WIDIA™

TURNING

WIDIA™ Means Complete Quality

As an innovator for more than 80 years, the WIDIA Products Group has been designing and manufacturing metalcutting products that make customer machining processes more efficient and effective.

With thousands of products in our portfolio, the WIDIA Products Group offers competitive advantages that will enhance your productivity and bolster your profitability.

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

TURNING

Turning

Introduction . . . . . ii–vii

Tools for External Turning, Internal Boring, and Cartridges A1–A99

Inserts B1–B87

Small Hole Boring C1–C131

Grooving, Cut-Off, and Turning D1–D115

Threading E1–E87

WIDIA™ Value F1–F21

Speciality G1–G61

Custom Solutions H1–H11

Services and Support I1–I9

Technical Information J1–J27

Index by Order Number K2–K26

Index by Catalogue Number K27–K51

Global Contacts K52–K53

WIDIA™ means complete quality

When you buy products from the WIDIA family of brands, you're not just buying speed, power, and precision — you're buying complete quality.

The WIDIA Products Group brands offer the most complete portfolio of precision-engineered products and custom solution services available today. With more than 14,000 turning, milling, and holemaking products in our portfolio and a skilled network of Authorised Distributor partners, you'll find everything you need from one single source.

80+ Years of Quality

1925
Application to register "WIDIA" as a trademark

1926
Tungsten carbide production begins

1930
WIDIA wins the Grand Prix at the world exposition EXPO in Liege

1962
First patent granted for coated carbide inserts

1968
Launch of first global coated grade

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 Essen and Lichtenau

2006
WIDIA celebrates 80 years

2009
Launch of the TN5100 and TN7100 Series grades for turning

Technical expertise
you can count on

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.

They will show you how to:

- Achieve measurable productivity improvements.
- Significantly reduce cycle time.
- Improve machine tool utilisation.
- Take advantage of proven supply chain solutions.
- Access local inventory and best-in-class technical support.
- Request onsite demonstrations of the latest tooling technology.

The most powerful
family of brands in the industry

The WIDIA family of brands is well served by a global network of the finest Authorised Distributors in the industry, selected for their specialised expertise in the areas of:

Turning, Holemaking, Indexable Milling, and Tooling Systems

WIDIA™ | WIDIA™ MANCHESTER™ | WIDIA™ CLAPPDICO™ | WIDIA™ CIRCLE™

Solid Carbide End Milling and Solid Carbide Drilling and Reaming

WIDIA™ HANITA™ | WIDIA™ RÜBIG™

Tapping Operations

WIDIA™ GTD™

Easy to order

Finding the right WIDIA™ products for your machining applications has never been easier. Our engineers and Authorised Distributor partners are experts in high-performance machining. They will work with you to determine the correct product for your application, then order, ship, and deliver the product with the attention to customer service you would expect from a world-leading brand.

Supply chain services

Whether your manufacturing enterprise involves batch processes or mass production, or your metalcutting machines are organised in lines, cells, or as standalone units, our supply chain services program will eliminate unnecessary overhead, ensure tooling availability, shorten setup times, and minimise costs by 30–90%.

In fact, our solutions often quickly pay for themselves by delivering savings that well exceed your annual spend on cutting tools and supplies.

Global manufacturing

WIDIA products are developed and manufactured at our Centres of Manufacturing Excellence in

- Essen, Germany
- Lichtenau, Germany
- Nabburg, Germany
- Johnson City, Tennessee, USA
- New Market, Virginia, USA
- Orwell, Ohio, USA
- Solon, Ohio, USA
- Bangalore, India
- Shlomi, Israel

Robust training programs

As a WIDIA™ customer, you can gain access to our exclusive online training program, where you'll find dozens of training courses on our newest products and services.

On the web

Visit our website to read up-to-the-minute information about new products, download electronic copies of product literature, and see a list of industry events in which we are participating. Visit www.widia.com and use the Distributor Finder to locate the Authorised Distributor nearest you.

When you think
speed, power, and precision,
think complete quality —
think WIDIA.

To find the Authorised WIDIA Distributor nearest you, use the Distributor Finder at **www.widia.com**.

Custom Solutions for
Turning, Boring, Grooving, Cut-Off, and Threading

We are dedicated to designing and developing special turning, milling, and holemaking solutions for demanding operations and focused manufacturing. Our factory engineers, production experts, and field application engineers are available to work with you to design solutions to provide maximum productivity and throughput.

Unique advantages, such as in-house PVD high-quality coating facilities (TiN, TiCN, TiAlN, AlTiN, Z-coat), a wide range of raw materials (HSS, HSS-E, HSS-Powder; Solid Carbide, Brazed Carbide), and capabilities for a wide range of diameters 0,25mm to 75mm, position WIDIA™ as the preferred brand for high-quality, application-specific tools.

We specialise in designing and manufacturing blueprint specials in the following tool styles:

- Complex geometries
- Toolholders and boring bars
- Form tools
- Modified standards
- Superabrasives (PCD and CBN)
- Tooling and inserts for:
  - Bar peeling
  - Heavy duty turning
  - Railway wheel machining

Environmental responsibility

We are deeply committed to offering environmentally responsible products that deliver high performance and proven value. With decades of experience in tooling and manufacturing, combined with the synergy of superior engineering, we offer customers some of the most effective opportunities for sustainable manufacturing in the industry.

Sustainable engineering

Leading the way with innovation, engineering, and service in standard and custom tooling. A proven methodology and partnership.

Successful project engineering requires planning, teamwork, and disciplined execution. Through our extensive experience in developing and implementing new project engineering strategies, we have pioneered a proven methodology to help you manufacture new products and bring them to market quickly. Service deliverables are carefully outlined and jointly agreed to before the project begins. We formally evaluate progress and results with you throughout the project through our stage-gate management systems.

With our best-in-class process, you'll experience accelerated time to market, lower overall costs, and reduced risks to implement new technologies.

Vendor of choice

We serve every major industrial market throughout the world and are a brand of choice in the most demanding industries, including Aerospace, Die and Mould, Automotive, Heavy Equipment, Medical, and General Engineering. Throughout our more than 80-year history, we have achieved a reputation for providing our customers with a constant flow of new and unique products and services, specially designed for maximum efficiency and performance. We have enabled customers to become more competitive and more profitable in their own industries, producing parts in less time, with fewer tool changes and longer tool life.

We are committed to providing you with tools and services that deliver the ultimate in customer satisfaction, and we are pleased to feature some of our latest breakthroughs in this catalogue. For more information about how these products can impact your bottom line, please contact your local Authorised WIDIA™ Distributor today.

WIDIA

Tools for External Turning, Internal Boring, and Cartridges

External Turning Toolholders — Catalogue Numbering System A4–A5
External Turning Toolholders — Overview A6–A7
External Turning Toolholders A8–A35
Internal Boring Toolholders — Catalogue Numbering System A38–A39
Internal Boring Toolholders — Overview A40–A41
Internal Boring Toolholders A42–A56
Miniature Toolholders A57–A59
Cartridges — Catalogue Numbering System A62–A63
Cartridges — Overview A64–A65
Cartridges A66–A99

Tools for External Turning

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.

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.

Clamping System M

- Combined pin/wedge clamp for negative inserts.
- An extremely sturdy clamping system, specially designed for interrupted cuts.
- Protected by a carbide shim.

Clamping System P

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

Clamping System S

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

Clamping System C

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

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 with hole

S

Center clamping by screw for inserts with hole

C — Insert Shape

K — Toolholder Style

N — Insert Clearance Angle

R — Hand of Tool

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

Additional Information	25 25	M	12	Additional Information	Insert Thickness *(optional)*
	Shank Dimensions	Tool Length	Insert Size Cutting Edge Length L10		

C Deep pocket for ceramic insert

S Single pocket locating wall

F Straight shank, no offset

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

l_1	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

H

O

P

S

T

CDE M V

W

L

A B K

R

M..
MF, MN, MX, for ceramic and PCBN inserts

4,76mm = 04

6,35mm = 06

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.

MCKN 75° Page: A8

MCLN 95° Page: A8

MCMN 50° Page: A9

MDJN 93° Page: A9

MSDN 45° Page: A10

MSSN 45° Page: A10

MTEN-S 60° Page: A11

MVJN 93° Page: A11

MVON 117,5° Page: A12

MVVN 72,5° Page: A12

MWLN 95° Page: A13

MSBN 75° Page: A13

MRGN Page: A14

Clamping System P

P

Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20,0mm 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: A15

PCKN 75° Page: A15

PCLN 95° Page: A16

PDJN 93° Page: A17

PDNN 62,5° Page: A17

PSBN 75° Page: A18

PSDN 45° Page: A19

PSKN 75° Page: A19

PSSN 45° Page: A20

PTFN 90° Page: A20

PTGN 90° Page: A21

PWLN 95° Page: A21

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. Toolholders with cutting edge heights upwards of 16,0mm and insert ICs greater than 6,35mm.

CCLN-MX
95°
Page: **A22**

CCLN-MN
95°
Page: **A22**

CCLN-MF
95°
Page: **A22**

CDJN-MX
93°
Page: **A23**

CDJN-MN
93°
Page: **A23**

CELN-MF
97,5°
Page: **A23**

CELN-MN
97,5°
Page: **A24**

CKJN
Page: **A24**

CRDN-MN
Page: **A24**

CRSN-MN
Page: **A25**

CSBP
75°
Page: **A25**

CSDP
45°
Page: **A26**

CSSP
45°
Page: **A26**

CTCPN
90°
Page: **A27**

CTDP
45°
Page: **A27**

CTFP
90°
Page: **A28**

CTGP
90°
Page: **A28**

572-SCE
Page: **A29**

CRDP*
Page: **A30**

CRGP*
Page: **A30**

*Exact Clamping System not shown.

Clamping System S

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 16,0mm and insert ICs from 9,52mm are secured by means of a threaded bushing.

SCLC
95°
Page: **A31**

SDHC
107,5°
Page: **A31**

SDJC
93°
Page: **A32**

SDNC
62,5°
Page: **A32**

SRDC
Page: **A33**

SSBC
75°
Page: **A33**

SSSC
45°
Page: **A34**

STFC
90°
Page: **A34**

SVHB
107,5°
Page: **A35**

SVJB
93°
Page: **A35**

SVVB
72,5°
Page: **A35**

See pages B16–B19, B46, and B72–B73 for inserts.

NOTE: H = H1

MCKN 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852705	**MCKNR2525M12**	25	25	32,3	151	35,1	—	3,1	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	3mm	**CKM21**	**STCM20**	3mm
3852706	**MCKNR3225P16**	32	25	32,3	171	36,8	—	3,8	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
	Left hand																
3852703	**MCKNL2525M12**	25	25	32,3	151	35,1	—	3,1	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	3mm	**CKM21**	**STCM20**	3mm
3852704	**MCKNL3225P16**	32	25	32,3	171	36,8	—	3,8	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm

See pages B16–B19, B46, and B72–B73 for inserts.

NOTE: H = H1

MCLN 95°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852716	**MCLNR2020K12**	20	20	25,3	126	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852717	**MCLNR2525M12**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852720	**MCLNR3225P12**	32	25	32,3	171	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852718	**MCLNR2525M16**	25	25	32,3	151	33,0	—	—	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852721	**MCLNR3225P16**	25	25	32,3	171	33,0	—	—	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852719	**MCLNR2525M19**	25	25	32,3	151	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852722	**MCLNR3225P19**	32	25	32,3	171	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852723	**MCLNR3232P19**	32	32	40,3	171	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852724	**MCLNR4040R19**	40	40	50,3	201	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
	Left hand																
3852707	**MCLNL2020K12**	20	20	25,3	126	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852708	**MCLNL2525M12**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852711	**MCLNL3225P12**	32	25	32,3	171	32,0	—	—	-5.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852709	**MCLNL2525M16**	25	25	32,3	151	33,0	—	—	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852712	**MCLNL3225P16**	32	25	32,3	171	33,0	—	—	-5.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852710	**MCLNL2525M19**	25	25	32,3	151	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852713	**MCLNL3225P19**	32	25	32,3	171	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852714	**MCLNL3232P19**	32	32	40,3	171	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
3852715	**MCLNL4040R19**	40	40	50,3	201	38,0	—	—	-5.0	-5.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm

See pages B16–B19, B46, and B72–B73 for inserts.

NOTE: H = H1

MCMN 50°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
3852725	**MCMNN2020K12**	20	20	9,8	126	32,0	—	—	0.0	-7.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852726	**MCMNN2525M12**	25	25	12,3	151	32,0	—	—	0.0	-7.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
3852727	**MCMNN3225P16**	32	25	12,3	171	38,0	—	—	0.0	-7.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852728	**MCMNN4040R19**	40	40	19,8	201	42,0	—	—	0.0	-7.0	CN..190612	**ICSN643**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm

See pages B22–B25, B52, and B76–B78 for inserts.

NOTE: H = H1

MDJN 93°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852734	**MDJNR2020K11**	20	20	25,3	126	32,0	—	—	-5.0	-5.0	DN..110408	**IDSN332**	**KLM34L**	2mm	**CKM7**	**STCM5**	2.5mm
3852736	**MDJNR2525M11**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	DN..110408	**IDSN332**	**KLM34L**	2mm	**CKM7**	**STCM5**	2.5mm
3852735	**MDJNR2020K15**	20	20	25,3	126	36,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm
3852737	**MDJNR2525M15**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm
3852738	**MDJNR3225P15**	32	25	32,3	171	32,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm
	Left hand																
3852729	**MDJNL2020K11**	20	20	25,3	126	32,0	—	—	-5.0	-5.0	DN..110408	**IDSN332**	**KLM34L**	2mm	**CKM7**	**STCM5**	2.5mm
3852731	**MDJNL2525M11**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	DN..110408	**IDSN332**	**KLM34L**	2mm	**CKM7**	**STCM5**	2.5mm
3852730	**MDJNL2020K15**	20	20	25,3	126	36,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm
3852732	**MDJNL2525M15**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm
3852733	**MDJNL3225P15**	32	25	32,3	171	32,0	—	—	-5.0	-5.0	DN..150608	**IDSN432**	**KLM46L**	2.5mm	**CKM22**	**STCM20**	3mm

See pages B30–B33, B55–B56, and B81 for inserts.

NOTE: H = H1

MSDN 45°

order number	catalogue number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Left hand														
3852739	MSDNN2020K12	20	20	9,8	126	32,0	0.0	-7.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852740	MSDNN2525M12	25	25	12,3	151	32,0	0.0	-7.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852742	MSDNN3225P12	32	25	12,3	171	32,0	0.0	-7.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852741	MSDNN2525M15	25	25	12,3	151	35,0	0.0	-7.0	SN..150412	ISSN533	KLM58	3mm	CKM21	STCM20	3mm
3852743	MSDNN3232P19	32	32	15,8	171	42,0	0.0	-7.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm

See pages B30–B33, B55–B56, and B81 for inserts.

NOTE: H = H1

MSSN 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852747	MSSNR2020K12	20	20	16,6	126	32,0	8,7	8,3	0.0	-8.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852748	MSSNR2525M12	25	25	23,6	151	32,0	8,7	8,3	0.0	-8.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852749	MSSNR3232P19	32	32	27,3	171	40,0	13,0	12,5	0.0	-8.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm
	Left hand																
3852744	MSSNL2020K12	20	20	16,6	126	32,0	8,7	8,3	0.0	-8.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852745	MSSNL2525M12	25	25	23,6	151	32,0	8,7	8,3	0.0	-8.0	SN..120408	ISSN432	KLM46	3mm	CKM21	STCM20	2.5mm
3852746	MSSNL3232P19	32	32	27,3	171	40,0	13,0	12,5	0.0	-8.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm

See pages B36–B39, B58, and B83 for inserts.

NOTE: H = H1

MTEN-S 60°

order number	catalogue number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
3852750	**MTENNS2020K16**	20	20	10,0	126	32,0	0.0	-10.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852751	**MTENNS2525M16**	25	25	12,0	151	32,0	0.0	-10.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852752	**MTENNS2525M22**	25	25	12,0	151	35,0	0.0	-10.0	TN..220408	**ITSN433**	**KLM46**	2.5mm	**CKM9**	**STCM4**	4mm
3852753	**MTENNS3225P22**	32	25	12,0	171	35,0	0.0	-10.0	TN..220408	**ITSN433**	**KLM46**	2.5mm	**CKM9**	**STCM4**	4mm

See pages B43, B59, and B86 for inserts.

NOTE: H = H1

MVJN 93°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852758	**MVJNR2020K16**	20	20	25,3	126	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852759	**MVJNR2525M16**	25	25	32,3	151	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852760	**MVJNR3225P16**	32	25	32,3	171	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852761	**MVJNR3225P22**	32	25	32,3	171	50,0	—	—	-9.0	-5.0	VN..220408	**IVSN432**	**KLM46**	2.5mm	**CKM26**	**STCM4**	4mm
	Left hand																
3852754	**MVJNL2020K16**	20	20	25,3	126	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852755	**MVJNL2525M16**	25	25	32,3	151	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852756	**MVJNL3225P16**	32	25	32,3	171	37,0	—	—	-9.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852757	**MVJNL3225P22**	32	25	32,3	171	50,0	—	—	-9.0	-5.0	VN..220408	**IVSN432**	**KLM46**	2.5mm	**CKM26**	**STCM4**	4mm

See pages B43, B59, and B86 for inserts.
NOTE: H = H1

NOTE: H = H1

MVON 117,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852763	**MVONR2525M16**	25	25	32,3	151	30,0	—	—	-6.4	-6.4	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM6**	**STCM5**	2.5mm
	Left hand																
3852762	**MVONL2525M16**	25	25	32,3	151	30,0	—	—	-6.4	-6.4	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM6**	**STCM5**	2.5mm

See pages B43, B59, and B86 for inserts.

NOTE: H = H1

MVVN 72,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
3852764	**MVVNN2020K16**	20	20	10,0	125	42,0	—	—	0.0	-14.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852765	**MVVNN2525M16**	25	25	12,5	150	42,0	—	—	0.0	-14.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852766	**MVVNN3225P16**	32	25	12,5	170	42,0	—	—	0.0	-14.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm

See pages B43–B45, B59, and B87 for inserts.

NOTE: H = H1

MWLN 95°

order number	catalogue number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand														
3852769	MWLNR2020K06	20	20	25,3	126	25,0	-5.0	-5.0	WN..060408	IWSN322	KLM34L	2.5mm	CKM6	STCM5	2mm
3852770	MWLNR2525M06	25	25	32,3	151	25,0	-5.0	-5.0	WN..060408	IWSN322	KLM34L	2.5mm	CKM6	STCM5	2mm
	Left hand														
3852767	MWLNL2020K06	20	20	25,3	126	25,0	-5.0	-5.0	WN..060408	IWSN322	KLM34L	2.5mm	CKM6	STCM5	2mm
3852768	MWLNL2525M06	25	25	32,3	151	25,0	-5.0	-5.0	WN..060408	IWSN322	KLM34L	2.5mm	CKM6	STCM5	2mm

See pages B30–B33, B55–B56, and B81 for inserts.

NOTE: H = H1

MSBN 75°

order number	catalogue number	H	B	F	L1	L2	FA	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand															
3852771	MSBNR2020K12	20	20	17,3	126	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852773	MSBNR2525M12	25	25	22,3	151	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852775	MSBNR3225P12	32	25	22,3	171	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852777	MSBNR3232P15	32	32	27,3	171	35,0	3,8	-5.0	-5.0	SN..150612	ISSN533	KLM58	3mm	CKM21	STCM20	3mm
3852779	MSBNR3232P19	32	32	27,3	171	40,0	4,6	-5.0	-5.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm
3852781	MSBNR4040R19	40	40	35,3	201	40,0	4,6	-5.0	-5.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm
	Left hand															
3852772	MSBNL2020K12	20	20	17,3	126	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852774	MSBNL2525M12	25	25	22,3	151	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852776	MSBNL3225P12	32	25	22,3	171	32,0	3,1	-5.0	-5.0	SN..120408	ISSN433	KLM46	2.5mm	CKM21	STCM20	3mm
3852778	MSBNL3232P15	32	32	27,3	171	35,0	3,8	-5.0	-5.0	SN..150612	ISSN533	KLM58	3mm	CKM21	STCM20	3mm
3852780	MSBNL3232P19	32	32	27,3	171	40,0	4,6	-5.0	-5.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm
3852782	MSBNL4040R19	40	40	35,3	201	40,0	4,6	-5.0	-5.0	SN..190612	ISSN633	KLM68	4mm	CKM12	STCM4	4mm

See page B28 for inserts.

MRGN

NOTE: H = H1

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
3852784	**MRGNR2525M12**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	RN..120400	**IRSN43**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm
	Left hand																
3852783	**MRGNL2525M12**	25	25	32,3	151	32,0	—	—	-5.0	-5.0	RN..120400	**IRSN43**	**KLM46**	2.5mm	**CKM21**	**STCM20**	3mm

See pages B16–B19, B46, B50, and B72–B73 for inserts.

NOTE: H = H1

PCBN 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP

See pages B16–B19, B46, B50, and B72–B73 for inserts.

NOTE: H = H1

PCKN 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878371	**PCKNR3232P19**	32	32	40,0	170	40,0	—	4,6	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	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	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878368	**PCKNL3232P19**	32	32	40,0	170	40,0	—	4,6	-6.0	-6.0	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	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP

See pages B16–B19, B46, B50, and B72–B73 for inserts.

NOTE: H = H1

PCLN 95°

order number	catalogue number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand														
3900154	**PCLNR1616H09**	16	16	20,0	100	23,0	-6.0	-6.0	CN..090308	**512.111**	**513.019**	**515.018**	**511.018**	**514.018**	15 IP
3878400	**PCLNR1616H12**	16	16	20,0	100	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878422	**PCLNR2020K12**	20	20	25,0	125	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878419	**PCLNR2525M12**	25	25	32,0	150	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878402	**PCLNR3225P12**	32	25	32,0	170	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878401	**PCLNR2525M16**	25	25	32,0	150	28,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878421	**PCLNR3225P16**	32	25	32,0	170	38,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878396	**PCLNR3232P16**	32	32	40,0	170	36,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878413	**PCLNR3225P19**	32	25	32,0	170	38,0	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878414	**PCLNR3232P19**	32	32	40,0	170	36,0	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878417	**PCLNR4040S19**	40	40	50,0	250	36,0	-6.0	-6.0	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	-6.0	-6.0	CN..090308	**512.111**	**513.019**	**515.018**	**511.018**	**514.018**	15 IP
3878379	**PCLNL1616H12**	16	16	20,0	100	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878418	**PCLNL2020K12**	20	20	25,0	125	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878398	**PCLNL2525M12**	25	25	32,0	150	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878397	**PCLNL3225P12**	32	25	32,0	170	26,0	-6.0	-6.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3878380	**PCLNL2525M16**	25	25	32,0	150	28,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878399	**PCLNL3225P16**	32	25	32,0	170	38,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878415	**PCLNL3232P16**	32	32	40,0	170	36,0	-6.0	-6.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3878381	**PCLNL3225P19**	32	25	32,0	170	38,0	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878393	**PCLNL3232P19**	32	32	40,0	170	36,0	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3878416	**PCLNL4040S19**	40	40	50,0	250	36,0	-6.0	-6.0	CN..190612	**512.123**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP

See pages B22–B25, B52, and B76–B78 for inserts.

NOTE: H = H1

PDJN 93°

order number	catalogue number	H	B	F	L1	L2	λS°	γO°	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	-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	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3879151	**PDJNR2525M11**	25	25	32,0	150	30,0	-7.0	-6.0	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	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878425	**PDJNR3225P15**	32	25	32,0	170	38,0	-7.0	-6.0	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	-6.0	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	-6.0	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	-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	-6.0	DN..110408	**512.060**	**513.060**	**515.018**	**511.060**	**514.118**	10 IP
3878428	**PDJNL2525M11**	25	25	32,0	150	30,0	-7.0	-6.0	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	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879314	**PDJNL2525M15**	25	25	32,0	150	36,0	-7.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3878423	**PDJNL3225P15**	32	25	32,0	170	38,0	-7.0	-6.0	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	-6.0	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	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP

See pages B22–B25, B52, and B76–B78 for inserts.

NOTE: H = H1

PDNN 62,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand																
3879319	**PDNNR2525M15**	25	25	12,5	150	36,0	—	—	-6.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900156	**PDNNR3225P15**	32	25	12,5	170	36,0	—	—	-6.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879322	**PDNNR4025M15**	40	25	12,5	150	36,0	—	—	-6.0	-6.0	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	—	—	-6.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3900155	**PDNNL3225P15**	32	25	12,5	170	36,0	—	—	-6.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP
3879321	**PDNNL4025M15**	40	25	12,5	150	36,0	—	—	-6.0	-6.0	DN..150608	**512.153**	**513.023**	**515.018**	**511.024**	**514.128**	15 IP

See pages B30–B33,
B55–B56, and B81 for inserts.

NOTE: H = H1

PSBN 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	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	—	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900158	**PSBNR2525M12**	25	25	22,0	150	26,0	—	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900157	**PSBNL2525M12**	25	25	22,0	150	26,0	—	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	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	—	-6.0	-6.0	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP
3900159	**PSBNL5050T25**	50	50	43,0	300	50,0	—	—	-6.0	-6.0	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP

See pages B30–B33,
B55–B56, and B81 for inserts.

NOTE: H = H1

PSDN 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
3879336	**PSDNN1616H09**	16	16	8,0	100	20,0	—	—	0.0	-7.0	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879335	**PSDNN2020K12**	20	20	10,0	125	26,0	—	—	0.0	-7.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879337	**PSDNN2525M12**	25	25	12,5	150	26,0	—	—	0.0	-7.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900160	**PSDNN3225P15**	32	25	12,5	170	33,0	—	—	0.0	-7.0	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3900161	**PSDNN3232P15**	32	32	16,0	170	33,0	—	—	0.0	-7.0	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879338	**PSDNN4040S25**	40	40	20,0	250	47,0	—	—	0.0	-7.0	SN..250724	**512.092**	**513.038**	**515.028**	**511.038**	**514.138**	30 IP

See pages B30–B33,
B55–B56, and B81 for inserts.

NOTE: H = H1

PSKN 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand																
3879346	**PSKNR1616H09**	16	16	20,0	100	20	—	2,2	-6.0	-6.0	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879340	**PSKNR2020K12**	20	20	25,0	125	23	—	3,1	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879341	**PSKNR2525M12**	25	25	32,0	150	23	—	3,1	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879708	**PSKNR2525M15**	25	25	32,0	150	32	—	3,8	-6.0	-6.0	SN..150612	**512.025**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
3879342	**PSKNR3232P19**	32	32	40,0	170	38	—	4,6	-6.0	-6.0	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879710	**PSKNR4040S19**	40	40	50,0	250	38	—	4,6	-6.0	-6.0	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
	Left hand																
3879709	**PSKNL1616H09**	16	16	20,0	100	20	—	2,2	-6.0	-6.0	SN..090308	**512.053**	**513.019**	**515.018**	**511.018**	**514.118**	10 IP
3879343	**PSKNL2020K12**	20	20	25,0	125	23	—	3,1	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879339	**PSKNL2525M12**	25	25	32,0	150	23	—	3,1	-6.0	-6.0	SN..120408	**512.063**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879344	**PSKNL3232P19**	32	32	40,0	170	38	—	4,6	-6.0	-6.0	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP
3879345	**PSKNL4040S19**	40	40	50,0	250	38	—	4,6	-6.0	-6.0	SN..190612	**512.083**	**513.033**	**515.022**	**511.033**	**514.133**	25 IP

See pages B30–B33, B55–B56, and B81 for inserts.

PSSN 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879360	PSSNR3225P12	32	25	32,0	170	29,0	8,3	8,3	0.0	-8.0	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	0.0	-8.0	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879362	PSSNR3225P15	32	25	32,0	170	32,0	10,2	10,2	0.0	-8.0	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879354	PSSNR3232P15	32	32	40,0	170	32,0	10,2	10,2	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	SN..120408	512.063	513.023	515.018	511.023	514.123	15 IP
3879358	PSSNL3225P12	32	25	32,0	170	29,0	8,3	8,3	0.0	-8.0	SN..120408	512.063	513.023	515.018	511.023		15 IP
3879355	PSSNL2525M15	25	25	32,0	150	32,0	10,2	10,2	0.0	-8.0	SN..150612	512.025	513.025	515.022	511.025	514.125	15 IP
3879843	PSSNL3225P15	32	25	32,0	170	32,0	10,2	10,2	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	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	0.0	-8.0	SN..250724	512.092	513.038	515.028	511.038	514.138	30 IP

NOTE: H = H1

See pages B36–B39, B58, and B83 for inserts.

PTFN 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand																
3879369	PTFNR1616H16	16	16	20,0	100	20,0	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879367	PTFNR2020K16	20	20	25,0	125	20,0	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879364	PTFNR2525M16	25	25	32,0	150	20,0	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879372	PTFNR2525M22	25	25	32,0	150	26,0	—	—	-6.0	-6.0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3879370	PTFNR3225P22	32	25	32,0	170	26,0	—	—	-6.0	-6.0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP
3879845	PTFNR3232P22	32	32	40,0	170	26,0	—	—	-6.0	-6.0	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	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879366	PTFNL2020K16	20	20	25,0	125	20,0	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879368	PTFNL2525M16	25	25	32,0	150	20,0	—	—	-6.0	-6.0	TN..160408	512.013	513.018	515.018	511.018	514.118	10 IP
3879371	PTFNL2525M22	25	25	32,0	150	26,0	—	—	-6.0	-6.0	TN..220408	512.023	513.023	515.018	511.023	514.123	15 IP

See pages B36–B39, B58, and B83 for inserts.

NOTE: H = H1

■ PTGN 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand																
3879385	**PTGNR1616H16**	16	16	20,0	100	20,0	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879389	**PTGNR2020K16**	20	20	25,0	125	20,0	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879390	**PTGNR2525M16**	25	25	32,0	150	20,0	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879387	**PTGNR2525M22**	25	25	32,0	150	26,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879846	**PTGNR3225P22**	32	25	32,0	170	28,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879391	**PTGNR3232P22**	32	32	40,0	170	26,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900163	**PTGNR4040T27**	40	40	50,0	300	31,0	—	—	-6.0	-6.0	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	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879384	**PTGNL2020K16**	20	20	25,0	125	20,0	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879388	**PTGNL2525M16**	25	25	32,0	150	20,0	—	—	-6.0	-6.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879386	**PTGNL2525M22**	25	25	32,0	150	26,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879847	**PTGNL3225P22**	32	25	32,0	170	28,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879392	**PTGNL3232P22**	32	32	40,0	170	26,0	—	—	-6.0	-6.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900162	**PTGNL4040T27**	40	40	50,0	300	31,0	—	—	-6.0	-6.0	TN..270612	**512.031**	**513.025**	**515.022**	**511.028**	**514.128**	15 IP

See pages B43–B45, B59, and B87 for inserts.

NOTE: H = H1

■ PWLN 95°

order number	catalogue number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand														
3879405	**PWLNR1616H06**	16	16	20,0	100	14,0	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879407	**PWLNR2020K06**	20	20	25,0	125	14,0	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3900167	**PWLNR2525M06**	25	25	32,0	150	20,0	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879408	**PWLNR2020K08**	20	20	25,0	125	20,0	-6.0	-6.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879409	**PWLNR2525M08**	25	25	32,0	150	26,0	-6.0	-6.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900164	**PWLNR3232P08**	32	32	40,0	170	26,0	-6.0	-6.0	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	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879406	**PWLNL2020K06**	20	20	25,0	125	14,0	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3900166	**PWLNL2525M06**	25	25	32,0	150	20,0	-6.0	-6.0	WN..060408	**512.134**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3879403	**PWLNL2020K08**	20	20	25,0	125	20,0	-6.0	-6.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3879404	**PWLNL2525M08**	25	25	32,0	150	26,0	-6.0	-6.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3900165	**PWLNL3232P08**	32	32	40,0	170	26,0	-6.0	-6.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP

See pages B50–B51 for inserts.

NOTE: H = H1

CCLN-MX 95°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand															
3032691	**CCLNR2525M12-MX7**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5mm	**551.316**	4mm
3032713	**CCLNR3225P12-MX7**	32	25	32,0	170	32,0	—	—	-6.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5mm	**551.316**	4mm
	Left hand															
3032692	**CCLNL2525M12-MX7**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5mm	**551.316**	4mm

NOTE: MX clamping version is shown.

See pages B50–B51 for inserts.

NOTE: H = H1

CCLN-MN 95°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand															
3032715	**CCLNR2525M12-MN4**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5mm	**551.317**	4mm
3032717	**CCLNR2525M12-MN7**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5mm	**551.317**	4mm
3032719	**CCLNR3225P12-MN7**	32	25	32,0	170	32,0	—	—	-6.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5mm	**551.317**	4mm
	Left hand															
3032716	**CCLNL2525M12-MN4**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5mm	**551.317**	4mm
3032718	**CCLNL2525M12-MN7**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5mm	**551.317**	4mm

NOTE: MX clamping version is shown.

See pages B50–B51 for inserts.

NOTE: H = H1

CCLN-MF 95°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand															
3032723	**CCLNR2525M12-MF7**	25	25	32,0	150	32,0	—	—	-6.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5mm	**551.317**	4mm

NOTE: MX clamping version is shown.

See page B52 for inserts.

NOTE: H = H1

CDJN-MX 93°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand															
3032726	**CDJNR2525M15-MX7**	25	25	32,0	150	38,0	—	—	-6.0	-6.0	DN.X150708	**552.228**	**554.252**	2.5mm	**551.332**	4mm
	Left hand															
3032727	**CDJNL2525M15-MX7**	25	25	32,0	150	38,0	—	—	-6.0	-6.0	DN.X150708	**552.228**	**554.252**	2.5mm	**551.332**	4mm

NOTE: MX clamping version is shown.

See page B52 for inserts.

NOTE: H = H1

CDJN-MN 93°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
	Right hand																
3032728	**CDJNR2525M15-MN7**	25	25	32,0	150	38,0	—	—	-6.0	-6.0	DN.N150708	**552.228**	**554.252**	2.5mm	**557.111**	**551.317**	4mm
3032545	**CDJNR3225P15-MN7**	32	25	32,0	170	38,0	—	—	-6.0	-6.0	DN.N150708	**552.228**	**554.252**	2.5mm	**557.111**	**551.317**	4mm
	Left hand																
3032544	**CDJNL2525M15-MN7**	25	25	32,0	150	38,0	—	—	-6.0	-6.0	DN.N150708	**552.228**	**554.252**	2.5mm	**557.111**	**551.317**	4mm
3032546	**CDJNL3225P15-MN7**	32	25	32,0	170	38,0	—	—	-6.0	-6.0	DN.N150708	**552.228**	**554.252**	2.5mm	**557.111**	**551.317**	4mm

NOTE: MX clamping version is shown.

See page B53 for inserts.

NOTE: H = H1

CELN-MF 97,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	chipbreaker	clamp assembly	hex
	Right hand																
3879700	**CELNR2525M13MF7**	25	25	32,5	153	32,0	—	—	-6.0	-6.0	ENGN130708	**552.240**	**554.252**	2.5mm	**557.125**	**551.317**	4mm
	Left hand																
3879698	**CELNL2525M13MF7**	25	25	32,5	153	32,0	—	—	-6.0	-6.0	ENGN130708	**552.240**	**554.252**	2.5mm	**557.125**	**551.317**	4mm

NOTE: MN clamping version is shown.

See page B53 for inserts.

NOTE: H = H1

CELN-MN 97,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
	Right hand																
3879701	**CELNR2525M13MN7**	25	25	32,5	153	32,0	—	—	-6.0	-6.0	ENGN130708	**552.240**	**554.252**	2.5mm	**557.111**	**551.317**	4mm
	Left hand																
3879699	**CELNL2525M13MN7**	25	25	32,5	153	32,0	—	—	-6.0	-6.0	ENGN130708	**552.240**	**554.252**	2.5mm	**557.111**	**551.317**	4mm

NOTE: MN clamping version is shown.

See page B53 for inserts.

NOTE: H = H1

CKJN

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim pin	hex	clamp assembly	hex	hex wrench	pin assembly
	Right hand																	
3870064	**CKJNR2525M16**	25	25	32,0	150	36,0	—	—	0.0	-6.0	KNUX160410R2	**512.100**	**513.020**	—	**551.129**	4mm	**170.004**	**513.123**
3870065	**CKJNR3225P16**	32	25	32,0	170	33,0	—	—	0.0	-6.0	KNUX160410R2	**512.100**	**513.020**	—	**551.129**	4mm	**170.004**	**513.123**
	Left hand																	
3870042	**CKJNL2525M16**	25	25	32,0	150	36,0	—	—	0.0	-6.0	KNUX160410L2	**512.101**	**513.020**	—	**551.130**	4mm	**170.004**	**513.123**
3870063	**CKJNL3225P16**	32	25	32,0	170	33,0	—	—	0.0	-6.0	KNUX160410L2	**512.101**	**513.020**	—	**551.130**	4mm	**170.004**	**513.123**

See pages B54 and B79 for inserts.

NOTE: H = H1

CRDN-MN

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
3032549	**CRDNN2525M12-MN4**	25	25	12,5	150	30,0	—	—	0.0	-8.5	RN.N120400	**552.229**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032550	**CRDNN3225P12-MN4**	32	25	12,5	170	30,0	—	—	0.0	-8.5	RN.N120400	**552.229**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032551	**CRDNN2525M12-MN7**	25	25	12,5	150	30,0	—	—	0.0	-8.5	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032552	**CRDNN3225P12-MN7**	32	25	12,5	170	30,0	—	—	0.0	-8.5	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm

NOTE: MN clamping version is shown.

See pages B54 and B79 for inserts.

NOTE: H = H1

CRSN-MN

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
	Right hand																
3032675	**CRSNR3225P12-MN4**	32	25	32,0	170	26,0	—	—	-6.0	-6.0	RN.N120400	**552.229**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032677	**CRSNR2525M12-MN7**	25	25	32,0	150	26,0	—	—	-6.0	-6.0	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032679	**CRSNR3225P12-MN7**	32	25	32,0	170	26,0	—	—	-6.0	-6.0	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
	Left hand																
3032676	**CRSNL3225P12-MN4**	32	25	32,0	170	26,0	—	—	-6.0	-6.0	RN.N120400	**552.229**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032678	**CRSNL2525M12-MN7**	25	25	32,0	150	26,0	—	—	-6.0	-6.0	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm
3032680	**CRSNL3225P12-MN7**	32	25	32,0	170	26,0	—	—	-6.0	-6.0	RN.N120700	**552.230**	**554.252**	2.5mm	**557.111**	**551.333**	4mm

NOTE: MN clamping version is shown.

See pages B34 and B57 for inserts.

NOTE: H = H1

CSBP 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	hex	shim screw	clamp	clamp screw	hex
	Right hand																
3870068	**CSBPR2020K12**	20	20	17,0	125	30,0	3,1	—	0.0	5.0	SP..120308	**SM840**	2mm	**MS111**	**CKM10**	**STCM8**	4mm
3870069	**CSBPR2525M12**	25	25	22,0	150	30,0	3,1	—	0.0	5.0	SP..120308	**SM840**	2mm	**MS111**	**CKM10**	**STCM8**	4mm
	Left hand																
3870066	**CSBPL2020K12**	20	20	17,0	125	30,0	3,1	—	0.0	5.0	SP..120308	**SM840**	2mm	**MS111**	**CKM10**	**STCM8**	4mm
3870067	**CSBPL2525M12**	25	25	22,0	150	30,0	3,1	—	0.0	5.0	SP..120308	**SM840**	2mm	**MS111**	**CKM10**	**STCM8**	4mm

See pages B34 and B57 for inserts.

NOTE: H = H1

CSDP 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870070	**CSDPN1616H09**	16	16	8,0	100	25,0	—	—	0.0	5.0	SP..090308	**SM820**	**MS959**	—	**CKM7**	**STCM9**	2.5mm
3870071	**CSDPN2020K12**	20	20	10,0	125	32,0	—	—	0.0	5.0	SP..120308	**SM840**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870072	**CSDPN2525M12**	25	25	12,5	150	32,0	—	—	0.0	5.0	SP..120308	**SM840**	**MS111**	2mm	**CKM9**	**STCM4**	4mm

See pages B34 and B57 for inserts.

NOTE: H = H1

CSSP 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	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	0.0	5.0	SP..120308	**SM840**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870075	**CSSPR2525M12**	25	25	32,0	150	32,0	8,7	8,3	0.0	5.0	SP..120308	**SM840**	**MS111**	2mm	**CKM9**	**STCM4**	4mm
	Left hand																
3870073	**CSSPL2525M12**	25	25	32,0	150	32,0	8,7	8,3	0.0	5.0	SP..120308	**SM840**	**MS111**	2mm	**CKM9**	**STCM4**	4mm

See pages B40–B41, B58, and B83 for inserts.

NOTE: H = H1

CTCPN 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
3870076	**CTCPN2510M11**	25	10	10,0	150	26,0	—	—	0.0	3.0	TP..110304	**SM819**	**MS960**	—	**CKM7**	**STCM5**	2.5mm
3870077	**CTCPN2514M16**	25	14	14,4	150	28,0	—	—	0.0	3.0	TP..160308	**SM841**	**MS111**	2mm	**CKM13**	**STCM4**	4mm
3870078	**CTCPN2518M22**	25	18	19,2	150	41,0	—	—	0.0	3.0	TP..220408	**SM837**	**MS125**	2.5mm	**CKM13**	**STCM4**	4mm
3870079	**CTCPN2520M22**	25	20	20,2	150	41,0	—	—	0.0	3.0	TP..220408	**SM837**	**MS125**	2.5mm	**CKM13**	**STCM4**	4mm
3870080	**CTCPN4018R22**	40	18	19,2	200	41,0	—	—	0.0	3.0	TP..220408	**SM837**	**MS125**	2.5mm	**CKM13**	**STCM4**	4mm
3870081	**CTCPN4020R22**	40	20	20,2	200	41,0	—	—	0.0	3.0	TP..220408	**SM837**	**MS125**	2.5mm	**CKM13**	**STCM4**	4mm

See pages B40–B41, B58, and B83 for inserts.

NOTE: H = H1

CTDP 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand																
3870083	**CTDPR1212F11**	12	12	6,0	80	22,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm
3870084	**CTDPR2525M16**	25	25	16,0	150	30,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM9**	**STCM4**	4mm
	Left hand																
3870082	**CTDPL1212F11**	12	12	6,0	80	22,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm

See pages B40–B41, B58, and B83 for inserts.

NOTE: H = H1

CTFP 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand																
3870087	**CTFPR2020K16**	20	20	25,0	125	29,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870088	**CTFPR2525M16**	25	25	32,0	150	29,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM9**	**STCM4**	4mm
	Left hand																
3870085	**CTFPL2020K16**	20	20	25,0	125	29,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870086	**CTFPL2525M16**	25	25	32,0	150	29,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM9**	**STCM4**	4mm

See pages B40–B41, B58, and B83 for inserts.

