put the global power of WIDIA to work for you — in your industry, in your region, and for your business.

WIDIA distributor partners provide technical expertise that you can count on. They will show you how to:

- Significantly reduce cycle time.
- Improve machine tool utilisation.
- Achieve measurable productivity improvements.
- Take advantage of proven supply chain solutions.
- Access local inventory and best-in-class technical support.
- Request onsite demonstrations of the latest tooling technology.

And with thousands of turning, milling, holemaking, tapping, and tooling systems products available from WIDIA, you'll find everything you need from one single source.



Find your Local WIDIA Authorised Distributor by accessing our distributor finder at **widia.com**

IMPORTANT SAFETY INSTRUCTIONS: Read before using the tools in this catalogue

METALCUTTING SAFETY

Projectile and Fragmentation Hazards

Modern metalcutting operations involve high spindle and cutter speeds and high temperatures and cutting forces. Hot metal chips may fly off the workpiece during metalcutting. Although cutting tools are designed and manufactured to withstand high cutting forces and temperatures, they can sometimes fragment, particularly if they are subjected to over-stress, severe impact, or other abuse.

To avoid injury:

- Always wear appropriate personal protective equipment, including safety goggles, when operating metalcutting machines or working nearby.
- Always make sure all machine guards are in place.

Breathing and Skin Contact Hazards

Grinding carbide or other advanced cutting tool materials produces dust or mist containing metallic particles. Breathing this dust or mist — especially over an extended period — can cause temporary or permanent lung disease or make existing medical conditions worse. Contact with this dust or mist can irritate eyes, skin, and mucous membranes and may make existing skin conditions worse.

To avoid injury:

- Always wear breathing protection and safety goggles when grinding.
- Provide ventilation control and collect and properly dispose of dust, mist, or sludge from grinding.
- Avoid skin contact with dust or mist.

For more information, read the applicable Material Safety Data Sheet provided by WIDIA and consult General Industry Safety and Health Regulations, Part 1910, Title 29 of the Code of Federal Regulations.

These safety instructions are general guidelines. Many variables affect machining operations. It is impossible to cover every specific situation. The technical information included in this catalogue and recommendations on machining practices may not apply to your particular operation.

For more information, consult WIDIA's Metalcutting Safety booklet, available free from WIDIA at +1 724 539 5747 or fax +1 724 539 5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at +1 724 539 5066 or fax +1 724 539 5372.

ArCut, AluSurf, Blue Box, CERMET-DCFD, CW2015, CW3020, CW5025, ERICKSON, GP6505, GP6520, Green Box, GUN, HCK10, HSR, HydroForce, KM, KM-LOC, KM-LOC II, KM-TS, K10, K10F, K10F-DCFD, M25, M100, M170, M200, M270, M370, M900, NINA, NOVO, ProGroove, Quadralock, ROTAFLEX, Shoulder Mill 11, Shoulder Mill 17, Separator, SuperFeed, TN6010, TN6025, TopClamp, Top Cut 4, TOP DRILL, TOP DRILL G, TOP DRILL M1, TOP DRILL S, TOP DRILL S+, ToolBOSS, TopGroove, TopThread, VariDrill, VariMill, VariMill I, VariMill II, VariMill III, VariTap, VariTurn, Victory, Vision Plus, Vision Plus X-Feed, VSM11, VSM17, VSM490-15, WavCut, WavCut I, WBH10P, WBH25P, WBH30P, WBK40U, WDN00U, WDN25U, Widafl ex, WIDIA, WIDIA-CIRCLE, WIDIA-GTD, WIDIA, WIDIA-Metcut, WIDIA-Rubig, WK15CM, WK15PD, WMT, WMT-SX, WN10HD, WP15PE, WP20PD, WP25CT, WP35CT, WP40PM, WST, WS10PT, WS15PE, WS25PT, WS30PM, WU05PR, WU10HT, WU10PT, WU20PD, WU25PD, and X-Feed are trademarks of Kennametal, Inc. and are used as such herein. The absence of a product, service name, or logo from this list does not constitute a waiver of Kennametal's trademark or other intellectual property rights concerning that name or logo.

Hardox® is a registered trademark of SSAB Technology AB Corporation. Hastelloy® is a registered trademarks of Haynes International, Inc. Corporation. Hostalen® is a registered trademark of HOECHST GMBH. INCONEL®, NIMONIC®, and UDIMET® are registered trademarks of Special Metals Corporation. Lexan® is a registered trademark of Sabic Global Technologies B.V. Makrolon® is a registered trademark of Bayer Aktiengesellschaft. **SAFE-λOCK**® is a registered trademark and **SAFE-LOCK**™ is a trademark of Haimer GmbH. Teflon® is a registered trademark of The Chemours Company FC, LLC. Weldon® is a registered trademark of Weldon Tool Company.

©Copyright 2016 by Kennametal Inc., Latrobe, PA 15650. All rights reserved.