NOTE: H = H1

CTGP 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand																
3870092	**CTGPR1212F11**	12	12	16,0	80	20,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm
3870103	**CTGPR1616H11**	16	16	20,0	100	20,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm
3870104	**CTGPR2020K11**	20	20	25,0	125	20,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm
3870105	**CTGPR2020K16**	20	20	25,0	125	26,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870106	**CTGPR2525M16**	25	25	32,0	150	26,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM9**	**STCM4**	4mm
3870107	**CTGPR2525M22**	25	25	32,0	150	30,0	—	—	0.0	5.0	TP..220408	**SM837**	**MS125**	2.5mm	**CKM9**	**STCM4**	4mm
	Left hand																
3870089	**CTGPL1212F11**	12	12	16,0	80	20,0	—	—	0.0	5.0	TP..110304	**SM819**	**MS960**	—	**CKM19**	**STCM9**	2.5mm
3870090	**CTGPL2020K16**	20	20	25,0	125	26,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM10**	**STCM8**	4mm
3870091	**CTGPL2525M16**	25	25	32,0	150	26,0	—	—	0.0	5.0	TP..160308	**SM841**	**MS111**	2mm	**CKM9**	**STCM4**	4mm

See page B34 for inserts.

NOTE: H = H1

572-SCE

order number	catalogue number	H B F L1 L2	gage insert	shim	shim screw	wrench	clamp	clamp screw	hex	washer
	Right hand									
2031942	12191814086	40 40 30,0 300 41,0	SOUN1904ZZT	12148566486	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
2031944	12191815086	50 50 35,0 350 50,0	SOUN2506ZZT	12148566586	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
	Left hand									
2031941	12191824086	40 40 30,0 300 41,0	SOUN1904ZZT	12148566486	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
2031943	12191825086	50 50 35,0 350 50,0	SOUN2506ZZT	12148566586	12148024500	12148041400	12148599900	12148021500	6mm	12148597100

Spare Parts

order number	catalogue number	shim	shim screw	wrench	clamp	clamp screw	hex	washer
	Right hand							
2031942	12191814086	12148566486	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
2031944	12191815086	12148566586	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
	Left hand							
2031941	12191824086	12148566486	12148024500	12148041400	12148599900	12148021500	6mm	12148597100
2031943	12191825086	12148566586	12148024500	12148041400	12148599900	12148021500	6mm	12148597100

Accessories

for indexable inserts		chipbreaker for edge width 2,5mm	3,2mm	4,0mm	6,0mm	8,0mm
SOUN 1904	Code 1 214 85...	...812 11 *	...813 11 *	...833 11 *	...947 11	–
SOUN 2506	Code 1 214 85...	–	–	...833 11 *	...844 11 *	...845 11 *

** These accessories belong to the range of spare parts.*

See page B53 for inserts.

CRDP

NOTE: H = H1

order number	catalogue number	H	B	F	L1	L2	CD	H3	gage insert	nest	clamp	clamp screw	hex
3871510	**CRDPN2525M06V**	25	25	12,5	151	—	19,0	—	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5mm
3871511	**CRDPN2525M09V**	25	25	12,5	151	—	29,0	—	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871513	**CRDPN2525M12V**	25	25	12,5	151	38,1	38,0	6,4	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871512	**CRDPN3232P09V**	32	32	16,0	171	—	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

NOTE: CRDP toolholders are able to use RPGX and RCGX insert styles.

See page B53 for inserts.

NOTE: H = H1

CRGP

order number	catalogue number	H	B	F	L1	L2	CD	H3	gage insert	nest	clamp	clamp screw	hex
	Right hand												
3871515	**CRGPR2525M06V**	25	25	32,0	151	—	7.3	—	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5mm
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	7.3	6,4	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871519	**CRGPR3232P09V**	32	32	40,0	171	—	8.3	—	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871523	**CRGPR3232P12V**	32	32	40,0	171	37,1	8.3	—	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
	Left hand												
3871516	**CRGPL2525M06V**	25	25	32,0	151	—	7.3	—	R..X060400E	**NST1**	**CM214**	**MS1321**	2.5mm
3871518	**CRGPL2525M09V**	25	25	32,0	151	—	7.3	—	R..X090700E	**NST2**	**CM219**	**CS412**	9/64
3871522	**CRGPL2525M12V**	25	25	32,0	151	27,1	7.3	6,4	R..X120700E	**NST3**	**CM216**	**CS412**	9/64
3871520	**CRGPL3232P09V**	32	32	40,0	171	—	8.3	—	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

NOTE: CRGP toolholders are able to use RPGX and RCGX insert styles.

See pages B14–B16, B46, and B70–B71 for inserts.

NOTE: H = H1

SCLC 95°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3900169	**SCLCR1010E06**	10	10	12,0	70	12,0	–	–	0.0	0.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900172	**SCLCR1212F06**	12	12	16,0	80	12,0	–	–	0.0	0.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900170	**SCLCR1212F09**	12	12	16,0	80	16,0	–	–	0.0	0.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3879416	**SCLCR1616H09**	16	16	20,0	100	16,0	–	–	0.0	0.0	CC..09T308	**SKCP343**	**SRS3**	3.5mm	**MS1156**	T15
3879417	**SCLCR2020K09**	20	20	25,0	125	16,0	–	–	0.0	0.0	CC..09T308	**SKCP343**	**SRS3**	3.5mm	**MS1156**	T15
3879414	**SCLCR2020K12**	20	20	25,0	125	20,0	–	–	0.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15
3879418	**SCLCR2525M12**	25	25	32,0	150	19,8	–	–	0.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand															
3900171	**SCLCL1010E06**	10	10	12,0	70	12,0	–	–	0.0	0.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900173	**SCLCL1212F06**	12	12	16,0	80	12,0	–	–	0.0	0.0	CC..060204	**–**	**–**	–	**MS1153**	T7
3900168	**SCLCL1212F09**	12	12	16,0	80	16,0	–	–	0.0	0.0	CC..09T308	**–**	**–**	–	**MS1155**	T15
3879411	**SCLCL1616H09**	16	16	20,0	100	16,0	–	–	0.0	0.0	CC..09T308	**SKCP343**	**SRS3**	3.5mm	**MS1156**	T15
3879412	**SCLCL2020K09**	20	20	25,0	125	16,0	–	–	0.0	0.0	CC..09T308	**SKCP343**	**SRS3**	3.5mm	**MS1156**	T15
3879415	**SCLCL2020K12**	20	20	25,0	125	20,0	–	–	0.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15
3879413	**SCLCL2525M12**	25	25	32,0	150	19,8	–	–	0.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15

See pages B20–B21, B47, and B75–B76 for inserts.

NOTE: H = H1

SDHC 107,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879435	**SDHCR1616H11**	16	16	20,0	100	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879437	**SDHCR2020K11**	20	20	25,0	125	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879440	**SDHCR2525M11**	25	25	32,0	150	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879436	**SDHCR2525M15**	25	25	32,0	150	25,0	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand															
3879433	**SDHCL1616H11**	16	16	20,0	100	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879439	**SDHCL2020K11**	20	20	25,0	125	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879438	**SDHCL2525M11**	25	25	32,0	150	20,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879434	**SDHCL2525M15**	25	25	32,0	150	25,0	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15

See pages B20–B21, B47, and B75–B76 for inserts.

NOTE: H = H1

SDJC 93°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879464	**SDJCR1010M07**	10	10	12	150,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3899890	**SDJCR1212F07**	12	12	16	80,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879456	**SDJCR1616H07**	16	16	20	100,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879458	**SDJCR2020K07**	20	20	25	125,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3900177	**SDJCR1212F11**	12	12	16	80,0	22	–	–	0.0	0.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3879459	**SDJCR1616H11**	16	16	20	100,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879460	**SDJCR2020K11**	20	20	25	125,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879461	**SDJCR2525M11**	25	25	32	150,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879457	**SDJCR2020K15**	20	20	25	125,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
3879463	**SDJCR2525M15**	25	25	32	150,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
3900175	**SDJCR3225P15**	32	25	32	170,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand															
3899892	**SDJCL1010E07**	10	10	12	70,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3899891	**SDJCL1212F07**	12	12	16	80,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879441	**SDJCL1616H07**	16	16	20	100,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879442	**SDJCL2020K07**	20	20	25	125,0	16	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3900176	**SDJCL1212F11**	12	12	16	80,0	22	–	–	0.0	0.0	DC..11T308	**–**	**–**	–	**MS1155**	T15
3879454	**SDJCL1616H11**	16	16	20	100,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879462	**SDJCL2020K11**	20	20	25	125,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879453	**SDJCL2525M11**	25	25	32	150,0	22	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879848	**SDJCL2020K15**	20	20	25	125,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
3879455	**SDJCL2525M15**	25	25	32	150,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
3900174	**SDJCL3225P15**	32	25	32	170,0	32	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15

See pages B20–B21, B47, and B75–B76 for inserts.

NOTE: H = H1

SDNC 62,5°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Left hand															
3879468	**SDNCN0808L07**	8	8	4,0	140	16,0	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3879469	**SDNCN1010M07**	10	10	5,0	150	16,0	–	–	0.0	0.0	DC..070204	**–**	**–**	–	**MS1153**	T7
3900178	**SDNCN1212F11**	12	12	6,0	80	22,0	–	–	–	–	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879465	**SDNCN1616H11**	16	16	8,0	100	22,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879467	**SDNCN2020K11**	20	20	10,0	125	22,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879849	**SDNCN2525M11**	25	25	12,5	150	25,0	–	–	0.0	0.0	DC..11T308	**SKDP343**	**SRS3**	3.5mm	**MS1156**	T15
3879466	**SDNCN2525M15**	25	25	12,0	150	28,0	–	–	0.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
3900179	**SDNCN3225P15**	32	25	12,5	170	32,5	–	–	–	–	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15

See pages B27–B28 and B47 for inserts.

NOTE: H = H1

SRDC

order number	catalogue number	H	B	F	L1	CD	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
3879735	**SRDCN1616H06**	16	16	11,0	100	16,0	0.0	0.0	RC..0602M0	**–**	**–**	–	**MS1153**	T7
3900182	**SRDCN2020K06**	20	20	12,5	125	19,7	0.0	0.0	RC..0602M0	**–**	**–**	–	**MS1153**	T7
3900183	**SRDCN2525M06**	25	25	15,0	150	19,7	0.0	0.0	RC..0602M0	**–**	**–**	–	**MS1153**	T7
3879702	**SRDCN1616H08**	16	16	12,0	100	16,0	0.0	0.0	RC..0803M0	**–**	**–**	–	**MS1154**	T9
3879733	**SRDCN2020K08**	20	20	14,0	125	20,0	0.0	0.0	RC..0803M0	**–**	**–**	–	**MS1154**	T9
3879737	**SRDCN2525M08**	25	25	16,5	150	25,0	0.0	0.0	RC..0803M0	**–**	**–**	–	**MS1154**	T9
3879736	**SRDCN2020K10**	20	20	15,0	125	20,0	0.0	0.0	RC..10T3M0	**SKRN100300**	**SRS3**	3.5mm	**MS1156**	T15
3879734	**SRDCN2525M10**	25	25	17,5	150	25,0	0.0	0.0	RC..10T3M0	**SKRN100300**	**SRS3**	3.5mm	**MS1156**	T15
3879738	**SRDCN2525M12**	25	25	18,5	150	25,0	0.0	0.0	RC..1204M0	**SKRN1203M0**	**SRS3**	3.5mm	**MS1156**	T15
3900181	**SRDCN3225P12**	32	25	8,0	170	28,0	0.0	0.0	RC..1204M0	**SKRN1203M0**	**SRS3**	3.5mm	**MS1156**	T15
3900180	**SRDCN3225P16**	32	25	20,0	170	35,0	0.0	0.0	RC..1605M0	**SKRN160400**	**SRS5**	5mm	**MS1160**	T20

See pages B29, B48, and B80 for inserts.

NOTE: H = H1

SSBC 75°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879850	**SSBCR1616H09**	16	16	13,0	100	16,0	2,2	–	0.0	0.0	SC..096308	**SKSP343**	**SRS3**	3.5mm	**MS1156**	T15
3879741	**SSBCR2020K12**	20	20	17,0	125	21,0	3,1	–	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
3879740	**SSBCR2525M12**	25	25	22,0	150	21,0	3,1	–	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand															
3879739	**SSBCL1616H09**	16	16	13,0	100	16,0	2,2	–	0.0	0.0	SC..09T308	**SKSP343**	**SRS3**	3.5mm	**MS1156**	T15
3879852	**SSBCL2020K12**	20	20	17,0	125	21,0	3,1	–	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
3879851	**SSBCL2525M12**	25	25	22,0	150	21,0	3,1	–	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15

See pages B29, B48, and B80 for inserts.

NOTE: H = H1

SSSC 45°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879747	**SSSCR1616H09**	16	16	20,0	100	18,0	6,1	6,1	0.0	0.0	SC..09T308	**SKSP343**	**SRS3**	3.5mm	**MS1156**	T15
3879746	**SSSCR2020K12**	20	20	25,0	125	25,0	8,3	8,3	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
3879744	**SSSCR2525M12**	25	25	32,0	150	25,0	8,3	8,3	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand															
3879745	**SSSCL1616H09**	16	16	20,0	100	18,0	6,1	6,1	0.0	0.0	SC..09T308	**SKSP343**	**SRS3**	3.5mm	**MS1156**	T15
3879743	**SSSCL2020K12**	20	20	25,0	125	25,0	8,3	8,3	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15
3879742	**SSSCL2525M12**	25	25	32,0	150	25,0	8,3	8,3	0.0	0.0	SC..120408	**SKSP453**	**SRS4**	4mm	**MS1158**	T15

See pages B35, B48, and B82 for inserts.

NOTE: H = H1

STFC 90°

order number	catalogue number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3900184	**STFCR1212F11**	12	12	16,0	80	13,0	—	—	0.0	0.0	TC..110204	**—**	**—**	—	**MS1153**	T7
3879749	**STFCR1616H16**	16	16	20,0	100	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15
3879763	**STFCR2020K16**	20	20	25,0	125	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15
3879750	**STFCR2525M16**	25	25	32,0	150	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15
	Left hand															
3879751	**STFCL1616H16**	16	16	20,0	100	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15
3879748	**STFCL2020K16**	20	20	25,0	125	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15
3879752	**STFCL2525M16**	25	25	32,0	150	20,0	—	—	0.0	0.0	TC..16T308	**SKTP343**	**SRS3**	3.5mm	**MS1156**	T15

See pages B42, B49, and B85 for inserts.

SVHB 107,5°

NOTE: H = H1

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879767	SVHBR2020K16	20	20	25,0	125	28,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879765	SVHBR2525M16	25	25	32,0	150	28,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879853	SVHBR3225P16	32	25	32,0	170	25,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
	Left hand															
3879764	SVHBL2020K16	20	20	25,0	125	28,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879766	SVHBL2525M16	25	25	32,0	150	28,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879768	SVHBL3225P16	32	25	32,0	170	25,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15

See pages B42, B49, and B85 for inserts.

SVJB 93°

NOTE: H = H1

order number	catalogue number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand															
3879769	SVJBR1616H16	16	16	20,0	100	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879776	SVJBR2020K16	20	20	25,0	125	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879775	SVJBR2525M16	25	25	32,0	150	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879773	SVJBR3225P16	32	25	32,0	170	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
	Left hand															
3879772	SVJBL1616H16	16	16	20,0	100	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879770	SVJBL2020K16	20	20	25,0	125	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879774	SVJBL2525M16	25	25	32,0	150	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879771	SVJBL3225P16	32	25	32,0	170	35,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15

See pages B42, B49, and B85 for inserts.

SVVB 72,5°

NOTE: H = H1

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
3879777	SVVBN2020K16	20	20	10,0	125	33,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879778	SVVBN2525M16	25	25	12,5	150	33,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15
3879779	SVVBN3225P16	32	25	12,5	170	33,0	—	—	0.0	0.0	VB..160408	SKVN343	SRS3	3.5mm	MS1156	T15

Tools for Internal Boring

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.

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.

Clamping System M

- Combined pin/wedge clamp for negative inserts.
- An extremely sturdy clamping system, specially designed for interrupted cuts.
- Protected by a carbide shim.

Clamping System P

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

Robust and easy-to-handle clamping system.

Proprietary coating and surface treatment for versatility and long tool life.

Combined pin and clamp locking for superior performance in tough applications.

Clamping System S

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

Clamping System C

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

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
Construction Features of the Boring Bar

S
Tool steel

A
Tool steel with internal coolant supply

B
Tool steel with vibration-absorbing shank

C
Carbide tool with fixed steel head

D
Tool steel with vibration-absorbing shank and internal coolant supply

E
Carbide tool with steel head and internal coolant supply

25
Shank Diameter

The code number is the shank diameter "D". Digits after the decimal point are ignored. Single-digit code numbers to be preceded by a 0 (zero), e.g., code 08 for diameter 8,0mm

R
Length of Boring Bar

l_1	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

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 with hole

S

Center clamping by screw for inserts with hole

C
Insert Shape

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

L
Boring Bar Style

N
Insert Clearance Angle

R
Hand of Tool

Right-hand boring bar

Left-hand boring bar

12
Insert Size Cutting Edge Length L10

Additional Information

M.. MF, MN, MX, for ceramic and PCBN inserts

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.

A-MCLN
95°
Page: **A42**

A-MDUN
93°
Page: **A42**

A-MWLN
95°
Page: **A43**

A-MTFN
90°
Page: **A43**

A-MVUN
93°
Page: **A44**

Clamping System P

P

Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20,0mm 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: **A45**

A-PTFN
90°
Page: **A46**

A-PWLN
95°
Page: **A46**

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. Toolholders with cutting edge heights upwards of 16,0mm and insert ICs greater than 6,35mm.

A-CTFP
90°
Page: **A47**

S-CCLN-MX
95°
Page: **A47**

S-CCLN-MN
95°
Page: **A48**

S-CDQN-MX
Page: **A48**

S-CSSN-MX
45°
Page: **A49**

S-CSYN-MN
85°
Page: **A49**

S-CWLN-MX
95°
Page: **A49**

Clamping System S

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 16,0mm and insert ICs from 9,52mm are secured by means of a threaded bushing.

A-SCLC
95°
Page: **A50**

E-SCLC
95°
Page: **A50**

E-SCLP
95°
Page: **A51**

E-SCFC
90°
Page: **A51**

E-SCFP
90°
Page: **A51**

A-SDQC
107,5°
Page: **A52**

E-SDQC
107,5°
Page: **A52**

A-SDUC
93°
Page: **A53**

E-SDUC
93°
Page: **A53**

A-STFC
90°
Page: **A54**

E-STFC
90°
Page: **A54**

A-STFP
90°
Page: **A55**

A-STWP
60°
Page: **A55**

SVQB
107,5°
Page: **A56**

SVUB
93°
Page: **A56**

Steel shank with through coolant
See pages B16–B19, B46, B50, and B72–B73 for inserts.

A-MCLN 95°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand															
3852644	**A25RMCLNR12**	25	32,0	17,0	200	33	1/4-18 NPT	-12.0	-5.0	CN..120408	**–**	**KLM43**	2mm	**CKM21**	**STCM11**	3mm
3852646	**A32SMCLNR12**	32	40,0	22,0	250	–	1/4-18 NPT	-14.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm
3852648	**A40TMCLNR12**	40	50,0	27,0	300	–	1/4-18 NPT	-12.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm
3852651	**A50UMCLNR12**	50	63,0	35,0	350	–	1/4-18 NPT	-12.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm
3852650	**A40TMCLNR16**	40	50,0	27,0	300	–	1/4-18 NPT	-11.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852663	**A50UMCLNR16**	50	63,0	35,0	350	–	1/4-18 NPT	-12.0	-5.0	CN..160612	**ICSN533**	**KLM58**	3mm	**CKM21**	**STCM20**	3mm
3852664	**A50UMCLNR19**	50	63,0	35,0	350	–	1/4-18 NPT	-12.0	-5.0	CN..190612	**ICSN633**	**KLM68**	4mm	**CKM12**	**STCM4**	4mm
	Left hand															
3852645	**A25RMCLNL12**	25	32,0	17,0	200	33	1/4-18 NPT	-12.0	-5.0	CN..120408	**–**	**KLM43**	2mm	**CKM21**	**STCM11**	3mm
3852647	**A32SMCLNL12**	32	40,0	22,0	250	–	1/4-18 NPT	-14.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm
3852649	**A40TMCLNL12**	40	50,0	27,0	300	–	1/4-18 NPT	-12.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm
3852652	**A50UMCLNL12**	50	63,0	35,0	350	–	1/4-18 NPT	-12.0	-5.0	CN..120408	**ICSN432**	**KLM46**	2.5mm	**CKM21**	**STCM11**	3mm

Steel shank with through coolant
See pages B22–B25, B52, and B76–B78 for inserts.

A-MDUN 93°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand															
3852665	**A25RMDUNR11**	25	32,0	17,0	200	40	1/4-18 NPT	-14.0	-5.0	DN..110408	**–**	**KLM33L**	2mm	**CKM7**	**STCM5**	2.5mm
3852666	**A25RMDUNR15**	25	32,0	17,0	200	–	1/4-18 NPT	-14.0	-5.0	DN..150608	**IDSN322**	**KLM46**	2.5mm	**CKM22**	**STCM11**	3mm
3852668	**A32SMDUNR15**	32	40,0	22,0	250	–	1/4-18 NPT	-12.0	-6.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm
3852670	**A40TMDUNR15**	40	50,0	27,0	300	–	1/4-18 NPT	-9.0	-5.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm
3852672	**A50UMDUNR15**	50	63,0	35,0	350	–	1/4-18 NPT	-7.0	-5.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm
	Left hand															
3852667	**A25RMDUNL15**	25	32,0	17,0	200	–	1/4-18 NPT	-14.0	-5.0	DN..150608	**IDSN322**	**KLM46**	2.5mm	**CKM22**	**STCM11**	3mm
3852669	**A32SMDUNL15**	32	40,0	22,0	250	–	1/4-18 NPT	-12.0	-6.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm
3852671	**A40TMDUNL15**	40	50,0	27,0	300	–	1/4-18 NPT	-9.0	-5.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm
3852673	**A50UMDUNL15**	50	63,0	35,0	350	–	1/4-18 NPT	-7.0	-5.0	DN..150608	**IDSN432**	**KLM46**	2.5mm	**CKM22**	**STCM20**	3mm

Steel shank with through coolant
See pages B43–B45, B59, and B87 for inserts.

A-MWLN 95°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand															
3852674	**A25RMWLNR06**	25	32,0	17,0	200	—	1/4-18 NPT	-12.0	-5.0	WN..060408	**—**	**KLM33L**	2mm	**CKM6**	**STCM5**	2.5mm
3852675	**A25RMWLNR08**	25	32,0	17,0	200	40	1/4-18 NPT	-12.0	-5.0	WN..080408	**—**	**KLM43**	2mm	**CKM20**	**STCM11**	3mm
3852676	**A32SMWLNR08**	32	40,0	22,0	250	50	1/4-18 NPT	-14.0	-5.0	WN..080408	**IWSN433**	**KLM46**	2.5mm	**CKM20**	**STCM20**	3mm
3852677	**A40TMWLNR08**	40	50,0	27,0	300	55	1/4-18 NPT	-12.0	-5.0	WN..080408	**IWSN433**	**KLM46**	2.5mm	**CKM20**	**STCM20**	3mm
	Left hand															
3852678	**A25RMWLNL08**	25	32,0	17,0	200	40	1/4-18 NPT	-12.0	-5.0	WN..080408	**—**	**KLM43**	2mm	**CKM20**	**STCM11**	3mm
3852679	**A32SMWLNL08**	32	40,0	22,0	250	50	1/4-18 NPT	-14.0	-5.0	WN..080408	**IWSN433**	**KLM46**	2.5mm	**CKM20**	**STCM20**	3mm
3852680	**A40TMWLNL08**	40	50,0	27,0	300	55	1/4-18 NPT	-12.0	-5.0	WN..080408	**IWSN433**	**KLM46**	2.5mm	**CKM20**	**STCM20**	3mm

Steel shank with through coolant
See pages B36–B39, B58, and B83 for inserts.

A-MTFN 90°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand														
3852682	**A25RMTFNR16**	25	32,0	17,0	200	1/4-18 NPT	-14.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852684	**A32SMTFNR16**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852686	**A40TMTFNR16**	40	50,0	27,0	300	1/4-18 NPT	-9.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852688	**A50UMTFNR22**	50	63,0	35,0	350	1/4-18 NPT	-7.0	-5.0	TN..220408	**ITSN433**	**KLM46**	2.5mm	**CKM9**	**STCM4**	4mm
	Left hand														
3852681	**A25RMTFNL16**	25	32,0	17,0	200	1/4-18 NPT	-14.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852683	**A32SMTFNL16**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852685	**A40TMTFNL16**	40	50,0	27,0	300	1/4-18 NPT	-9.0	-5.0	TN..160408	**ITSN322**	**KLM34L**	2mm	**CKM21**	**STCM20**	3mm
3852687	**A50UMTFNL22**	50	63,0	35,0	350	1/4-18 NPT	-7.0	-5.0	TN..220408	**ITSN433**	**KLM46**	2.5mm	**CKM9**	**STCM4**	4mm

Steel shank with through coolant
See pages B43, B56, and B86 for inserts.

A-MVUN 93°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand														
3852690	**A25RMVUNR16**	25	37,0	22,0	200	1/4-18 NPT	-12.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852692	**A32SMVUNR16**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
	Left hand														
3852689	**A25RMVUNL16**	25	37,0	22,0	200	1/4-18 NPT	-12.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm
3852691	**A32SMVUNL16**	32	40,0	22,0	250	1/4-18 NPT	-12.0	-5.0	VN..160408	**IVSN322**	**KLM34L**	2mm	**CKM31**	**STCM20**	3mm

Steel shank with through coolant
See pages B16–B19, B46, B50, and B72–B73 for inserts.

A-PCLN 95°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand															
3883468	**A25TPCLNR12**	25	32	17,0	300	40	1/4-18 NPT	-12.0	-5.0	CN..120408	**–**	**–**	**–**	**511.022**	**514.122**	10 IP
3883466	**A32UPCLNR12**	32	40	22,0	350	50	1/4-18 NPT	-10.0	-5.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883463	**A40VPCLNR12**	40	50	27,0	400	55	1/4-18 NPT	-10.0	-5.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883442	**A40VPCLNR16**	40	50	27,0	400	55	1/4-18 NPT	-11.0	-5.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP
	Left hand															
3883469	**A25TPCLNL12**	25	32	17,0	300	40	1/4-18 NPT	-12.0	-5.0	CN..120408	**–**	**–**	**–**	**511.022**	**514.122**	10 IP
3883467	**A32UPCLNL12**	32	40	22,0	350	50	1/4-18 NPT	-10.0	-5.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883465	**A40VPCLNL12**	40	50	27,0	400	55	1/4-18 NPT	-10.0	-5.0	CN..120408	**512.112**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883464	**A40VPCLNL16**	40	50	27,0	400	55	1/4-18 NPT	-11.0	-5.0	CN..160612	**512.117**	**513.025**	**515.022**	**511.025**	**514.125**	15 IP

Steel shank with through coolant
See pages B36–B39, B58, and B83 for inserts.

A-PTFN 90°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand															
3883263	**A25TPTFNR16**	25	32	17,0	300	40	1/4-18 NPT	-12.0	-5.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883151	**A32UPTFNR16**	32	40	22,0	350	50	1/4-18 NPT	-10.0	-5.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883149	**A40VPTFNR22**	40	48	27,0	400	55	1/4-18 NPT	-10.0	-5.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
	Left hand															
3883264	**A25TPTFNL16**	25	32	17,0	300	40	1/4-18 NPT	-12.0	-5.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883152	**A32UPTFNL16**	32	40	22,0	350	50	1/4-18 NPT	-10.0	-5.0	TN..160408	**512.013**	**513.018**	**515.018**	**511.018**	**514.118**	10 IP
3883150	**A40VPTFNL22**	40	48	27,0	400	55	1/4-18 NPT	-10.0	-5.0	TN..220408	**512.023**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP

Steel shank with through coolant
See pages B43–B45, B59, and B87 for inserts.

A-PWLN 95°

order number	catalogue number	D	D min	F	L1	L2	CS	γF°	γP°	gage insert	shim	shim pin	punch pin	lever	lever screw	Torx Plus
	Right hand															
3883459	**A16RPWLNR06**	16	27	11,0	200	32	1/8-27 NPT	-12.0	-5.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883455	**A20SPWLNR06**	20	25	13,0	250	32	1/8-27 NPT	-14.0	-5.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883458	**A25RPWLNR08**	25	32	17,0	200	40	1/4-18 NPT	-12.0	-5.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883454	**A32SPWLNR08**	32	40	22,0	250	50	1/4-18 NPT	-10.0	-5.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
	Left hand															
3883461	**A16RPWLNL06**	16	27	11,0	200	32	1/8-27 NPT	-12.0	-5.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883457	**A20SPWLNL06**	20	25	13,0	250	32	1/8-27 NPT	-14.0	-5.0	WN..060408	**–**	**–**	**–**	**511.030**	**514.112**	8 IP
3883460	**A25RPWLNL08**	25	32	17,0	200	40	1/4-18 NPT	-12.0	-5.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP
3883456	**A32SPWLNL08**	32	40	22,0	250	50	1/4-18 NPT	-10.0	-5.0	WN..080408	**512.135**	**513.023**	**515.018**	**511.023**	**514.123**	15 IP

Steel shank with through coolant
See pages B40–B41, B58, and B83 for inserts.

A-CTFP 90°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	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	5.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5mm
3883450	**A25RCTFPR16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	5.0	TP..160308	**SM841**	**MS110**	2mm	**CKM10**	**STCM8**	4mm
	Left hand														
3883453	**A16RCTFPL11**	16	20,0	11,0	200	1/8-27 NPT	-4.0	5.0	TP..110304	**–**	**–**	–	**CKM19**	**STCM9**	2.5mm
3883452	**A25RCTFPL16**	25	32,0	17,0	200	1/4-18 NPT	-3.0	5.0	TP..160308	**SM841**	**MS110**	2mm	**CKM10**	**STCM8**	4mm

Steel shank without through coolant
See pages B50–B51 for inserts.

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													
3029009	**S40T-CCLNR12-MX7**	40	55	27,0	300	40,0	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5mm	**551.316**	4mm
3883565	**S32SCCLNR12MX7**	32	40	22,0	251	42,8	-14.0	-5.0	CNGX120708	**–**	**–**	–	**551.316**	4mm
	Left hand													
3029010	**S40T-CCLNL12-MX7**	40	55	27,0	300	40,0	-14.0	-6.0	CN.X120708	**552.221**	**554.252**	2.5mm	**551.316**	4mm
3883564	**S32SCCLNL12MX7**	32	40	22,0	251	42,8	-14.0	-5.0	CNGX120708	**–**	**–**	–	**551.316**	4mm

NOTE: MN clamping version is shown.

Steel shank without through coolant
See pages B50–B51 for inserts.

S-CCLN-MN 95°

order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	screw	hex
	Right hand														
3029011	**S40T-CCLNR12-MN4**	40	55	27,0	300	40,0	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5mm	**557.111**	**554.201**	4mm
3029143	**S40T-CCLNR12-MN7**	40	55	27,0	300	40,0	-14.0	-6.0	CN.N120708	**552.221**	**554.253**	2.5mm	**557.111**	**554.201**	4mm
	Left hand														
3029012	**S40T-CCLNL12-MN4**	40	55	27,0	300	40,0	-14.0	-6.0	CN.N120408	**552.220**	**554.252**	2.5mm	**557.111**	**554.201**	4mm
3029144	**S40T-CCLNL12-MN7**	40	55	27,0	300	40,0	-14.0	-6.0	CN.N120708	**552.221**	**554.252**	2.5mm	**557.111**	**554.201**	4mm

NOTE: MN clamping version is shown.

Steel shank without through coolant
See page B52 for inserts.

S-CDQN-MX

order number	catalogue number	D	D min	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	screw	hex
	Right hand														
3883567	**S40TCDQNR12MX7**	40	50	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5mm	**–**	**–**	4mm
	Left hand														
3883566	**S40TCDQNL12MX7**	40	50	27,0	302	45,0	-14.0	-5.0	DN.X120708	**552.225**	**554.254**	2.5mm	**–**	**–**	4mm

NOTE: MN clamping version is shown.

Steel shank without through coolant
See pages B56–B57 for inserts.

S-CSSN-MX 45°

order number	catalogue number	D	D min	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand															
3029151	**S40T-CSSNR12-MX7**	40	55	27,0	300	67,0	8,23	8,50	-14.1	-5.9	SN.X120708	**552.232**	**554.252**	2.5mm	**551.316**	4mm
	Left hand															
3029152	**S40T-CSSNL12-MX7**	40	55	27,0	300	67,0	8,23	8,50	-14.1	-5.9	SN.X120708	**552.232**	**554.252**	2.5mm	**551.316**	4mm

NOTE: MX clamping version is shown.

Steel shank without through coolant
See pages B55–B56 for inserts.

S-CSYN-MN 85°

order number	catalogue number	D	D min	F	L1	L2	L1A	γF°	γP°	gage insert	shim	shim screw	hex	thrust plate	clamp assembly	hex
	Right hand															
3883569	**S40TCSYNR12-MN7**	40	55	27,0	300	67,0	0,97	-14.0	-6.0	SN.N120708	**552.232**	**554.252**	2.5mm	**557.111**	**551.317**	4mm
	Left hand															
3883568	**S40TCSYNL12-MN7**	40	55	27,0	300	67,0	0,97	-14.0	-6.0	SN.N120708	**552.232**	**554.252**	2.5mm	**557.111**	**551.317**	4mm

NOTE: MN clamping version is shown.

Steel shank without through coolant
See page B59 for inserts.

S-CWLN-MX 95°

order number	catalogue number	D	D min	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	hex	clamp assembly	hex
	Right hand													
3029153	**S40T-CWLNR08-MX7**	40	80	27,0	300	55,0	-10.0	-5.0	WN.X080708	**552.210**	**554.252**	2.5mm	**551.316**	4mm
	Left hand													
3029154	**S40T-CWLNL08-MX7**	40	80	27,0	300	55,0	-10.0	-5.0	WN.X080708	**552.210**	**554.252**	2.5mm	**551.316**	4mm

NOTE: MX clamping version is shown.

Steel shank with through coolant
See pages B14–B16, B46, and B70–B71 for inserts.

A-SCLC 95°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand														
3883285	**A08JSCLCR06**	8	11,0	6,0	110	2,4	–	-8.0	0.0	CC..060204	–	–	–	**MS1939**	T7
3883283	**A10KSCLCR06**	10	13,0	7,0	125	3,2	–	-7.0	0.0	CC..060204	–	–	–	**MS1153**	T7
3883271	**A16RSCLCR09**	16	20,0	11,0	200	–	1/8-27 NPT	-7.0	0.0	CC..09T308	–	–	–	**MS1155**	T15
3883269	**A20SSCLCR09**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	0.0	CC..09T308	–	–	–	**MS1155**	T15
3883265	**A25TSCLCR12**	25	32,0	17,0	300	–	1/4-18 NPT	-7.0	0.0	CC..120408	–	–	–	**MS1157**	T15
3883266	**A32TSCLCR12**	32	40,0	22,0	300	–	1/4-18 NPT	-7.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand														
3883286	**A08JSCLCL06**	8	11,0	6,0	110	2,4	–	-8.0	0.0	CC..060204	–	–	–	**MS1939**	T7
3883284	**A10KSCLCL06**	10	13,0	7,0	125	3,2	–	-7.0	0.0	CC..060204	–	–	–	**MS1153**	T7
3883272	**A16RSCLCL09**	16	20,0	11,0	200	–	1/8-27 NPT	-7.0	0.0	CC..09T308	–	–	–	**MS1155**	T15
3883270	**A20SSCLCL09**	20	25,0	13,0	250	–	1/8-27 NPT	-5.0	0.0	CC..09T308	–	–	–	**MS1155**	T15
3883267	**A25TSCLCL12**	25	32,0	17,0	300	–	1/4-18 NPT	-7.0	0.0	CC..120408	–	–	–	**MS1157**	T15
3883268	**A32TSCLCL12**	32	40,0	22,0	300	–	1/4-18 NPT	-7.0	0.0	CC..120408	**SKCP453**	**SRS4**	4mm	**MS1158**	T15

Carbide shank with through coolant
See pages B14–B16, B46, and B70–B71 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											
2023603	**E08KSCLCR065**	8	10,0	5,0	125	3,0	–	-15.0	0.0	CC..060204	**12148036300**	T8
2010068	**E08KSCLCR06**	8	11,0	6,0	125	3,0	–	-12.0	0.0	CC..060204	**12148036300**	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
2023621	**E20SSCLCR09**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2031029	**E25TSCLCR09**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2023614	**E16RSCLCR09T3**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..09T308	**12148038800**	T15
2010184	**E20SSCLCR09T3**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..09T308	**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	**12148007300**	T20
	Left hand											
2031020	**E08KSCLCL065**	8	10,0	5,0	125	3,0	–	-15.0	0.0	CC..060204	**12148036300**	T8
2023601	**E08KSCLCL06**	8	11,0	6,0	125	3,0	–	-12.0	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
2031026	**E20SSCLCL09**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..090308	**12148038800**	T15
2010215	**E25TSCLCL09**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..090308	**12148038800**	T15
2023615	**E16RSCLCL09T3**	16	20,0	11,0	200	4,5	–	-7.0	0.0	CC..09T308	**12148038800**	T15
2031027	**E20SSCLCL09T3**	20	25,0	13,0	250	–	G 1/8	-5.0	0.0	CC..09T308	**12148038800**	T15
2031028	**E25TSCLCL09T3**	25	32,0	17,0	300	–	G 1/4	-3.0	0.0	CC..09T308	**12148038800**	T15

Carbide shank with through coolant
See pages B20 and B74–B75 for inserts.

E-SCLP 95°

order number	catalogue number	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand										
2023598	E06JSCLPR04	6	8,0	4,5	110	2,0	-10.0	0.0	CP..04T104	12148005800	T6
	Left hand										
2023597	E06JSCLPL04	6	8,0	4,5	110	2,0	-10.0	0.0	CP..04T104	12148005800	T6

Carbide shank with through coolant
See pages B14–B16, B46,
and B70–B71 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	125,0	3,0	-12.0	0.0	CC..060204	12148036300	T8
	Left hand										
2031019	E08KSCFCL06	8	11,0	6,0	125,0	3,0	-12.0	0.0	CC..060204	12148036300	T8

Carbide shank with through coolant
See pages B20 and B74–B75 for inserts.

E-SCFP 90°

order number	catalogue number	D	D min	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand										
2010047	E06JSCFPR04	6	8,0	4,5	110,0	2,0	-10.0	0.0	CP..04T104	12148005800	T6
	Left hand										
2031018	E06JSCFPL04	6	8,0	4,5	110,0	2,0	-10.0	0.0	CP..04T104	12148005800	T6

Steel shank with through coolant
See pages B20–B21, B47,
and B75–B76 for inserts.

A-SDQC 107,5°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand										
3883476	**A16RSDQCR07**	16	20,0	11,0	200,0	1/8-27 NPT	-5.0	0.0	DC..070204	**MS1153**	T7
3883474	**A20SSDQCR11**	20	25,0	13,0	250,0	1/8-27 NPT	-5.0	0.0	DC..11T308	**MS1155**	T15
3883462	**A25TSDQCR11**	25	32,0	17,0	300,0	1/4-18 NPT	-4.0	0.0	DC..11T308	**MS1155**	T15
	Left hand										
3883477	**A16RSDQCL07**	16	20,0	11,0	200,0	1/8-27 NPT	-5.0	0.0	DC..070204	**MS1153**	T7
3883475	**A20SSDQCL11**	20	25,0	13,0	250,0	1/8-27 NPT	-5.0	0.0	DC..11T308	**MS1155**	T15
3883473	**A25TSDQCL11**	25	32,0	17,0	300,0	1/4-18 NPT	-4.0	0.0	DC..11T308	**MS1155**	T15

Carbide shank with through coolant
See pages B20–B21, B47,
and B75–B76 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	**E12QSDQCRO7**	12	16,0	9,0	180	4,5	—	-7.0	0.0	DC..070204	**12148080000**	T8
2031025	**E16RSDQCR07**	16	20,0	11,0	200	—	—	-5.0	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	—	—	-5.0	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
See pages B20–B21, B47,
and B75–B76 for inserts.

A-SDUC 93°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand														
3883297	**A10KSDUCR07**	10	13,0	7,0	125	3,2	—	-7.0	0.0	DC..070204	**—**	**—**	—	**MS1153**	T7
3883294	**A16RSDUCR07**	16	20,0	11,0	200	—	1/8-27 NPT	-4.0	0.0	DC..070204	**—**	**—**	—	**MS1153**	T7
3883293	**A16RSDUCR11**	16	20,0	11,0	200	—	1/8-27 NPT	-6.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883291	**A20SSDUCR11**	20	25,0	13,0	250	—	1/8-27 NPT	-5.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883288	**A25TSDUCR11**	25	32,0	17,0	300	—	1/8-27 NPT	-4.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883287	**A32TSDUCR15**	32	40,0	22,0	300	—	1/8-27 NPT	-7.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15
	Left hand														
3883298	**A10KSDUCL07**	10	13,0	7,0	125	3,2	—	-7.0	0.0	DC..070204	**—**	**—**	—	**MS1153**	T7
3883296	**A16RSDUCL07**	16	20,0	11,0	200	—	1/8-27 NPT	-4.0	0.0	DC..070204	**—**	**—**	—	**MS1153**	T7
3883295	**A16RSDUCL11**	16	20,0	11,0	200	—	1/8-27 NPT	-6.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883292	**A20SSDUCL11**	20	25,0	13,0	250	—	1/8-27 NPT	-5.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883290	**A25TSDUCL11**	25	32,0	17,0	300	—	1/8-27 NPT	-4.0	0.0	DC..11T308	**—**	**—**	—	**MS1155**	T15
3883289	**A32TSDUCL15**	32	40,0	22,0	300	—	1/8-27 NPT	-7.0	0.0	DC..150408	**SKDP453**	**SRS4**	4mm	**MS1158**	T15

Carbide shank with through coolant
See pages B20–B21, B47,
and B75–B76 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 B35, B48, and B82 for inserts.

A-STFC 90°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
3883382	**A10KSTFCR11**	10	13,0	7,0	125	3,2	—	-7.0	0.0	TC..110204	**MS1153**	T7
	Left hand											
3883443	**A10KSTFCL11**	10	13,0	7,0	125	3,2	—	-7.0	0.0	TC..110204	**MS1153**	T7

Carbide shank with through coolant
See pages B35, B48, and B82 for inserts.

E-STFC 90°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
2031888	**E10MSTFCR11**	10	13,0	7,0	150	3,5	—	-10.0	0.0	TC..110204	**12148068700**	T8
2031024	**E12QSTFCR11**	12	16,0	9,0	180	4,5	—	-8.0	0.0	TC..110204	**12148068700**	T8
2010174	**E16RSTFCR16**	16	20,0	11,0	200	4,5	—	-9.0	0.0	TC..16T308	**12148038800**	T15
2023626	**E20SSTFCR16**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	TC..16T308	**12148038800**	T15
2023631	**E25TSTFCR16**	25	32,0	17,0	300	—	G 1/4	-5.0	0.0	TC..16T308	**12148038800**	T15
	Left hand											
2010090	**E10MSTFCL11**	10	13,0	7,0	150	3,5	—	-10.0	0.0	TC..110204	**12148068700**	T8
2010120	**E12QSTFCL11**	12	16,0	9,0	180	4,5	—	-8.0	0.0	TC..110204	**12148068700**	T8
2023618	**E16RSTFCL16**	16	20,0	11,0	200	4,5	—	-9.0	0.0	TC..16T308	**12148038800**	T15
2023625	**E20SSTFCL16**	20	25,0	13,0	250	—	G 1/8	-7.0	0.0	TC..16T308	**12148038800**	T15
2010233	**E25TSTFCL16**	25	32,0	17,0	300	—	G 1/4	-5.0	0.0	TC..16T308	**12148038800**	T15

Steel shank with through coolant
See page B84 for inserts.

A-STFP 90°

order number	catalogue number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
3883446	**A10KSTFPR11**	10	13,0	7,0	125	3,2	—	-4.0	0.0	TP..110204	**MS1153**	T7
3883444	**A16RSTFPR11**	16	20,0	11,0	200	—	1/16-27 NPT	0.0	0.0	TP..110204	**MS1153**	T7
	Left hand											
3883447	**A10KSTFPL11**	10	13,0	7,0	125	3,2	—	-4.0	0.0	TP..110204	**MS1153**	T7
3883445	**A16RSTFPL11**	16	20,0	11,0	200	—	1/16-27 NPT	0.0	0.0	TP..110204	**MS1153**	T7

Steel shank with through coolant
See page B84 for inserts.

A-STWP 60°

order number	catalogue number	D	D min	F	L1	L1A	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
3883448	**A10KSTWPR11**	10	13,0	7,0	125	5,0	3,2	-4.0	0.0	TP..110204	**MS1153**	T7
	Left hand											
3883449	**A10KSTWPL11**	10	13,0	7,0	125	5,0	3,2	-4.0	0.0	TP..110204	**MS1153**	T7

Steel shank with through coolant
See pages B42, B49, and B85 for inserts.

A-SVQB 107,5°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand										
3883436	**A16RSVQBR11**	16	20,0	11,0	200	1/8-27 NPT	-7.0	0.0	VB..110304	**MS1153**	T7
3883434	**A25TSVQBR16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	0.0	VB..160408	**MS1155**	T15
	Left hand										
3883437	**A16RSVQBL11**	16	20,0	11,0	200	1/8-27 NPT	-7.0	0.0	VB..110304	**MS1153**	T7
3883435	**A25TSVQBL16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	0.0	VB..160408	**MS1155**	T15

Steel shank with through coolant
See pages B42, B49, and B85 for inserts.

A-SVUB 93°

order number	catalogue number	D	D min	F	L1	CS	γF°	γP°	gage insert	insert screw	Torx
	Right hand										
3883440	**A20SSVUBR11**	20	25,0	13,0	250	1/8-27 NPT	-6.0	0.0	VB..110304	**MS1153**	T7
3883438	**A25TSVUBR16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	0.0	VB..160408	**MS1155**	T15
	Left hand										
3883441	**A20SSVUBL11**	20	25,0	13,0	250	1/8-27 NPT	-6.0	0.0	VB..110304	**MS1153**	T7
3883439	**A25TSVUBL16**	25	32,0	17,0	300	1/4-18 NPT	-6.0	0.0	VB..160408	**MS1155**	T15

See pages B14–B16, B46, and B70–B71 for inserts.

53°

order number	catalogue number	B	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Right hand									
2031094	**12157210200**	8,00	4,50	8,00	6,00	32,00	CC..0602..	**12148068700**	T8	1,0
2031101	**12157210600**	10,00	5,00	10,00	7,50	40,00	CC..0602..	**12148068700**	T8	1,0
2031111	**12157211000**	12,00	6,50	12,00	9,00	50,00	CC..0903..	**12148095100**	T15	3,0
2031116	**12157211400**	16,00	8,00	16,00	12,00	60,00	CC..0903..	**12148095100**	T15	3,0
2031109	**12157200200**	12,00	6,50	12,00	9,00	50,00	CC..09T3..	**12148095100**	T15	3,0
2031262	**12157200400**	16,00	8,00	16,00	12,00	60,00	CC..09T3..	**12148095100**	T15	3,0
2031137	**12157201000**	20,00	10,50	20,00	14,00	100,00	CC..09T3..	**12148095100**	T15	3,0
	Left hand									
2028218	**12157210300**	8,00	4,50	8,00	6,00	32,00	CC..0602..	**12148068700**	T8	1,0
2012010	**12157210700**	10,00	5,00	10,00	7,50	40,00	CC..0602..	**12148068700**	T8	1,0
2012111	**12157211100**	12,00	6,50	12,00	9,00	50,00	CC..0903..	**12148095100**	T15	3,0
2012199	**12157211500**	16,00	8,00	16,00	12,00	60,00	CC..0903..	**12148095100**	T15	3,0
2031107	**12157200300**	12,00	6,50	12,00	9,00	50,00	CC..09T3..	**12148095100**	T15	3,0
2019362	**12157200500**	16,00	8,00	16,00	12,00	60,00	CC..09T3..	**12148095100**	T15	3,0
2031135	**12157201100**	20,00	10,50	20,00	14,00	100,00	CC..09T3..	**12148095100**	T15	3,0

See pages B14–B16, B46, and B70–B71 for inserts.

90°

order number	catalogue number	B	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Right hand									
2024102	**12157210400**	10,00	10,30	10,00	7,50	40,00	CC..0602..	**12148068700**	T8	1,0
2031112	**12157210800**	12,00	12,30	12,00	9,00	50,00	CC..0903..	**12148095100**	T15	3,0
2031117	**12157211200**	16,00	16,30	16,00	12,00	60,00	CC..0903..	**12148095100**	T15	3,0
2031110	**12157200600**	12,00	12,30	12,00	9,00	50,00	CC..09T3..	**12148095100**	T15	3,0
2012203	**12157200800**	16,00	16,30	16,00	12,00	60,00	CC..09T3..	**12148095100**	T15	3,0
	Left hand									
2031100	**12157210500**	10,00	10,30	10,00	7,50	40,00	CC..0602..	**12148068700**	T8	1,0
2012113	**12157210900**	12,00	12,30	12,00	9,00	50,00	CC..0903..	**12148095100**	T15	3,0
2031115	**12157211300**	16,00	16,30	16,00	12,00	60,00	CC..0903..	**12148095100**	T15	3,0
2031108	**12157200700**	12,00	12,30	12,00	9,00	50,00	CC..09T3..	**12148095100**	T15	3,0
2031114	**12157200900**	16,00	16,30	16,00	12,00	60,00	CC..09T3..	**12148095100**	T15	3,0
2031136	**12157201300**	20,00	20,30	20,00	14,00	100,00	CC..09T3..	**12148037700**	T15	3,0

Steel shank without through coolant
See pages B29, B48, and B80 for inserts.

45°

order number	catalogue number	D	F	H1	L1	gage insert	insert screw	Torx	Nm
	Left hand								
2031213	S30MSSDCN12	30,00	0,00	0,50	150,00	SC..1204..	12148007200	T20	3,5

Steel shank without through coolant
See pages B14–B16, B46,
and B70–B71 for inserts.

50°

order number	catalogue number	D	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Left hand									
2024091	S08ASCMCN065	8,00	0,00	7,00	6,00	32,00	CC..0602..	12148068700	T8	1,0
2012035	S10BSCMCN06	10,00	0,00	9,00	7,00	40,00	CC..0602..	12148068700	T8	1,0
2031113	S12DSCMCN06	12,00	0,00	11,00	8,00	60,00	CC..0602..	12148068700	T8	1,0
2031119	S16FSCMCN09	16,00	0,00	15,00	10,00	80,00	CC..0903..	12148095100	T15	3,0
2030994	12157301800	16,00	0,00	15,00	10,00	80,00	CC..09T3..	12148095100	T15	3,0

Steel shank without through coolant
See pages B14–B16, B46,
and B70–B71 for inserts.

65°

order number	catalogue number	D	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Right hand									
2031097	S08ASCNCR06	8,00	1,00	7,00	2,00	32,00	CC..0602..	12148068700	T8	1,0
2024106	S10BSCQCR06	10,00	1,00	9,00	2,00	40,00	CC..0602..	12148068700	T8	1,0
	Left hand									
2031096	S08ASCNCL066	8,00	1,00	7,00	2,00	32,00	CC..0602..	12148068700	T8	1,0
2024105	S10BSCQCL06	10,00	1,00	9,00	2,00	40,00	CC..0602..	12148068700	T8	1,0

Steel shank without through coolant
See pages B14–B16, B46, and B70–B71 for inserts.

■ 90°

order number	catalogue number	D	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Right hand									
2031103	**S10BSCACR06**	10,00	5,30	9,00	7,00	40,00	CC..0602..	**12148068700**	T8	1,0
2024123	**S12DSCACR06**	12,00	6,30	11,00	8,00	60,00	CC..0602..	**12148068700**	T8	1,0
2031118	**S16FSCACR09**	16,00	8,00	15,00	10,00	80,00	CC..0903..	**12148095100**	T15	3,0
2030995	**12157301400**	16,00	8,00	15,00	10,00	80,00	CC..09T3..	**12148095100**	T15	3,0
2030999	**12157301600**	20,00	10,00	18,00	10,50	125,00	CC..09T3..	**12148095100**	T15	3,0
	Left hand									
2031095	**S08ASCACL069**	8,00	4,30	7,00	6,00	32,00	CC..0602..	**12148068700**	T8	1,0
2031102	**S10BSCACL06**	10,00	5,30	9,00	7,00	40,00	CC..0602..	**12148068700**	T8	1,0
2012133	**S12DSCACL06**	12,00	6,30	11,00	8,00	60,00	CC..0602..	**12148068700**	T8	1,0
2012209	**S16FSCACL09**	16,00	8,00	15,00	10,00	80,00	CC..0903..	**12148095100**	T15	3,0
2030993	**12157301500**	16,00	8,00	15,00	10,00	80,00	CC..09T3..	**12148095100**	T15	3,0
2030998	**12157301700**	20,00	10,00	18,00	10,50	125,00	CC..09T3..	**12148095100**	T15	3,0

Steel shank without through coolant
See pages B35, B48, and B82 for inserts.

■ 90°

order number	catalogue number	D	F	H	H1	L1	gage insert	insert screw	Torx	Nm
	Left hand									
2031104	**S10BSTCCN11**	10,00	5,20	9,00	2,00	40,00	TC..1102..	**12148068700**	T8	1,0
2012225	**S16FSTCCN16**	16,00	7,65	14,50	2,00	80,00	TC..16T3..	**12148038800**	T15	3,0

Cartridges

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.

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 20,0mm 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.

Simple and secure mounting to the tool by a single cartridge clamping screw.

Same clamping systems as standard turning toolholders.

High accuracy on “F” dimension ensures proper application to minimum bore dimensions.

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 16,0mm and insert ICs from 9,52mm 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 with hole

S

Center clamping by screw for inserts with hole

C
Insert Shape

C

D

R

S

T

W

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	09	
Cartridge Size	Identifying Code of Cartridge	Mounting Design of Cartridge	Insert Size Cutting Edge Length L10	Additional Information

H1 = cutting edge height of cartridge, in mm.

C = cartridge

A-design conforming to ISO 5611

C

D

S

T

W

R

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°
Pages: **A66–A67**

MCKN
75°
Pages: **A66–A67**

MCLN
95°
Pages: **A68–A69**

MDJN
93°
Pages: **A68–A69**

MDQN
107,5°
Pages: **A70–A71**

MSKN
75°
Pages: **A70–A71**

MSRN
75°
Pages: **A72–A73**

MSSN
45°
Pages: **A72–A73**

MSTN
60°
Pages: **A74–A75**

MSYN
85°
Pages: **A74–A75**

MTFN
90°
Pages: **A76–A77**

MTGN
90°
Pages: **A76–A77**

Clamping System P

P

Lever-type clamping system for negative indexable inserts with hole to DIN 4988 and positive round inserts more than 20,0mm 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°
Pages: **A78–A79**

PSKN
75°
Pages: **A78–A79**

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°
Pages:
A80–A81

CSSP
45°
Pages:
A80–A81

CSRP
75°
Pages:
A80–A81

CTFP
90°
Pages:
A82–A83

Clamping System S

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 16,0mm and insert ICs from 9,52mm are secured by means of a threaded bushing.

SCFP
90°
Pages:
A84–A85

SCGP
90
Pages:
A84–A85

SCLC
95°
Pages:
A84–A85

SCLP
95°
Pages:
A86–A87

SCRP
75°
Pages:
A86–A87

SCSP
45°
Pages:
A88–A89

SCTP
60°
Pages:
A88–A89

SCWP
60°
Pages:
A88–A89

SDJP
93°
Pages:
A90–A91

SRGC
Pages:
A90–A91

SSKC
75°
Pages:
A90–A91

SSKP
75°
Pages:
A92–A93

SSRC
75°
Pages:
A92–A93

SSRP
75°
Pages:
A92–A93

SSSC
45°
Pages:
A94–A95

SSSP
45°
Pages:
A94–A95

STFP
90°
Pages:
A96–A97

STGP
90°
Pages:
A96–A97

STTP
60°
Pages:
A98–A99

STWP
60°
Pages:
A98–A99

See pages B16–B19, B46, B50, and B72–B73 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

See pages B16–B19, B46, B50, and B72–B73 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	3,08	-9.0	-5.0	CN..120408/CN..432
3870415	**MCKNR16CA12**	60	25,0	63	3,08	-9.0	-5.0	CN..120408/CN..432
	Left hand							
3870417	**MCKNL12CA12**	50	20,0	55	3,08	-9.0	-5.0	CN..120408/CN..432

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ICSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ICSN432	KLM46	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ICSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ICSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050

See pages B16–B19, B46, B50, and B72–B73 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

See pages B22–B25, B52, and B76–B78 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

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ICSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ICSN432	KLM46	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ICSN633	KLM68	4mm	CKM35	STCM8	4mm	KUAM27	4mm	KUAM32	MS364	8mm	CSWM 100 080
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ICSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ICSN432	KLM46	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ICSN633	KLM68	4mm	CKM35	STCM8	4mm	KUAM27	4mm	KUAM32	MS364	8mm	CSWM 100 080

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
IDSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
IDSN432	KLM46	2.5mm	CKM41	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
IDSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

See pages B22–B25, B52, and B76–B78 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

See pages B30–B33, B55–B56, and B81 for inserts.

MSKN 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3870352	**MSKNR10CA09**	40	14,0	50	2,22	-9.0	-5.0	SN..090308/SN..322
3870351	**MSKNR12CA12**	50	20,0	55	3,04	-9.0	-5.0	SN..120408/SN..432
3870350	**MSKNR16CA12**	60	25,0	63	3,04	-9.0	-5.0	SN..120408/SN..432
3870349	**MSKNR20CA15**	70	25,0	70	3,74	-9.0	-5.0	SN..150612/SN..543
3870348	**MSKNR25CA19**	100	32,0	100	4,56	-9.0	-5.0	SN..190612/SN..543
	Left hand							
3870356	**MSKNL10CA09**	40	14,0	50	2,22	-9.0	-5.0	SN..090308/SN..322
3870355	**MSKNL12CA12**	50	20,0	55	3,04	-9.0	-5.0	SN..120408/SN..432
3870354	**MSKNL16CA12**	60	25,0	63	3,04	-9.0	-5.0	SN..120408/SN..432
3870353	**MSKNL20CA15**	70	25,0	70	3,74	-9.0	-5.0	SN..150612/SN..543

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
IDSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
IDSN432	KLM46	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
IDSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
IDSN432	KLM46	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ISSN633	KLM68	4mm	CKM35	STCM8	4mm	KUAM27	4mm	KUAM32	MS364	8mm	CSWM 100 080
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

See pages B30–B33, B55–B56, and B81 for inserts.

MSRN 75°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870344	**MSRNR10CA09**	40	14,0	50	-9.0	-5.0	SN..090308/SN..322
3870343	**MSRNR12CA12**	50	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870342	**MSRNR16CA12**	60	25,0	63	-9.0	-5.0	SN..120408/SN..432
3870341	**MSRNR20CA15**	70	25,0	70	-9.0	-5.0	SN..150612/SN..543
	Left hand						
3870347	**MSRNL12CA12**	50	20,0	55	-9.0	-5.0	SN..120408/SN..432
3870346	**MSRNL16CA12**	60	25,0	63	-9.0	-5.0	SN..120408/SN..432
3870345	**MSRNL20CA15**	70	25,0	70	-9.0	-5.0	SN..150612/SN..543

See pages B30–B33, B55–B56, and B81 for inserts.

MSSN 45°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
	Right hand							
3870336	**MSSNR10CA09**	40	14,0	44	6,09	-13.0	0.0	SN..090308/SN..322
3870335	**MSSNR12CA12**	50	20,0	47	8,33	-13.0	0.0	SN..120408/SN..432
3870334	**MSSNR16CA12**	60	25,0	53	8,33	-13.0	0.0	SN..120408/SN..432
3870333	**MSSNR20CA15**	70	25,0	60	10,25	-13.0	0.0	SN..150612/SN..543
	Left hand							
3870340	**MSSNL10CA09**	40	14,0	44	6,09	-13.0	0.0	SN..090308/SN..322
3870339	**MSSNL12CA12**	50	20,0	47	8,33	-13.0	0.0	SN..120408/SN..432
3870338	**MSSNL16CA12**	60	25,0	53	8,33	-13.0	0.0	SN..120408/SN..432
3870337	**MSSNL20CA15**	70	25,0	60	10,25	-13.0	0.0	SN..150612/SN..543

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM36	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
SKSN566K	KLM54	2.5mm	CKM37	STCM40	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

See pages B30–B33, B55–B56, and B81 for inserts.

MSTN 60°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
	Right hand							
3870312	**MSTNR10CA09**	40	9,0	50	13,31	-11.0	0.0	SN..090308/SN..322
3870311	**MSTNR12CA12**	50	13,0	55	5,86	-11.0	0.0	SN..120408/SN..432
3870310	**MSTNR16CA12**	60	15,0	63	5,90	0.0	-11.0	SN..120408/SN..432

See pages B30–B33, B55–B56, and B81 for inserts.

MSYN 85°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3870308	**MSYNR10CA09**	40	14,0	50	0,75	-9.0	-5.0	SN..090308/SN..322
3870307	**MSYNR12CA12**	50	20,0	55	1,02	-9.0	-5.0	SN..120408/SN..432
3870306	**MSYNR16CA12**	60	25,0	63	1,02	-9.0	-5.0	SN..120408/SN..432
3870305	**MSYNR25CA19**	100	32,0	100	1,54	-9.0	-5.0	SN..190612/SN..643
	Left hand							
3870309	**MSYNL10CA09**	40	14,0	50	0,75	-9.0	-5.0	SN..090308/SN..322

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	KLM43	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ISSN432	KLM46S	2.5mm	CKM34	STCM9	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

ISSN633	KLM68	4mm	CKM35	STCM8	4mm	KUAM27	4mm	KUAM33	MS364	8mm	CSWM 100 080
–	KLM33	2mm	CKM36	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050

See pages B36–B39, B58, and B83 for inserts.

MTFN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3871303	MTFNR12CA16	50	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871302	MTFNR16CA16	60	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871301	MTFNR20CA22	70	25,0	70	-9.0	-5.0	TN..220408/TN..432
3871300	MTFNR25CA27	100	32,0	100	-9.0	-5.0	TN..270612/TN..443
	Left hand						
3871306	MTFNL12CA16	50	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871305	MTFNL16CA16	60	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871304	MTFNL20CA22	70	25,0	70	-9.0	-5.0	TN..220408/TN..432

See pages B36–B39, B58, and B83 for inserts.

MTGN 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3871296	MTGNR12CA16	50	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871295	MTGNR16CA16	60	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871294	MTGNR20CA22	70	25,0	70	-9.0	-5.0	TN..220408/TN..432
	Left hand						
3871299	MTGNL12CA16	50	20,0	55	-9.0	-5.0	TN..160408/TN..332
3871298	MTGNL16CA16	60	25,0	63	-9.0	-5.0	TN..160408/TN..332
3871297	MTGNL20CA22	70	25,0	70	-9.0	-5.0	TN..220408/TN..432

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33L	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ITSN322	KLM34L	2mm	CKM34	STCM9	2mm	KUAM25	2mm	KUAM32	191.407	5mm	CSWM 080 050
ITSN433	KLM46	2.5mm	CKM35	STCM37	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
ITSN534	KLM58	3mm	CKM38	STCM39	3mm	KUAM26	3mm	KUAM32	MS364	8mm	CSWM 100 080
–	KLM33L	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ITSN322	KLM34L	2mm	CKM34	STCM9	2mm	KUAM25	2mm	KUAM32	191.407	5mm	CSWM 080 050
ITSN433	KLM46	2.5mm	CKM35	STCM37	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	lock pin	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	KLM33L	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ITSN322	KLM34L	2mm	CKM34	STCM9	2mm	KUAM25	2mm	KUAM32	191.407	5mm	CSWM 080 050
ITSN433	KLM46	2.5mm	CKM35	STCM37	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	KLM33L	2mm	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
ITSN322	KLM34L	2mm	CKM34	STCM9	2mm	KUAM25	2mm	KUAM32	191.407	5mm	CSWM 080 050
ITSN433	KLM46	2.5mm	CKM35	STCM37	2.5mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

See pages B16–B19, B46, B50, and B72–B73 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

See pages B30–B33, B55–B56, and B81 for inserts.

PSKN 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
	Right hand							
3871287	PSKNR12CA12	50	20,0	55	3,05	-8.0	-6.0	SN..120408/SN..432
3871286	PSKNR16CA12	60	25,0	63	3,05	-6.0	-6.0	SN..120408/SN..432
3871289	PSKNR20CA15	70	25,0	70	3,75	—	—	SN..150612/SN..543
	Left hand							
3871288	PSKNL16CA12	60	25,0	63	3,05	-6.0	-6.0	SN..120408/SN..432

shim	shim pin	lever	lever screw	Torx Plus	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	–	511.022	514.122	10 IP	KUAM28	2mm	KUAM31	191.406	4mm	CSWM 060 050
512.112	513.023	511.023	514.123	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
512.112	513.023	511.023	514.123	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
512.117	513.025	511.025	514.125	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

shim	shim pin	lever	lever screw	Torx Plus	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	–	511.022	514.122	10 IP	KUAM28	2mm	KUAM31	191.406	4mm	CSWM 060 050
512.063	513.023	511.023	514.123	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
512.025	513.025	511.025	514.125	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
512.063	513.023	511.023	514.123	15 IP	KUAM23	2.5mm	KUAM32	191.407	5mm	CSWM 080 050

See pages B34 and B57 for inserts.

CSKP 75°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
	Right hand							
3870437	**CSKPR10CA3**	40	14,0	50	2,24	0.0	5.0	SP..090308/SP..322
3870436	**CSKPR12CA4**	50	20,0	55	3,06	0.0	5.0	SP..120308/SP..422

See pages B34 and B57 for inserts.

CSRP 75°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
	Right hand							
3870435	**CSRPR10CA3**	40	14,0	50	2,20	0.0	0.0	SP..090308/SP..322
3870434	**CSRPR12CA4**	50	20,0	55	3,02	3.0	0.0	SP..120308/SP..422

Chipbreakers for C-Style Cartridges

insert	chipbreaker	effective width
SP..090308/SP..322	CBS-12	2.1
–	CBS-12D**	2.1
SP..120308/SP..422	CBS16	4.4
–	CBS-16D**	2.8
–	CBS-16N	3.0
–	CBS16F	2.1

***For chipbreaking on both primary and secondary cutting edges.*

clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050

Chipbreakers for C-Style Cartridges

insert	chipbreaker	effective width
SP..090308/SP..322	CBS-12	2.1
–	CBS-12D**	2.1
SP..120308/SP..422	CBS16	4.4
	CBS-16D**	2.8
–	CBS-16N	3.0
–	CBS16F	2.1

***For chipbreaking on both primary and secondary cutting edges.*

clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050

See pages B34 and B57 for inserts.

CSSP 45°

order number	catalogue number	D min	F	L1	L1A	λS°	γO°	gage insert
	Right hand							
3870430	**CSSPR10CA3**	40	14,0	44	6,08	0.0	0.0	SP..090308/SP..322
3870429	**CSSPR12CA4**	50	20,0	47	8,32	0.0	0.0	SP..120308/SP..422
	Left hand							
3870433	**CSSPL10CA3**	40	14,0	44	6,08	0.0	0.0	SP..090308/SP..322
3870432	**CSSPL12CA4**	50	20,0	47	8,32	0.0	0.0	SP..120308/SP..422
3870431	**CSSPL20CA4**	70	25,0	60	8,33	0.0	0.0	SP..120308/SP..422

See pages B40–B41, B58, and B83 for inserts.

CTFP 90°

order number	catalogue number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870427	**CTFPR10CA2**	40	14,0	50	0.0	5.0	TP..110304/TP..421
3870426	**CTFPR12CA3**	50	20,0	55	0.0	5.0	TP..160308/TP..322
3870425	**CTFPR16CA3**	60	25,0	63	0.0	5.0	TP..160308/TP..322
3870424	**CTFPR20CA4**	70	25,0	70	0.0	5.0	TP..220408/TP..432
	Left hand						
3870428	**CTFPL12CA3**	50	20,0	55	0.0	5.0	TP..160308/TP..322

Chipbreakers for C-Style Cartridges

insert	chipbreaker	effective width
SP..090308/SP..322	CBS-12	2.1
–	CBS-12D**	2.1
SP..120308/SP..422	CBS16	4.4
–	CBS-16D**	2.8
–	CBS-16N	3.0
–	CBS16F	2.1

***For chipbreaking on both primary and secondary cutting edges.*

shim	shim screw	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	–	–	CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	–	–	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
–	–	–	CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	–	–	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
SM840	MS111	2mm	CKM20	STCM11	3mm	KUAM26	3mm	KUAM32	191.407	5mm	CSWM 080 050

Chipbreakers for C-Style Cartridges

insert	chipbreaker	effective width
TP..110304/TP..421	CBT-8	2.2
TP..160308/TP..322	CBT-12*	4.0
–	CBT-12*	2.7
–	CBT-12*	2.2
TP..220408/TP..432	CBT-16	5.5
–	CBT-16N	3.2
–	CBT-16F	2.1

**Use with CTC style holder only.*

shim	shim screw	hex	clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
–	–	–	CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
–	–	–	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050
SM841	MS109	2mm	CKM34	STCM38	2mm	KUAM24	2mm	KUAM32	191.407	5mm	CSWM 080 050
SM837	MS125	2.5mm	CKM35	STCM8	4mm	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
–	–	–	CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050

See pages B20 and B74–B75 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

See pages B20 and B74–B75 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

See pages B14–B16, B46, and B70–B71 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	**KUAM34**	1.5mm	**KUAM35**	**MS2173**	2mm	**CSWM 035 040**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM25**	2.5mm	**KUAM32**	**191.407**	5mm	**CSWM 080 050**

See pages B20 and B74–B75 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

See pages B20 and B74–B75 for inserts.

SCRP 75°

order number	catalogue number	D min	F	L1	FA	γF°	γP°	gage insert
	Right hand							
3871257	**SCRPR08CA06**	25	10,0	32	1,51	0.0	0.0	CP..060204/CP..2151
	Left hand							
3871258	**SCRPL08CA06**	25	10,0	32	1,51	0.0	0.0	CP..060204/CP..2151

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	**KUAM34**	1.5mm	**KUAM35**	**MS2173**	2mm	**CSWM 035 040**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1933	T7	**KUAM34**	1.5mm	**KUAM35**	**MS2173**	2mm	**CSWM 035 040**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	monuting screw	hex	washer
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

See pages B20 and B74–B75 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	3,65	0.0	0.0	CP..050204/CP..18151
3871254	SCSPR08CA06	25	10,0	28	4,22	0.0	0.0	CP..060204/CP..2151
	Left hand							
3871256	SCSPL08CA06	25	10,0	28	4,22	0.0	0.0	CP..060204/CP..2151

See pages B20 and B74–B75 for inserts.

SCTP 60°

order number	catalogue number	D min	F	L1	FA	γF°	γP°	gage insert
	Right hand							
3871252	SCTPR06CA05	20	5,5	25	2,60	0.0	0.0	CP..050204/CP..18151
3871251	SCTPR08CA06	25	6,0	32	2,95	0.0	0.0	CP..060204/CP..2151
	Left hand							
3871253	SCTPL08CA06	25	6,0	32	2,95	0.0	0.0	CP..060204/CP..2151

See pages B20 and B74–B75 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	**–**	–	**KUAM35**	**MS2173**	2mm	**CSWM 035 040**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	**–**	–	**KUAM35**	**MS2173**	2mm	**CSWM 035 040**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**

See pages B78–B79 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

See pages B27–B28
and B47 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

See pages B29, B48,
and B80 for inserts.

SSKC 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3871192	**SSKCR10CA09**	40	14,0	50	2,24	-4.3	-2.5	SC..09T308/SC..3252
3871191	**SSKCR12CA12**	50	20,0	55	3,06	-3.0	0.0	SC..120408/SC..432
3871190	**SSKCR16CA12**	60	25,0	63	3,06	-3.0	0.0	SC..120408/SC..432
	Left hand							
3871243	**SSKCL12CA12**	50	20,0	55	3,06	-3.0	0.0	SC..120408/SC..432

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1153	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1154	T9	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM25**	2.5mm	**KUAM32**	**191.407**	5mm	**CSWM 080 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

See pages B29, B48, and B80 for inserts.

SSKP 75°

order number	catalogue number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3870393	SSKPR10CA09	40	14,0	50	2,2	0.0	0.0	SP..09T308/SP..3252
3870392	SSKPR12CA09	50	20,0	55	2,2	0.0	0.0	SP..09T308/SP..3252
	Left hand							
3870394	SSKPL10CA09	40	14,0	50	2,2	0.0	0.0	SP..09T308/SP..3252

See pages B29, B48, and B80 for inserts.

SSRC 75°

order number	catalogue number	D min	F	L1	FA	λS°	γO°	gage insert
	Right hand							
3870390	SSRCR12CA12	50	20,0	55	3,06	-3.0	0.0	SC..120408/SC..432
	Left hand							
3870391	SSRCL12CA12	50	20,0	55	3,06	-3.0	0.0	SC..120408/SC..432

See pages B29, B48, and 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

See pages B29, B48, and 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

See pages B29, B48, and 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1157	T15	**KUAM25**	2.5mm	**KUAM32**	**191.407**	5mm	**CSWM 080 050**
MS1157	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

See page B84 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
3870375	**STFPR16CA16**	60	25,0	63	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

See page B84 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM25**	4mm	**KUAM32**	**191.407**	5mm	**CSWM 080 050**
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**

See page B84 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

See page B84 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

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1152	T7	**KUAM34**	1.5mm	**KUAM20**	**MS2175**	2.5mm	**CSWM 040 050**
MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

MS1153	T7	**KUAM28**	2mm	**KUAM30**	**191.405**	4mm	**CSWM 060 050**
MS1155	T15	**KUAM23**	2.5mm	**KUAM31**	**191.406**	4mm	**CSWM 060 050**

KM™ Quick Change Tooling — The Heavy-Duty Choice.

ISO 26622

WIDIA

Speed and Feed for Negative Inserts

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

Cutting Speed (vc) m/min

DIN ISO 513	VDI 3323	Finishing (ap x f = 1 x 0,1)									Medium (ap x f = 2 x 0,2)									Roughing (ap x f = 4 x 0,25)									Heavy roughing (ap x f = 6 x 0,6)								
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	Geometry	22			22 • FW • 49						22 • 49 • AP • MW • 5									49 • 5 • 8									5 • 8 • SR								
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						0,50–5 • 0,18–0,40									1–8 • 0,20–0,60									2–15 • 0,40–1,00								
		TT115			TN7105			TN7110			TN7110 • TN6010			TN7115 • TN6025			TN7115			TN7125						TN7125			TN7135					
	1	390	550	660	360	520	620	340	490	590	280	400	480	250	360	430	200	290	350	180	260	310				150	220	260	150	210	250			
	2	380	540	650	360	510	610	340	480	580	260	370	440	240	340	410	190	270	320	130	190	230				110	160	190	110	150	180			
	3	320	460	550	310	440	530	290	420	500	180	260	310	170	240	290	160	230	280	130	180	220				110	150	180	100	140	170			
	4	290	410	490	270	390	470	260	370	440	190	270	320	180	250	300	130	190	230	110	150	180				90	130	160	70	100	120			
	5	220	320	380	210	300	360	200	280	340	140	200	240	130	190	230	90	130	160	75	110	130				65	90	110	55	80	95			
	6	300	430	520	290	410	490	270	390	470	200	290	350	190	270	320	140	200	240	110	160	190				90	130	160	75	110	130			
	7	290	410	490	270	390	470	260	370	440	190	270	320	180	250	300	130	190	230	110	150	180				85	120	140	70	100	120			
	8	250	350	420	230	330	400	220	320	380	160	230	280	150	210	250	110	150	180	85	120	140				70	100	120	65	90	110			
	9	220	320	380	210	300	360	200	280	340	140	200	240	130	190	230	90	130	160	75	110	130				65	90	110	55	80	95			
	10	300	430	520	290	410	490	270	390	470	200	290	350	190	270	320	140	200	240	110	160	190				90	130	160	75	110	130			
	11	220	320	380	210	300	360	200	280	340	130	190	230	120	170	200	90	130	160	75	110	130				65	90	110	55	80	95			
	12	180	260	310	180	250	300	150	220	260	140	200	240	130	190	220	120	170	200	110	160	190				110	150	180	100	140	170			
	13.1	150	220	260	150	210	250	130	190	230	120	170	200	110	150	180	100	140	170	90	130	160				85	120	140	75	110	130			
	13.2	80	110	130	75	105	125	65	95	115	60	85	100	55	75	90	50	70	85	45	65	80				45	60	70	40	55	65			
M	Geometry	22			22 • FW • 48						22 • 48 • AP • MW • SM						48 • SM • 65									5M • SR								
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						0,50–5 • 0,12–0,40						0,50–6 • 0,10–0,60									4–15 • 0,40–1								
		TT115			TN8025 • TN6010						TN8025 • TN6010			TN6025			TN8025			TN6025						TN7115								
	14.1	280	400	480	180	250	300				150	220	260	140	190	230	140	200	240	110	150	180				110	150	180						
	14.2	250	370	440	140	200	240				130	180	220	110	160	190	110	160	190	85	120	140				85	120	140						
	14.3	190	270	320	110	150	180				100	140	170	85	120	140	85	120	140	65	90	110				65	90	110						
	14.4	140	200	240	90	130	160				75	110	130	70	95	110	70	100	120	55	80	95				60	80	95						
K	Geometry	22			22 • FW • 5 • 22						5 • MW • NMA			NMA • P30			22 • 5 • NMA			NMA						5 • NMA								
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						1–8 • 0,20–0,50			0,50–4 • 0,20–0,40			1–8 • 0,20–0,60			1–8 • 0,20–0,80						2–15 • 0,25–1,20								
		TT115			TN5105 • TN5120 • TN6010						TN5105 • TN5120 • TN6010			CW2015			TN5105 • TN5120			CW5025						TN5105 • TN5120								
	15	–	–	–	290	410	490				230	330	400	300	600	900	180	260	310	350	650	1000				160	230	280						
	16	–	–	–	230	330	400				180	250	300	200	350	550	140	200	240	250	400	600				120	170	200						
	17	280	400	480	250	360	430				210	300	360	350	650	900	180	250	300	400	700	1100				150	220	260						
	18	280	350	420	240	340	410				190	270	320	250	400	600	150	210	250	300	450	700				130	180	220						
	19	–	–	–	340	490	590				290	410	490	300	600	900	240	340	410	350	650	1000				220	310	370						
	20	–	–	–	290	410	490				230	330	400	250	400	600	180	260	310	300	450	700				160	230	280						
N	Geometry							1–4 • 0,10–0,40						1–4 • 0,10–0,40						1–4 • 0,10–0,40														
	ap [mm] • f [mm]																																		
								THM • TN6010						THM • TN6025						THM														
	21							800	1000	3000				500	1000	2500				300	1000	2000												
	22							400	1000	2000				300	1000	1800				300	1000	1500												
	23							600	1000	1500				500	800	1300				200	700	1200												
	24							600	1000	1500				500	800	1300				200	700	1200												
	25							400	700	1000				300	600	800				200	500	700												
	26							400	500	600				300	400	500				250	350	400												
	27							400	500	600				300	400	500				200	300	400												
	28							200	300	400				150	250	350				100	200	300												
	29							100	150	200				100	140	180				80	120	150												
	30							150	200	250				120	180	220				100	150	200												
S	Geometry	< 1 • 0,10			22 • SM • 48			22 • SM • 48			22 • SM • 48			GN			22 • SM • 48			22 • SM • 48														
	ap [mm] • f [mm]				0,50–4 • 0,10–0,50			0,50–4 • 0,10–0,50			0,50–4 • 0,10–0,50			0,50–4 • 0,10–0,50			0,50–4 • 0,10–0,50			0,50–6 • 0,10–0,60														
		THM			TN6025			TN6010 • TN6025			TN6010 • TN6025 • TN8025			CW3020			THM			TN8025														
	31	35	50	60	49	70	85	55	80	95	49	70	85	170	200	370	26	38	45	42	60	70												
	32	28	40	48	39	55	65	46	65	80	42	60	70	170	200	370	21	30	36	34	49	60												
	33	22	32	38	31	44	55	34	48	60	30	43	50	170	220	370	17	24	29	25	36	43												
	34	14	20	24	18	26	31	21	30	36	19	27	32	200	250	370	11	15	18	16	23	27												
	35	14	20	24	20	28	34	22	32	38	20	29	35	200	250	370	11	15	18	17	24	29												
	36	55	80	95	–	–	–	–	–	–	–	–	–	–	–	–	42	60	70	–	–	–												
	37	28	40	48	39	55	65	42	60	70	39	55	65	–	–	–	21	30	36	32	45	55												

Speed and Feed for Positive Inserts

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

DIN ISO 513	VDI 3323	Finishing (ap x f = 1 x 0,1)									Medium (ap x f = 2 x 0,2)									Roughing (ap x f = 4 x 0,25)														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	Geometry	2 • 41			2 • MU						2 • MU • CMT									MU • CMT														
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						0,30–4,50 • 0,08–0,35									0,70–5 • 0,12–0,40														
		TT115			TN7105			TN7110			TN7115 • TN6025			TN7115 • TN6025						TN7115			TN7125											
	1	390	550	660	360	520	620	340	490	590	280	400	480	250	360	430				200	290	350	180	260	310									
	2	380	540	650	360	510	610	340	480	580	260	370	440	240	340	410				190	270	320	130	190	230									
	3	320	460	550	310	440	530	290	420	500	180	260	310	170	240	290				160	230	280	130	180	220									
	4	290	410	490	270	390	470	260	370	440	190	270	320	180	250	300				130	190	230	110	150	180									
	5	220	320	380	210	300	360	200	280	340	140	200	240	130	190	230				90	130	160	75	110	130									
	6	300	430	520	290	410	490	270	390	470	200	290	350	190	270	320				140	200	240	110	160	190									
	7	290	410	490	270	390	470	260	370	440	190	270	320	180	250	300				130	190	230	110	150	180									
	8	250	350	420	230	330	400	220	320	380	160	230	280	150	210	250				110	150	180	85	120	140									
	9	220	320	380	210	300	360	200	280	340	140	200	240	130	190	230				90	130	160	75	110	130									
	10	300	430	520	290	410	490	270	390	470	200	290	350	190	270	320				140	200	240	110	160	190									
	11	220	320	380	210	300	360	200	280	340	130	190	230	120	170	200				90	130	160	75	110	130									
	12	180	260	310	180	250	300	150	220	260	140	200	240	130	180	220				120	170	200	110	160	190									
	13.1	150	220	260	150	210	250	130	190	230	120	170	200	110	150	180				100	140	170	90	130	160									
	13.2	80	110	130	75	105	125	65	95	115	60	85	100	55	75	90				50	70	85	45	65	80									
M	Geometry	MU			MU						2 • MU • CMT									2 • MU • CMT														
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						0,30–4,50 • 0,08–0,35									0,30–4,50 • 0,08–0,35														
		TT115			TN8025 • TN6010						TN8025 • TN6010			TN6025						TN8025			TN6025											
	14.1	280	400	480	180	250	300				150	220	260	140	190	230				140	200	240	110	150	180									
	14.2	250	370	440	140	200	240				130	180	220	110	160	190				110	160	190	85	120	140									
	14.3	190	270	320	110	150	180				100	140	170	85	120	140				85	120	140	65	90	110									
	14.4	140	200	240	90	130	160				75	110	130	70	95	110				70	100	120	55	80	95									
K	Geometry	MU			MU						MU									CMW														
	ap [mm] • f [mm]	0,20–2 • 0,05–0,20			0,20–2 • 0,05–0,20						0,30–4,50 • 0,08–0,35									1–8 • 0,10–0,50														
		TT115			TN5105 • TN5120 • TN6010						TN5105 • TN5120 • TN6010									TN5105 • TN5120														
	15	–	–	–	290	410	490				230	330	400							180	260	310												
	16	–	–	–	230	330	400				180	250	300							140	200	240												
	17	280	400	480	250	360	430				210	300	360							180	250	300												
	18	280	350	420	240	340	410				190	270	320							150	210	250												
	19	–	–	–	340	490	590				290	410	490							240	340	410												
	20	–	–	–	290	410	490				230	330	400							180	260	310												
N	Geometry	_MW • AL1 • AL2 • AL3			_MW • AL1 • AL2 • AL3						MW • AL1 • AL2 • AL3						_MW • AL1 • AL2 • AL3			_MW • AL1 • AL2 • AL3			AL1 • AL2 • AL3										
	ap [mm] • f [mm]	1–4 • 0,10–0,20			1–4 • 0,10–0,20						1–4 • 0,10–0,20						1–4 • 0,10–0,20			1–4 • 0,10–0,40			1–4 • 0,10–0,40										
		THM • HWK10 • HWK15 • TN6025						HCK10 • TN6010			THM • HWK10 • HWK15 • TN6025						HCK10 • TN6010			THM • HWK10 • HWK15			HCK15										
	21				800	1000	3000	800	2000	3000	500	1000	2500	500	1600	2500	300	1000	2000	300	1500	2000	300	1500	2000								
	22				400	1000	2000	400	1500	2000	300	1000	1800	300	1400	1800	300	1000	1500	300	1200	1500											
	23				600	1000	1500	600	1200	1500	500	800	1300	500	1000	1300	200	700	1200	200	900	1200											
	24				600	1000	1500	600	1200	1500	500	800	1300	500	1000	1300	200	700	1200	200	900	1200											
	25				400	700	1000	400	800	1000	300	600	800	300	600	800	200	500	700	200	500	700											
	26				400	500	600	400	500	600	300	400	500	300	400	500	250	350	400	250	350	400											
	27				400	500	600	400	500	600	300	400	500	300	400	500	200	300	400	200	300	400											
	28				200	300	400	200	300	400	150	250	350	150	250	350	100	200	300	100	200	300											
	29				100	150	200	100	150	200	100	140	180	100	140	180	80	120	150	80	120	150											
	30				150	200	250	150	200	250	120	180	220	120	180	220	100	150	200	100	150	200											
S	Geometry	CMT			MU						CMT			MU						CMT			GX											
	ap [mm] • f [mm]	0,70–3 • 0,12–0,20			0,30–2 • 0,08–0,20						0,70–5 • 0,12–0,40			0,30–4,50 • 0,08–0,35						0,70–5 • 0,12–0,40			0,30–4,50 • 0,08–0,35										
		THM			TN6025			TN6010 • TN8025			THM			TN6025 • TN8025			TN6010 • TN8025			THM			TN6025 • TN8025			CW3020								
	31	35	50	60	49	70	85	55	80	95	32	45	55	46	65	80	49	70	85	26	38	45	42	60	70	170	200	370						
	32	28	40	48	39	55	65	46	65	80	25	36	43	35	50	60	42	60	70	21	30	36	34	49	60	170	200	370						
	33	22	32	38	31	44	55	34	48	60	20	29	35	28	40	48	30	43	50	17	24	29	25	36	43	170	220	370						
	34	14	20	24	18	26	31	21	30	36	13	18	22	16	23	28	19	27	32	11	15	18	16	23	27	200	250	370						
	35	14	20	24	20	28	34	22	32	38	13	18	22	18	25	30	20	29	35	11	15	18	17	24	29	200	250	370						
	36	55	80	95	–	–	–	–	–	49	70	85	–	–	–	–	–	–	–	42	60	70	–	–	–	–	–	–						
	37	28	40	48	39	55	65	42	60	70	25	36	43	35	50	60	39	55	65	21	30	36	32	45	55	–	–	–						

WIDIA

Achieve Maximum Machine Output

WIDIA's extensive portfolio of KM™ Quick Change Tooling and Accessories offers the most complete tooling package on the market today — one that's easy to configure, and much more robust than the competition.

KM™ QUICK CHANGE

If you're looking to boost your overall machining efficiency by up to 60%, then look no further than KM™ Quick Change Tooling. Its unique three-surface taper contact design makes it the most rigid and accurate quick change tooling system available. Highly versatile and easily employed on your lathe, machining center, multi-spindle, or mill-turn machine, KM™ Quick Change Tooling significantly reduces tool change and downtime while increasing production, enabling you to run faster and longer between tool changes.

- The most heavy-duty, rigid modular quick change tooling available on the market today.
- Advanced cutting tool materials means increased production and fewer tool changes.
- All the tooling necessary to complete a production run or shift of operation in one complete kit.
- Improved tool maintenance, increased machine up time, and decreased nonconforming percentages.

THE HEAVY-DUTY CHOICE

WIDIA™

WWW.WIDIA.COM

Inserts

Selection Guide and Start-Up Recommendations **B2–B5**

Chipbreaker Geometry — Negative **B6–B7**

Chipbreaker Geometry — Positive **B8–B9**

Grades and Grade Descriptions **B10–B11**

Catalogue Numbering System **B12–B13**

Carbide Inserts **B14–B45**

Inserts for Aluminium **B46–B49**

Ceramic Inserts **B50–B59**

Cubic Boron Nitride and Polycrystalline Diamond Inserts **B60–B87**

- Overview B60–B61
- Cutting Materials Groups B62
- Custom Solutions • CBN and PCD B63
- Grades and Grade Descriptions B64–B65
- Speed and Feed Chart B66–B67
- Catalogue Numbering System B68–B69
- Inserts B70–B87

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 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.

TN7105–TN7135 for Steel

wear resistance = harder

TN7105 — Finish and fine turning.

TN7110 — Light to medium turning under favourable conditions.

TN7115 — Medium roughing and slightly interrupted cuts.

TN7125 — General roughing, also with interrupted cuts.

TN7135 — Heavy turning and heavily interrupted cuts.

toughness = softer

Start-Up Recommendations for Steel

Double-Sided, Negative Inserts

Roughing
Interrupted cut and/or heavy scale
USE: 5 geometry

Medium Turning
Slightly interrupted cut and/or slight scale
USE: AP geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Positive Inserts

Roughing
Interrupted cut and/or scale
USE: STANDARD MT geometry

Medium Turning
General turning and boring
USE: MU geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Negative Inserts

Heavy Duty Turning
Very large depth of cut and feed rates < 0,8mm
USE: SR geometry

Heavy Roughing
Interrupted cut and/or large scale
USE: 8 geometry

Roughing
Lightly interrupted cut, minimum scale
USE: 65 geometry

3 Select the Cutting Speed:
Using the speed and feed chart, establish cutting speed and obtain optimal starting conditions and range.

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

TN6010–TN6025 for Stainless Steel

wear resistance = harder

TN6010 — Finish and fine turning.

TN8025 — Light to medium turning of stainless steels suitable for interrupted and non-interrupted cuts.

TN6025 — Difficult machining operations.

toughness = softer

Start-Up Recommendations for Stainless Steel

Double-Sided, Negative Inserts

Roughing
Medium to roughing with positive chip groove
USE: SM geometry

Medium Turning
Slightly interrupted cut and/or slight scale
USE: AP geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Positive Inserts

Roughing
Interrupted cut and/or scale
USE: STANDARD MT geometry

Medium Turning
General turning and boring
USE: MU geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Negative Inserts

Heavy Roughing
Interrupted cut and/or large scale, as well as for very large depth of cut and high feed rates
USE: SR geometry

Roughing
Lightly interrupted cut, minimum scale
USE: 65 geometry

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 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.

TN5105–TN5120 for Cast Iron

wear resistance = harder

TN6010 — Finish and fine turning.

TN5105 — Preferred for grey cast iron finishing operations.

TN5120 — Preferred for all grey cast iron and nodular cast iron.

TN7115 — Nodular cast iron grades > GGG40.

toughness = softer

Start-Up Recommendations for Cast Iron

Double-Sided, Negative Inserts

Roughing
Interrupted cut and/or heavy scale
USE: 5 geometry

Medium Turning
Slightly interrupted cut and/or slight scale
USE: ..MA geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Positive Inserts

Roughing
Interrupted cut and/or scale
USE: STANDARD ..MW geometry

Medium Turning
General turning and boring
USE: MU geometry

Finishing
Non-interrupted cut, no scale
USE: 41 geometry

3 Select the Cutting Speed:
Using the speed and feed chart, establish cutting speed and obtain optimal starting conditions and range.

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

TN6010–TN6025 for High-Temperature Alloys

wear resistance = harder

THM — Fine finish turning.

TN6010 — For light turning operations.

TN6025 — For light and medium turning operations.

TN8025 — Roughing operations.

toughness = softer

Start-Up Recommendations for High-Temperature Alloys

Double-Sided, Negative Inserts

Roughing
Medium to roughing with positive chip groove
USE: SM geometry

Medium Turning
Slightly interrupted cut and/or slight scale
USE: 48 geometry

Finishing
Non-interrupted cut, no scale
USE: 22 geometry

Single-Sided, Positive Inserts

Roughing
Interrupted cut and/or scale
USE: STANDARD CMT geometry

Medium Turning
General turning and boring
USE: MU geometry

Double-Sided, Negative Inserts

22

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

FL

Double-sided insert with adjusted inclination angle for good chip control at low depths of cut.

FW

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

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.

48

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.

AP

For near-net shape turning with low depths of cut and medium feeds. Stabilised cutting edge. Optimised chip forming and corrugated cutting edges ensure good swarf control and chip evacuation. For steels, rolled or drawn components with casting or forging skin.

FR

Double-sided insert with medium positive geometry. Adjusted inclination angle reduces cutting forces, provides good chip control over wide range of feed rates.

49

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.

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.

5

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

Double-Sided, Negative Inserts

SL

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

SM

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

CT

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

..MA

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

..MG

For light machining to light roughing.

Single-Sided, Negative Inserts

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.

8

Stable cutting edge for heaviest chip sections and highest metal removal rates. For interrupted cut and applications involving high cutting edge loading. Depths of cut up to 16,0mm and feeds up to 1,6mm.

SR

Strong cutting edge for highest loads in roughing with depths of cut up to 22,0mm and feeds up to 2,0mm.

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

Single-Sided, 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 0,2mm 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.

67

Provides chip control in the medium-duty range. Positive rake reduces cutting forces and power consumption. Used on low-strength and stainless steels.

MU

Medium universal turning includes rough machining with medium chip loads and finish machining with low chip loads.

MT

Stabilised cutting edge for medium chip sections. Effective in operations that make high demands on toughness or involve interrupted cuts.

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

Round, Positive Inserts

RCMT/RCMX

For straight turning, facing, and profile turning. Used at small depths of cut and high feeds up to 0,1 x D.

RCMT43

For turning, facing, and contouring in roughing and finishing. Ideal for machining alloy, carbon, and stainless steels. Range includes:

feeds:
f ≤ 0,1 x D

depths of cut:
ap ≤ 0,4 x D

Single-Sided, Positive Inserts for Aluminium Machining

AL1

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

AL2

For difficult-to-machine aluminium alloys with low Si contents, wrought alloys, and extrusions. Achieves optimum results on difficult-to-machine materials.

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.

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

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

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

Grade

	Coating	Grade Description	P	M	K	N	S	H	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											
NEW! TN5105	HC-K15	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.			K												
NEW! TN5120	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Light and medium machining. For cast irons.			K												
TN6010	HC-S10	Coated carbide. PVD — TiAlN Nano-multi-layer. Light machining. For difficult-to-machine alloys and stainless steels.		M			S										
TN6025	HC-S25	Coated carbide. PVD — TiAlN Nano-multi-layer. Light and medium machining. For difficult-to-machine alloys and stainless steels.		M			S										
NEW! TN7105	HC-P05	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Extremely wear resistant. Light machining. For steels and nodular cast iron in non-interrupted cuts.	P														
NEW! TN7110	HC-P10	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Very wear resistant. Light and medium machining. For steels.	P														
NEW! TN7115	HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P														
NEW! TN7125	HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good toughness properties. Medium and heavy machining. For steels.	P	M													

Grade

	Coating	Grade Description	05	10	15	20	25	30	35	40	45
NEW! TN7135	HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Proven on all roughing and heavy roughing operations, wet or dry, on interrupted and non-interrupted cuts.	P	P	P	P	P	P	P	P	P
TN8025	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 300 series.	M	M	M	M	M	M	M	M	M
HWK10	HF-N10	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light machining. For non-ferrous metals and non-metals.	N	N	N	N	N	N	N	N	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	N	N	N	N	N	N	N	N
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.	K, N, S, H	K, N, S, H	K, N, S, H	K, N, S, H	N	N	N	N	N
TTM	HW-P25	Uncoated carbide. Medium machining. For steels and nodular cast iron.	P, M	P, M	P, M	P, M	P	P	P	P	P
TTR	HW-P35	Uncoated carbide. Light and medium machining. For steels and nodular cast iron. To be used at low cutting speeds. Effective in unfavourable conditions.	P, M	P, M	P, M	P, M	P	P	P	P	P
TTX	HW-P35	Uncoated carbide. Very wear-resistant grade. Light machining. To be used in favourable conditions.	P, M	P, M	P, M	P, M	P	P	P	P	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	P, M	P, M	P, M	P	P	P	P	P
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	K	K	K	K	K	K	K	K
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	K	K	K	K	K	K	K	K
NEW! 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	S	S	S	S	S	S	S	S

How Do Catalog Numbers Work?

Each character in our catalog 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	Special Design

12 — Size

Code for metric cutting edge length "L10"

mm	"D" 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 — Thickness S

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
09	9,52
11	11,11
12	12,70

08 — Corner Radius "Rε"

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

Hand of Insert (optional)

R = Right hand

L = Left hand

N = Neutral

Cutting Edge (optional)

F — Sharp

E — Rounded

T — Chamfered

S — Chamfered and Rounded

K — Double-Chamfered

P — Double-Chamfered and Rounded

FM — Chipbreaker (optional)

2 = Sharp Edge
3 = Medium Roughing
4 = Finish Medium
5 = Medium Roughing
8 = Heavy Roughing
11 = Ground Chip Groove "width of chip groove 1,1mm"
13 = Railroad Light
16 = Railroad Medium
18 = Ground Chip Groove "width of chip groove 1,8mm"
22 = Finishing
25 = Ground Chip Groove "width of chip groove 2,5mm"
29 = Ground Chip Groove "width of chip groove 2,9mm"
41 = Light Medium
43 = Finish Medium
48 = Medium Steel
49 = Medium Stainless
65 = Roughing
67 = Medium Roughing
AP = Near Net Shape
AL1 = Universal
AL2 = Sharp Edge
AL3 = High Positive
CT = Copy Turning
EN95 = Heavy Roughing
FL = Finish Light
FM = Finish Medium
FR = Finish Rough
FW = Finishing Wiper
HP = Hard Peeling for materials over 950 N/mm²
MU = Medium Universal
MW = Medium Wiper
RRP = Railroad Positive
SL = Light Medium Roughing
SM = Sharp Medium
SP = Soft Peeling for materials up to 950 N/mm²
SR = Super Rough
T = Negative Land

± Tolerance on "D"

"D" mm	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	0,06	0,06	0,06	0,13
12,70	0,06	0,06	0,06	0,13
14,29	0,06	0,06	0,06	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

± Tolerance on "B"

"D" mm	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

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CCGT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCGT0602022	6,35	6,45	2,38	0,2	2,80										●					●
CCGT09T3022	9,53	9,67	3,97	0,2	4,40															●

CCGT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCGT060202MU	6,35	6,45	2,38	0,2	2,80		●					●			●					

CCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMT060202	6,35	6,45	2,38	0,2	2,80		●			●	●	●		●	●				●	●
CCMT060204	6,35	6,45	2,38	0,4	2,80		●			●	●	●	●	●	●	●	●		●	●
CCMT060208	6,35	6,45	2,38	0,8	2,80		●			●	●	●	●							
CCMT080304	7,94	8,06	3,18	0,4	3,40								●							
CCMT080308	7,94	8,06	3,18	0,8	3,40								●							
CCMT090304	9,53	9,67	3,18	0,4	4,40		●			●	●	●	●	●					●	●
CCMT090308	9,53	9,67	3,18	0,8	4,40		●			●	●	●	●	●					●	●
CCMT090312	9,53	9,67	3,18	1,2	4,40							●								
CCMT09T304	9,53	9,67	3,97	0,4	4,40		●			●	●	●	●	●	●				●	●
CCMT09T308	9,53	9,67	3,97	0,8	4,40		●			●	●	●	●	●	●	●		●	●	●
CCMT09T312	9,53	9,67	3,97	1,2	4,40		●						●	●					●	
CCMT120408	12,70	12,90	4,76	0,8	5,50		●			●	●	●	●	●	●				●	●
CCMT120412	12,70	12,90	4,76	1,2	5,50		●			●	●	●	●	●	●					

CCMT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMT0602042	6,35	6,45	2,38	0,4	2,80						●	●	●		●	●				●
CCMT0602082	6,35	6,45	2,38	0,8	2,80										●					
CCMT0903042	9,53	9,67	3,18	0,4	4,40							●								
CCMT09T3042	9,53	9,67	3,97	0,4	4,40						●	●	●		●	●				

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ CCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMT060204MU	6,35	6,45	2,38	0,4	2,80		●				●	●	●		●					
CCMT060208MU	6,35	6,45	2,38	0,8	2,80		●					●	●		●					
CCMT090304MU	9,53	9,67	3,18	0,4	4,40	●	●			●	●	●	●		●					
CCMT090308MU	9,53	9,67	3,18	0,8	4,40	●	●				●	●	●		●					
CCMT090312MU	9,53	9,67	3,18	1,2	4,40		●								●					
CCMT09T304MU	9,53	9,67	3,97	0,4	4,40	●	●	●	●	●	●	●	●		●					
CCMT09T308MU	9,53	9,67	3,97	0,8	4,40	●	●	●	●	●	●	●	●	●	●					
CCMT09T312MU	9,53	9,67	3,97	1,2	4,40		●	●	●						●					
CCMT120404MU	12,70	12,90	4,76	0,4	5,50		●	●				●	●		●					
CCMT120408MU	12,70	12,90	4,76	0,8	5,50		●	●	●		●	●	●		●					
CCMT120412MU	12,70	12,90	4,76	1,2	5,50		●	●	●						●					

■ CCMT-41

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMT09030441	9,53	9,67	3,18	0,4	4,40						●		●							
CCMT09030841	9,53	9,67	3,18	0,8	4,40						●	●	●							
CCMT09T30441	9,53	9,67	3,97	0,4	4,40						●	●	●							
CCMT09T30841	9,53	9,67	3,97	0,8	4,40						●	●	●	●						
CCMT09T31241	9,53	9,67	3,97	1,2	4,40							●								
CCMT12040441	12,70	12,90	4,76	0,4	5,50						●	●	●		●					●
CCMT12040841	12,70	12,90	4,76	0,8	5,50						●	●	●	●	●					●
CCMT12041241	12,70	12,90	4,76	1,2	5,50								●							

■ CCMT-67

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMT12040867	12,70	12,90	4,76	0,8	5,50						●		●							

■ CCMW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CCMW060202	6,35	6,45	2,38	0,2	2,80															●
CCMW060204	6,35	6,45	2,38	0,4	2,80	●	●													●
CCMW090302	9,53	9,67	3,18	0,2	4,40															●
CCMW090304	9,53	9,67	3,18	0,4	4,40	●	●													●
CCMW090308	9,53	9,67	3,18	0,8	4,40	●	●													●
CCMW09T304	9,53	9,67	3,97	0,4	4,40	●	●													●
CCMW09T308	9,53	9,67	3,97	0,8	4,40	●	●													●
CCMW120404	12,70	12,90	4,76	0,4	5,50	●	●													●
CCMW120408	12,70	12,90	4,76	0,8	5,50	●	●													●

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CCMX

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CCMX060202L10	6,35	6,45	2,38	0,2	2,80												●			
CCMX120408L16	12,70	12,90	4,76	0,8	5,40													●		

CNMA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMA120404	12,70	12,90	4,76	0,4	5,16	●	●													
CNMA120408	12,70	12,90	4,76	0,8	5,16	●	●													●
CNMA120412	12,70	12,90	4,76	1,2	5,16	●	●													
CNMA120416	12,70	12,90	4,76	1,6	5,16	●														
CNMA160612	15,88	16,12	6,35	1,2	6,35		●													
CNMA190612	19,05	19,34	6,35	1,2	7,93		●													
CNMA190616	19,05	19,34	6,35	1,6	7,93		●													●

CNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120404	12,70	12,90	4,76	0,4	5,16		●			●	●	●	●	●						
CNMG120408	12,70	12,90	4,76	0,8	5,16		●				●	●	●	●					●	●
CNMG120412	12,70	12,90	4,76	1,2	5,16		●					●		●						
CNMG160608	15,88	16,12	6,35	0,8	6,35		●							●						
CNMG160612	15,88	16,12	6,35	1,2	6,35		●													
CNMG190612	19,05	19,34	6,35	1,2	7,93		●					●		●						
CNMG190616	19,05	19,34	6,35	1,6	7,93		●							●						

CNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG12040422	12,70	12,90	4,76	0,4	5,16	●	●	●		●	●		●		●	●				
CNMG12040822	12,70	12,90	4,76	0,8	5,16	●	●	●	●	●	●	●	●		●	●				
CNMG12041222	12,70	12,90	4,76	1,2	5,16	●	●	●	●		●				●	●				

CNMG-4

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG1204044	12,70	12,90	4,76	0,4	5,16						●		●			●				
CNMG1204084	12,70	12,90	4,76	0,8	5,16							●	●	●		●				

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CNMG-48

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMG12040448	12,70	12,90	4,76	0,4	5,16						●	●	●		●					
CNMG12040848	12,70	12,90	4,76	0,8	5,16						●	●	●	●	●					
CNMG12041248	12,70	12,90	4,76	1,2	5,16						●	●			●					

CNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMG09030849	9,53	9,67	3,18	0,8	3,81						●	●		●						
CNMG12040849	12,70	12,90	4,76	0,8	5,16					●	●	●	●	●	●					
CNMG12041249	12,70	12,90	4,76	1,2	5,16					●	●	●	●	●	●					

CNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMG1204085	12,70	12,90	4,76	0,8	5,16		●			●	●	●	●	●	●					
CNMG1204125	12,70	12,90	4,76	1,2	5,16		●			●	●	●	●	●	●					
CNMG1204165	12,70	12,90	4,76	1,6	5,16		●					●		●	●					
CNMG1606085	15,88	16,12	6,35	0,8	6,35		●				●	●	●	●	●					
CNMG1606125	15,88	16,12	6,35	1,2	6,35		●				●	●	●	●	●					
CNMG1606165	15,88	16,12	6,35	1,6	6,35		●				●	●	●	●	●					
CNMG1906085	19,05	19,34	6,35	0,8	7,93		●				●	●	●	●	●					
CNMG1906125	19,05	19,34	6,35	1,2	7,93		●				●	●	●	●	●					
CNMG1906165	19,05	19,34	6,35	1,6	7,93		●				●	●	●	●	●					
CNMG1906245	19,05	19,34	6,35	2,4	7,93		●								●					

CNMG-AP

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMG120408AP	12,70	12,90	4,76	0,8	5,16			●	●		●	●	●		●					
CNMG120412AP	12,70	12,90	4,76	1,2	5,16			●	●	●	●				●					

CNMG-FL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMG120404FL	12,70	12,90	4,76	0,4	5,16					●										
CNMG120408FL	12,70	12,90	4,76	0,8	5,16					●										

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120404FM	12,70	12,90	4,76	0,4	5,16					●										
CNMG120412FM	12,70	12,90	4,76	1,2	5,16					●										

CNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120408FR	12,70	12,90	4,76	0,8	5,16					●										
CNMG120412FR	12,70	12,90	4,76	1,2	5,16					●										

CNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120404FW	12,70	12,90	4,76	0,4	5,16	●									●					
CNMG120408FW	12,70	12,90	4,76	0,8	5,16	●									●					
CNMG120412FW	12,70	12,90	4,76	1,2	5,16	●									●					

CNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120408MW	12,70	12,90	4,76	0,8	5,16	●						●			●					
CNMG120412MW	12,70	12,90	4,76	1,2	5,16	●						●			●					

CNMG-SL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CNMG120408SL	12,70	12,90	4,76	0,8	5,16						●	●	●		●					
CNMG120412SL	12,70	12,90	4,76	1,2	5,16										●					
CNMG120416SL	12,70	12,90	4,76	1,6	5,16						●				●					
CNMG160608SL	15,88	16,12	6,35	0,8	6,35						●	●	●		●					
CNMG160612SL	15,88	16,12	6,35	1,2	6,35						●	●	●		●					
CNMG160616SL	15,88	16,12	6,35	1,6	6,35							●			●					
CNMG190612SL	19,05	19,34	6,35	1,2	7,93							●	●		●					
CNMG190616SL	19,05	19,34	6,35	1,6	7,93							●			●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CNMM-65

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMM12040865	12,70	12,90	4,76	0,8	5,16						●	●	●	●	●					
CNMM12041265	12,70	12,90	4,76	1,2	5,16						●	●	●	●	●					
CNMM12041665	12,70	12,90	4,76	1,6	5,16									●	●					
CNMM16060865	15,88	16,12	6,35	0,8	6,35								●	●	●					
CNMM16061265	15,88	16,12	6,35	1,2	6,35						●	●	●	●	●					
CNMM16061665	15,88	16,12	6,35	1,6	6,35								●		●					
CNMM19061265	19,05	19,34	6,35	1,2	7,93						●	●	●	●	●					
CNMM19061665	19,05	19,34	6,35	1,6	7,93							●	●	●	●					
CNMM19062465	19,05	19,34	6,35	2,4	7,93							●			●					

CNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMM1204088	12,70	12,90	4,76	0,8	5,16									●						
CNMM1204128	12,70	12,90	4,76	1,2	5,16								●	●						
CNMM1606128	15,88	16,12	6,35	1,2	6,35								●	●						
CNMM1606168	15,88	16,12	6,35	1,6	6,35							●								
CNMM1906128	19,05	19,34	6,35	1,2	7,93									●						
CNMM1906168	19,05	19,34	6,35	1,6	7,93							●	●	●						
CNMM1906248	19,05	19,34	6,35	2,4	7,93									●						
CNMM2509248	25,40	25,79	9,53	2,4	9,12							●								

CNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMM190616SR	19,05	19,34	6,35	1,6	7,93							●	●		●					
CNMM190624SR	19,05	19,34	6,35	2,4	7,93							●	●		●					
CNMM250916SR	25,40	25,79	9,53	1,6	9,12										●					
CNMM250924SR	25,40	25,79	9,53	.2,4	9,12							●	●		●					

CNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
CNMP120404SM	12,70	12,90	4,76	0,4	5,16			●							●					
CNMP120408SM	12,70	12,90	4,76	0,8	5,16			●	●						●					
CNMP120412SM	12,70	12,90	4,76	1,2	5,16			●	●						●					
CNMP160608SM	15,88	16,12	6,35	0,8	6,35										●					
CNMP160612SM	15,88	16,12	6,35	1,2	6,35			●							●					
CNMP190612SM	19,05	19,34	6,35	1,2	7,93			●												
CNMP190616SM	19,05	19,34	6,35	1,6	7,93										●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

CPGT-3

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
CPGT04T1043	4,76	4,83	1,98	0,4	2,15									●			●	●	●	

DCGT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DCGT0702022	6,35	7,75	2,38	0,2	2,80										●	●				
DCGT11T3022	9,53	11,63	3,97	0,2	4,40						●									●

DCGT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DCGT070202MU	6,35	7,75	2,38	0,2	2,80										●					

DCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DCMT070202	6,35	7,75	2,38	0,2	2,80		●			●	●	●								●
DCMT070204	6,35	7,75	2,38	0,4	2,80		●			●	●	●	●	●						●
DCMT070208	6,35	7,75	2,38	0,8	2,80		●			●	●	●	●	●						●
DCMT11T304	9,53	11,63	3,97	0,4	4,40		●			●	●	●	●	●	●	●			●	●
DCMT11T308	9,53	11,63	3,97	0,8	4,40		●			●	●	●	●	●	●	●			●	●
DCMT11T312	9,53	11,63	3,97	1,2	4,40		●					●							●	●
DCMT150404	12,70	15,50	4,76	0,4	5,50		●				●	●	●	●	●					●
DCMT150408	12,70	15,50	4,76	0,8	5,50		●				●	●	●	●	●			●	●	●
DCMT150412	12,70	15,50	4,76	1,2	5,50		●				●								●	●
DCMT150416	12,70	15,50	4,76	1,6	5,50		●				●	●	●	●						●

DCMT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DCMT0702042	6,35	7,75	2,38	0,4	2,80						●	●	●		●					
DCMT0702082	6,35	7,75	2,38	0,8	2,80										●					
DCMT11T3042	9,53	11,63	3,97	0,4	4,40							●			●	●				●
DCMT11T3082	9,53	11,63	3,97	0,8	4,40						●	●	●		●	●				

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ DCMT-41

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMT11T30441	9,53	11,63	3,97	0,4	4,40						●	●	●		●	●				●
DCMT11T30841	9,53	11,63	3,97	0,8	4,40						●	●	●	●	●	●				●
DCMT11T31241	9,53	11,63	3,97	1,2	4,40						●		●		●					
DCMT15040441	12,70	15,50	4,76	0,4	5,50						●	●	●							●
DCMT15040841	12,70	15,50	4,76	0,8	5,50						●		●	●						

■ DCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMT070204MU	6,35	7,75	2,38	0,4	2,80		●					●	●		●					
DCMT070208MU	6,35	7,75	2,38	0,8	2,80		●					●	●		●					
DCMT11T304MU	9,53	11,63	3,97	0,4	4,40	●	●	●	●	●	●	●	●		●					
DCMT11T308MU	9,53	11,63	3,97	0,8	4,40	●	●	●	●	●	●	●	●	●	●					
DCMT11T312MU	9,53	11,63	3,97	1,2	4,40		●	●	●			●			●					
DCMT150404MU	12,70	15,50	4,76	0,4	5,50			●							●					
DCMT150408MU	12,70	15,50	4,76	0,8	5,50	●	●	●	●		●	●	●		●					
DCMT150412MU	12,70	15,50	4,76	1,2	5,50	●	●	●	●				●		●					

■ DCMW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMW070204	6,35	7,75	2,38	0,4	2,80	●	●													●
DCMW11T304	9,53	11,63	3,97	0,4	4,40	●	●													●
DCMW150408	12,70	15,50	4,76	0,8	5,50	●	●													●

■ DCMX-18

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMX11T302L18	9,53	11,63	3,97	0,2	4,30															●
DCMX11T302R18	9,53	11,63	3,97	0,2	4,30						●									●
DCMX11T304L18	9,53	11,63	3,97	0,4	4,30									●						●
DCMX11T304R18	9,53	11,63	3,97	0,4	4,30									●						●
DCMX11T308R18	9,53	11,63	3,97	0,8	4,30									●						

■ DCMX-25

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMX150404R25	12,70	15,50	4,76	0,4	5,40									●						

■ DCMX-29

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DCMX150408R29	12,70	15,50	4,76	0,8	5,40									●						

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

DNMA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMA150408	12,70	15,50	4,76	0,8	5,16	●	●													
DNMA150412	12,70	15,50	4,76	1,2	5,16	●	●													
DNMA150608	12,70	15,50	6,35	0,8	5,16	●	●													
DNMA150612	12,70	15,50	6,35	1,2	5,16	●	●													

DNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG150408	12,70	15,50	4,76	0,8	5,16		●													
DNMG150412	12,70	15,50	4,76	1,2	5,16		●													
DNMG150604	12,70	15,50	6,35	0,4	5,16	●	●			●	●	●	●	●						
DNMG150608	12,70	15,50	6,35	0,8	5,16	●	●				●	●		●						
DNMG150612	12,70	15,50	6,35	1,2	5,16		●					●		●						

DNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG11040422	9,53	11,63	4,76	0,4	3,81	●	●			●	●	●	●		●	●				
DNMG11040822	9,53	11,63	4,76	0,8	3,81	●	●			●	●	●	●		●	●				
DNMG11041222	9,53	11,63	4,76	1,2	3,81										●					
DNMG15040422	12,70	15,50	4,76	0,4	5,16	●						●								
DNMG15040822	12,70	15,50	4,76	0,8	5,16	●	●													
DNMG15041222	12,70	15,50	4,76	1,2	5,16	●	●													
DNMG15060422	12,70	15,50	6,35	0,4	5,16	●	●	●		●	●	●	●		●	●				
DNMG15060822	12,70	15,50	6,35	0,8	5,16	●	●	●	●	●	●	●	●		●	●				
DNMG15061222	12,70	15,50	6,35	1,2	5,16	●	●	●	●		●				●					

DNMG-4

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG1506044	12,70	15,50	6,35	0,4	5,16						●		●			●				
DNMG1506084	12,70	15,50	6,35	0,8	5,16						●		●	●		●				

● first choice
○ alternate choice

		TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P		○	○		●	●	●	●	●	●		●	●	●	●	
M		○		○	○						●	●	●	●		
K		●	●			○	○	○	○							●
N																●
S				●	●											●
H																●

■ DNMG-48

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DNMG11040448	9,53	11,63	4,76	0,4	3,81										●					
DNMG11040848	9,53	11,63	4,76	0,8	3,81										●					
DNMG11041248	9,53	11,63	4,76	1,2	3,81										●					
DNMG15040848	12,70	15,50	4,76	0,8	5,16										●					
DNMG15060448	12,70	15,50	6,35	0,4	5,16										●					
DNMG15060848	12,70	15,50	6,35	0,8	5,16							●			●					
DNMG15061248	12,70	15,50	6,35	1,2	5,16										●					
DNMG15061648	12,70	15,50	6,35	1,6	5,16										●					

■ DNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DNMG11040849	9,53	11,63	4,76	0,8	3,81						●	●	●	●	●					
DNMG11041249	9,53	11,63	4,76	1,2	3,81								●							
DNMG15040849	12,70	15,50	4,76	0,8	5,16							●	●							
DNMG15060849	12,70	15,50	6,35	0,8	5,16					●	●	●	●	●	●					
DNMG15061249	12,70	15,50	6,35	1,2	5,16					●	●	●	●		●					
DNMG15061649	12,70	15,50	6,35	1,6	5,16							●	●							

■ DNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DNMG1104085	9,53	11,63	4,76	0,8	3,81		●													
DNMG1504085	12,70	15,50	4,76	0,8	5,16		●								●					
DNMG1504125	12,70	15,50	4,76	1,2	5,16		●													
DNMG1506085	12,70	15,50	6,35	0,8	5,16		●				●	●	●	●	●					
DNMG1506125	12,70	15,50	6,35	1,2	5,16		●			●	●	●	●	●	●					
DNMG1506165	12,70	15,50	6,35	1,6	5,16		●				●	●	●	●	●					

■ DNMG-AP

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
DNMG150408AP	12,70	15,50	4,76	0,8	5,16										●					
DNMG150412AP	12,70	15,50	4,76	1,2	5,16										●					
DNMG150608AP	12,70	15,50	6,35	0,8	5,16			●	●		●	●	●		●					
DNMG150612AP	12,70	15,50	6,35	1,2	5,16			●	●		●				●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

DNMG-CT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG150404CT	12,70	15,50	4,76	0,4	5,16			●												
DNMG150408CT	12,70	15,50	4,76	0,8	5,16			●			●									
DNMG150604CT	12,70	15,50	6,35	0,3	5,16						●	●			●					
DNMG150608CT	12,70	15,50	6,35	0,7	5,16						●	●	●		●					
DNMG150612CT	12,70	15,50	6,35	1,1	5,16						●	●	●		●					

DNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG110408FM	9,53	11,63	4,76	0,8	3,81					●										

DNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG150404FW	12,70	15,50	4,76	0,4	5,16	●									●					
DNMG150408FW	12,70	15,50	4,76	0,4	5,16	●									●					
DNMG150604FW	12,70	15,50	6,35	0,4	5,16	●									●					
DNMG150608FW	12,70	15,50	6,35	0,4	5,16	●									●					

DNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG150408MW	12,70	15,50	4,76	0,4	5,16	●									●					
DNMG150412MW	12,70	15,50	4,76	1,2	5,16	●									●					
DNMG150608MW	12,70	15,50	6,35	0,4	5,16	●									●					
DNMG150612MW	12,70	15,50	6,35	1,2	5,16	●									●					

DNMG-SL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMG150608SL	12,70	15,50	6,35	0,8	5,16						●	●	●		●					
DNMG150612SL	12,70	15,50	6,35	1,2	5,16						●		●		●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ DNMM-65

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMM15060865	12,70	15,50	6,35	0,8	5,16						●	●	●	●	●					
DNMM15061265	12,70	15,50	6,35	1,2	5,16						●	●	●	●	●					
DNMM15061665	12,70	15,50	6,35	1,6	5,16						●		●		●					

■ DNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
DNMP150404SM	12,70	15,50	4,76	0,4	5,16			●							●					
DNMP150408SM	12,70	15,50	4,76	0,8	5,16			●							●					
DNMP150412SM	12,70	15,50	4,76	1,2	5,16										●					
DNMP150604SM	12,70	15,50	6,35	0,4	5,16			●							●					
DNMP150608SM	12,70	15,50	6,35	0,8	5,16			●	●						●					
DNMP150612SM	12,70	15,50	6,35	1,2	5,16			●	●						●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

LNMX-HP

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNMX181220HP	18,00	37,05	12,00	0,4	—							●			●					

LNMX-SP

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNMX181220SP	18,00	37,05	12,50	0,4	—							●			●					

LNUX-13

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNUX19194013	10,00	19,05	19,05	4,0	6,35		●						●							
LNUX30194013	12,00	30,00	19,05	4,0	6,35		●													

LNUX-16

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNUX19194016	10,00	19,05	19,05	4,0	6,35							●	●							
LNUX30194016	12,00	30,00	19,05	4,0	6,35							●								

LNUX-RRP

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNUX191940RRP	10,00	19,00	19,05	4,0	6,35							●								

LNUX-T

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNUX191940T	10,00	19,05	19,05	4,0	6,35		●					●								
LNUX301940T	12,00	30,00	19,05	4,0	6,35		●					●								

LNUX-EN95

ISO catalogue number	W	Ll	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
LNUX400924EN95	25,40	40,00	9,53	2,4	9,12														●	

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

NNGJ

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
NNGJ281020	28,58	22,00	10,00	5,0	7,00							●			●					

NNGJ-1D

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
NNGJ2810201D	28,58	22,00	10,00	5,0	7,00							●			●					

NNUJ-11

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
NNUJ22082011	22,00	16,16	8,00	1,0	7,00							●								

RCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
RCMT0602M0	6,00	–	2,38	–	2,80		●					●	●			●			●	●
RCMT0803M0	8,00	–	3,18	–	3,40		●			●	●	●	●							●
RCMT10T3M0	10,00	–	3,97	–	4,40		●			●	●	●	●	●					●	●
RCMT1204M0	12,00	–	4,76	–	4,40		●			●	●	●	●	●		●		●		●
RCMT1606M0	16,00	–	6,35	–	5,50		●				●	●		●						

RCMT-43

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
RCMT0602M043	6,00	–	2,38	–	2,80		●					●	●	●	●					●
RCMT0803M043	8,00	–	3,18	–	3,40		●				●	●	●	●	●					●
RCMT10T3M043	10,00	–	3,97	–	4,40		●				●	●	●	●	●					●
RCMT1204M043	12,00	–	4,76	–	4,40		●			●	●	●	●	●	●					●
RCMT1606M043	16,00	–	6,35	–	5,50		●				●	●	●	●	●					●

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

RCMT-T

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
RCMT1606M0T	16,00	—	6,35	—	5,50								●						●	●

RCMX

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
RCMX2006M0T	20,00	—	6,35	—	6,50		●			●	●	●	●	●						
RCMX2507M0T	25,00	—	7,94	—	7,40		●				●	●	●	●					●	
RCMX3209M0T	32,00	—	9,53	—	9,50							●								

RNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
RNMG120400	12,70	—	4,76	—	5,16		●				●									

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ SCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SCMT090304	9,53	9,53	3,18	0,4	4,40						●	●		●					●	●
SCMT090308	9,53	9,53	3,18	0,8	4,40					●	●	●		●					●	●
SCMT09T304	9,53	9,53	3,97	0,4	4,40		●				●		●	●					●	●
SCMT09T308	9,53	9,53	3,97	0,8	4,40		●			●	●	●	●	●				●	●	●
SCMT120408	12,70	12,70	4,76	0,8	5,50		●			●	●	●	●	●	●			●	●	●
SCMT120412	12,70	12,70	4,76	1,2	5,50		●				●	●	●	●	●	●		●	●	●
SCMT120416	12,70	12,70	4,76	1,6	5,50		●							●	●					
SCMT150512	15,88	15,88	5,56	1,2	5,50									●				●	●	●

■ SCMT-41

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SCMT09T30441	9,53	9,53	3,97	0,4	4,40						●		●							
SCMT09T30841	9,53	9,53	3,97	0,8	4,40						●	●	●							

■ SCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SCMT090304MU	9,53	9,53	3,18	0,4	4,40	●	●			●	●	●	●		●					
SCMT090308MU	9,53	9,53	3,18	0,8	4,40	●	●			●	●	●		●	●					
SCMT09T304MU	9,53	9,53	3,97	0,4	4,40	●	●	●	●		●	●	●		●					
SCMT09T308MU	9,53	9,53	3,97	0,8	4,40	●	●	●	●		●	●	●	●	●					
SCMT120408MU	12,70	12,70	4,76	0,8	5,50		●	●	●				●		●					
SCMT120412MU	12,70	12,70	4,76	1,2	5,50		●	●	●						●					
SCMT120416MU	12,70	12,70	4,76	1,6	5,50		●		●						●					

■ SCMW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SCMW090304	9,53	9,53	3,18	0,4	4,40	●	●													●
SCMW09T308	9,53	9,53	3,97	0,8	4,40		●													
SCMW120408	12,70	12,70	4,76	0,8	5,50	●	●											●		●

● first choice
○ alternate choice

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

SNGN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNGN120412	12,70	12,70	4,76	1,2	—						●									

SNMA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMA120408	12,70	12,70	4,76	0,8	5,16	●	●													●
SNMA120412	12,70	12,70	4,76	1,2	5,16	●	●													
SNMA190612	19,05	19,05	6,35	1,2	7,93		●													
SNMA190616	19,05	19,05	6,35	1,6	7,93		●													●

SNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG090308	9,53	9,53	3,18	0,8	3,81						●	●	●	●						
SNMG120404	12,70	12,70	4,76	0,4	5,16		●					●		●						
SNMG120408	12,70	12,70	4,76	0,8	5,16	●	●				●	●	●	●				●	●	
SNMG120412	12,70	12,70	4,76	1,2	5,16	●	●							●						
SNMG150612	15,88	15,88	6,35	1,2	6,35		●							●						
SNMG190612	19,05	19,05	6,35	1,2	7,93									●				●		
SNMG190616	19,05	19,05	6,35	1,6	7,93		●							●						

SNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG09030422	9,53	9,53	3,18	0,4	3,81	●	●				●									
SNMG09030822	9,53	9,53	3,18	0,8	3,81	●	●			●	●	●	●							
SNMG12040422	12,70	12,70	4,76	0,4	5,16	●	●	●			●	●			●					
SNMG12040822	12,70	12,70	4,76	0,8	5,16	●	●	●	●		●		●		●					
SNMG12041222	12,70	12,70	4,76	1,2	5,16	●	●	●	●		●		●		●					
SNMG12041622	12,70	12,70	4,76	1,6	5,16				●						●					

SNMG-4

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG1204084	12,70	12,70	4,76	0,8	5,16							●	●			●				
SNMG1204124	12,70	12,70	4,76	1,2	5,16									●						

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ SNMG-48

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG12040448	12,70	12,70	4,76	0,4	5,16										●					
SNMG12040848	12,70	12,70	4,76	0,8	5,16							●	●		●					
SNMG12041248	12,70	12,70	4,76	1,2	5,16										●					

■ SNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG12040849	12,70	12,70	4,76	0,8	5,16						●	●	●	●	●					
SNMG12041249	12,70	12,70	4,76	1,2	5,16					●	●	●	●	●	●					
SNMG12041649	12,70	12,70	4,76	1,6	5,16							●								

■ SNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG1204085	12,70	12,70	4,76	0,8	5,16		●				●	●	●	●	●					
SNMG1204125	12,70	12,70	4,76	1,2	5,16		●				●	●	●		●					
SNMG1204165	12,70	12,70	4,76	1,6	5,16		●								●					
SNMG1506085	15,88	15,88	6,35	0,8	6,35		●					●	●		●					
SNMG1506125	15,88	15,88	6,35	1,2	6,35		●				●	●	●		●					
SNMG1506165	15,88	15,88	6,35	1,6	6,35		●						●		●					
SNMG1506245	15,88	15,88	6,35	2,4	6,35		●								●					
SNMG1906085	19,05	19,05	6,35	0,8	7,93		●				●		●	●	●					
SNMG1906125	19,05	19,05	6,35	1,2	7,93		●				●	●	●	●	●					
SNMG1906165	19,05	19,05	6,35	1,6	7,93		●				●	●	●	●	●					

■ SNMG-AP

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMG120408AP	12,70	12,70	4,76	0,8	5,16			●	●			●	●		●					
SNMG120412AP	12,70	12,70	4,76	1,2	5,16			●	●						●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

SNMG-SL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SNMG120408SL	12,70	12,70	4,76	0,8	5,16										●					
SNMG120412SL	12,70	12,70	4,76	1,2	5,16										●					
SNMG120416SL	12,70	12,70	4,76	1,6	5,16										●					
SNMG150608SL	15,88	15,88	6,35	0,8	6,35										●					
SNMG150612SL	15,88	15,88	6,35	1,2	6,35							●			●					
SNMG150616SL	15,88	15,88	6,35	1,6	6,35										●					
SNMG190612SL	19,05	19,05	6,35	1,2	7,93								●		●					
SNMG190616SL	19,05	19,05	6,35	1,6	7,93						●				●					

SNMM-65

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SNMM12040865	12,70	12,70	4,76	0,8	5,16							●	●	●	●					
SNMM12041265	12,70	12,70	4,76	1,2	5,16						●		●	●	●					
SNMM12041665	12,70	12,70	4,76	1,6	5,16										●					
SNMM15061665	15,88	15,88	6,35	1,6	6,35								●							
SNMM19061265	19,05	19,05	6,35	1,2	7,93							●	●	●	●					
SNMM19061665	19,05	19,05	6,35	1,6	7,93							●		●	●					
SNMM19062465	19,05	19,05	6,35	2,4	7,93										●					

SNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SNMM1204128	12,70	12,70	4,76	1,2	5,16								●							
SNMM1506128	15,88	15,88	6,35	1,2	6,35								●	●						
SNMM1906128	19,05	19,05	6,35	1,2	7,93									●						
SNMM1906168	19,05	19,05	6,35	1,6	7,93							●	●	●						
SNMM1906248	19,05	19,05	6,35	2,4	7,93									●						
SNMM2507248	25,40	25,40	7,94	2,4	9,12						●	●	●	●						

SNMM-SR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
SNMM190616SR	19,05	19,05	6,35	1,6	7,93							●	●		●					
SNMM190624SR	19,05	19,05	6,35	2,4	7,93										●					
SNMM250916SR	25,40	25,40	9,53	1,6	9,12								●		●					
SNMM250924SR	25,40	25,40	9,53	2,4	9,12							●	●		●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ SNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNMP120408SM	12,70	12,70	4,76	0,8	5,16			●	●						●					
SNMP120412SM	12,70	12,70	4,76	1,2	5,16			●	●						●					
SNMP150608SM	15,88	15,88	6,35	0,8	6,35				●						●					
SNMP150612SM	15,88	15,88	6,35	1,2	6,35				●						●					
SNMP150616SM	15,88	15,88	6,35	1,6	6,35				●						●					
SNMP190616SM	19,05	19,05	6,35	1,6	7,93										●					

■ SNUN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SNUN090308	9,53	9,53	3,18	0,8	–															●
SNUN120408	12,70	12,70	4,76	0,8	–		●											●		●
SNUN120412	12,70	12,70	4,76	1,2	–		●											●	●	●
SNUN150412	15,88	15,88	4,76	1,2	–													●		
SNUN190412	19,05	19,05	4,76	1,2	–													●		

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

SOUN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SOUN1904ZZT2	19,05	19,05	4,76	—	—														●	
SOUN1904ZZT3	19,05	19,05	4,76	—	—														●	
SOUN2506ZZT2	25,40	25,40	6,35	—	—														●	
SOUN2506ZZT3	25,40	25,40	6,35	—	—														●	

SPGN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SPGN090304	9,53	9,53	3,18	0,4	—													●		●
SPGN090308	9,53	9,53	3,18	0,8	—		●											●		●
SPGN120304	12,70	12,70	3,18	0,4	—													●		
SPGN120308	12,70	12,70	3,18	0,8	—		●											●		●
SPGN120312	12,70	12,70	3,18	1,2	—		●											●		
SPGN190412	19,05	19,05	4,76	1,2	—													●		

SPMR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SPMR090308	9,53	9,53	3,18	0,8	—		●				●			●						
SPMR120304	12,70	12,70	3,18	0,4	—		●				●	●		●						
SPMR120308	12,70	12,70	3,18	0,8	—		●											●		
SPMR120312	12,70	12,70	3,18	1,2	—		●					●		●						

SPUN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SPUN090304	9,53	9,53	3,18	0,4	—													●		
SPUN090308	9,53	9,53	3,18	0,8	—													●		●
SPUN120304	12,70	12,70	3,18	0,4	—						●	●					●	●		●
SPUN120308	12,70	12,70	3,18	0,8	—		●				●	●						●	●	●
SPUN120312	12,70	12,70	3,18	1,2	—		●											●		●
SPUN120412	12,70	12,70	4,76	1,2	—													●		●
SPUN150412	15,88	15,88	4,76	1,2	—													●	●	●
SPUN190412	19,05	19,05	4,76	1,2	—													●	●	●

SPUN-T

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
SPUN150412T	15,88	15,88	4,76	1,2	—													●		
SPUN190416T	19,05	19,05	4,76	1,6	—													●		
SPUN250620T	25,40	25,40	6,35	2,0	—							●						●	●	

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

TCGT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCGT1102022	6,35	11,00	2,38	0,2	2,80										●					

TCGT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCGT110202MU	6,35	11,00	2,38	0,2	2,80		●					●			●					

TCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCMT110202	6,35	11,00	2,38	0,2	2,80						●	●		●						●
TCMT110204	6,35	11,00	2,38	0,4	2,80		●			●	●	●	●	●		●			●	●
TCMT110208	6,35	11,00	2,38	0,8	2,80		●				●	●	●	●		●				●
TCMT16T304	9,53	16,50	3,97	0,4	4,40		●			●	●	●	●	●				●	●	●
TCMT16T308	9,53	16,50	3,97	0,8	4,40		●			●	●	●	●	●				●	●	●
TCMT16T312	9,53	16,50	3,97	1,2	4,40		●				●		●	●						
TCMT220408	12,70	22,00	4,76	0,8	5,50						●	●	●	●				●		●
TCMT220412	12,70	22,00	4,76	1,2	5,50		●					●	●	●						●

TCMT-2

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCMT1102042	6,35	11,00	2,38	0,4	2,80							●			●	●				
TCMT1102082	6,35	11,00	2,38	0,8	2,80										●					
TCMT16T3042	9,53	16,50	3,97	0,4	4,40							●				●				

TCMT-41

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCMT16T30441	9,53	16,50	3,97	0,4	4,40							●	●	●		●				●
TCMT16T30841	9,53	16,50	3,97	0,8	4,40							●	●							

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

TCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCMT110204MU	6,35	11,00	2,38	0,4	2,80		●				●	●	●		●					
TCMT110208MU	6,35	11,00	2,38	0,8	2,80		●						●		●					
TCMT16T304MU	9,53	16,50	3,97	0,4	4,40	●	●	●	●	●	●	●	●		●					
TCMT16T308MU	9,53	16,50	3,97	0,8	4,40	●	●	●	●		●	●	●	●	●					
TCMT16T312MU	9,53	16,50	3,97	1,2	4,40			●	●						●					
TCMT220408MU	12,70	22,00	4,76	0,8	5,50		●						●		●					
TCMT220412MU	12,70	22,00	4,76	1,2	5,50		●								●					

TCMW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TCMW110204	6,35	11,00	2,38	0,4	2,80	●	●											●		●
TCMW16T304	9,53	16,50	3,97	0,4	4,40	●	●											●		●

TNMA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMA160408	9,53	16,50	4,76	0,8	3,81	●	●													●
TNMA160412	9,53	16,50	4,76	1,2	3,81	●	●													
TNMA220408	12,70	22,00	4,76	0,8	5,16	●	●													
TNMA220412	12,70	22,00	4,76	1,2	5,16	●	●													
TNMA220416	12,70	22,00	4,76	1,6	5,16	●	●													

TNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG160404	9,53	16,50	4,76	0,4	3,81		●				●	●	●	●				●		
TNMG160408	9,53	16,50	4,76	0,8	3,81		●			●	●	●	●	●			●	●		
TNMG160412	9,53	16,50	4,76	1,2	3,81		●					●								
TNMG220404	12,70	22,00	4,76	0,4	5,16						●	●		●				●		
TNMG220408	12,70	22,00	4,76	0,8	5,16		●				●	●		●				●	●	
TNMG220412	12,70	22,00	4,76	1,2	5,16		●							●						
TNMG220416	12,70	22,00	4,76	1,6	5,16		●													

TNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG11030422	6,35	11,00	3,18	0,4	2,26	●	●													
TNMG11030822	6,35	11,00	3,18	0,8	2,26	●	●													
TNMG16040422	9,53	16,50	4,76	0,4	3,81	●	●	●		●	●	●	●		●	●				
TNMG16040822	9,53	16,50	4,76	0,8	3,81	●	●	●	●	●	●	●			●	●				
TNMG16041222	9,53	16,50	4,76	1,2	3,81	●	●	●	●						●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

TNMG-4

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG1604044	9,53	16,50	4,76	0,4	3,81								●							
TNMG1604084	9,53	16,50	4,76	0,8	3,81						●		●							

TNMG-48

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG16040448	9,53	16,50	4,76	0,4	3,81						●	●	●		●					
TNMG16040848	9,53	16,50	4,76	0,8	3,81						●		●		●					
TNMG16041248	9,53	16,50	4,76	1,2	3,81										●					
TNMG16041648	9,53	16,50	4,76	1,6	3,81										●					
TNMG22040448	12,70	22,00	4,76	0,4	5,16								●							
TNMG22040848	12,70	22,00	4,76	0,8	5,16								●							

TNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG16040849	9,53	16,50	4,76	0,8	3,81					●	●	●	●	●	●					
TNMG16041249	9,53	16,50	4,76	1,2	3,81					●	●	●	●							
TNMG22040849	12,70	22,00	4,76	0,8	5,16						●	●	●	●						
TNMG22041249	12,70	22,00	4,76	1,2	5,16						●	●	●							
TNMG22041649	12,70	22,00	4,76	1,6	5,16						●	●								

TNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG1604085	9,53	16,50	4,76	0,8	3,81		●			●		●	●	●	●					
TNMG1604125	9,53	16,50	4,76	1,2	3,81		●			●		●	●	●	●					
TNMG1604165	9,53	16,50	4,76	1,6	3,81										●					
TNMG2204085	12,70	22,00	4,76	0,8	5,16		●				●	●	●	●	●					
TNMG2204125	12,70	22,00	4,76	1,2	5,16		●					●	●		●					
TNMG2204165	12,70	22,00	4,76	1,6	5,16		●								●					
TNMG2706085	15,88	27,50	6,35	0,8	6,35									●						
TNMG2706125	15,88	27,50	6,35	1,2	6,35						●		●	●						
TNMG2706165	15,88	27,50	6,35	1,6	6,35								●							
TNMG2706245	15,88	27,50	6,35	2,4	6,35									●						

TNMG-AP

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG160408AP	9,53	16,50	4,76	0,8	3,81			●	●	●		●	●		●					
TNMG160412AP	9,53	16,50	4,76	1,2	3,81			●	●						●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

TNMG-FL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG160404FL	9,53	16,50	4,76	0,4	3,81					●										
TNMG160408FL	9,53	16,50	4,76	0,8	3,81					●										

TNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG160404FM	9,53	16,50	4,76	0,4	3,81					●										
TNMG160408FM	9,53	16,50	4,76	0,8	3,81					●										

TNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMG160412FR	9,53	16,50	4,76	1,2	3,81					●										

TNMM-65

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMM16040865	9,53	16,50	4,76	0,8	3,81							●	●	●	●					
TNMM16041265	9,53	16,50	4,76	1,2	3,81										●					
TNMM16041665	9,53	16,50	4,76	1,6	3,81										●					
TNMM22040865	12,70	22,00	4,76	0,8	5,16							●	●	●	●					
TNMM22041265	12,70	22,00	4,76	1,2	5,16								●	●	●					
TNMM22041665	12,70	22,00	4,76	1,6	5,16									●	●					

TNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMM1604128	9,53	16,50	4,76	1,2	3,81										●					
TNMM2204088	12,70	22,00	4,76	0,8	5,16								●		●					
TNMM2204128	12,70	22,00	4,76	1,2	5,16								●							
TNMM2204168	12,70	22,00	4,76	1,6	5,16								●	●						
TNMM2706128	15,88	27,50	6,35	1,2	6,35									●						
TNMM2706248	15,88	27,50	6,35	2,4	6,35								●							

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ TNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNMP160404SM	9,53	16,50	4,76	0,4	3,81			●							●					
TNMP160408SM	9,53	16,50	4,76	0,8	3,81			●	●						●					
TNMP160412SM	9,53	16,50	4,76	1,2	3,81			●	●						●					
TNMP220404SM	12,70	22,00	4,76	0,4	5,16			●							●					
TNMP220408SM	12,70	22,00	4,76	0,8	5,16			●	●						●					
TNMP220412SM	12,70	22,00	4,76	1,2	5,16			●	●						●					

■ TNUN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TNUN160308	9,53	16,50	3,18	0,8	—													●		
TNUN160312	9,53	16,50	3,18	1,2	—													●		
TNUN160408	9,53	16,50	4,76	0,8	—		●											●		●
TNUN160412	9,53	16,50	4,76	1,2	—															●
TNUN220416	12,70	22,00	4,76	1,6	—													●		

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ TPGN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPGN110204	6,35	11,00	2,38	0,4	–													●		
TPGN110208	6,35	11,00	2,38	0,8	–													●		
TPGN110304	6,35	11,00	3,18	0,4	–													●		●
TPGN110308	6,35	11,00	3,18	0,8	–		●													●
TPGN160304	9,53	16,50	3,18	0,4	–											●		●		●
TPGN160308	9,53	16,50	3,18	0,8	–		●									●		●		●
TPGN160312	9,53	16,50	3,18	1,2	–															●

■ TPGR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPGR160308	9,53	16,50	3,18	0,8	–									●						

■ TPGA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPGA110204	6,35	11,00	2,38	0,4	2,80															●
TPGA110208	6,35	11,00	2,38	0,8	2,80															●

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ TPMR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPMR110304	6,35	11,00	3,18	0,4	–						●	●		●					●	
TPMR110308	6,35	11,00	3,18	0,8	–		●			●	●	●		●					●	
TPMR160304	9,53	16,50	3,18	0,4	–		●				●	●		●				●	●	
TPMR160308	9,53	16,50	3,18	0,8	–		●			●	●	●		●					●	●
TPMR160312	9,53	16,50	3,18	1,2	–		●					●		●					●	

■ TPUN

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPUN110304	6,35	11,00	3,18	0,4	–						●			●				●		●
TPUN110308	6,35	11,00	3,18	0,8	–						●	●						●		●
TPUN160304	9,53	16,50	3,18	0,4	–		●				●	●	●					●		●
TPUN160308	9,53	16,50	3,18	0,8	–		●				●	●	●					●	●	●
TPUN160312	9,53	16,50	3,18	1,2	–		●						●					●	●	●
TPUN220408	12,70	22,00	4,76	0,8	–						●	●	●	●				●		
TPUN220412	12,70	22,00	4,76	1,2	–		●						●	●				●	●	●
TPUN220416	12,70	22,00	4,76	1,6	–													●		

■ TPUN-T

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPUN270620T	15,88	27,50	6,35	2,0	–													●		

■ TPUR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
TPUR160308L	9,53	16,50	3,18	0,8	–													●		
TPUR160308R	9,53	16,50	3,18	0,8	–													●		

● first choice
○ alternate choice

		TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P		○	○		●	●	●	●	●	●		●	●	●	●	
M		○		○	○						●	●	●	●		
K		●	●			○	○	○	○							●
N																●
S				●	●											●
H																●

VBMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
VBMT160404	9,53	16,61	4,76	0,4	4,40		●			●	●	●	●	●		●				●
VBMT160408	9,53	16,61	4,76	0,8	4,40		●			●	●	●	●	●		●				●
VBMT160412	9,53	16,61	4,76	1,2	4,40		●			●	●	●	●	●						●

VCMT

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
VCMT16T308	9,53	16,61	3,97	0,8	4,40		●													

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ VNMG

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
VNMG12T308	7,14	12,45	3,97	0,8	3,65		●													

■ VNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
VNMG16040422	9,53	16,61	4,76	0,4	3,81						●									
VNMG16040822	9,53	16,61	4,76	0,8	3,81						●									

■ VNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
VNMP160404SM	9,53	16,61	4,76	0,4	3,81			●												
VNMP160408SM	9,53	16,61	4,76	0,8	3,81			●			●									

■ WNMA

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMA080408	12,70	8,69	4,76	0,8	5,16	●	●													
WNMA080412	12,70	8,69	4,76	1,2	5,16	●	●													

■ WNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG06040422	9,53	6,52	4,76	0,4	3,81	●	●			●	●	●								
WNMG06040822	9,53	6,52	4,76	0,8	3,81	●	●			●	●	●								

■ WNMG-4

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG0804044	12,70	8,69	4,76	0,4	5,16						●	●	●		●					
WNMG0804084	12,70	8,69	4,76	0,8	5,16						●	●	●		●					
WNMG0804124	12,70	8,69	4,76	1,2	5,16						●	●			●					

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

WNMG-48

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
WNMG06040448	9,53	6,52	4,76	0,4	3,81										●					
WNMG06040848	9,53	6,52	4,76	0,8	3,81										●					
WNMG06041248	9,53	6,52	4,76	1,2	3,81										●					
WNMG08040448	12,70	8,69	4,76	0,4	5,16										●					
WNMG08040848	12,70	8,69	4,76	0,8	5,16										●					
WNMG08041248	12,70	8,69	4,76	1,2	5,16										●					
WNMG08041648	12,70	8,69	4,76	1,6	5,16										●					

WNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
WNMG06040849	9,53	6,52	4,76	0,8	3,81					●	●	●	●	●						
WNMG08040849	12,70	8,69	4,76	0,8	5,16					●	●	●	●	●	●					
WNMG08041249	12,70	8,69	4,76	1,2	5,16					●	●	●	●	●	●					
WNMG08041649	12,70	8,69	4,76	1,6	5,16						●									

WNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
WNMG0604085	9,53	6,52	4,76	0,8	3,81					●					●					
WNMG0604125	9,53	6,52	4,76	1,2	3,81					●					●					
WNMG0804085	12,70	8,69	4,76	0,8	5,16		●			●	●	●	●	●	●					
WNMG0804125	12,70	8,69	4,76	1,2	5,16		●			●	●	●	●	●	●					
WNMG0804165	12,70	8,69	4,76	1,6	5,16		●				●				●					

WNMG-AP

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
WNMG080408AP	12,70	8,69	4,76	0,8	5,16			●	●			●	●		●					
WNMG080412AP	12,70	8,69	4,76	1,2	5,16			●	●			●			●					

WNMG-FL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TT115	TTX	TTM	TTR	THM
WNMG060404FL	9,53	6,52	4,76	0,4	3,81					●										

● first choice
○ alternate choice

	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
P	○	○		●	●	●	●	●	●		●	●	●	●	
M	○		○	○						●	●	●	●		
K	●	●			○	○	○	○							●
N															●
S			●	●											●
H															●

■ WNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG060408FR	9,53	6,52	4,76	0,8	3,81					●										
WNMG060412FR	9,53	6,52	4,76	1,2	3,81					●										

■ WNMG-FW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG080404FW	12,70	8,69	4,76	0,4	5,16	●									●					
WNMG080408FW	12,70	8,69	4,76	0,8	5,16	●									●					
WNMG080412FW	12,70	8,69	4,76	1,2	5,16	●									●					

■ WNMG-MW

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG080408MW	12,70	8,69	4,76	0,8	5,16	●						●			●					
WNMG080412MW	12,70	8,69	4,76	1,2	5,16	●									●					

■ WNMG-SL

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMG080408SL	12,70	8,69	4,76	0,8	5,16							●	●		●					
WNMG080412SL	12,70	8,69	4,76	1,2	5,16						●	●			●					

■ WNMP-SM

ISO catalogue number	D	L10	S	Rε	D1	TN5105	TN5120	TN6010	TN6025	TN7105	TN7110	TN7115	TN7125	TN7135	TN8025	TTI15	TTX	TTM	TTR	THM
WNMP080408SM	12,70	8,69	4,76	0,8	5,16			●												
WNMP080412SM	12,70	8,69	4,76	1,2	5,16			●												

● first choice
○ alternate choice

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M			
K			
N	●	●	●
S			
H			

CCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CCGT060202AL1	6,35	6,45	2,38	0,2	2,80	●	●	
CCGT060204AL1	6,35	6,45	2,38	0,4	2,80	●	●	
CCGT09T302AL1	9,53	9,67	3,97	0,2	4,40		●	
CCGT09T304AL1	9,53	9,67	3,97	0,4	4,40	●	●	
CCGT09T308AL1	9,53	9,67	3,97	0,8	4,40	●	●	
CCGT120402AL1	12,70	12,90	4,76	0,2	5,50		●	
CCGT120404AL1	12,70	12,90	4,76	0,4	5,50	●	●	
CCGT120408AL1	12,70	12,90	4,76	0,8	5,50	●	●	

CCGT-AL2

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CCGT060202AL2	6,35	6,45	2,38	0,2	2,80			●
CCGT060204AL2	6,35	6,45	2,38	0,4	2,80			●
CCGT09T304AL2	9,53	9,67	3,97	0,4	4,40			●
CCGT09T308AL2	9,53	9,67	3,97	0,8	4,40			●

CCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CCGT060202AL3	6,35	6,45	2,38	0,2	2,80	●		●
CCGT060204AL3	6,35	6,45	2,38	0,4	2,80	●		●
CCGT09T302AL3	9,53	9,67	3,97	0,2	4,40			●
CCGT09T304AL3	9,53	9,67	3,97	0,4	4,40	●		●
CCGT09T308AL3	9,53	9,67	3,97	0,8	4,40			●
CCGT120402AL3	12,70	12,90	4,76	0,2	5,50			●
CCGT120404AL3	12,70	12,90	4,76	0,4	5,50	●		●
CCGT120408AL3	12,70	12,90	4,76	0,8	5,50	●		●

CNGM-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
CNGM190612AL1	19,05	19,34	6,35	1,2	7,93		●	

● first choice
○ alternate choice

P			
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N	●	●	●
S			
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DCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
DCGT070202AL1	6,35	7,75	2,38	0,2	2,80	●	●	
DCGT070204AL1	6,35	7,75	2,38	0,4	2,80	●	●	
DCGT11T302AL1	9,53	11,63	3,97	0,2	4,40	●	●	
DCGT11T304AL1	9,53	11,63	3,97	0,4	4,40	●	●	
DCGT11T308AL1	9,53	11,63	3,97	0,8	4,40	●	●	

DCGT-AL2

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
DCGT070204AL2	6,35	7,75	2,38	0,4	2,80			●
DCGT11T304AL2	9,53	11,63	3,97	0,4	4,40			●
DCGT11T308AL2	9,53	11,63	3,97	0,8	4,40			●

DCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
DCGT070202AL3	6,35	7,75	2,38	0,2	2,80	●		●
DCGT070204AL3	6,35	7,75	2,38	0,4	2,80	●		●
DCGT11T302AL3	9,53	11,63	3,97	0,2	4,40			●
DCGT11T304AL3	9,53	11,63	3,97	0,4	4,40	●		●
DCGT11T308AL3	9,53	11,63	3,97	0,8	4,40	●		●

RCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
RCGT0803M0AL1	8,00	—	3,18	—	3,40	●	●	
RCGT1003M0AL1	10,00	—	3,18	—	4,40		●	

● first choice
○ alternate choice

P			
M			
K			
N	●	●	●
S			
H			

SCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
SCGT09T304AL1	9,53	9,53	3,97	0,4	4,40		●	
SCGT09T308AL1	9,53	9,53	3,97	0,8	4,40		●	
SCGT120408AL1	12,70	12,70	4,76	0,8	5,50		●	

SCGT-AL3

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

TCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
TCGT110202AL1	6,35	11,00	2,38	0,2	2,80		●	
TCGT110204AL1	6,35	11,00	2,38	0,4	2,80		●	
TCGT16T302AL1	9,53	16,50	3,97	0,2	4,40		●	
TCGT16T304AL1	9,53	16,50	3,97	0,4	4,40		●	
TCGT16T308AL1	9,53	16,50	3,97	0,8	4,40		●	

● first choice
○ alternate choice

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M			
K			
N	●	●	●
S			
H			

■ VCGT-AL1

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
VCGT110302AL1	6,35	11,07	3,18	0,2	2,80	●	●	
VCGT110304AL1	6,35	11,07	3,18	0,4	2,80		●	
VCGT110308AL1	6,35	11,07	3,18	0,8	2,80		●	
VCGT160404AL1	9,53	16,61	4,76	0,4	4,40	●	●	
VCGT160408AL1	9,53	16,61	4,76	0,8	4,40	●	●	
VCGT160412AL1	9,53	16,61	4,76	1,2	4,40		●	
VCGT220530AL1	12,70	22,14	5,56	3,0	5,50		●	

■ VCGT-AL3

ISO catalogue number	D	L10	S	Rε	D1	HCK10	HWK10	HWK15
VCGT110302AL3	6,35	11,07	3,18	0,2	2,80			●
VCGT110304AL3	6,35	11,07	3,18	0,4	2,80			●
VCGT160404AL3	9,53	16,61	4,76	0,4	4,40	●		●
VCGT160408AL3	9,53	16,61	4,76	0,8	4,40	●		●
VCGT160412AL3	9,53	16,61	4,76	1,2	4,40	●		●
VCGT220530AL3	12,70	22,14	5,56	3,0	5,50	●		●

● first choice
○ alternate choice

P		
M		
K	●	●
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S		●
H	●	

CNGN

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGN120404T02020	12,70	12,90	4,76	0,4	—	●		
CNGN120408T01020	12,70	12,90	4,76	0,8	—		●	
CNGN120408T02020	12,70	12,90	4,76	0,8	—	●		●
CNGN120412T01020	12,70	12,90	4,76	1,2	—		●	
CNGN120412T02020	12,70	12,90	4,76	1,2	—	●		●
CNGN120416T01020	12,70	12,90	4,76	1,6	—		●	
CNGN120416T02020	12,70	12,90	4,76	1,6	—	●		●
CNGN120712T01020	12,70	12,90	7,94	1,2	—		●	
CNGN120712T02020	12,70	12,90	7,94	1,2	—	●		●
CNGN120716T01020	12,70	12,90	7,94	1,6	—		●	
CNGN120716T02020	12,70	12,90	7,94	1,6	—			●
CNGN160716T02020	15,88	16,12	7,94	1,6	—	●		

CNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGA120404T02020	12,70	12,90	4,76	0,4	5,16	●		
CNGA120408T02020	12,70	12,90	4,76	0,8	5,16	●		●
CNGA120412T02020	12,70	12,90	4,76	1,2	5,16	●		●
CNGA120416T02020	12,70	12,90	4,76	1,6	5,16			●
CNGA160612T02020	15,88	16,12	6,35	1,2	6,35	●		●
CNGA160616T02020	15,88	16,12	6,35	1,6	6,35			●
CNGA190612T02020	19,05	19,34	6,35	1,2	7,93	●		●
CNGA190616T02020	19,05	19,34	6,35	1,6	7,93	●		●

CNGA-FW

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

CNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNGX120708T02020	12,70	12,90	7,94	0,8	—			●
CNGX120712T02020	12,70	12,90	7,94	1,2	—			●
CNGX120716T02020	12,70	12,90	7,94	1,6	—			●
CNGX160716T02020	15,88	16,12	7,94	1,6	—			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ CNGX-FW

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

■ CNMA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNMA120408T02020	12,70	12,90	4,76	0,8	5,16			●
CNMA120412T02020	12,70	12,90	4,76	1,2	5,16			●
CNMA120416T02020	12,70	12,90	4,76	1,6	5,16			●
CNMA160612T02020	15,88	16,12	6,35	1,2	6,35			●
CNMA160616T02020	15,88	16,12	6,35	1,6	6,35			●

■ CNMX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
CNMX120712T02020	12,70	12,90	7,94	1,2	—			●
CNMX120716T02020	12,70	12,90	7,94	1,6	—			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

DNGN

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGN150704T02020	12,70	15,50	7,94	0,4	—	●		
DNGN150708T01020	12,70	15,50	7,94	0,8	—		●	
DNGN150708T02020	12,70	15,50	7,94	0,8	—	●		
DNGN150712T01020	12,70	15,50	7,94	1,2	—		●	
DNGN150712T02020	12,70	15,50	7,94	1,2	—	●		
DNGN150716T01020	12,70	15,50	7,94	1,6	—		●	
DNGN150716T02020	12,70	15,50	7,94	1,6	—	●		

DNGA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGA150404T02020	12,70	15,50	4,76	0,4	5,16	●		
DNGA150408T02020	12,70	15,50	4,76	0,8	5,16	●		●
DNGA150412T02020	12,70	15,50	4,76	1,2	5,16	●		●
DNGA150604T02020	12,70	15,50	6,35	0,4	5,16	●		
DNGA150608T02020	12,70	15,50	6,35	0,8	5,16	●		
DNGA150612T02020	12,70	15,50	6,35	1,2	5,16	●		●

DNGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNGX120712T02020	10,00	12,21	7,94	1,2	—			●
DNGX120716T02020	10,00	12,21	7,94	1,6	—			●
DNGX150708T02020	12,70	15,50	7,94	0,8	—			●
DNGX150712T02020	12,70	15,50	7,94	1,2	—			●
DNGX150716T02020	12,70	15,50	7,94	1,6	—			●

DNMA

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNMA150412T02020	12,70	15,50	4,76	1,2	5,16			●

DNMX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
DNMX150716T02020	12,70	15,50	7,94	1,6	—			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

ENGN

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

ENGX

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

RCGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
RCGX060400T01020	6,35	–	4,76	–	–		●	
RCGX090700T01020	9,53	–	7,92	–	–	●	●	
RCGX090700T02020	9,53	–	7,92	–	–	●		
RCGX090700T07015	9,53	–	7,92	–	–	●		
RCGX090700T20015	9,53	–	7,92	–	–	●		
RCGX120700T01020	12,70	–	7,92	–	–		●	
RCGX120700T02020	12,70	–	7,92	–	–	●		
RCGX120700T20015	12,70	–	7,92	–	–	●		

RPGX

ISO catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
RPGX060400T01020	6,35	–	4,78	–	–		●	
RPGX090700T01020	9,53	–	7,92	–	–		●	
RPGX120700T01020	12,70	–	7,92	–	–		●	

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

RNGN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
RNGN090300T01020	9,53	–	3,18	–	–		●	
RNGN090400T02020	9,53	–	4,76	–	–	●		
RNGN120400T01020	12,70	–	4,76	–	–		●	
RNGN120400T02020	12,70	–	4,76	–	–	●		●
RNGN120700T01020	12,70	–	7,94	–	–		●	
RNGN120700T02020	12,70	–	7,94	–	–	●		●
RNGN120700T10015	12,70	–	7,94	–	–	●		
RNGN120700T15015	12,70	–	7,94	–	–		●	
RNGN120700T20015	12,70	–	7,94	–	–	●		
RNGN150700T02020	15,88	–	7,94	–	–	●		●

RNMN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
RNMN120700T02020	12,70	–	7,94	–	–			●

SCGN

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

SCGN-FW

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SCGN090408EFW	9,53	9,53	4,76	0,8	–			●

SCUN

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

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ SNGN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGN090308T02020	9,53	9,53	3,18	0,8	–	●		
SNGN090412T00515	9,53	9,53	4,76	1,2	–	●		
SNGN120408T00520	12,70	12,70	4,76	0,8	–	●		
SNGN120408T02020	12,70	12,70	4,76	0,8	–	●		●
SNGN120412T01020	12,70	12,70	4,76	1,2	–		●	
SNGN120412T02020	12,70	12,70	4,76	1,2	–	●		●
SNGN120416T01020	12,70	12,70	4,76	1,6	–		●	
SNGN120416T02020	12,70	12,70	4,76	1,6	–	●		●
SNGN120704T02020	12,70	12,70	7,94	0,4	–	●		
SNGN120708T02020	12,70	12,70	7,94	0,8	–	●		
SNGN120712T00520	12,70	12,70	7,94	1,2	–	●		
SNGN120712T01020	12,70	12,70	7,94	1,2	–		●	
SNGN120712T02020	12,70	12,70	7,94	1,2	–	●		●
SNGN120716T00520	12,70	12,70	7,94	1,6	–	●		
SNGN120716T01020	12,70	12,70	7,94	1,6	–		●	
SNGN120716T02020	12,70	12,70	7,94	1,6	–	●		●
SNGN120720T02020	12,70	12,70	7,94	2,0	–	●		
SNGN120720T10015	12,70	12,70	7,94	2,0	–	●		
SNGN150712T02020	15,88	15,88	7,94	1,2	–	●		
SNGN150716T02020	15,88	15,88	7,94	1,6	–	●		
SNGN190720K20015	19,05	19,05	7,94	2,0	–	●		
SNGN190720T20015	19,05	19,05	7,94	2,0	–	●		

■ SNGA

catalogue number	D	L10	S	Rε	D1			
SNGA120408T02020	12,70	12,70	4,76	0,8	5,16	●		●
SNGA120412T02020	12,70	12,70	4,76	1,2	5,16	●		●
SNGA120416T02020	12,70	12,70	4,76	1,6	5,16	●		●
SNGA150612T02020	15,88	15,88	6,35	1,2	6,35			●
SNGA150616T02020	15,88	15,88	6,35	1,6	6,35			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

SNGX

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120708T02020	12,70	12,70	7,94	0,8	—			●
SNGX120712T02020	12,70	12,70	7,94	1,2	—			●
SNGX120716T02020	12,70	12,70	7,94	1,6	—			●
SNGX150716T02020	15,88	15,88	7,94	1,6	—			●

SNGX-FW

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNGX120712T01020FW	12,70	12,70	7,94	1,2	—			●

SNMN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNMN120412T02020	12,70	12,70	4,76	1,2	—			●
SNMN120416T02020	12,70	12,70	4,76	1,6	—			●

SNMA

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
SNMA120412T02020	12,70	12,70	4,76	1,2	5,16			●
SNMA120416T02020	12,70	12,70	4,76	1,6	5,16			●
SNMA150616T02020	15,88	15,88	6,35	1,6	6,35			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

SNMX

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

SPGN

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

SPUN

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

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

TNGN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGN110308T02020	6,35	11,00	3,18	0,8	–	●		
TNGN160404T02020	9,53	16,50	4,76	0,4	–	●		
TNGN160408T01020	9,53	16,50	4,76	0,8	–		●	
TNGN160408T02020	9,53	16,50	4,76	0,8	–	●		●
TNGN160412T01020	9,53	16,50	4,76	1,2	–		●	
TNGN160412T02020	9,53	16,50	4,76	1,2	–	●		●
TNGN160416T02020	9,53	16,50	4,76	1,6	–	●		
TNGN160708T02020	9,53	16,50	7,94	0,8	–	●		
TNGN160712T02020	9,53	16,50	7,94	1,2	–	●		
TNGN220408T02020	12,70	22,00	4,76	0,8	–	●		
TNGN220416T02020	12,70	22,00	4,76	1,6	–			●

TNGA

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TNGA160408T02020	9,53	16,50	4,76	0,8	3,81	●		●
TNGA160412T02020	9,53	16,50	4,76	1,2	3,81	●		●
TNGA160416T02020	9,53	16,50	4,76	1,6	3,81	●		●
TNGA220408T02020	12,70	22,00	4,76	0,8	5,16	●		

TPGN

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
TPGN110304T01020	6,35	11,00	3,18	0,4	–	●		
TPGN110308T01020	6,35	11,00	3,18	0,8	–	●		
TPGN110312T01020	6,35	11,00	3,18	1,2	–	●		
TPGN160304T00520	9,53	16,50	3,18	0,4	–	●		
TPGN160304T01020	9,53	16,50	3,18	0,4	–	●		
TPGN160308T00520	9,53	16,50	3,18	0,8	–	●		
TPGN160308T01020	9,53	16,50	3,18	0,8	–	●		
TPGN160308T02020	9,53	16,50	3,18	0,8	–			●
TPGN160312T01020	9,53	16,50	3,18	1,2	–	●		
TPGN160312T02020	9,53	16,50	3,18	1,2	–			●

● first choice
○ alternate choice

P			
M			
K	●		●
N			
S		●	
H	●		

■ VNGA

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

■ WNGA

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

■ WNGX

catalogue number	D	L10	S	Rε	D1	CW2015	CW3020	CW5025
WNGX080712T02020	12,70	8,69	7,94	1,2	—			●

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

NEW!

- CVD- and PVD-coated grades are now 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

WBH10C
- CVD-coated low-content grade.
- Ideal for high-speed machining.
- Increased thermal stability prevents chipping.

WBH10P
- PVD-coated low-content grade.
- Coating provides thermal barrier to reduce crater wear.
- Increased chipping resistance.

WBH10U
- Uncoated low-content grade.
- Extremely wear-resistant CBN.
- Stable, high-quality edges.

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

WBH25U
- Uncoated medium-content grade.
- Versatile application range.
- Withstands moderate interruptions.

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

WBH30U
- Uncoated high-content grade.
- Superior abrasion resistance.
- Withstands moderate interruptions.

Grey Cast Iron Grades

WBK45U
- Uncoated high-content grade, tipped inserts only.
- Superior abrasion resistance.
- Withstands moderate interruptions.

WBK40C
- CVD-coated high-content grade, solid inserts only.
- Superior abrasion resistance enables high material removal rates.
- Withstands moderate interruptions.

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

New PCD Grades for Turning Non-Ferrous Materials

NEW!

- Three new PCD grades — WDN05U, 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 alloy with low- and high-silicon content, copper alloys, ceramics, and plastics.
- Suitable for machining highly abrasive materials such as Compacted Graphic Iron (CGI), titanium, and Metal Matrix Composites (MMC).

The cutting tool materials developed more than a century ago are classified by the combination of their hardness and wear resistance characteristics.

In most steel and cast iron applications, coated hard metals are preferred because they provide much longer life and/or higher cutting speeds, thus permitting more cost-effective production.

Uncoated hard metal grades are used for operations involving light cuts requiring sharp cutting edges and operations demanding very high toughness. They are also used on non-ferrous metals and non-metallic materials.

The extended standard DIN ISO 513 also includes ceramic cutting materials, 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)

Fast Track Custom Solutions (FTCS) Program for CBN Inserts

The key success factors in using CBN inserts is the right combination of grade and edge preparation. With this program, it is easy to develop designs to meet your needs with the shortest possible lead time and most reasonable cost.

Here is how it works:

1 Choose Style and Grade from This Table:

style		grades					
	number of tips	WBH10U	WBH25U	WBH30U	WBH10P	WBH25P	WBH30P
CCGW0602	2	▲	▲	▲	▲	▲	▲
CCGW09T3	2	▲	▲	▲	▲	▲	▲
CNGA1204	2	▲	▲	▲	▲	▲	▲
CNMA1204	2	▲	▲	▲	▲	▲	▲
CPGW0602	2	▲	▲	▲	▲	▲	▲
CPGW09T3	2	▲	▲	▲	▲	▲	▲
DCGW11T3	2	▲	▲	▲	▲	▲	▲
DNGA1504	2	▲	▲	▲	▲	▲	▲
DNGA1506	2	▲	▲	▲	▲	▲	▲
DNMA1104	2	▲	▲	▲	▲	▲	▲
DPGW11T3	2	▲	▲	▲	▲	▲	▲
SNGA1204	2	▲	▲	▲	▲	▲	▲
SNMN0903	2	▲	▲	▲	▲	▲	▲
TCGW1102	2	▲	▲	▲	▲	▲	▲
TNGA1604	2	▲	▲	▲	▲	▲	▲
TPGW1102	2	▲	▲	▲	▲	▲	▲
VBGW1604	2	▲	▲	▲	▲	▲	▲
VNGA1604	2	▲	▲	▲	▲	▲	▲
	type	WBK40U					
RNM0903	solid	▲					
RNM1203	solid	▲					
RNM1204	solid	▲					

2 Decide: • Nose radius • T-land width • Hone size • Wiper

Edge Prep Examples

3 Target Lead Time: Uncoated inserts: 2 weeks + shipping.
PVD-coated inserts: 3–4 weeks + shipping.
CVD-coated inserts: Not part of the program.

4 Price: Contact your Local Authorised Distributor or Customer Service Representative.

5 Quantity: Limit 10 pieces per design to maintain the above mentioned lead times.
Additional quantities may be ordered with additional lead times.

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

Grade

Coating		Grade Description	05	10	15	20	25	30	35	40	45
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 provide better security and shock resistance than tipped inserts, while also enabling deeper depth-of-cut capability.									
			K								
WBK45U	BN-K45	A high CBN content, CBN tip brazed onto a carbide insert. 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. Available in a wide range of insert styles, including positive rake geometries ideally suited for boring applications.									
			K								
			H								
WBH10U	BN-H10	A low CBN content, CBN tip brazed onto a carbide insert. Designed for precision finishing in smooth cuts on hardened steels (>45 HRC) where optimal surface finish is needed. 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. Do not apply on soft steel as rapid crater wear will result.									
			H								
WBH25U	BN-H25	A low CBN content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing of hardened steels (>45 HRC) where optimal surface finish is needed. Use in continuous to interrupted cutting of 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								
WBH30U*	BN-H30	A high CBN content, CBN tip brazed onto a carbide insert. Designed for roughing to finishing in interrupted cuts on hardened steels (>45 HRC). It can also be applied on grey cast iron, chilled irons, high-chrome alloyed steels, and sintered powdered metals.									
			K								
			S								
			H								
WBH10P	BN-H10	A low CBN content 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								
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								

*Grade available as Custom Solution only.

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

Grade

Coating		Grade Description	05	10	15	20	25	30	35	40	45
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, and sintered powdered metals.	K	K	K						
			S		S	S					
			H				H	H	H		
WBH10C	BN-H10	A low content CBN grade with a MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN coating for protection against crater wear. Designed for precision machining of hardened steels (>48 HRC), 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. Do not use on soft steels.	K	K							
			H	H	H						
WBH40C	BN-H40	A high CBN content, solid CBN with multiple cutting edges and a CVD — Al_2O_3-TiN-TiCN-Al_2O_3-TiN alumina coating. Applied in roughing to semi-finishing of fully pearlitic grey cast iron, chilled irons, high chrome alloy steels, sintered powdered metals, and heavy cuts in hardened steels (>45 HRC). Use for finished chilled and fully pearlitic cast iron. Do not apply on finishing hardened steels. The solid WBH40C also can be effectively applied when roughing hardened steels.	K		K	K	K	K	K		
			H						H	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	N	N	N					
			S	S							
WDN05U*	DP-N05	A pure CVD-deposited diamond sheet tool directly brazed to a carbide substrate. The industry's most abrasion-resistant tool material for non-ferrous and non-metallic materials. Best applied when abrasion resistance is the desired benefit. Withstands moderate interruptions.	N	N	N						
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		N	N	N				

*Grade available as Custom Solution only.

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

WIDIA

DIN ISO 513	VDI 3323	Continuous Cut												Lightly Interrupted Cut					
Material Group		Cutting Speed • vc m/min																	
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]																		
	f [mm]																		
	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
	7																		
	8																		
	9																		
	10																		
	11																		
	12																		
	13.1																		
	13.2																		
M	ap [mm]																		
	f [mm]																		
	14.1																		
	14.2																		
	14.3																		
	14.4																		
K	ap [mm]	0,20	—	2,00	0,20	—	1,50	1,30	—	10,00	1,00	—	8,00	0,20	—	2,00	0,15	—	1,50
	f [mm]	0,10	—	0,40	0,10	—	0,30	0,25	—	1,00	0,20	—	0,80	0,10	—	0,30	0,08	—	0,25
		WBK40U/WBK45U			WBK40U/WBK45U			WBK40C			WBK40C			WBK40U/WBK45U			WBK40U/WBK45U		
	15	400	**700**	1100	—	—	—	500	**700**	1200	—	—	—	400	**700**	1100	—	—	—
	16	400	**700**	1100	—	—	—	500	**700**	1200	—	—	—	400	**700**	1100	—	—	—
	17	—	—	—	280	**400**	600	—	—	—	280	**400**	700	—	—	—	280	**400**	600
	18	—	—	—	280	**400**	600	—	—	—	280	**400**	700	—	—	—	280	**400**	600
	19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
N	ap [mm]	0,20	—	2,00	0,10	—	1,00	0,20	—	2,00	0,10	—	1,00	0,20	—	2,00	0,20	—	2,00
	f [mm]	0,05	—	0,41	0,06	—	0,20	0,10	—	0,25	0,06	—	0,20	0,10	—	0,25	0,10	—	0,25
		WDN25U			WDN05U			WDN25U			WDN05U			WDN00U			WDN25U		
	21	500	**750**	2500	—	—	—	—	—	—	—	—	—	500	**750**	2500	—	—	—
	22	500	**750**	2500	—	—	—	—	—	—	—	—	—	500	**750**	2500	—	—	—
	23	—	—	—	400	**580**	1100	—	—	—	—	—	—	—	—	—	300	**520**	980
	24	—	—	—	400	**580**	1100	—	—	—	—	—	—	—	—	—	300	**520**	980
	25	—	—	—	400	**580**	1100	—	—	—	—	—	—	—	—	—	300	**520**	980
	26	—	—	—	—	—	—	250	**500**	800	—	—	—	—	—	—	—	—	—
	27	—	—	—	—	—	—	250	**500**	800	—	—	—	—	—	—	—	—	—
	28	—	—	—	—	—	—	250	**500**	800	—	—	—	—	—	—	—	—	—
	29	—	—	—	—	—	—	—	—	—	400	**460**	850	—	—	—	—	—	—
	30	—	—	—	—	—	—	—	—	—	400	**460**	850	—	—	—	—	—	—
S	ap [mm]																		
	f [mm]																		
	31																		
	32																		
	33																		
	34																		
	35																		
	36																		
	37																		
H	ap [mm]	0,10	—	0,50	0,10	—	0,50							0,10	—	0,50	0,10	—	0,50
	f [mm]	0,06	—	0,25	0,06	—	0,25							0,05	—	0,20	0,05	—	0,20
		WBH10U			WBH10P									WBH25U			WBH25P		
	38.1	50	**140**	230	75	**150**	260							50	**110**	200	50	**120**	230
	38.2	50	**140**	230	75	**150**	260							50	**110**	200	50	**120**	230
	39.1	50	**140**	230	75	**150**	260							50	**110**	200	50	**120**	230
	39.2	50	**140**	230	75	**150**	260							50	**110**	200	50	**120**	230

Lightly Interrupted Cut						Heavily Interrupted Cut												VDI 3323	DIN ISO 513
Cutting Speed • vc m/min																		Material Group	
min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max		
																		ap [mm] f [mm]	
																		1	P
																		2	
																		3	
																		4	
																		5	
																		6	
																		7	
																		8	
																		9	
																		10	
																		11	
																		12	
																		13.1	
																		13.2	
																		ap [mm] f [mm]	
																		14.1	M
																		14.2	
																		14.3	
																		14.4	
1,30	—	10,00	1,00	—	8,00	0,10	—	2,00	0,10	—	1,50							ap [mm]	
0,25	—	1,00	0,20	—	0,80	0,08	—	0,40	0,08	—	0,20							f [mm]	
WBK40C			WBK40C			WBK40U/WBK45U			WBK40U/WBK45U										
500	**700**	1200	—	—	—	400	**700**	1100	—	—	—							15	K
500	**700**	1200	—	—	—	400	**700**	1100	—	—	—							16	
—	—	—	280	**400**	700	—	—	—	280	**400**	600							17	
—	—	—	280	**400**	700	—	—	—	280	**400**	600							18	
—	—	—	—	—	—	—	—	—	—	—	—							19	
—	—	—	—	—	—	—	—	—	—	—	—							20	
0,10	—	1,00	0,20	—	2,00	0,20	—	2,00	0,20	—	2,00	0,10	—	1,00	0,20	—	2,00	ap [mm]	
0,06	—	0,20	0,10	—	0,30	0,10	—	0,25	0,10	—	0,25	0,06	—	0,20	0,10	—	0,30	f [mm]	
WDN05U			WDN00U			WDN00U			WDN25U			WDN00U			WDN00U				
—	—	—	—	—	—	500	**750**	2500	—	—	—	—	—	—	—	—	—	21	N
—	—	—	—	—	—	500	**750**	2500	—	—	—	—	—	—	—	—	—	22	
—	—	—	—	—	—	—	—	—	300	**520**	980	—	—	—	—	—	—	23	
—	—	—	—	—	—	—	—	—	300	**520**	980	—	—	—	—	—	—	24	
—	—	—	—	—	—	—	—	—	300	**520**	980	—	—	—	—	—	—	25	
300	**520**	1000	—	—	—	—	—	—	—	—	—	300	**520**	1000	—	—	—	26	
300	**520**	1000	—	—	—	—	—	—	—	—	—	300	**520**	1000	—	—	—	27	
300	**520**	1000	—	—	—	—	—	—	—	—	—	300	**520**	1000	—	—	—	28	
—	—	—	350	**365**	750	—	—	—	—	—	—	—	—	—	350	**365**	750	29	
—	—	—	350	**365**	750	—	—	—	—	—	—	—	—	—	350	**365**	750	30	
																		ap [mm] f [mm]	
																		31	S
																		32	
																		33	
																		34	
																		35	
																		36	
																		37	
0,10	—	0,50	0,10	—	0,50	0,08	—	0,40	0,08	—	0,40							ap [mm]	
0,05	—	0,20	0,05	—	0,20	0,05	—	0,20	0,05	—	0,20							f [mm]	
WBH25U			WBH25P			WBH30U			WBH30P										
50	**110**	200	50	**120**	230	45	**90**	170	50	**105**	200							38.1	H
50	**110**	200	50	**120**	230	45	**90**	170	50	**105**	200							38.2	
50	**110**	200	50	**120**	230	45	**90**	170	50	**105**	200							39.1	
50	**110**	200	50	**120**	230	45	**90**	170	50	**105**	200							39.2	

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	120°	
O	135°	
P	108°	
R	—	
S	90°	
T	60°	
C D E M V	80° 55° 75° 86° 35°	
W	80° with enlarged corner angles	
L	90°	
A B N/K	85° 82° 55°	

C — 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.	

G — Tolerance Class

Tolerances apply prior to edge prep and coating

D: Theoretical diameter of the insert inscribed circle
S: Thickness
B: See figures above

W — Insert Features

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

06 — Size

Code for metric cutting edge length "L10"

"D" mm	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 in size column		±0,013
U	See tables in size column		±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.

02 — Thickness

symbol mm	thickness 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

02 — Corner Radius "Rε"

symbol mm	corner radius 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	

Hand of Insert *(optional)*

R = Right hand

L = Left hand

N = Neutral

E — Cutting Edge

F*
Sharp

E*
Rounded

T
Chamfered

S*
Chamfered and Rounded

K
Double-Chamfered

P
Double-Chamfered and Rounded

*Also available in Wiper style.

T-Land Width *(optional)*

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

T-Land Angle *(optional)*

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

C — Tip Style *(optional)*

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

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CCGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW060202EC	6,35	6,45	2,38	0,2	2,80	–				●					
CCGW060202S01015C	6,35	6,45	2,38	0,2	2,80	–		●	●						
CCGW060204S01015C	6,35	6,45	2,38	0,4	2,80	–		●	●	●					
CCGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	–				●					
CCGW09T308EC	9,53	9,67	3,97	0,8	4,40	–								●	
CCGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	–				●					

CCGW-EMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW09T304EMT	9,53	9,67	3,97	0,4	4,40	1,60	●								

CCGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW060204FST	6,35	6,45	2,38	0,4	2,80	2,40									●
CCGW09T304FST	9,53	9,67	3,97	0,4	4,40	2,40									●
CCGW09T308FST	9,53	9,67	3,97	0,8	4,40	1,65									●

CCGW-FWC

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW060202EFWC	6,35	6,45	2,38	0,2	2,80	–				●					
CCGW060204EFWC	6,35	6,45	2,38	0,4	2,80	–				●					
CCGW09T304EFWC	9,53	9,67	3,97	0,4	4,40	–				●					
CCGW09T308EFWC	9,53	9,67	3,97	0,8	4,40	–				●					

CCGW-FWM

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW060202EFWM	6,35	6,45	2,38	0,2	2,80	1,60				●					
CCGW060204EFWM	6,35	6,45	2,38	0,4	2,80	1,60				●					
CCGW09T304EFWM	9,53	9,67	3,97	0,4	4,40	1,60				●					
CCGW09T308EFWM	9,53	9,67	3,97	0,8	4,40	1,12				●					

CCGW-FWMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW09T304S01015FWMT	9,53	9,67	3,97	0,4	4,40	1,60	●		●						
CCGW09T308S01015FWMT	9,53	9,67	3,97	0,8	4,40	1,12			●						

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CCGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW060202EM	6,35	6,45	2,38	0,2	2,80	1,60				●					
CCGW060204S01015M	6,35	6,45	2,38	0,4	2,80	1,60	●			●					
CCGW09T304S01015M	9,53	9,67	3,97	0,4	4,40	1,60				●					
CCGW09T308S01015M	9,53	9,67	3,97	0,8	4,40	1,12				●					

CCGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCGW09T304S01015MT	9,53	9,67	3,97	0,4	4,40	1,60		●	●						
CCGW09T308S01015MT	9,53	9,67	3,97	0,8	4,40	1,12	●	●	●						
CCGW120404S01015MT	12,70	12,90	4,76	0,4	5,50	1,60								●	
CCGW120408S01015MT	12,70	12,90	4,76	0,8	5,50	1,12								●	

CCMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCMW060204FST	6,35	6,45	2,38	0,4	2,80	2,40									●
CCMW060208FST	6,35	6,45	2,38	0,8	2,80	1,65									●
CCMW09T304FST	9,53	9,67	3,97	0,4	4,40	2,40									●
CCMW09T308FST	9,53	9,67	3,97	0,8	4,40	1,12								●	●

CCMW-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CCMW060204S01020ST	6,35	6,45	2,38	0,4	2,80	1,60					●				
CCMW090304S01020ST	9,53	9,67	3,18	0,4	4,40	1,60								●	
CCMW120408S01020ST	12,70	12,90	4,76	0,8	5,50	1,12					●				

CDHB-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CDHBS4T002FST	3,97	4,03	1,02	0,1	2,13	1,32									●
CDHBS4T004FST	3,97	4,03	1,02	0,2	2,13	1,32									●

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CNGA-EMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNGA120408EMT	12,70	12,90	4,76	0,8	5,16	1,60	●			●					
CNGA120412EMT	12,70	12,90	4,76	1,2	5,16	1,12				●					

CNGA-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNGA120404FST	12,70	12,90	4,76	0,4	5,16	2,40									●
CNGA120408FST	12,70	12,90	4,76	0,8	5,16	1,65									●

CNGA-FW/MW MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNGA120404EFWMT	12,70	12,90	4,76	0,4	5,15	1,60				●	●				
CNGA120404S01025FWMT	12,70	12,90	4,76	0,4	5,16	1,60		●	●						
CNGA120408EFWMT	12,70	12,90	4,76	0,8	5,16	1,12				●	●				
CNGA120408S01020FWMT	12,70	12,90	4,76	0,8	5,16	1,12	●								
CNGA120408S01025FWMT	12,70	12,90	4,76	0,8	5,16	1,12		●	●						
CNGA120412EFWMT	12,70	12,90	4,76	1,2	5,16	0,86				●	●				
CNGA120416S02015MWMT	12,70	12,90	4,76	1,6	5,16	0,64								●	

CNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNGA120404S01020MT	12,70	12,90	4,76	0,4	5,16	1,60	●								
CNGA120404S01025MT	12,70	12,90	4,76	0,4	5,16	1,60		●	●	●	●				
CNGA120408S01020MT	12,70	12,90	4,76	0,8	5,16	1,12	●							●	
CNGA120408S01025MT	12,70	12,90	4,76	0,8	5,16	1,12		●	●	●	●				
CNGA120408S02020MT	12,70	12,90	4,76	0,8	5,16	1,12								●	
CNGA120412S01025MT	12,70	12,90	4,76	1,2	5,16	0,86		●	●	●	●				
CNGA120412T02020MT	12,70	12,90	4,76	1,2	5,16	0,86								●	
CNGA120416S01020MT	12,70	12,90	4,76	1,6	5,16	0,63								●	

CNGA-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNGA120404S01025ST	12,70	12,90	4,76	0,4	5,16	1,60					●				
CNGA120408S01025ST	12,70	12,90	4,76	0,8	5,16	1,12					●				
CNGA120412S01025ST	12,70	12,90	4,76	1,2	5,16	0,86					●				

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CNMN

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMN090308S02020	9,53	9,67	3,18	0,8	–	–							●		
CNMN090312S02020	9,53	9,67	3,18	1,2	–	–							●		
CNMN120408S02020	12,70	12,90	4,76	0,8	–	–							●		
CNMN120412S02020	12,70	12,90	4,76	1,2	–	–							●		

CNMA

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMA120408S01025	12,70	12,90	4,76	0,8	5,16	–					●				
CNMA120408S02020	12,70	12,90	4,76	0,8	5,16	–							●		
CNMA120412S02020	12,70	12,90	4,76	1,2	5,16	–							●		

CNMA-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMA120408FST	12,70	12,90	4,76	0,8	5,16	1,12					●				

CNMA-MT

(MTV)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMA120408S01020MTV	12,70	12,90	4,76	0,8	5,16	1,12					●			●	

CNMA-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMA120404S01020ST	12,70	12,90	4,76	0,4	5,16	1,60					●				
CNMA120408S01020ST	12,70	12,90	4,76	0,8	5,16	1,12					●			●	
CNMA120412S01020ST	12,70	12,90	4,76	1,2	5,16	0,86					●				

CNMS-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CNMS120404FST	12,70	12,90	4,76	0,4	5,16	2,40									●
CNMS120408FST	12,70	12,90	4,76	0,8	5,16	1,65									●

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CPGN

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGN120304F	12,70	12,90	3,18	0,4	–	1,60									●
CPGN120308F	12,70	12,90	3,18	0,8	–	1,12									●

CPGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW060202EC	6,35	6,45	2,38	0,2	2,80	–				●					
CPGW060202S01015C	6,35	6,45	2,38	0,2	2,80	–		●	●						
CPGW060204S01015C	6,35	6,45	2,38	0,4	2,80	–		●	●	●				●	
CPGW060208EC	6,35	6,45	2,38	0,8	2,80	–								●	
CPGW060208S01015C	6,35	6,45	2,38	0,8	2,80	–				●					
CPGW09T304EC	9,53	9,67	3,97	0,4	4,40	–								●	
CPGW09T304S01015C	9,53	9,67	3,97	0,4	4,40	–				●					
CPGW09T308EC	9,53	9,67	3,97	0,8	4,40	–								●	
CPGW09T308S01015C	9,53	9,67	3,97	0,8	4,40	–				●				●	

CPGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW060202FST	6,35	6,45	2,38	0,2	2,80	1,65									●
CPGW060204FST	6,35	6,45	2,38	0,4	2,80	1,65									●
CPGW060208FST	6,35	6,45	2,38	0,8	2,80	1,65									●
CPGW09T304FST	9,53	9,67	3,97	0,4	4,40	2,40									●
CPGW09T308FST	9,53	9,67	3,97	0,8	4,40	1,65									●
CPGW120404FST	12,70	12,90	4,76	0,4	5,50	2,40									●
CPGW120408FST	12,70	12,90	4,76	0,8	5,50	1,65									●

CPGW-FWMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW09T304S01015FWMT	9,53	9,67	3,97	0,4	4,40	1,60			●						
CPGW09T308S01015FWMT	9,53	9,67	3,97	0,8	4,40	1,12			●						

CPGW-FWST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW060204FWST	6,35	6,45	2,38	0,4	2,80	2,40									●
CPGW09T308FWST	9,53	9,67	3,97	0,8	4,40	1,65									●
CPGW120408FWST	12,70	12,90	4,76	0,8	5,50	1,65									●

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

CPGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW060202EM	6,35	6,45	2,38	0,2	2,80	1,60				●					
CPGW060204EM	6,35	6,45	2,38	0,4	2,80	1,60	●								
CPGW060204S01015M	6,35	6,45	2,38	0,4	2,80	1,60	●			●					
CPGW060208S01015M	6,35	6,45	2,38	0,8	2,80	1,12				●					
CPGW09T304S01015M	9,53	9,67	3,97	0,4	4,40	1,60				●					
CPGW09T308S01015M	9,53	9,67	3,97	0,8	4,40	1,12				●					

CPGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPGW09T304S01015MT	9,53	9,67	3,97	0,4	4,40	1,60	●	●	●						
CPGW09T308S01015MT	9,53	9,67	3,97	0,8	4,40	1,12	●	●	●						

CPMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPMW050202FST	5,56	5,65	2,38	0,2	2,50	2,40									●
CPMW050204FST	5,56	5,65	2,38	0,4	2,50	1,60					●				●
CPMW060202FST	6,35	6,45	2,38	0,2	2,80	1,60					●				
CPMW060204FST	6,35	6,45	2,38	0,4	2,80	2,40									●
CPMW09T308FST	9,53	9,67	3,97	0,8	4,40	1,65									●

CPMW-FWST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
CPMW09T304FWST	9,53	9,67	3,97	0,4	4,40	2,40									●

DCGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCGW070202EC	6,35	7,75	2,38	0,2	2,80	–				●					
DCGW070202S01015C	6,35	7,75	2,38	0,2	2,80	–		●	●						
DCGW070204S01015C	6,35	7,75	2,38	0,4	2,80	–		●	●	●					

DCGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCGW070204FST	6,35	7,75	2,38	0,4	2,80	2,50									●
DCGW11T304FST	9,53	11,63	3,97	0,4	4,40	2,50									●

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

DCGW-FWMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCGW11T308S01015FWMT	9,53	11,63	3,97	0,8	4,40	1,50	●								

DCGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCGW070202EM	6,35	7,75	2,38	0,2	2,80	1,80				●					
DCGW070204S01015M	6,35	7,75	2,38	0,4	2,80	1,70				●					
DCGW11T304S01015M	9,53	11,63	3,97	0,4	4,40	1,70				●					
DCGW11T308S01015M	9,53	11,63	3,97	0,8	4,40	1,50				●					

DCGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCGW11T304S01015MT	9,53	11,63	3,97	0,4	4,40	1,70	●	●	●		●			●	
DCGW11T308S01015MT	9,53	11,63	3,97	0,8	4,40	1,50	●	●	●		●			●	

DCMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCMW070204FST	6,35	7,75	2,38	0,4	2,80	2,50									●
DCMW11T304FST	9,53	11,63	3,97	0,4	4,40	1,70								●	●
DCMW11T308FST	9,53	11,63	3,97	0,8	4,40	2,30									●

DCMW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCMW070202S01020MT	6,35	7,75	2,38	0,2	2,80	1,80					●				
DCMW070204S01020MT	6,35	7,75	2,38	0,4	2,80	1,70					●				
DCMW11T308S01020MT	9,53	11,63	3,97	0,8	4,40	1,50					●				

DCMW-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DCMW070202S01020ST	6,35	7,75	2,38	0,2	2,80	1,80					●				
DCMW11T304S01020ST	9,53	11,63	3,97	0,4	4,40	1,70					●			●	

DNGA-EMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNGA150408EMT	12,70	15,50	4,76	0,8	5,16	1,50	●			●				●	
DNGA150412EMT	12,70	15,50	4,76	1,2	5,16	1,30				●					

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

DNGA-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNGA150404FST	12,70	15,50	4,76	0,4	5,16	2,50									●
DNGA150408FST	12,70	15,50	4,76	0,8	5,16	2,30									●

DNGA-FWMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNGA150404EFWMT	12,70	15,50	4,76	0,4	5,16	1,70				●					
DNGA150408EFWMT	12,70	15,50	4,76	0,8	5,16	1,50	●			●					
DNGA150412EFWMT	12,70	15,50	4,76	1,2	5,16	1,30				●					

DNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNGA150404S01020MT	12,70	15,50	4,76	0,4	5,16	1,70	●								
DNGA150404S01025MT	12,70	15,50	4,76	0,4	5,16	1,70		●	●	●					
DNGA150408S01020MT	12,70	15,50	4,76	0,8	5,16	1,50								●	
DNGA150408S01025MT	12,70	15,50	4,76	0,8	5,16	1,50		●	●	●	●				
DNGA150412S01025MT	12,70	15,50	4,76	1,2	5,16	1,30			●	●	●				
DNGA150608S01020MT	12,70	15,50	6,35	0,8	5,16	1,50	●								

DNMA

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNMA110408S02020	9,53	11,63	4,76	0,8	3,81	—							●		
DNMA110412S02020	9,53	11,63	4,76	1,2	3,81	—							●		

DNMA-MTV

(MTV)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNMA150612S01020MTV	12,70	15,50	6,35	1,2	5,16	1,30								●	

DNMA-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNMA150404S01020ST	12,70	15,50	4,76	0,4	5,16	1,70					●				
DNMA150604S01020ST	12,70	15,50	6,35	0,4	5,16	1,70					●				

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

DNMS-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DNMS150404FST	12,70	15,50	4,76	0,4	5,16	2,50									●
DNMS150408FST	12,70	15,50	4,76	0,8	5,16	2,30									●

DPGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW070202EC	6,35	7,75	2,38	0,2	2,80	–				●					
DPGW070204S01015C	6,35	7,75	2,38	0,4	2,80	–				●					
DPGW070208S01015C	6,35	7,75	2,38	0,8	2,80	–				●					

DPGW-EMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW11T304EMT	9,53	11,63	3,97	0,4	4,40	1,70								●	

DPGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW070202FST	6,35	7,75	2,38	0,2	2,80	2,70									●
DPGW070204FST	6,35	7,75	2,38	0,4	2,80	2,50									●
DPGW11T304FST	9,53	11,63	3,97	0,4	4,40	2,50									●

DPGW-FWST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW070204FWST	6,35	7,75	2,38	0,2	2,80	2,50									●
DPGW11T304FWST	9,53	11,63	3,97	0,2	4,40	2,50									●

DPGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW070202EM	6,35	7,75	2,38	0,2	2,80	1,80				●					
DPGW070204S01015M	6,35	7,75	2,38	0,4	2,80	1,70				●					
DPGW070208S01015M	6,35	7,75	2,38	0,8	2,80	1,50				●					
DPGW11T304S01015M	9,53	11,63	3,97	0,4	4,40	1,70				●					
DPGW11T308S01015M	9,53	11,63	3,97	0,8	4,40	1,50				●					

● first choice
○ alternate choice

■ DPGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
DPGW11T304S01015MT	9,53	11,63	3,97	0,4	4,40	1,70			●		●				
DPGW11T308S01015MT	9,53	11,63	3,97	0,8	4,40	1,50			●		●				

■ RNMN

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
RNMN090300S02020	9,53	–	3,18	–	–	–							●		
RNMN120300S02020	12,70	–	3,18	–	–	–						●	●		
RNMN120400S02020	12,70	–	4,76	–	–	–							●		

		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P										
M										
K		○					○	●	●	
N										●
S									○	
H		●	●	●	●	●	●		●	

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

SCMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SCMW09T308FST	9,53	9,53	3,97	0,8	4,40	1,50					●			●	

SNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SNGA120404S01025MT	12,70	12,70	4,76	0,4	5,16	1,50				●					
SNGA120408S01020MT	12,70	12,70	4,76	0,8	5,16	1,50	●								
SNGA120408S01025MT	12,70	12,70	4,76	0,8	5,16	1,50			●	●					
SNGA120412S01025MT	12,70	12,70	4,76	1,2	5,16	1,50			●	●					

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

SNGN-MTV

(MTV)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SNGN120412FMTV	12,70	12,70	4,76	1,2	—	1,50								●	

SNMN

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SNMN090308S02020	9,53	9,53	3,18	0,8	—	—							●		
SNMN090312S02020	9,53	9,53	3,18	1,2	—	—						●	●		
SNMN090316S02020	9,53	9,53	3,18	1,6	—	—							●		
SNMN120308S02020	12,70	12,70	3,18	0,8	—	—							●		
SNMN120312S02020	12,70	12,70	3,18	1,2	—	—							●		
SNMN120316S02020	12,70	12,70	3,18	1,6	—	—							●		
SNMN120416T02020	12,70	12,70	4,76	1,6	—	—							●		

SNMA

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SNMA120408S01025	12,70	12,70	4,76	0,8	5,16	—					●				
SNMA120408S02020	12,70	12,70	4,76	0,8	5,16	—							●		
SNMA120412S01025	12,70	12,70	4,76	1,2	5,16	—					●				
SNMA120412S02020	12,70	12,70	4,76	1,2	5,16	—							●		

SNMS-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
SNMS120408FST	12,70	12,70	4,76	0,8	5,16	2,30									●
SNMS120412FST	12,70	12,70	4,76	1,2	5,16	2,30									●

● first choice
○ alternate choice

		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P										
M										
K		○					○	●	●	
N										●
S									○	
H		●	●	●	●	●	●		●	

TCGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCGW110202EC	6,35	11,00	2,38	0,2	2,80	–				●					
TCGW110202S01015C	6,35	11,00	2,38	0,2	2,80	–			●						
TCGW110204S01015C	6,35	11,00	2,38	0,4	2,80	–			●	●					

TCGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCGW110204FST	6,35	11,00	2,38	0,4	2,80	2,50									●
TCGW16T304FST	9,53	16,50	3,97	0,4	4,40	2,50									●

TCGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCGW110202EM	6,35	11,00	2,38	0,2	2,80	1,70				●					
TCGW110204S01015M	6,35	11,00	2,38	0,4	2,80	1,60				●					
TCGW16T304S01015M	9,53	16,50	3,97	0,4	4,40	1,60				●					
TCGW16T308S01015M	9,53	16,50	3,97	0,8	4,40	1,50				●					

TCGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCGW16T304S01015MT	9,53	16,50	3,97	0,4	4,40	1,60					●				

TCMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCMW110204FST	6,35	11,00	2,38	0,4	2,80	1,60								●	●
TCMW16T304FST	9,53	16,50	3,97	0,4	4,40	1,60								●	●

TCMW-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TCMW110202S01020ST	6,35	11,00	2,38	0,2	2,80	1,70					●				
TCMW110204S01020ST	6,35	11,00	2,38	0,4	2,80	1,60								●	
TCMW16T308S01020ST	9,53	16,50	3,97	0,8	4,40	1,50					●				

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

■ TNGA-FWMT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TNGA160408EFWMT	9,53	16,50	4,76	0,8	3,81	1,50				●					
TNGA160412EFWMT	9,53	16,50	4,76	1,2	3,81	1,40				●					

■ TNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TNGA160404S01025MT	9,53	16,50	4,76	0,4	3,81	1,60			●	●					
TNGA160408S01020MT	9,53	16,50	4,76	0,8	3,81	1,50								●	
TNGA160408S01025MT	9,53	16,50	4,76	0,8	3,81	1,50			●	●	●				
TNGA160412S01025MT	9,53	16,50	4,76	1,2	3,81	1,40			●	●	●				
TNGA160416S01025MT	9,53	16,50	4,76	1,6	3,81	1,20								●	

■ TNMS-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TNMS160404FST	9,53	16,50	4,76	0,4	3,81	2,50									●
TNMS160408FST	9,53	16,50	4,76	0,8	3,81	2,20									●

■ TPGN

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGN110304F	6,35	11,00	3,18	0,4	–	–									●
TPGN110308F	6,35	11,00	3,18	0,8	–	–									●
TPGN160304F	9,53	16,50	3,18	0,4	–	–									●
TPGN160308F	9,53	16,50	3,18	0,8	–	–									●
TPGN160312F	9,53	16,50	3,18	1,2	–	–									●
TPGN220404F	12,70	22,00	4,76	0,4	–	–									●
TPGN220408F	12,70	22,00	4,76	0,8	–	–									●

■ TPGN-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGN110308FST	6,35	11,00	3,18	0,8	–	1,50								●	
TPGN160304FST	9,53	16,50	3,18	0,4	–	1,60					●				
TPGN160308FST	9,53	16,50	3,18	0,8	–	1,50					●				

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

TPGW-C

(C)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGW110202EC	6,35	11,00	2,38	0,2	2,80	–				●					
TPGW110204EC	6,35	11,00	2,38	0,4	2,80	–								●	
TPGW110204S01015C	6,35	11,00	2,38	0,4	2,80	–		●	●	●					
TPGW110208S01015C	6,35	11,00	2,38	0,8	2,80	–		●	●	●					

TPGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGW110204FST	6,35	11,00	2,38	0,4	2,80	2,50									●
TPGW110208FST	6,35	11,00	2,38	0,8	2,80	2,20									●
TPGW16T304FST	9,53	16,50	3,97	0,4	4,40	2,50									●
TPGW16T308FST	9,53	16,50	3,97	0,8	4,40	2,20									●

TPGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGW110202EM	6,35	11,00	2,38	0,2	2,80	1,70				●					
TPGW110204S01015M	6,35	11,00	2,38	0,4	2,80	1,60				●					
TPGW110208S01015M	6,35	11,00	2,38	0,8	2,80	1,50	●			●					
TPGW16T304S01015M	9,53	16,50	3,97	0,4	4,40	1,60				●					
TPGW16T308S01015M	9,53	16,50	3,97	0,8	4,40	1,50				●					

TPGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
TPGW16T308S01015MT	9,53	16,50	3,97	0,8	4,40	1,50					●				

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

VBGW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VBGW110304FST	6,35	11,07	3,18	0,4	2,80	3,30									●
VBGW160404FST	9,53	16,61	4,76	0,4	4,40	3,30									●

VBGW-M

(M)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VBGW160404S01015M	9,53	16,61	4,76	0,4	4,40	2,20				●					
VBGW160408S01015M	9,53	16,61	4,76	0,8	4,40	1,80				●					

VBGW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VBGW160404S01015MT	9,53	16,61	4,76	0,4	4,40	2,20		●	●		●				
VBGW160408S01015MT	9,53	16,61	4,76	0,8	4,40	1,80	●	●	●		●				

VBMW-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VBMW160412S01020MT	9,53	16,61	4,76	1,2	4,40	1,30					●				

VBMW-ST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VBMW160408S01020ST	9,53	16,61	4,76	0,8	4,40	1,80					●				

● first choice
○ alternate choice

		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P										
M										
K		○					○	●	●	
N										●
S									○	
H		●	●	●	●	●	●		●	

VCMW-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VCMW110304FST	6,35	11,07	3,18	0,4	2,80	3,30									●
VCMW160402FST	9,53	16,61	4,76	0,2	4,40	3,60									●

VNGA-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VNGA160404FST	9,53	16,61	4,76	0,4	3,81	3,30									●
VNGA160408FST	9,53	16,61	4,76	0,8	3,81	2,60									●

VNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VNGA160404S01020MT	9,53	16,61	4,76	0,4	3,81	2,20	●								
VNGA160404S01025MT	9,53	16,61	4,76	0,4	3,81	2,20		●	●	●	●				
VNGA160408S01020MT	9,53	16,61	4,76	0,8	3,81	1,80	●								
VNGA160408S01025MT	9,53	16,61	4,76	0,8	3,81	1,80		●	●	●	●				

VNMS-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
VNMS160404FST	9,53	16,61	4,76	0,4	3,81	3,30									●
VNMS160408FST	9,53	16,61	4,76	0,8	3,81	2,60									●

● first choice
○ alternate choice

	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
P									
M									
K	○					○	●	●	
N									●
S								○	
H	●	●	●	●	●	●		●	

■ WNGA-FST

(ST)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
WNGA080404FST	12,70	8,69	4,76	0,4	5,16	2,40									●
WNGA080408FST	12,70	8,69	4,76	0,8	5,16	1,65									●

■ WNGA-MT

(MT)

ISO catalogue number	D	L10	S	Rε	D1	max DOC	WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U
WNGA080404S01025MT	12,70	8,69	4,76	0,4	5,16	1,60			●						
WNGA080408S01020MT	12,70	8,69	4,76	0,8	5,16	1,12	●								
WNGA080408S01025MT	12,70	8,69	4,76	0,8	5,16	1,12			●						

WIDIA CIRCLE

Tools for Small Hole Boring

Small Hole ID Indexable Insert Tooling **C2–C47**
Choosing the Correct Small Hole Boring Bar C4–C7
Catalogue Numbering System C8–C9
Boring Bars for Turning C10–C23
Boring Bars for Profiling C24–C25
Boring Bars for Grooving and Threading C26
Sleeves C27
Insert Selection Guide C28–C29
Chipbreaker Geometries • Positive C30–C31
Grades and Grade Descriptions C32–C33
Speed and Feed Chart C34–C35
Catalogue Numbering System C36–C37
Positive Inserts C38–C45
Cross Reference Chart C46
Hardware C47

A/B Series **C48–C59**

Quadralock™ **C60–C69**

Solid Carbide Bars **C70–C124**

Technical Information **C126–C129**

Custom Solution Worksheet **C130–C131**

Small Hole Boring • **ID Indexable Insert Tooling**

The WIDIA™ line of micro boring bars provides accurate holemaking tooling in diameters as small as 1,57mm. These economical, indexable inserts are available in both steel and carbide shanks and are ideal for a wide range of applications, including precision micro boring.

80° Diamond Insert Boring Bars

- Available in shanks as small as 4,0mm 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 inside a 6,91mm bore diameter.

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

- Positive rake geometry to bore holes >6,98mm diameter.
- Designed for less obstruction and greater chip evacuation.
- Stocked in all grades, including diamond-tipped and borazon-tipped styles.
- Stocked in shanks as small as 6,0mm 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 (Dmin).

NOTE: Proper bar selection will have largest minimum bore dimension under hole size to be bored.

- Indexable Tooling
- A/B Series
- Quadralock
- Solid Carbide Bars

Boring

minimum bore diameter (Dmin)	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	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	

Profiling

minimum bore diameter (Dmin)	high performance ◀ ▶ general performance
1	Quadralock™ / A Series / B Series / Indexable Tooling
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	

Threading

minimum bore diameter (Dmin)	high performance ◀ ▶ general performance
1	Quadralock / A Series / Solid Carbide / Indexable Tooling
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 (Dmin)	high performance ◀ ▶ general performance
1	Quadralock / A Series / Indexable Tooling / Solid Carbide
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.

Determine Materials to Be Machined and the Appropriate Insert

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 126**.)* For indexable tooling, go to **step 3**. For all other tooling systems, go directly to **step 4**.

C Determine lead angle (KRI). 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.

Small Hole Boring Bars for Turning

Clamping System S • Carbide

■ CCBM

order number	catalogue number	C KRI	A D	D min	D2	F	B L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2831801	CCBM61000R	90	6,00	5,94	5,33	3,16	100,58	1,02	0,0	5,0	CD..S4T002	CC11	T6
3696025	CCBM61000R	90	6,00	7,08	6,20	3,73	100,33	1,19	0,0	5,0	CD..S4T002	CC11	T6
2831301	CCBM61520R	90	6,00	7,08	6,20	3,73	152,15	1,19	0,0	5,0	CD..S4T002	CC11	T6
2831277	CCBM81520R	90	8,00	9,04	8,20	4,70	152,15	2,36	0,0	5,0	CD..S4T002	CC11	T6
2831826	CCBM51006R	95	5,00	5,94	5,33	3,02	100,58	1,02	0,0	5,0	CD..S4T002	CC11	T6
2831031	CCBM51525R	95	5,00	5,94	5,33	3,02	152,40	1,02	0,0	5,0	CD..S4T002	CC11	T6
2831821	CCBM61005R	95	6,00	7,08	6,20	3,73	100,33	1,19	0,0	5,0	CD..S4T002	CC11	T6

3 Determine which chipbreaker is best for the material to be machined.

Consult the Small Hole Boring Chipbreaker Geometry charts on **pages C30–C31**.

Small Hole Boring Chipbreaker Geometries

Single-Sided, Positive Inserts

..HB

..HT

4 Determine which grade is best for the material to be machined.

Consult the Grades and Grade Description Chart on **pages C32–C33**.

Grades and Grade Descriptions

Small Hole Boring

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

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

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										
M										

Determine Materials to Be Machined and the Appropriate Insert

5 Select the appropriate insert based on style, grade, and geometry.

Small Hole Boring Positive Inserts

WIDIA CIRCLE

● first choice
○ alternate choice

	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN8	CPD1
P						●			●		
M					●						
K		●	●					●			
N	●	●	●								●
S					●		●				
H										●	

■ CDHB

ISO catalogue number	D	L10	S	Rε	D1	max DOC*	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN8	CPD1
CDHBS4T002	3,97	4,03	1,02	0,18	2,13	–		●		●		●	●	●	●		
CDHBS4T004	3,97	4,03	1,02	0,38	2,13	–		●		●		●	●	●	●		
CDHBS4T0X0	3,97	4,03	1,02	0,05	2,13	–		●		●		●	●		●		
CDHBS4T002M	3,97	4,03	1,02	0,18	2,13	0,96										●	●
CDHBS4T0X0M	3,97	4,03	1,02	0,05	2,13	0,96										●	●
CDHBS4T004M	3,97	4,03	1,02	0,38	2,13	0,96										●	●

*max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.

■ CDHH-R/L

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN8	CPD1
Right hand																
CDHHS4T002R	3,97	4,03	1,02	0,18	2,13				●		●	●				
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13				●							
Left hand																
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13				●		●	●		●		
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13				●		●	●				

*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 for 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.

WIDIA CIRCLE

Speed and Feed Chart

A/B Series Inserts • Metric

ANSI ISO 513	VDI 3323	Cutting Speed • vc m/min											
Material Group		min	Start	max	min	Start	max	min	Start	max	min	Start	max
	ap [mm]	0,025	—	0,200	0,025	—	0,200						
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013						
			CG5			CM1			CBN8			CPD1	
P	1	95	120	145	55	70	85						
	2	70	90	105	40	50	60						
	3	55	70	80	35	40	50						
	4	60	75	80	40	45	55						
	5	45	55	70	30	35	40						
	6	75	95	110	45	55	65						
	7	50	60	75	30	40	45						
	8	45	55	70	30	35	40						
	9	40	50	60	25	30	35						
	10	70	85	100	40	50	60						
	11	45	55	65	25	30	40						
	12	70	85	100	40	50	60						
	13.1	55	70	85	35	40	50						
	13.2	45	55	65	25	30	40						
	ap [mm]	0,025	—	0,200	0,025	—	0,200						
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013						
			CG5			CM1			CBN8			CPD1	
M	14.1	75	95	110	55	70	85						
	14.2	60	75	90	45	55	65						
	14.3	70	85	100	50	65	75						
	14.4	45	55	65	30	40	45						
	ap [mm]	0,067	—	0,010	0,067	—	0,010						
	f [mm/rev]	0,007	—	0,0005	0,007	—	0,0005						
			CG5			CM1			CBN8			CPD1	
K	15	75	90	110	55	70	85						
	16	50	65	75	40	50	60						
	17	80	100	120	65	80	95						
	18	55	65	80	40	50	60						
	19	100	125	145	75	95	115						

A

B

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.

CSBM5210125R

C — Series Type

C

F

G

Q

S

S — Bar Type

S = Steel
(with coolant)

C = Carbide
(with coolant)

B — Bar Style Designation

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

M — Units

M = Metric

Insert Shape *(optional)*

C

W

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

CSBM**5210125R**

52
Head Diameter
shown as "D2"

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

*If blank, value is equal to shank diameter.

NOTE: Only shown on stepped-style bars.

10
Shank Diameter
shown as "D"

4	=	4,00mm
5	=	5,00mm
6	=	6,00mm
8	=	8,00mm
10	=	10,00mm
12	=	12,00mm
16	=	16,00mm

12
Length/Depth
shown as "L1/L4"

Bore length for step bars

Thread depth for threading bars

Overall length for straight shank bars

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

5
Lead Angle
shown as "KRI" for metric bars and "KRA" for inch bars.

0	=	90° Used for Threading/ Grooving Bars
3	=	93°
5	=	95°
7	=	97°
225	=	67,5°
30	=	30°
45	=	45°
60	=	60°

R
Hand of Tool

R = Right hand

L = Left hand

Right-hand boring bar

Left-hand boring bar

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
3518693	**CSBM8760R**	90	8,00	9,05	8,18	4,70	76,00	1,52	0.0	5.0	CD..S4T002	**CC11**	T6
2831441	**CSBM5655R**	95	5,00	5,78	5,16	2,95	63,50	1,02	0.0	5.0	CD..S4T002	**CC09**	T6
2831687	**CSBM6655R**	95	6,00	7,09	6,20	3,73	63,50	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831666	**CSBM8765R**	95	8,00	9,05	8,18	4,70	76,00	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	1,11	0.0	5.0	CD..S4T002	**CC09**	T6
3896207	**CSBM6650L**	90	6,00	7,09	6,20	3,73	63,50	1,11	0.0	5.0	CD..S4T002	**CC11**	T6
3896209	**CSBM8760L**	90	8,00	9,05	8,18	4,70	76,00	1,52	0.0	5.0	CD..S4T002	**CC11**	T6
3896206	**CSBM5655L**	95	5,00	5,78	5,16	2,95	63,50	1,11	0.0	5.0	CD..S4T002	**CC09**	T6
3896208	**CSBM6655L**	95	6,00	7,09	6,20	3,73	63,50	1,11	0.0	5.0	CD..S4T002	**CC11**	T6
3517652	**CSBM8765L**	95	8,00	9,05	8,18	4,70	76,00	1,52	0.0	5.0	CD..S4T002	**CC11**	T6
2831695	**CSBM4657L**	97	4,00	4,57	4,22	2,41	63,50	1,11	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													
2831628	**CSBM5210120R**	90	10,00	5,94	5,16	3,10	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831606	**CSBM5210250R**	90	10,00	5,94	5,16	3,10	70,00	25,40	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	2,64	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC09**	T6
2831651	**CSBM4510255R**	95	10,00	5,18	4,57	2,64	70,00	25,40	1,02	0.0	5.0	CD..S4T002	**CC09**	T6
2831639	**CSBM5210125R**	95	10,00	5,78	5,16	2,95	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831615	**CSBM5210255R**	95	10,00	5,78	5,16	2,95	70,00	25,40	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
2831571	**CSBM6410325R**	95	10,00	7,24	6,60	3,68	70,00	31,75	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831548	**CSBM4512125R**	95	12,00	5,18	4,57	2,64	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC09**	T6
2831535	**CSBM5212125R**	95	12,00	5,78	5,16	2,95	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831512	**CSBM5212255R**	95	12,00	5,78	5,16	2,95	70,00	25,40	1,02	0.0	5.0	CD..S4T002	**CC11**	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	70,00	12,70	1,02	0.0	5.0	CD..S4T002	**CC09**	T6
3890854	**CSBM4512255L**	95	12,00	5,18	4,57	2,64	70,00	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
2831505	**CSBM5212255L**	95	12,00	5,78	5,16	2,95	70,00	25,40	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	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2831801	**CCBM51000R**	90	5,00	5,94	5,33	3,18	100,58	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
3896025	**CCBM61000R**	90	6,00	7,08	6,20	3,73	100,33	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
2831301	**CCBM61520R**	90	6,00	7,08	6,20	3,73	152,15	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
2831277	**CCBM81520R**	90	8,00	9,04	8,20	4,70	152,15	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831826	**CCBM51005R**	95	5,00	5,94	5,33	3,02	100,58	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831031	**CCBM51525R**	95	5,00	5,94	5,33	3,02	152,40	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831821	**CCBM61005R**	95	6,00	7,08	6,20	3,73	100,33	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
2831311	**CCBM61525R**	95	6,00	7,08	6,20	3,73	152,15	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
3520653	**CCBM81005R**	95	8,00	9,04	8,20	4,70	101,60	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831289	**CCBM81525R**	95	8,00	9,04	8,20	4,70	152,15	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831832	**CCBM41007R**	97	4,00	4,57	4,22	2,41	100,33	1,02	0.0	0.0	CD..S4T002	**CC09**	T6
2831324	**CCBM41527R**	97	4,00	4,57	4,22	2,41	152,40	1,02	0.0	0.0	CD..S4T002	**CC09**	T6
	Left hand												
3896023	**CCBM51000L**	90	5,00	5,94	5,33	3,18	100,58	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
3896024	**CCBM61000L**	90	6,00	7,08	6,20	3,73	100,33	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
3896026	**CCBM61520L**	90	6,00	7,08	6,20	3,73	152,15	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
3896028	**CCBM81520L**	90	8,00	9,04	8,20	4,70	152,15	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831807	**CCBM51005L**	95	5,00	5,94	5,33	3,02	100,58	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831025	**CCBM51525L**	95	5,00	5,94	5,33	3,02	152,40	1,02	0.0	5.0	CD..S4T002	**CC11**	T6
2831791	**CCBM61005L**	95	6,00	7,08	6,20	3,73	100,33	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
2831307	**CCBM61525L**	95	6,00	7,08	6,20	3,73	152,15	1,19	0.0	5.0	CD..S4T002	**CC11**	T6
3896027	**CCBM81005L**	95	8,00	9,04	8,20	4,70	101,60	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831283	**CCBM81525L**	95	8,00	9,04	8,20	4,70	152,15	2,36	0.0	5.0	CD..S4T002	**CC11**	T6
2831813	**CCBM41007L**	97	4,00	4,57	4,22	2,41	100,33	1,02	0.0	0.0	CD..S4T002	**CC09**	T6
3896002	**CCBM41527L**	97	4,00	4,57	4,22	2,41	152,40	1,02	0.0	0.0	CD..S4T002	**CC09**	T6

■ CCBM • STEPPED

order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2831211	**CCBM5312510R**	90	12,00	6,10	5,30	3,18	88,90	50,80	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831232	**CCBM5312250R**	90	12,00	6,10	5,30	3,18	63,50	25,40	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831127	**CCBM5316510R**	90	16,00	6,10	5,30	3,18	114,30	50,80	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831188	**CCBM6612320R**	90	12,00	7,42	6,55	3,86	69,85	31,75	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831175	**CCBM6612630R**	90	12,00	7,42	6,55	3,86	101,60	63,50	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831110	**CCBM6516320R**	90	16,00	7,42	6,55	3,86	95,25	31,75	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831255	**CCBM4812485R**	95	12,00	5,28	4,80	2,64	85,73	47,63	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
2831265	**CCBM4812225R**	95	12,00	5,28	4,80	2,64	60,33	22,23	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
3896015	**CCBM4816225R**	95	16,00	5,28	4,80	2,64	85,73	22,23	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
3896017	**CCBM4816485R**	95	16,00	5,28	4,80	2,64	111,13	47,63	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
2831221	**CCBM5312515R**	95	12,00	5,94	5,30	3,02	88,90	50,80	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831244	**CCBM5312255R**	95	12,00	5,94	5,30	3,02	63,50	25,40	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831162	**CCBM5316255R**	95	16,00	5,94	5,30	3,02	88,90	25,40	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831139	**CCBM5316515R**	95	16,00	5,94	5,30	3,02	114,30	50,80	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
3896019	**CCBM6612635R**	95	12,00	7,24	6,55	3,68	101,60	63,50	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831201	**CCBM6612325R**	95	12,00	7,24	6,55	3,68	69,85	31,75	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
3896018	**CCBM6516325R**	95	16,00	7,24	6,55	3,68	95,25	31,75	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
	Left hand													
2831260	**CCBM4812225L**	95	12,00	5,28	4,80	2,64	60,33	22,23	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
3896016	**CCBM4816485L**	95	16,00	5,28	4,80	2,64	111,13	47,63	3,18	0.0	5.0	CD..S4T002	**CC09**	T6
2831238	**CCBM5312255L**	95	12,00	5,94	5,30	3,02	63,50	25,40	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831132	**CCBM5316515L**	95	16,00	5,94	5,30	3,02	114,30	50,80	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831157	**CCBM5316255L**	95	16,00	5,94	5,30	3,02	88,90	25,40	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831194	**CCBM6612325L**	95	12,00	7,24	6,55	3,68	69,85	31,75	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
3896093	**CCBM6612635L**	95	12,00	7,24	6,55	3,68	101,60	63,50	3,18	0.0	5.0	CD..S4T002	**CC11**	T6
2831117	**CCBM6516325L**	95	16,00	7,24	6,55	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
2829539	**FSBM81000R**	90	8,00	9,14	8,20	4,80	101,60	1,52	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
2829548	**FSBM81005R**	95	8,00	9,14	8,20	4,80	101,60	1,52	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
3896212	**FSBM61005L**	95	6,00	7,06	6,20	3,71	101,60	1,02	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

QSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2824886	**QSBM121520R**	90	12,00	13,16	12,19	6,81	152,00	2,03	0.0	5.0	TP..110202	**QC26**	T9
3886552	**QSBM101275R**	95	10,00	11,15	10,21	5,79	127,00	2,03	0.0	5.0	TP..110202	**QC21**	T9
2824898	**QSBM121525R**	95	12,00	13,16	12,19	6,81	152,00	2,03	0.0	5.0	TP..110202	**QC26**	T9
	Left hand												
3886550	**QSBM101270L**	90	10,00	11,15	10,21	5,79	127,00	2,03	0.0	5.0	TP..110202	**QC21**	T9
3886943	**QSBM121520L**	90	12,00	13,16	12,19	6,81	152,00	2,03	0.0	5.0	TP..110202	**QC26**	T9
3886551	**QSBM101275L**	95	10,00	11,15	10,21	5,79	127,00	2,03	0.0	5.0	TP..110202	**QC21**	T9

SSBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3886965	**SSBM161780R**	90	16,00	17,20	16,13	8,89	177,80	6,35	0.0	5.0	TP..160302	**SC30**	T10
3886968	**SSBM202030R**	90	20,00	21,23	20,19	10,92	203,20	7,14	0.0	5.0	TP..160302	**SC30**	T10
	Left hand												
3886964	**SSBM161780L**	90	16,00	17,20	16,13	8,89	179,90	6,35	0.0	5.0	TP..160302	**SC30**	T10
3886967	**SSBM202030L**	90	20,00	21,23	20,19	10,92	203,20	7,14	0.0	5.0	TP..160302	**SC30**	T10
3886966	**SSBM161785L**	95	16,00	17,20	16,13	8,89	179,90	6,35	0.0	5.0	TP..160302	**SC30**	T10
3886969	**SSBM202035L**	95	20,00	21,23	20,19	10,92	203,20	7,14	0.0	5.0	TP..160302	**SC30**	T10

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order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2829496	**FSBM6612190R**	90	12,00	7,52	6,60	3,96	76,00	19,05	1,02	0.0	5.0	TD..07S102	**FC14**	T7
3890858	**FSBM6612320R**	90	12,00	7,52	6,60	3,96	76,00	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	76,00	38,10	1,52	0.0	5.0	TD..07S102	**FC14**	T7
3890860	**FSBM6616190R**	90	16,00	7,52	6,60	3,96	102,00	19,05	1,02	0.0	5.0	TD..07S102	**FC14**	T7
2829408	**FSBM8216380R**	90	16,00	9,09	8,15	4,75	102,00	38,10	1,52	0.0	5.0	TD..07S102	**FC14**	T7
2829533	**FSBM5212125R**	95	12,00	6,99	5,16	3,20	76,00	12,70	1,02	0.0	5.0	TD..07S102	**FC11**	T7
3890857	**FSBM5212255R**	95	12,00	6,99	5,16	3,20	76,00	25,40	1,02	0.0	5.0	TD..07S102	**FC11**	T7
2829508	**FSBM6612195R**	95	12,00	7,52	6,60	3,96	76,00	19,05	1,02	0.0	5.0	TD..07S102	**FC14**	T7
3890859	**FSBM6612325R**	95	12,00	7,52	6,60	3,96	76,00	31,75	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	102,00	12,70	1,02	0.0	5.0	TD..07S102	**FC11**	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
3890862	**FSBM6616325R**	95	16,00	7,52	6,60	3,96	102,00	31,75	1,02	0.0	5.0	TD..07S102	**FC14**	T7
3890863	**FSBM8216385R**	95	16,00	9,09	8,15	4,75	102,00	38,10	1,52	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	6,60	3,96	102,00	31,75	1,02	0.0	5.0	TD..07S102	**FC14**	T7
3890856	**FSBM5212125L**	95	12,00	6,99	5,16	3,20	76,00	12,70	1,02	0.0	5.0	TD..07S102	**FC11**	T7
2829501	**FSBM6612195L**	95	12,00	7,52	6,60	3,96	76,00	19,05	1,02	0.0	5.0	TD..07S102	**FC14**	T7

■ 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
3886946	**QSBM1316630R**	90	16,00	14,30	12,95	7,52	107,95	63,50	2,03	0.0	5.0	TP..110202	**QC26**	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

FCBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3896036	**FCBM51000R**	90	5,00	6,98	5,30	3,40	100,58	1,02	0.0	5.0	TD..07S102	**FC11**	T7
3896031	**FCBM61520R**	90	6,00	7,06	6,20	3,70	152,40	1,19	0.0	5.0	TD..07S102	**FC11**	T7
2829356	**FCBM81520R**	90	8,00	9,16	8,20	4,80	152,40	2,36	0.0	5.0	TD..07S102	**FC11**	T7
3896038	**FCBM51005R**	95	5,00	6,98	5,30	3,20	100,58	1,02	0.0	5.0	TD..07S102	**FC11**	T7
2829390	**FCBM61525R**	95	6,00	7,06	6,20	3,70	152,40	1,19	0.0	5.0	TD..07S102	**FC11**	T7
2829368	**FCBM81525R**	95	8,00	9,16	8,20	4,80	152,40	2,36	0.0	5.0	TD..07S102	**FC11**	T7
	Left hand												
3896035	**FCBM51000L**	90	5,00	6,98	5,30	3,40	100,58	1,02	0.0	5.0	TD..07S102	**FC11**	T7
3896030	**FCBM61520L**	90	6,00	7,06	6,20	3,70	152,40	1,19	0.0	5.0	TD..07S102	**FC11**	T7
3896032	**FCBM81520L**	90	8,00	9,16	8,20	4,80	152,40	2,36	0.0	5.0	TD..07S102	**FC11**	T7
3896037	**FCBM51005L**	95	5,00	6,98	5,30	3,20	100,58	1,02	0.0	5.0	TD..07S102	**FC11**	T7
2829385	**FCBM61525L**	95	6,00	7,06	6,20	3,70	152,40	1,19	0.0	5.0	TD..07S102	**FC11**	T7
3896033	**FCBM81525L**	95	8,00	9,16	8,20	4,80	152,40	2,36	0.0	5.0	TD..07S102	**FC11**	T7

QCBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3854445	**QCBM102540R**	90	10,00	11,15	10,21	5,79	254,00	3,20	0.0	5.0	TP..110202	**QC21**	T9
2824737	**QCBM122540R**	90	12,00	13,16	12,19	6,81	254,00	4,70	0.0	5.0	TP..110202	**QC26**	T9
2824776	**QCBM102545R**	95	10,00	11,15	10,21	5,79	254,00	3,20	0.0	5.0	TP..110202	**QC21**	T9
2824747	**QCBM122545R**	95	12,00	13,16	12,19	6,81	254,00	4,70	0.0	5.0	TP..110202	**QC26**	T9
	Left hand												
3896042	**QCBM102540L**	90	10,00	11,15	10,21	5,79	254,00	3,20	0.0	5.0	TP..110202	**QC21**	T9
3896043	**QCBM122540L**	90	12,00	13,16	12,19	6,81	254,00	4,70	0.0	5.0	TP..110202	**QC26**	T9
2824769	**QCBM102545L**	95	10,00	11,15	10,21	5,79	254,00	3,20	0.0	5.0	TP..110202	**QC21**	T9
3896044	**QCBM122545L**	95	12,00	13,16	12,19	6,81	254,00	4,70	0.0	5.0	TP..110202	**QC26**	T9

SCBM

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3895892	**SCBM162540R**	90	16,00	17,25	16,13	8,89	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3897083	**SCBM202540R**	90	20,00	21,25	20,19	10,90	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3896004	**SCBM162545R**	95	16,00	17,25	16,13	8,89	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3896006	**SCBM202545R**	95	20,00	21,25	20,19	10,90	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
	Left hand												
3895891	**SCBM162540L**	90	16,00	17,25	16,13	8,89	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3896005	**SCBM202540L**	90	20,00	21,25	20,19	10,90	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3896003	**SCBM162545L**	95	16,00	17,25	16,13	8,89	254,00	5,51	0.0	5.0	TP..160302	**SC30**	T10
3896091	**SCBM202545L**	95	20,00	21,25	20,19	10,90	254,00	5,51	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	16,13	8,89	254,00	5,54	0.0	5.0	TP..160302	**SC30**	T10
3896014	**SDBM202540R**	90	20,00	21,25	20,19	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	20,19	10,90	254,00	7,11	0.0	5.0	TP..160302	**SC30**	T10
	Left hand												
3896010	**SDBM162540L**	90	16,00	17,25	16,13	8,89	254,00	5,54	0.0	5.0	TP..160302	**SC30**	T10
3896013	**SDBM202540L**	90	20,00	21,25	20,19	10,90	254,00	7,11	0.0	5.0	TP..160302	**SC30**	T10
3896012	**SDBM162545L**	95	16,00	17,25	16,13	8,89	254,00	5,54	0.0	5.0	TP..160302	**SC30**	T10
3897084	**SDBM202545L**	95	20,00	21,25	20,19	10,90	254,00	7,11	0.0	5.0	TP..160302	**SC30**	T10

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order number	catalogue number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2829339	**FCBM5312250R**	90	12,00	6,98	5,30	3,40	63,50	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
2829309	**FCBM6612320R**	90	12,00	7,52	6,60	3,96	69,85	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896072	**FCBM6612630R**	90	12,00	7,52	6,60	3,96	101,60	63,50	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829289	**FCBM8212380R**	90	12,00	9,09	8,20	4,75	76,20	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829268	**FCBM8212790R**	90	12,00	9,09	8,20	4,75	117,48	79,38	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896069	**FCBM5316250R**	90	16,00	6,98	5,30	3,40	88,90	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
2829253	**FCBM5316510R**	90	16,00	6,98	5,30	3,40	114,30	50,80	3,18	0.0	5.0	TD..07S102	**FC11**	T7
3896084	**FCBM6616320R**	90	16,00	7,52	6,60	3,96	95,25	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896094	**FCBM6616630R**	90	16,00	7,52	6,60	3,96	127,00	63,50	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896086	**FCBM8216380R**	90	16,00	9,09	8,20	4,75	101,60	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896095	**FCBM8216790R**	90	16,00	9,09	8,20	4,75	117,48	79,38	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829350	**FCBM5312255R**	95	12,00	6,98	5,30	3,20	63,50	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
2829323	**FCBM6612325R**	95	12,00	7,52	6,60	3,96	69,85	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896083	**FCBM6612635R**	95	12,00	7,52	6,60	3,96	101,60	63,50	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829301	**FCBM8212385R**	95	12,00	9,09	8,20	4,75	76,20	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829279	**FCBM8212795R**	95	12,00	9,09	8,20	4,75	117,48	79,38	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3897085	**FCBM5316255R**	95	16,00	6,98	5,30	3,20	88,90	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
3896071	**FCBM5316515R**	95	16,00	6,98	5,30	3,20	114,30	50,80	3,18	0.0	5.0	TD..07S102	**FC11**	T7
3790247	**FCBM6616325R**	95	16,00	7,52	6,60	3,96	95,25	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3786518	**FCBM6616635R**	95	16,00	7,52	6,60	3,96	127,00	63,50	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3897086	**FCBM8216385R**	95	16,00	9,09	8,20	4,75	101,60	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3786519	**FCBM8216795R**	95	16,00	9,09	8,20	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	5,30	3,40	88,90	50,80	3,18	0.0	5.0	TD..07S102	**FC11**	T7
2829344	**FCBM5312255L**	95	12,00	6,98	5,30	3,20	63,50	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
3896068	**FCBM5312515L**	95	12,00	6,98	5,30	3,20	88,90	50,80	3,18	0.0	5.0	TD..07S102	**FC11**	T7
2829319	**FCBM6612325L**	95	12,00	7,52	6,60	3,96	69,85	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
2829295	**FCBM8212385L**	95	12,00	9,09	8,20	4,75	76,20	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896070	**FCBM5316255L**	95	16,00	6,98	5,30	3,20	88,90	25,40	3,18	0.0	5.0	TD..07S102	**FC11**	T7
3896085	**FCBM6616325L**	95	16,00	7,52	6,60	3,96	95,25	31,75	3,18	0.0	5.0	TD..07S102	**FC14**	T7
3896087	**FCBM8216385L**	95	16,00	9,09	8,20	4,75	101,60	38,10	3,18	0.0	5.0	TD..07S102	**FC14**	T7

GSBMW

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2828134	**GSBMW51003R**	93	5,00	6,60	5,72	3,20	101,50	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
2828122	**GSBMW61003R**	93	6,00	6,78	6,20	3,43	101,50	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
3886549	**GSBMW81003R**	93	8,00	8,10	8,18	4,42	101,50	1,02	-3.0	0.0	WP..S30104	**CT15**	T6
	Left hand												
2828130	**GSBMW51003L**	93	5,00	6,60	5,72	3,20	101,50	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
2828116	**GSBMW61003L**	93	6,00	6,78	6,20	3,43	101,50	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
3886548	**GSBMW81003L**	93	8,00	8,10	8,18	4,42	101,50	1,02	-3.0	0.0	WP..S30104	**CT15**	T6

QSBMW

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3886951	**QSBMW101273R**	93	9,99	10,94	10,21	5,59	127,00	2,36	-3.0	0.0	WP..040204	**QTM20**	T7
3393828	**QSBMW121523R**	93	11,99	12,90	12,19	6,55	152,40	2,36	-3.0	0.0	WP..040204	**QTM26**	T7
	Left hand												
3886952	**QSBMW101273L**	93	9,99	10,94	10,21	5,59	127,00	2,36	-3.0	0.0	WP..040204	**QTM20**	T7
3886963	**QSBMW121523L**	93	11,99	12,90	12,19	6,55	152,40	2,36	-3.0	0.0	WP..040204	**QTM26**	T7

GCBMW

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3896040	**GCBMW51523R**	93	5,00	6,60	5,33	3,20	152,40	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
2827711	**GCBMW61523R**	93	6,00	6,78	6,20	3,43	152,40	1,19	-3.0	0.0	WP..S30104	**CT11**	T6
2827699	**GCBMW81523R**	93	8,00	8,80	8,18	4,42	152,40	2,36	-3.0	0.0	WP..S30104	**CT15**	T6
	Left hand												
3896039	**GCBMW51523L**	93	5,00	6,60	5,33	3,20	152,40	1,02	-3.0	0.0	WP..S30104	**CT11**	T6
2827705	**GCBMW61523L**	93	6,00	6,78	6,20	3,43	152,40	1,19	-3.0	0.0	WP..S30104	**CT11**	T6
3897012	**GCBMW81523L**	93	8,00	8,80	8,18	4,42	152,40	2,36	-3.0	0.0	WP..S30104	**CT15**	T6

QCBMW

order number	catalogue number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3782378	**QCBMW102543R**	93	10,00	10,95	10,21	5,59	254,00	3,20	-3.0	0.0	WP..040204	**QTM20**	T7
	Left hand												
3896045	**QCBMW102543L**	93	10,00	10,95	10,21	5,59	254,00	3,20	-3.0	0.0	WP..040204	**QTM20**	T7
3896046	**QCBMW122543L**	93	12,00	12,90	12,19	6,55	254,00	4,70	-3.0	0.0	WP..040204	**QTM26**	T7

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															
2824815	**QSOM9516380R**	90	16,00	16,51	9,50	0,64	95,25	38,10	10,10	10,74	2,03	0.0	5.0	TP..110202	**QC26**	T9
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

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	TP..160302	**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	TP..160302	**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	TP..160302	**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	TP..160302	**SC30**	T10

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	104,65	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
2831390	**CSPM812325R**	95.0	12,00	10,74	8,20	6,38	2,30	101,60	101,60	31,75	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	104,65	101,60	25,40	1,02	0.0	0.0	GC..050102	**CT15**	T6
2831378	**CSPM81232225L**	67.5	12,00	11,37	8,18	7,01	2,92	101,60	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	GC..050102	**CT15**	T6
2831383	**CSPM812325L**	95.0	12,00	10,74	8,20	6,38	2,30	101,60	101,60	31,75	1,02	0.0	0.0	GC..050102	**CT15**	T6

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															
2827688	**GSPM101638225R**	67.5	16,00	13,72	9,78	8,59	3,70	106,07	101,60	38,10	2,49	0.0	0.0	GC..060202	**GT21**	T7
3897897	**GSPM131651225R**	67.5	16,00	16,89	12,95	10,16	3,68	131,01	127,00	50,80	2,49	0.0	0.0	GC..060202	**GT21**	T7
3025010	**GSPM1016385R**	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
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	106,07	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	3,98	131,01	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°.

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	3,30	155,45	152,40	1,19	0.0	0.0	GP..050102	**CT15**	T6
2830986	**CCPM8152225R**	67.5	8,00	11,38	7,01	2,92	155,96	152,40	2,36	0.0	0.0	GP..050102	**CT15**	T6
2831020	**CCPM61525R**	95.0	6,00	9,14	5,59	2,29	152,40	152,40	1,19	0.0	0.0	GP..050102	**CT15**	T6
3782376	**CCPM81525R**	95.0	8,00	10,74	6,38	2,29	152,40	152,40	2,36	0.0	0.0	GP..050102	**CT15**	T6
	Left hand													
2831004	**CCPM6152225L**	67.5	6,00	10,16	6,60	3,30	155,45	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	2,29	152,40	152,40	1,19	0.0	0.0	GP..050102	**CT15**	T6
3896022	**CCPM81525L**	95.0	8,00	10,74	6,38	2,29	152,40	152,40	2,36	0.0	0.0	GP..050102	**CT15**	T6

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	3,68	257,89	254,00	4,70	0.0	0.0	GC..060202	**GT21**	T7
3896073	**GCPM16254225R**	67.5	16,00	20,07	11,76	3,70	258,01	254,00	5,54	0.0	0.0	GC..060202	**GT21**	T7
3897904	**GCPM102545R**	95.0	10,00	13,54	8,15	3,02	254,00	254,00	3,20	0.0	0.0	GC..060202	**GT21**	T7
3759184	**GCPM122545R**	95.0	12,00	15,52	9,14	3,02	254,00	254,00	4,70	0.0	0.0	GC..060202	**GT21**	T7
3897909	**GCPM162545R**	95.0	16,00	19,43	11,10	3,04	254,00	254,00	5,54	0.0	0.0	GC..060202	**GT21**	T7
	Left hand													
3897903	**GCPM10254225L**	67.5	10,00	14,20	8,81	3,68	258,47	254,00	3,20	0.0	0.0	GC..060202	**GT21**	T7
3897905	**GCPM12254225L**	67.5	12,00	16,18	9,80	3,68	257,89	254,00	4,70	0.0	0.0	GC..060202	**GT21**	T7
3897908	**GCPM16254225L**	67.5	16,00	20,07	11,76	3,70	258,01	254,00	5,54	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	3,02	254,00	254,00	4,70	0.0	0.0	GC..060202	**GT21**	T7
2827644	**GCPM162545L**	95.0	16,00	19,43	11,10	3,04	254,00	254,00	5,54	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											
2831054	**CSMM5640R**	5,00	6,91	5,56	3,91	64,00	1,02	0.0	0.0	CD.5..	**CC11**	T6
2831048	**CSMM6760R**	6,00	7,92	6,60	4,45	76,00	1,02	0.0	0.0	CD.5..	**CC11**	T6

NOTE: Refer to insert design for cutting depth, cutting width, and blind hole limitations.

CCMM

order number	catalogue number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
2831042	**CCMM51020R**	5,00	6,91	5,56	3,94	101,60	1,02	0.0	0.0	CD.5..	**CC11**	T6
2831036	**CCMM61020R**	6,00	7,92	6,60	4,45	101,60	1,19	0.0	0.0	CD.5..	**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	6,35	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

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 Materials
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 application.

..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 application. 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.

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

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.

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.
- Superior surface finish and closer tolerance on workpiece.

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

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

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

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, wear-resistant cermet provides 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 Materials
S	High-Temp Alloys
H	Hardened Materials

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, K	P, M, K	P, M, K	M					
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	P, M, K, N, S	P, M, K, N, S	P, M, K, N, S	P, M, K, N, S	P, M, K, N, 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 provides superior thermal deformation resistance and depth-of-cut notch resistance.	P, M, K, S	P, M, K, S	P, M, K, S	P, M, K, S	P, M, K				
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						

Speed and Feed Chart

Positive Inserts

WIDIA CIRCLE

ANSI ISO 513	VDI 3323															
Material Group		Cutting Speed • vc m/min														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]										0,051	—	0,300	0,025	—	0,300
	f [mm/rev]										0,300	—	0,025	0,300	—	0,025
			C2			C25			C3			CG5**			CG55**	
	1										95	**120**	145	105	**130**	155
	2										70	**90**	105	80	**95**	115
	3										55	**70**	80	60	**75**	90
	4										65	**75**	90	70	**85**	100
	5										45	**55**	70	50	**65**	75
	6										75	**95**	110	85	**105**	125
	7										50	**60**	75	55	**70**	80
	8										45	**55**	70	50	**65**	75
	9										40	**50**	60	45	**55**	65
	10										70	**85**	100	75	**95**	110
	11										45	**55**	65	50	**60**	70
	12										70	**85**	100	75	**95**	110
	13.1										55	**70**	85	65	**80**	95
	13.2										45	**55**	65	50	**60**	70
M	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]	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025
			C2**			C25**			C3**			CG5**			CG55	
	14.1	55	**70**	85	60	**75**	90	65	**80**	95	75	**95**	110	85	**105**	125
	14.2	45	**55**	70	50	**60**	75	50	**65**	75	60	**75**	90	65	**80**	100
	14.3	55	**65**	80	55	**70**	85	60	**75**	90	70	**85**	100	75	**95**	110
	14.4	35	**40**	50	35	**45**	55	40	**45**	55	45	**55**	65	50	**60**	70
K	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]	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025
			C2**			C25			C3			CG5**			CG55**	
	15	65	**80**	95	70	**85**	105	70	**85**	105	75	**90**	110	80	**100**	120
	16	45	**55**	65	50	**60**	75	50	**60**	75	50	**65**	75	55	**70**	85
	17	75	**90**	110	80	**95**	115	80	**95**	115	80	**100**	120	90	**110**	135
	18	45	**55**	70	50	**65**	75	50	**65**	75	55	**65**	80	60	**75**	90
	19	90	**110**	130	95	**120**	145	95	**120**	145	100	**125**	145	110	**135**	165
	20	50	**65**	75	55	**70**	85	55	**70**	85	55	**70**	85	65	**80**	95
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]	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025
			C2			C25			C3			CG5**			CG55**	
	21	405	**505**	605	405	**505**	605	405	**505**	605	405	**505**	605	445	**555**	665
	22	245	**305**	365	245	**305**	365	245	**305**	365	245	**305**	365	270	**335**	400
	23	405	**505**	605	405	**505**	605	405	**505**	605	405	**505**	605	445	**555**	665
	24	245	**305**	370	245	**305**	370	245	**305**	370	245	**305**	370	270	**340**	405
	25	70	**90**	105	70	**90**	105	70	**90**	105	85	**105**	125	95	**115**	140
	26	320	**400**	480	320	**400**	480	320	**400**	480	145	**180**	215	160	**200**	235
	27	295	**370**	440	295	**370**	440	295	**370**	440	135	**170**	205	150	**185**	225
	28	320	**400**	480	320	**400**	480	320	**400**	480	145	**180**	215	160	**200**	235
	29	150	**185**	220	150	**185**	220	150	**185**	220	180	**220**	265	200	**245**	295
	30	135	**170**	205	135	**170**	205	135	**170**	205	165	**205**	245	180	**225**	270
S	ap [mm]	0,025	—	0,510	0,025	—	0,510	0,025	—	0,510	0,025	—	0,510	0,025	—	0,510
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025	0,127	—	0,025	0,127	—	0,025	0,127	—	0,025
			C2**			C25**			C3**			CG5			CG55**	
	31	40	**45**	55	40	**45**	55	40	**45**	55	40	**45**	55	40	**50**	60
	32	25	**35**	40	25	**35**	40	25	**35**	40	25	**35**	40	30	**35**	45
	33	30	**40**	45	30	**40**	45	30	**40**	45	30	**40**	45	35	**40**	50
	34	20	**25**	35	20	**25**	35	20	**25**	35	20	**25**	35	25	**30**	35
	35	25	**30**	35	25	**30**	35	25	**30**	35	25	**30**	35	25	**35**	40
	36	—	—	—	—	—	—	—	—	—	35	**40**	50	40	**45**	55
	37	—	—	—	—	—	—	—	—	—	25	**35**	40	30	**35**	45
H	ap [mm]															
	f [mm/rev]															
			C2			C25			C3			CG5			CG55	
	38.1															
	38.2															
	39.1															
	39.2															
	40.1															
	40.2															
	41.1															
	41.2															

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.

A double asterisk (**) shown after the insert grade name indicates primary grade recommendations for the material shown. Insert grade names shown without the double asterisk are secondary choices.

																		VDI 3323	ANSI ISO 513
Cutting Speed • vc m/min																		Material Group	
min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max		
									0,051	—	0,300	0,025	—	0,300	0,025	—	0,300	ap [mm]	
									0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	f [mm/rev]	
	CG6			CM1			ALO			TN7			CBN6			CPD1			
									95	**120**	145	105	**130**	155	105	**130**	155	1	
									70	**90**	105	80	**95**	115	80	**95**	115	2	
									55	**70**	80	60	**75**	90	60	**75**	90	3	
									65	**75**	90	70	**85**	100	70	**85**	100	4	
									45	**55**	70	50	**65**	75	50	**65**	75	5	
									75	**95**	110	85	**105**	125	85	**105**	125	6	
									50	**60**	75	55	**70**	80	55	**70**	80	7	P
									45	**55**	70	50	**65**	75	50	**65**	75	8	
									40	**50**	60	45	**55**	65	45	**55**	65	9	
									70	**85**	100	75	**95**	110	75	**95**	110	10	
									45	**55**	65	50	**60**	70	50	**60**	70	11	
									70	**85**	100	75	**95**	110	75	**95**	110	12	
									55	**70**	85	65	**80**	95	65	**80**	95	13.1	
									45	**55**	65	50	**60**	70	50	**60**	70	13.2	
0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	ap [mm]	
0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	0,300	—	0,025	f [mm/rev]	
	CG6			CM1			ALO			TN7			CBN6			CPD1			
95	**120**	145	55	**70**	85	110	**135**	160	105	**130**	155							14.1	
75	**95**	110	45	**55**	65	85	**105**	125	85	**105**	125							14.2	M
90	**110**	130	50	**65**	75	100	**120**	145	95	**120**	145							14.3	
55	**65**	80	35	**40**	45	65	**75**	90	60	**75**	90							14.4	
0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	0,051	—	0,300	ap [mm]	
0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	0,250	—	0,025	f [mm/rev]	
	CG6**			CM1**			ALO			TN7**			CBN6			CPD1			
90	**110**	130	55	**70**	85	150	**185**	220	100	**125**	150							15	
65	**75**	90	40	**50**	60	105	**130**	155	70	**90**	105							16	
100	**125**	150	65	**80**	95	165	**210**	250	110	**140**	165							17	K
65	**80**	100	40	**50**	60	110	**135**	165	75	**90**	110							18	
120	**150**	180	75	**95**	115	205	**255**	310	140	**170**	205							19	
70	**85**	105	45	**55**	65	120	**145**	175	80	**100**	120							20	
			0,051	—	0,510				0,051	—	0,510				0,051	—	0,510	ap [mm]	
			0,200	—	0,025				0,200	—	0,025				0,200	—	0,025	f [mm/rev]	
	CG6			CM1**			ALO			TN7**			CBN6			CPD1			
			405	**505**	605				405	**505**	605				855	**1070**	1285	21	
			245	**305**	365				245	**305**	365				735	**915**	1100	22	
			405	**505**	605				405	**505**	605				685	**855**	1025	23	
			245	**305**	370				245	**305**	370				540	**675**	805	24	
			70	**90**	105				85	**105**	125				370	**460**	550	25	N
			105	**125**	155				200	**245**	295				330	**415**	495	26	
			100	**125**	150				195	**240**	290				320	**400**	480	27	
			105	**125**	155				200	**245**	295				330	**415**	495	28	
			150	**185**	220				200	**245**	295				345	**430**	515	29	
			135	**170**	205				160	**200**	240				330	**415**	495	30	
			0,025	—	0,510													ap [mm]	
			0,127	—	0,025													f [mm/rev]	
	CG6			CM1			ALO			TN7			CBN6			CPD1			
			35	**40**	45													31	
			25	**30**	35													32	
			25	**35**	40													33	S
			20	**25**	30													34	
			20	**25**	30													35	
			30	**35**	45													36	
			25	**30**	35													37	
												0,025	—	0,300				ap [mm]	
												0,127	—	0,025				f [mm/rev]	
	CG6			CM1			ALO			TN7			CBN6			CPD1			
												110	**140**	165				38.1	
												105	**130**	155				38.2	
												100	**125**	150				39.1	
												90	**110**	135				39.2	H
												—	—	—				40.1	
												—	—	—				40.2	
												—	—	—				41.1	
												—	—	—				41.2	

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.

A double asterisk (**) shown after the insert grade name indicates primary grade recommendations for the material shown. Insert grade names shown without the double asterisk are secondary choices.

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°

G 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"
H	±0,013	±0,013	±0,025
HG	±0,025	±0,025	±0,013
M	±0,05	±0,11	±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

Code for metric cutting edge length "L10"

"D" mm	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
Thickness

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

02
Corner Radius "Rε"

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

Hand of Insert *(optional)*

R = Right hand

L = Left hand

R

L

Cutting Edge Condition or Chip Control Features *(optional)*

HP High positive

LF Light finishing

Tip Style *(optional)*

Symbol
M

Usage
Mini tip

● 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 DOC*	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CDHBS4T002	3,97	4,03	1,02	0,18	2,13	—		●		●		●	●	●	●		
CDHBS4T004	3,97	4,03	1,02	0,38	2,13	—		●		●		●	●	●	●		
CDHBS4T0X0	3,97	4,03	1,02	0,05	2,13	—		●		●		●	●		●		
CDHBS4T002M	3,97	4,03	1,02	0,18	2,13	0,96										●	●
CDHBS4T0X0M	3,97	4,03	1,02	0,05	2,13	0,96										●	●
CDHBS4T004M	3,97	4,03	1,02	0,38	2,13	0,96										●	●

**max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.*

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				●		●	●				
CDHHS4T004R	3,97	4,03	1,02	0,38	2,13				●							
Left hand																
CDHHS4T002L	3,97	4,03	1,02	0,18	2,13				●		●	●		●		
CDHHS4T004L	3,97	4,03	1,02	0,38	2,13				●		●	●				

**max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.*

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				●			●				
CDHHS4T004	3,97	4,03	1,02	0,38	2,13				●							

● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					○	○	●	○	○	●		
M		○	○	○	○	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	○	○		○		○		●
S		○	○	○	●	○		●				
H											●	

■ 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				●			●				
CPHB06T104	6,35	6,45	1,91	0,38	2,80				●							

■ 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	2,80				●		●	●				
CPHH06T104	6,35	6,45	1,91	0,38	2,80				●		●	●				

■ CPGT-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
CPGT09T304LF	9,53	9,67	3,97	0,40	4,40				●							

■ 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				●							
CPMT09T304LF	9,53	9,67	3,97	0,40	4,40				●			●				
CPMT09T308LF	9,53	9,67	3,97	0,80	4,40				●							

● 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				●		●	●				
GCHW060204	4,76	6,73	2,36	0,38	2,39				●		●	●				

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				●			●				
GCHT060204	4,83	6,83	2,36	0,38	2,39				●			●				

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	1,58	0,18	2,13				●		●	●				
GPHW050104	3,97	5,61	1,58	0,38	2,13				●		●	●				

GPHT

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
GPHT050102	4,08	5,61	1,58	0,18	2,13				●			●				
GPHT050104	4,08	5,61	1,58	0,38	2,13				●			●				

(M)

● 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 DOC*	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHB07S1X0	4,06	7,04	1,19	0,05	2,39	—		●		●		●	●		●		
TDHB07S102	4,06	7,04	1,19	0,18	2,39	—		●		●		●	●	●	●		
TDHB07S104	4,06	7,04	1,19	0,38	2,39	—		●		●		●	●		●		
TDHB07S108	4,06	7,04	1,19	0,79	2,39	—		●		●		●	●				
TDHB07S1X0M	4,06	7,04	1,19	0,05	2,39	1,27										●	●
TDHB07S102M	4,06	7,04	1,19	0,18	2,39	1,27										●	●
TDHB07S104M	4,06	7,04	1,19	0,38	2,39	1,27										●	●
TDHB07S108M	4,06	7,04	1,19	0,79	2,39	1,27										●	●

**max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.*

■ 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	2,39				●			●				
TDHH07S104R	4,06	7,04	1,19	0,38	2,39				●							
Left hand																
TDHH07S102L	4,06	7,04	1,19	0,18	2,39				●		●	●		●		
TDHH07S104L	4,06	7,04	1,19	0,38	2,39				●		●	●		●		

■ TDHH

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TDHH07S102	4,06	7,04	1,19	0,18	2,41				●			●				
TDHH07S104	4,06	7,04	1,19	0,38	2,41				●							

(M)

● first choice
○ alternate choice

	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P				○	○	●	○	○	●		
M	○	○	○	○	●	○	○	○	○		
K	○	●	●	○	○	○	○	●	○		
N	●	●	●	○	○		○		○		●
S	○	○	○	●	○		●				
H										●	

TPHB

ISO catalogue number	D	L10	S	Rε	D1	max DOC*	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHB1102X0	6,35	11,00	2,38	0,05	3,30	—			●	●		●	●		●		
TPHB110202	6,35	11,00	2,38	0,18	3,30	—			●	●		●	●		●		
TPHB110204	6,35	11,00	2,38	0,40	3,30	—			●	●		●	●	●	●		
TPHB110208	6,35	11,00	2,38	0,79	3,30	—			●	●		●	●		●		
TPHB1603X0	9,53	16,50	3,18	0,05	3,30	—	●			●		●	●	●	●		
TPHB160302	9,53	16,50	3,18	0,18	3,30	—	●			●		●	●		●		
TPHB160304	9,53	16,50	3,18	0,38	3,30	—	●			●		●	●	●	●		
TPHB160308	9,53	16,50	3,18	0,79	3,30	—	●			●		●	●		●		
TPHB160316	9,53	16,50	3,18	1,60	3,30	—				●							
TPHB160304M	9,53	16,50	3,18	0,38	3,30	1,98											●
TPHB160308M	9,53	16,50	3,18	0,79	3,30	1,98											●
TPHB1102X0M	6,35	11,00	2,38	0,05	3,30	1,62										●	●
TPHB110202M	6,35	11,00	2,38	0,18	3,30	1,62										●	●
TPHB110204M	6,35	11,00	2,38	0,40	3,30	1,62										●	●
TPHB110208M	6,35	11,00	2,38	0,79	3,30	1,62											●

**max DOC only applies to tipped inserts, which are designated with an "M" at the end of the catalogue number.*

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	3,30				●							
TPHH110204R	6,35	11,00	2,38	0,40	3,30				●		●					
TPHH110208R	6,35	11,00	2,38	0,79	3,30				●			●				
TPHH160302R	9,53	16,50	3,18	0,18	3,30				●			●				
TPHH160304R	9,53	16,50	3,18	0,40	3,30				●		●					
TPHH160308R	9,53	16,50	3,18	0,79	3,30				●							
Left hand																
TPHH110202L	6,35	11,00	2,38	0,18	3,30				●		●	●		●		
TPHH110204L	6,35	11,00	2,38	0,40	3,30				●		●	●		●		
TPHH110208L	6,35	11,00	2,38	0,79	3,30				●		●					
TPHH160302L	9,53	16,50	3,18	0,18	3,30				●		●	●		●		
TPHH160304L	9,53	16,50	3,18	0,40	3,30				●		●	●		●		
TPHH160308L	9,53	16,50	3,18	0,79	0,33				●		●	●				

● 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	6,50	11,00	2,38	0,18	3,30				●		●	●		●		
TPHH110204	6,50	11,00	2,38	0,38	3,30	●			●		●	●		●		

■ TPHH-LF

ISO catalogue number	D	L10	S	Rε	D1	C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
TPHH160304LF	9,53	16,50	3,18	0,38	3,30		●		●		●	●	●			
TPHH160308LF	9,53	16,50	3,18	0,79	3,30		●		●		●	●	●	●		
TPHH17T305LF	9,80	16,98	3,96	0,53	3,30						●					
TPHH17T309LF	9,80	16,98	3,96	0,94	3,30				●		●					

■ 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				●			●				
TPGT110204HP	6,35	11,00	2,38	0,40	2,90				●			●				
TPGT16T304HP	9,53	16,50	3,97	0,40	4,40				●			●				

● first choice
○ alternate choice

		C2	C25	C3	CG5	CG55	CG6	CM1	ALO	TN7	CBN6	CPD1
P					○	○	●	○	○	●		
M		○	○	○	○	●	○	○	○	○		
K		○	●	●	○	○	○	○	●	○		
N		●	●	●	○	○		○		○		●
S		○	○	○	●	○		●				
H											●	

■ 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				●		●					
TPMT110204LF	6,35	11,00	2,38	0,40	2,80				●		●					
TPMT160304LF	9,53	16,50	3,18	0,40	4,40				●		●					
TPMT160308LF	9,53	16,50	3,18	0,79	4,40				●		●					
TPMT160312LF	9,53	16,50	3,18	1,19	4,40				●							

■ 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	2,13				●			●				
WPHTS30102	4,76	3,26	1,59	0,20	2,13				●			●				
WPHTS30104	4,76	3,26	1,59	0,38	2,13				●			●				
WPHT040201	6,35	4,34	2,38	0,10	2,80				●			●				
WPHT040202	6,35	4,34	2,38	0,20	2,80				●			●				
WPHT040204	6,35	4,34	2,38	0,38	2,80				●			●				

■ 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					●						
WPMT040204LF	6,35	4,34	2,38	0,40	2,90					●						
WPMT06T304LF	9,53	6,52	3,97	0,40	4,40					●						
WPMT06T308LF	9,53	6,52	3,97	0,80	4,40					●						

NOTE: Detail of 0,38 insert.

● first choice
○ alternate choice

		C25	CG5	CG6	CM1
P			○	●	○
M		○	○	○	○
K		●	○	○	○
N		●	○		○
S		○	●		●
H					

CDG-R/L

ISO catalogue number	D	S	T	W	D1	C25	CG5	CG6	CM1
CDG50152R	3,97	1,27	0,51	0,38	2,13		●		●
CDG50252R	3,97	1,27	1,02	0,64	2,13		●		●
CDG50302R	3,97	1,27	1,02	0,76	2,13		●		●

CDT-R/L

ISO catalogue number	D	S	T	RC	D1	TP min	TP max	C25	CG5	CG6	CM1
CDT50022R	3,97	1,27	0,76	0,05	2,11	0,5	1,0		●		●

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	2mm	M4X0.7
2892513	BS832	5/64	#8-32
2840186	AS832	5/64	#8-32
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2832655	CC09	T6	#1-72
2825948	QTM26	T7	M2.5X0.45
2825941	QTM20	T7	M2.5X0.45
2830477	FC11	T7	#2-56
2828337	GT21	T7	#2-56
2830471	FC14	T7	#2-56
2826005	QC15	T8	#3-48
2826031	QC26	T9	#4-40
2826038	QC21	T9	#4-40

Wrenches

order number	ISO catalogue number	Torx/hex
2840174	AKEY	5/64
2840094	MKEY	2mm
2823182	SKEY	T10
2823189	STKEY	T15
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825952	QTKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2mm
2823236	SBIT	T10
2823196	STBIT	T15
2828324	GTBIT	T5
2832661	CBIT	T6
2825963	QTBIT	T7
2830497	FBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9

Wedges

order number	ISO catalogue number
2840192	AW250
2836024	BW312

A/B Series Small Hole Tooling

Micro Boring Bar Application Range

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, such as those manufactured in the Aerospace, Heavy Equipment, and Automotive industries.

A/B Series Micro Boring Bar

Features:

- 1,57mm–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 Small Hole Tooling

Small Hole Toolholders **C48–C55**
Catalogue Numbering System — Boring Bars C50
Toolholders C51
Grades and Grade Descriptions C52
Speed and Feed Chart C53
Catalogue Numbering System C55

Solid Carbide Inserts **C56–C59**
Inserts C56–C58
Hardware C59

A/B Series Boring Bar Identification System

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	8 = 8,00mm 10 = 10,00mm 12 = 12,00mm 16 = 16,00mm 20 = 20,00mm	38 = 38,0mm 100 = 100,0mm 102 = 102,0mm 152 = 152,0mm

ATBM

order number	catalogue number	D	D2	L	L1	A	wedge	wedge screw	hex
2839222	**ATBM838**	8,00	19,30	38	19	3,18	**AW250**	**AS832**	5/64
3896120	**ATBM1038**	10,00	19,30	38	19	6,25	**AW250**	**AS832**	5/64
3896122	**ATBM1238**	12,00	19,30	38	19	6,25	**AW250**	**AS832**	5/64
3896121	**ATBM12100**	12,00	19,30	102	19	6,25	**AW250**	**AS832**	5/64
2839192	**ATBM1638**	16,00	19,30	38	19	6,25	**AW250**	**AS832**	5/64
3896193	**ATBM16100**	16,00	19,30	102	19	6,25	**AW250**	**AS832**	5/64
3896194	**ATBM20102**	20,00	19,30	102	19	6,25	**AW250**	**AS832**	5/64
3896195	**ATBM25102**	25,00	19,30	102	19	6,25	**AW250**	**AS832**	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).

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

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

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	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			
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			
CBN6	BN-H25	PVD-TiAlN coating over a 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								
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						

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,025	—	0,200	0,025	—	0,200						
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013						
			CG5			CM1			CBN6			CPD1	
	1	95	**120**	145	55	**70**	85						
	2	70	**90**	105	40	**50**	60						
	3	55	**70**	80	35	**40**	50						
	4	65	**75**	90	40	**45**	55						
	5	45	**55**	70	30	**35**	40						
	6	75	**95**	110	45	**55**	65						
	7	50	**60**	75	30	**40**	45						
	8	45	**55**	70	30	**35**	40						
	9	40	**50**	60	25	**30**	35						
	10	70	**85**	100	40	**50**	60						
	11	45	**55**	65	25	**30**	40						
	12	70	**85**	100	40	**50**	60						
	13.1	55	**70**	85	35	**40**	50						
	13.2	45	**55**	65	25	**30**	40						
M	ap [mm]	0,025	—	0,200	0,025	—	0,200						
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013						
			CG5			CM1			CBN6			CPD1	
	14.1	75	**95**	110	55	**70**	85						
	14.2	60	**75**	90	45	**55**	65						
	14.3	70	**85**	100	50	**65**	75						
	14.4	45	**55**	65	35	**40**	45						
K	ap [mm]	0,001	—	0,010	0,001	—	0,010						
	f [mm/rev]	0,007	—	0,0005	0,007	—	0,0005						
			CG5			CM1			CBN6			CPD1	
	15	75	**90**	110	55	**70**	85						
	16	50	**65**	75	40	**50**	60						
	17	80	**100**	120	65	**80**	95						
	18	55	**65**	80	40	**50**	60						
	19	100	**125**	145	75	**95**	115						
	20	55	**70**	85	45	**55**	65						
N	ap [mm]	0,025	—	0,640	0,025	—	0,640				0,013	—	0,760
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013				0,178	—	0,013
			CG5			CM1			CBN6			CPD1	
	21	405	**505**	605	405	**505**	605				855	**1070**	1285
	22	245	**305**	365	245	**305**	365				735	**915**	1100
	23	405	**505**	605	405	**505**	605				685	**855**	1025
	24	245	**305**	370	245	**305**	370				540	**675**	805
	25				70	**90**	105				370	**460**	550
	26	145	**180**	215	105	**125**	155				330	**415**	495
	27	135	**170**	205	100	**125**	150				320	**400**	480
	28	145	**180**	215	105	**125**	155				330	**415**	495
	29	—	—	—	—	—	—				345	**430**	515
	30	—	—	—	—	—	—				330	**415**	495
S	ap [mm]	0,025	—	0,20,	0,025	—	0,20,						
	f [mm/rev]	0,178	—	0,013	0,178	—	0,013						
			CG5			CM1			CBN6			CPD1	
	31	35	**40**	45	65	**80**	95						
	32	25	**30**	35	45	**55**	70						
	33	25	**35**	40	50	**65**	75						
	34	20	**25**	30	40	**45**	55						
	35	20	**25**	30	40	**50**	60						
	36	35	**40**	50	30	**35**	45						
	37	25	**35**	40	25	**30**	35						
H	ap [mm]							0,025	—	0,200			
	f [mm/rev]							0,004	—	0,0005			
			CG5			CM1			CBN6			CPD1	
	38.1							110	**140**	165			
	38.2							105	**130**	155			
	39.1							100	**125**	150			
	39.2							90	**110**	135			
	40.1							—	—	—			
	40.2							—	—	—			
	41.1							—	—	—			
	41.2							—	—	—			

Our complete portfolio.
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From turning, holemaking, and indexable milling to solid carbide end milling, solid carbide drilling, and tapping, the most powerful tools in the business now proudly wear WIDIA™ brands. When you buy WIDIA products, you're not just purchasing speed, power, and precision, you're investing in quality and complete satisfaction.

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Metric 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 = No 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
Dimensions
shown as "L4"

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

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

M
Tip Style
(optional)

Symbol

M

Usage

Mini tip

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

ABD

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6	CPD1
ABD06187R	1,58	5,41	21,92	0,66	●	●		
ABD06312R	1,58	7,93	24,44	0,66	●	●		
ABD09281R	2,39	7,14	23,65	1,04	●	●		
ABD09500R	2,39	12,70	29,21	1,04	●	●		
ABD125375R	3,18	9,53	26,04	1,45	●	●		
ABD125625R	3,18	15,88	32,39	1,45	●	●		
ABD156500R	3,96	12,70	29,21	1,85	●	●		
ABD156875R	3,96	22,23	38,74	1,85	●	●		

ABD-M

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1	CBN6	CPD1
ABD09500RM	2,39	12,70	29,21	1,04	0,18			●	●
ABD125625RM	3,18	15,88	32,39	1,45	0,18			●	
ABD156875RM	3,96	22,23	38,74	1,85	0,18			●	

AGD

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1	CBN6	CPD1
AGD09503	2,79	7,93	24,44	1,17	0,76	0,76	●	●		
AGD12504	3,56	9,53	26,04	1,55	0,89	1,02	●	●		
AGD15605	4,45	12,70	29,21	1,93	1,27	1,27	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

APD

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6	CPD1
APD06187R	1,58	4,75	21,26	0,66	0,43	0,18	●			
APD09281R	2,39	7,14	23,65	1,07	0,71	0,18	●	●		
APD125375R	3,18	9,53	26,04	1,45	1,02	0,18	●	●		
APD156500R	3,96	12,70	29,21	1,85	1,27	0,18	●	●		

ATD

ISO catalogue number	D min	L4	L	F	CD	W	TP min	TP max	CG5	CM1	CBN6	CPD1
ATD09560F2	2,79	7,93	24,44	1,17	0,56	0,05	0,80	0,53	●	●		
ATD12560F2	3,56	9,53	26,04	1,55	0,69	0,05	1,06	0,53	●	●		
ATD15660F2	4,45	12,70	29,21	1,93	0,81	0,05	1,27	0,53	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

BB

ISO catalogue number	D min	L4	L	F	CG5	CM1	CBN6	CPD1
BB187750R	4,75	19,05	45,72	2,24	●	●		
BB1871250R	4,75	31,75	58,42	2,24	●			
BB2501000R	6,35	25,40	52,07	3,05	●	●		
BB2501750R	6,35	44,45	71,12	3,05	●	●		
BB3121250R	7,93	53,98	80,65	3,84	●	●		

BP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6	CPD1
BP187600R	4,75	15,24	41,91	2,24	1,58	0,18	●			
BP250825R	6,35	20,96	47,63	3,05	1,98	0,18	●	●		
BP3121000R	7,93	25,40	52,07	3,84	2,39	0,18	●	●		

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2mm	M4X0.7
2892513	BS832	5/64	#8-32
2840186	AS832	5/64	#8-32
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2832655	CC09	T6	#1-72
2825948	QTM26	T7	M2.5X0.45
2825941	QTM20	T7	M2.5X0.45
2830477	FC11	T7	#2-56
2828337	GT21	T7	#2-56
2830471	FC14	T7	#2-56
2826005	QC15	T8	#3-48
2826031	QC26	T9	#4-40
2826038	QC21	T9	#4-40

Wrenches

order number	ISO catalogue number	Torx/hex
2840174	AKEY	5/64
2840094	MKEY	2mm
2823182	SKEY	T10
2823189	STKEY	T15
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825952	QTKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2mm
2823236	SBIT	T10
2823196	STBIT	T15
2828324	GTBIT	T5
2832661	CBIT	T6
2825963	QTBIT	T7
2830497	FBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9

Wedges

order number	ISO catalogue number
2840192	AW250
2836024	BW312

Quadralock™

High-Precision Products for ID Applications

Easy access, quick-change toolholders and inserts perform multiple ID applications for maximum productivity with one toolholder.

The unique cutting tip of the Quadralock™ ID Quick-Change Tooling System can be locked in four different positions, enabling operation in both Swiss-style and conventional machines. Four quick, easy set-up steps and guaranteed insert repeatability within ±0,013mm ensures superior performance.

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™ Small Hole Tooling

Quadralock Small Hole Toolholders **C60–C65**
Catalogue Numbering System C62
Toolholders C63
Grades and Grade Descriptions C64
Speed and Feed Chart C65

Quadralock Small Hole Inserts **C66–C69**
Catalogue Numbering System C66
Inserts C67–C68
Hardware C69

Quadralock Boring Bar Identification System

MTM	M	8	40
Quadralock Boring System	Type	Shank Diameter *shown as "D"*	Length *shown as "L"*
	M = Metric	**Metric**	**Metric**
		8 = 8,00mm	40 = 38,1mm
		10 = 10,00mm	100 = 101,6mm
		12 = 12,00mm	127 = 127,0mm
		16 = 16,00mm	
		22 = 22,00mm	

MTMM

order number	catalogue number	D	D2	L	L1	A	insert screw	hex
3896202	**MTMM840**	8,00	12,95	38	19	3,00	**MSM46**	2mm
3896198	**MTMM1040**	10,00	12,95	38	19	3,00	**MSM46**	2mm
3896200	**MTMM1240**	12,00	12,95	38	19	3,00	**MSM46**	2mm
3896199	**MTMM12100**	12,00	12,95	102	19	3,00	**MSM46**	2mm
3831788	**MTMM16100**	16,00	12,95	102	19	3,00	**MSM46**	2mm
3896201	**MTMM22127**	22,00	12,95	127	19	3,00	**MSM46**	2mm

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

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

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									

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/mm											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,02	—	0,20	0,02	—	0,20						
	f [mm/rev]	0,07	—	0,02	0,07	—	0,02						
			CG5			CM1			CBN6			CPD1	
	1	105	**130**	155	65	**80**	100						
	2	80	**100**	120	50	**65**	75						
	3	65	**75**	90	40	**50**	60						
	4	70	**90**	105	45	**55**	65						
	5	55	**65**	80	35	**40**	50						
	6	85	**105**	125	55	**70**	80						
	7	55	**70**	85	40	**45**	55						
	8	55	**65**	80	35	**40**	50						
	9	45	**55**	65	30	**35**	45						
	10	75	**95**	115	50	**60**	75						
	11	50	**60**	75	35	**40**	45						
	12	75	**95**	115	50	**60**	75						
	13.1	65	**80**	95	40	**50**	60						
	13.2	50	**60**	70	35	**40**	45						
M	ap [mm]	0,02	—	0,20	0,02	—	0,20						
	f [mm/rev]	0,07	—	0,02	0,07	—	0,02						
			CG5			CM1			CBN6			CPD1	
	14.1	75	**95**	110	55	**70**	85						
	14.2	60	**75**	90	45	**55**	65						
	14.3	70	**85**	100	50	**65**	75						
	14.4	45	**55**	65	35	**40**	45						
K	ap [mm]	0,02	—	0,20	0,02	—	0,20						
	f [mm/rev]	0,07	—	0,02	0,07	—	0,02						
			CG5			CM1			CBN6			CPD1	
	15	75	**90**	110	55	**70**	85						
	16	50	**65**	75	40	**50**	60						
	17	80	**100**	120	65	**80**	95						
	18	55	**65**	80	40	**50**	60						
	19	100	**125**	145	75	**95**	115						
	20	55	**70**	85	45	**55**	65						
N	ap [mm]	0,02	—	0,51	0,02	—	0,51				0,02	—	0,51
	f [mm/rev]	0,09	—	0,01	0,09	—	0,01				0,09	—	0,01
			CG5			CM1			CBN6			CPD1	
	21	405	**505**	605	405	**505**	605				855	**1070**	1285
	22	245	**305**	365	245	**305**	365				735	**915**	1100
	23	405	**505**	605	405	**505**	605				685	**855**	1025
	24	245	**305**	370	245	**305**	370				540	**675**	805
	25	—	—	—	70	**90**	105				370	**460**	550
	26	145	**180**	215	105	**125**	155				330	**415**	495
	27	135	**170**	205	100	**125**	150				320	**400**	480
	28	145	**180**	215	105	**125**	155				330	**415**	495
	29	—	—	—	—	—	—				345	**430**	515
	30	—	—	—	—	—	—				330	**415**	495
S	ap [mm]	0,02	—	0,51	0,02	—	0,51						
	f [mm/rev]	0,06	—	0,02	0,06	—	0,02						
			CG5			CM1			CBN6			CPD1	
	31	35	**40**	45	65	**80**	95						
	32	25	**30**	35	45	**55**	70						
	33	25	**35**	40	50	**65**	75						
	34	20	**25**	30	40	**45**	55						
	35	20	**25**	30	40	**50**	60						
	36	35	**40**	50	30	**35**	45						
	37	25	**35**	40	25	**30**	35						
H	ap [mm]							0,02	—	0,20			
	f [mm/rev]							0,0024	—	0,0008			
			CG5			CM1			CBN6			CPD1	
	38.1							110	**140**	165			
	38.2							105	**130**	155			
	39.1							100	**125**	150			
	39.2							90	**110**	135			
	40.1							—	—	—			
	40.2							—	—	—			
	41.1							—	—	—			
	41.2							—	—	—			

Quadralock Boring Bar Insert Identification System

MB
Insert Style

MB = Boring

MG = Grooving

MP = Profiling

MT = Threading

125
Minimum Bore
shown as "D min"

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"

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 only)

030 = 0,76mm
040 = 1,02mm
050 = 1,27mm

Thread (MT style only)

60F2 = 0,05
flat on 60° thread

R
Hand of Insert

R = Right hand
L = Left hand

● first choice
○ alternate choice

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

■ MB

ISO catalogue number	D min	L4	L	F	Rε	CG5	CM1	CBN6	CPD1
Right hand									
MB010062R	0,25	1,58	20,57	0,09	0,03	●	●		
MB030187R	0,76	4,75	21,26	0,34	0,03	●	●		
MB062187R	1,58	5,41	21,92	0,66	0,05	●	●		
MB062312R	1,58	7,93	24,44	0,66	0,05	●	●		
MB094281R	2,39	7,14	23,65	1,04	0,05	●	●		
MB094500R	2,39	12,70	29,21	1,04	0,05	●	●		
MB125375R	3,18	9,53	26,04	1,45	0,10	●	●		
MB125625R	3,18	15,88	32,39	1,45	0,10	●	●		
MB156500R	3,96	12,70	29,21	1,85	0,10	●	●		
MB156875R	3,96	22,23	38,74	1,85	0,10	●	●		
Left hand									
MB010062L	0,25	1,58	20,57	0,09	0,03	●	●		
MB030187L	0,76	4,75	21,26	0,34	0,03	●	●		
MB062187L	1,58	5,41	21,92	0,66	0,05	●	●		
MB062312L	1,58	7,93	24,44	0,66	0,05	●	●		
MB094281L	2,39	7,14	23,65	1,04	0,05	●	●		
MB094500L	2,39	12,70	29,21	1,04	0,05	●	●		
MB125375L	3,18	9,53	26,04	1,45	0,10	●	●		
MB125625L	3,18	15,88	32,39	1,45	0,10	●	●		
MB156500L	3,96	12,70	29,21	1,85	0,10	●	●		
MB156875L	3,96	22,23	38,74	1,85	0,10	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ MG

ISO catalogue number	D min	L4	L	F	CD	W	CG5	CM1	CBN6	CPD1
Right hand										
MG095030R	2,79	7,93	24,44	1,17	0,76	0,76	●	●		
MG125040R	3,56	9,53	26,04	1,55	0,89	1,02	●	●		
MG156050R	4,45	12,70	29,21	1,93	1,27	1,27	●	●		
Left hand										
MG095030L	2,79	7,93	24,44	1,17	0,76	0,76	●	●		
MG125040L	3,56	9,53	26,04	1,55	0,89	1,02	●	●		
MG156050L	4,45	12,70	29,21	1,93	1,27	1,27	●	●		

■ MP

ISO catalogue number	D min	L4	L	F	CD	Rε	CG5	CM1	CBN6	CPD1
Right hand										
MP062187R	1,58	4,75	21,26	0,66	0,43	0,10	●	●		
MP094281R	2,39	7,14	23,65	1,07	0,71	0,10	●	●		
MP125375R	3,18	9,53	26,04	1,45	1,02	0,20	●	●		
MP156500R	3,96	12,70	29,21	1,85	1,27	0,20	●	●		
Left hand										
MP062187L	1,58	4,75	21,26	0,66	0,43	0,10	●	●		
MP094281L	2,39	7,14	23,65	1,07	0,71	0,10	●	●		
MP125375L	3,18	9,53	26,04	1,45	1,02	0,20	●	●		
MP156500L	3,96	12,70	29,21	1,85	1,27	0,20	●	●		

■ MT

ISO catalogue number	D min	L4	L	F	CD	W	TP min	TP max	CG5	CM1	CBN6	CPD1
Right hand												
MT09560F2R	2,79	7,93	24,44	1,17	0,56	0,05	0,50	0,80	●	●		
MT12560F2R	3,56	9,53	26,04	1,55	0,69	0,05	0,50	1,05	●	●		
MT15660F2R	4,45	12,70	29,21	1,93	0,81	0,05	0,50	1,27	●	●		
Left hand												
MT09560F2L	2,79	7,93	24,44	1,17	0,56	0,05	0,50	0,80	●	●		
MT12560F2L	3,56	9,53	26,04	1,55	0,69	0,05	0,50	1,05	●	●		
MT15660F2L	4,45	12,70	29,21	1,93	0,81	0,05	0,50	1,27	●	●		

Insert Screws

order number	ISO catalogue number	Torx/hex	internal thread
2840098	MSM46	2mm	M4X0.7
2892513	BS832	5/64	#8-32
2840186	AS832	5/64	#8-32
2823227	SC30	T10	#4-40
2823203	STM31	T15	M3.5 X 0.6
2832641	CT15	T16	#1-72
2820981	LTM16	T5	M2X0.4
2832647	CC11	T6	#1-72
2832635	CT11	T6	#1-72
2832655	CC09	T6	#1-72
2825948	QTM26	T7	M2.5X0.45
2825941	QTM20	T7	M2.5X0.45
2830477	FC11	T7	#2-56
2828337	GT21	T7	#2-56
2830471	FC14	T7	#2-56
2826005	QC15	T8	#3-48
2826031	QC26	T9	#4-40
2826038	QC21	T9	#4-40

Wrenches

order number	ISO catalogue number	Torx/hex
2840174	AKEY	5/64
2840094	MKEY	2mm
2823182	SKEY	T10
2823189	STKEY	T15
2828318	GTKEY	T5
2832628	CKEY	T6
2830492	FKEY	T7
2825952	QTKEY	T7
2825973	Q8KEY	T8
2825982	QKEY	T9

Drive Bits

order number	ISO catalogue number	Torx/hex
2840089	MBIT	2mm
2823236	SBIT	T10
2823196	STBIT	T15
2828324	GTBIT	T5
2832661	CBIT	T6
2825963	QTBIT	T7
2830497	FBIT	T7
2825964	Q8BIT	T8
2826045	QBIT	T9

Wedges

order number	ISO catalogue number
2840192	AW250
2836024	BW312

Solid Carbide Bars

Small Hole Tooling

For exceptional performance in most steels, stainless steels, cast irons, and non-ferrous materials, the tough, economical WIDIA™ solid carbide bars are engineered for outstanding results in most machining applications.

Features:

- Accurate, quick-change tooling and toolholders are ideal for small parts machining applications.
- Strong micro-grain substrate available in coated and uncoated grades.
- Excellent choice for full radius, face, O-ring, and undercut grooving applications.

Benefits:

- Exceptional machining versatility and rupture strength.
- Coated tooling for enhanced tool life.
- Specially engineered for outstanding performance and consistent results.

Solid Carbide Bars

Solid Carbide Bars **C70–C124**
Catalogue Numbering System C72
Toolholders C73
Grades and Grade Descriptions C74
Speed and Feed Chart C75
Catalogue Numbering System C76–C77
Carbide Boring Inserts C79–C99
Carbide Helical Boring Bars C100
Choosing the Correct Grooving Insert C101
Catalogue Numbering System C102–C103
Carbide Face Groove Inserts C105
Carbide Full Radius Inserts C106–C108
Carbide O-Ring Inserts C109
Caribde Retaining Ring Inserts C110–C112
Carbide Undercut Groove Inserts C113
Carbide Undercut Profile Groove Inserts C114
Catalogue Numbering System C116–C117
Carbide Acme Threading Inserts C118
Carbide Stub Acme Threading Inserts C119
60° Single Point Threading Inserts C120–C123
Carbide Thread Relief Inserts C124

Solid Carbide Bar Identification System

CTH	M	12	47	70
Micro Boring System	Type	Shank Diameter *shown as "D"*	Insert Bore Diameter *shown as "D1"*	Length of Tool *shown as "L"*
	M = Metric	12 = 12,00mm 16 = 16,00mm 20 = 20,00mm	32 = 3,18mm 47 = 4,76mm 64 = 6,35mm 79 = 7,94mm 95 = 9,53mm 127 = 12,70mm	70 = 70,0mm

CTHM

order number	catalogue number	D1	D	L1	L
3897868	CTHM123270	3,18	12	6	70
3897883	CTHM163270	3,18	16	6	70
3897889	CTHM203270	3,18	20	6	70
3897869	CTHM124770	4,76	12	6	70
3897884	CTHM164770	4,76	16	6	70
3897890	CTHM204770	4,76	20	6	70
3897870	CTHM126470	6,35	12	6	70
3897885	CTHM166470	6,35	16	6	70
3897891	CTHM206470	6,35	20	6	70
3897871	CTHM127970	7,94	12	6	70
3897886	CTHM167970	7,94	16	6	70
3897892	CTHM207970	7,94	20	6	70
3897872	CTHM129570	9,53	12	6	70
3897887	CTHM169570	9,53	16	6	70
3897893	CTHM209570	9,53	20	6	70
3897888	CTHM2012770	12,70	20	6	70

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

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

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									
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									

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	0,025	—	0,300	0,025	—	0,300						
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025						
			CG5			CM1			CBN6			CPD1	
	1	105	**130**	155	65	**80**	100						
	2	80	**100**	120	50	**65**	75						
	3	65	**75**	90	40	**50**	60						
	4	70	**90**	105	45	**55**	65						
	5	55	**65**	80	35	**40**	50						
	6	85	**105**	125	55	**70**	80						
	7	55	**70**	85	40	**45**	55						
	8	55	**65**	80	35	**40**	50						
	9	45	**55**	65	30	**35**	45						
	10	75	**95**	115	50	**60**	75						
	11	50	**60**	75	35	**40**	45						
	12	75	**95**	115	50	**60**	75						
	13.1	65	**80**	95	40	**50**	60						
	13.2	50	**60**	70	35	**40**	45						
M	ap [mm]	0,025	—	0,300	0,025	—	0,300						
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025						
			CG5			CM1			CBN6			CPD1	
	14.1	75	**95**	110	55	**70**	85						
	14.2	60	**75**	90	45	**55**	65						
	14.3	70	**85**	100	50	**65**	75						
	14.4	45	**55**	65	35	**40**	45						
K	ap [mm]	0,025	—	0,300	0,025	—	0,300						
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025						
			CG5			CM1			CBN6			CPD1	
	15	75	**90**	110	55	**70**	85						
	16	50	**65**	75	40	**50**	60						
	17	80	**100**	120	65	**80**	95						
	18	55	**65**	80	40	**50**	60						
	19	100	**125**	145	75	**95**	115						
	20	55	**70**	85	45	**55**	65						
N	ap [mm]	0,025	—	0,300	0,025	—	0,300				0,025	—	0,300
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025				0,127	—	0,025
			CG5			CM1			CBN6			CPD1	
	21	440	**550**	660	405	**505**	605				855	**1070**	1285
	22	440	**550**	660	245	**305**	365				735	**915**	1100
	23	415	**520**	625	405	**505**	605				685	**855**	1025
	24	415	**520**	625	245	**305**	370				540	**675**	805
	25	—	**—**	—	70	**90**	105				370	**460**	550
	26	185	**230**	275	105	**125**	155				330	**415**	495
	27	200	**245**	295	100	**125**	150				320	**400**	480
	28	200	**245**	295	105	**125**	155				330	**415**	495
	29	—	**—**	—	—	**—**	—				345	**430**	515
	30	—	**—**	—	—	**—**	—				330	**415**	495
S	ap [mm]	0,025	—	0,300	0,025	—	0,300						
	f [mm/rev]	0,127	—	0,025	0,127	—	0,025						
			CG5			CM1			CBN6			CPD1	
	31	35	**40**	45	65	**80**	95						
	32	25	**30**	35	45	**55**	70						
	33	25	**35**	40	50	**65**	75						
	34	20	**25**	30	40	**45**	55						
	35	20	**25**	30	40	**50**	60						
	36	35	**40**	50	30	**35**	45						
	37	25	**35**	40	25	**30**	35						
H	ap [mm]							0,025	—	0,300			
	f [mm/rev]							0,127	—	0,025			
			CG5			CM1			CBN6			CPD1	
	38.1							35	**40**	45			
	38.2							35	**40**	50			
	39.1							40	**45**	55			
	39.2							40	**50**	55			
	40.1							—	**—**	—			
	40.2							—	**—**	—			
	41.1							—	**—**	—			
	41.2							—	**—**	—			

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 — Material

C = Carbide

B — Application

B = Boring

H = Helical Boring

2 — Shank Diameter *shown as "D"*

2	=	3,18mm
3	=	4,76mm
4	=	6,35mm
5	=	7,94mm
6	=	9,53mm
8	=	12,70mm

050 — Minimum Bore *shown as "D min"*

015	=	0,38mm
020	=	0,51mm
025	=	0,64mm
030	=	0,76mm
035	=	0,89mm
040	=	1,02mm
045	=	1,14mm
050	=	1,27mm
060	=	1,52mm
070	=	1,78mm
080	=	2,03mm
090	=	2,29mm
100	=	2,54mm
110	=	2,79mm
120	=	3,05mm
135	=	3,43mm
140	=	3,56mm
150	=	3,81mm
160	=	4,06mm
180	=	4,57mm
200	=	5,08mm
210	=	5,33mm
230	=	5,84mm
240	=	6,10mm
290	=	7,37mm
300	=	7,62mm
320	=	8,13mm
360	=	9,14mm
480	=	12,19mm
490	=	12,45mm

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

150

Bore Depth
shown as "L4"

050	=	1,27mm
075	=	1,91mm
100	=	2,54mm
150	=	3,81mm
200	=	5,08mm
250	=	6,35mm
300	=	7,62mm
350	=	8,89mm
400	=	10,16mm
500	=	12,70mm
600	=	15,24mm
700	=	17,78mm
750	=	19,05mm
800	=	20,32mm
900	=	22,86mm
1000	=	25,40mm
1100	=	27,94mm
1150	=	29,21mm
1200	=	30,48mm
1250	=	31,75mm
1300	=	33,02mm
1350	=	34,29mm
1400	=	35,56mm
1500	=	38,10mm
1600	=	40,64mm
1750	=	44,45mm
1800	=	45,72mm
2000	=	50,80mm
2500	=	63,50mm
2600	=	66,04mm
2750	=	69,85mm
3000	=	76,20mm
4000	=	101,60mm
4500	=	114,30mm

1500

Overall Length
shown as "L"

1500	=	38,10mm
2000	=	50,80mm
2500	=	63,50mm
3000	=	76,20mm
4000	=	101,60mm
6000	=	387,09mm

4

Tool Radius
shown as "Rε"

0	=	0,00mm
4	=	0,10mm
6	=	0,15mm

R

Hand of Insert

R = Right hand

L = Left hand

M

Tip Designation

M = Mini tip

WIN WITH WIDIA™

WIDIA-CIRCLE™ Small Hole Tooling Series

The WIDIA™ line of small hole boring tools is an excellent, economical choice for a wide range of applications. Our solid carbide bars provide exceptional machining versatility and rupture strength. Indexable inserts are available in both steel and carbide shanks.

A/B Series

- Unique locking system enables quick, accurate insert changes.

Quadralock™

- V-slots and limit-stop bolts for increased indexability.

Micro Boring Bars

- Free cutting action, better surface finishes, and greater chip evacuation.

Solid Carbide Bars

- Accurate, quick-change tooling and toolholders are ideal for small parts machining applications.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA™
Win with WIDIA™

● first choice
○ alternate choice

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

■ CB • Shank Diameter 3,18mm • Cutting Diameter ≤1,65mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB201505015000R	-5	3,18	0,38	1,27	38,10	–	●	●		
CB202007515000R	-5	3,18	0,51	1,91	38,10	–	●	●		
CB202510015000R	-5	3,18	0,64	2,54	38,10	–	●	●		
CB203010015000R	-5	3,18	0,76	2,54	38,10	–	●	●		
CB203510015000R	-5	3,18	0,89	2,54	38,10	–	●	●		
CB203515015000R	-5	3,18	0,89	3,81	38,10	–	●	●		
CB204010015000R	-5	3,18	1,02	2,54	38,10	–	●	●		
CB204015015000R	-5	3,18	1,02	3,81	38,10	–	●	●		
CB204510015000R	-5	3,18	1,14	2,54	38,10	–	●	●		
CB204515015000R	-5	3,18	1,14	3,81	38,10	–	●	●		
CB205015015004R	-3	3,18	1,27	3,81	38,10	0,10	●	●		
CB205015015000R	-3	3,18	1,27	3,81	38,10	–	●	●		
CB205020015004R	-3	3,18	1,27	5,08	38,10	0,10	●	●		
CB205020015000R	-3	3,18	1,27	5,08	38,10	–	●	●		
CB205030015004R	-3	3,18	1,27	7,62	38,10	0,10	●	●		
CB205030015000R	-3	3,18	1,27	7,62	38,10	–	●	●		
CB205040015000R	-3	3,18	1,27	10,16	38,10	–	●	●		
CB206015015004R	-3	3,18	1,52	3,81	38,10	0,10	●	●		
CB206015015000R	-3	3,18	1,52	3,81	38,10	–	●	●		
CB206020015004R	-3	3,18	1,52	5,08	38,10	0,10	●	●		
CB206020015000R	-3	3,18	1,52	5,08	38,10	–	●	●		
CB206030015004R	-3	3,18	1,52	7,62	38,10	0,10	●	●		
CB206030015000R	-3	3,18	1,52	7,62	38,10	–	●	●		
CB206040015004R	-3	3,18	1,52	10,16	38,10	0,10	●	●		
CB205040015004R	-3	3,18	1,27	10,16	38,10	0,10	●	●		
CB206040015000R	-3	3,18	1,52	10,16	38,10	–	●	●		
CB206050015004R	-3	3,18	1,52	12,70	38,10	0,10	●	●		
CB206050015000R	-3	3,18	1,52	12,70	38,10	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 3,18mm • Cutting Diameter ≤1,65mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB201505015000L	-5	3,18	0,38	1,27	38,10	–	●	●		
CB202007515000L	-5	3,18	0,51	1,91	38,10	–	●	●		
CB202510015000L	-5	3,18	0,64	2,54	38,10	–	●	●		
CB203010015000L	-5	3,18	0,76	2,54	38,10	–	●	●		
CB203510015000L	-5	3,18	0,89	2,54	38,10	–	●	●		
CB203515015000L	-5	3,18	0,89	3,81	38,10	–	●	●		
CB204010015000L	-5	3,18	1,02	2,54	38,10	–	●	●		
CB204015015000L	-5	3,18	1,02	3,81	38,10	–	●	●		
CB204510015000L	-5	3,18	1,14	2,54	38,10	–	●	●		
CB204515015000L	-5	3,18	1,14	3,81	38,10	–	●	●		
CB205015015004L	-3	3,18	1,27	3,81	38,10	0,10	●	●		
CB205015015000L	-3	3,18	1,27	3,81	38,10	–	●	●		
CB205020015004L	-3	3,18	1,27	5,08	38,10	0,10	●	●		
CB205020015000L	-3	3,18	1,27	5,08	38,10	–	●	●		
CB205030015004L	-3	3,18	1,27	7,62	38,10	0,10	●	●		
CB205030015000L	-3	3,18	1,27	7,62	38,10	–	●	●		
CB205040015004L	-3	3,18	1,27	10,16	38,10	0,10	●	●		
CB205040015000L	-3	3,18	1,27	10,16	38,10	–	●	●		
CB206015015004L	-3	3,18	1,52	3,81	38,10	0,10	●	●		
CB206015015000L	-3	3,18	1,52	3,81	38,10	–	●	●		
CB206020015004L	-3	3,18	1,52	5,08	38,10	0,10	●	●		
CB206020015000L	-3	3,18	1,52	5,08	38,10	–	●	●		
CB206030015004L	-3	3,18	1,52	7,62	38,10	0,10	●	●		
CB206030015000L	-3	3,18	1,52	7,62	38,10	–	●	●		
CB206040015004L	-3	3,18	1,52	10,16	38,10	0,10	●	●		
CB206040015000L	-3	3,18	1,52	10,16	38,10	–	●	●		
CB206050015004L	-3	3,18	1,52	12,70	38,10	0,10	●	●		
CB206050015000L	-3	3,18	1,52	12,70	38,10	–	●	●		

● first choice
○ alternate choice

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

■ CB • Shank Diameter 3,18mm • Cutting Diameter >1,65mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB208015015004R	-3	3,18	2,03	3,81	38,10	0,10	●	●		
CB208015015000R	-3	3,18	2,03	3,81	38,10	–	●	●		
CB208020015004R	-3	3,18	2,03	5,08	38,10	0,10	●	●		
CB208020015000R	-3	3,18	2,03	5,08	38,10	–	●	●		
CB208030015004R	-3	3,18	2,03	7,62	38,10	0,10	●	●		
CB208030015000R	-3	3,18	2,03	7,62	38,10	–	●	●		
CB208040015004R	-3	3,18	2,03	10,16	38,10	0,10	●	●		
CB208040015000R	-3	3,18	2,03	10,16	38,10	–	●	●		
CB208050015004R	-3	3,18	2,03	12,70	38,10	0,10	●	●		
CB208050015000R	-3	3,18	2,03	12,70	38,10	–	●	●		
CB208060015004R	-3	3,18	2,03	15,24	38,10	0,10	●	●		
CB208060015000R	-3	3,18	2,03	15,24	38,10	–	●	●		
CB210015015004R	-3	3,18	2,54	3,81	38,10	0,10	●	●		
CB210015015000R	-3	3,18	2,54	3,81	38,10	–	●	●		
CB210020015004R	-3	3,18	2,54	5,08	38,10	0,10	●	●		
CB210020015000R	-3	3,18	2,54	5,08	38,10	–	●	●		
CB210030015004R	-3	3,18	2,54	7,62	38,10	0,10	●	●		
CB210030015000R	-3	3,18	2,54	7,62	38,10	–	●	●		
CB210040015004R	-3	3,18	2,54	10,16	38,10	0,10	●	●		
CB210040015000R	-3	3,18	2,54	10,16	38,10	–	●	●		
CB210050015004R	-3	3,18	2,54	12,70	38,10	0,10	●	●		
CB210050015000R	-3	3,18	2,54	12,70	38,10	–	●	●		
CB210060015004R	-3	3,18	2,54	15,24	38,10	0,10	●	●		
CB210060015000R	-3	3,18	2,54	15,24	38,10	–	●	●		
CB210070015004R	-3	3,18	2,54	17,78	38,10	0,10	●	●		
CB210070015000R	-3	3,18	2,54	17,78	38,10	–	●	●		
CB211015015004R	-3	3,18	2,79	3,81	38,10	0,10	●	●		
CB211015015000R	-3	3,18	2,79	3,81	38,10	–	●	●		
CB211020015004R	-3	3,18	2,79	5,08	38,10	0,10	●	●		
CB211020015000R	-3	3,18	2,79	5,08	38,10	–	●	●		
CB211030015004R	-3	3,18	2,79	7,62	38,10	0,10	●	●		
CB211030015000R	-3	3,18	2,79	7,62	38,10	–	●	●		
CB211040015004R	-3	3,18	2,79	10,16	38,10	0,10	●	●		
CB211040015000R	-3	3,18	2,79	10,16	38,10	–	●	●		
CB211050015004R	-3	3,18	2,79	12,70	38,10	0,10	●	●		
CB211050015000R	-3	3,18	2,79	12,70	38,10	–	●	●		
CB211060015004R	-3	3,18	2,79	15,24	38,10	0,10	●	●		
CB211060015000R	-3	3,18	2,79	15,24	38,10	–	●	●		
CB211070015004R	-3	3,18	2,79	17,78	38,10	0,10	●	●		
CB211070015000R	-3	3,18	2,79	17,78	38,10	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

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

■ CB • Shank Diameter 3,18mm • Cutting Diameter >1,65mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB208015015004L	-3	3,18	2,03	3,81	38,10	0,10	●	●		
CB208015015000L	-3	3,18	2,03	3,81	38,10	–	●	●		
CB208020015004L	-3	3,18	2,03	5,08	38,10	0,10	●	●		
CB208020015000L	-3	3,18	2,03	5,08	38,10	–	●	●		
CB208030015004L	-3	3,18	2,03	7,62	38,10	0,10	●	●		
CB208030015000L	-3	3,18	2,03	7,62	38,10	–	●	●		
CB208040015004L	-3	3,18	2,03	10,16	38,10	0,10	●	●		
CB208040015000L	-3	3,18	2,03	10,16	38,10	–	●	●		
CB208050015004L	-3	3,18	2,03	12,70	38,10	0,10	●	●		
CB208050015000L	-3	3,18	2,03	12,70	38,10	–	●	●		
CB208060015004L	-3	3,18	2,03	15,24	38,10	0,10	●	●		
CB208060015000L	-3	3,18	2,03	15,24	38,10	–	●	●		
CB210015015004L	-3	3,18	2,54	3,81	38,10	0,10	●	●		
CB210015015000L	-3	3,18	2,54	3,81	38,10	–	●	●		
CB210020015004L	-3	3,18	2,54	5,08	38,10	0,10	●	●		
CB210020015000L	-3	3,18	2,54	5,08	38,10	–	●	●		
CB210030015004L	-3	3,18	2,54	7,62	38,10	0,10	●	●		
CB210030015000L	-3	3,18	2,54	7,62	38,10	–	●	●		
CB210040015004L	-3	3,18	2,54	10,16	38,10	0,10	●	●		
CB210040015000L	-3	3,18	2,54	10,16	38,10	–	●	●		
CB210050015004L	-3	3,18	2,54	12,70	38,10	0,10	●	●		
CB210050015000L	-3	3,18	2,54	12,70	38,10	–	●	●		
CB210060015004L	-3	3,18	2,54	15,24	38,10	0,10	●	●		
CB210060015000L	-3	3,18	2,54	15,24	38,10	–	●	●		
CB210070015004L	-3	3,18	2,54	17,78	38,10	0,10	●	●		
CB210070015000L	-3	3,18	2,54	17,78	38,10	–	●	●		
CB211015015004L	-3	3,18	2,79	3,81	38,10	0,10	●	●		
CB211015015000L	-3	3,18	2,79	3,81	38,10	–	●	●		
CB211020015004L	-3	3,18	2,79	5,08	38,10	0,10	●	●		
CB211020015000L	-3	3,18	2,79	5,08	38,10	–	●	●		
CB211030015004L	-3	3,18	2,79	7,62	38,10	0,10	●	●		
CB211030015000L	-3	3,18	2,79	7,62	38,10	–	●	●		
CB211040015004L	-3	3,18	2,79	10,16	38,10	0,10	●	●		
CB211040015000L	-3	3,18	2,79	10,16	38,10	–	●	●		
CB211050015004L	-3	3,18	2,79	12,70	38,10	0,10	●	●		
CB211050015000L	-3	3,18	2,79	12,70	38,10	–	●	●		
CB211060015004L	-3	3,18	2,79	15,24	38,10	0,10	●	●		
CB211060015000L	-3	3,18	2,79	15,24	38,10	–	●	●		
CB211070015004L	-3	3,18	2,79	17,78	38,10	0,10	●	●		
CB211070015000L	-3	3,18	2,79	17,78	38,10	–	●	●		

● first choice
○ alternate choice

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

■ CB • Shank Diameter 4,76mm • Cutting Diameter ≤3,56mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB312025020006R	-3	4,76	3,05	6,35	50,80	0,15	●	●		
CB312025020000R	-3	4,76	3,05	6,35	50,80	–	●	●		
CB312035020006R	-3	4,76	3,05	8,89	50,80	0,15	●	●		
CB312035020000R	-3	4,76	3,05	8,89	50,80	–	●	●		
CB312050020006R	-3	4,76	3,05	12,70	50,80	0,15	●	●		
CB312050020000R	-3	4,76	3,05	12,70	50,80	–	●	●		
CB312060020006R	-3	4,76	3,05	15,24	50,80	0,15	●	●		
CB312060020000R	-3	4,76	3,05	15,24	50,80	–	●	●		
CB312070020006R	-3	4,76	3,05	17,78	50,80	0,15	●	●		
CB312070020000R	-3	4,76	3,05	17,78	50,80	–	●	●		
CB312080020006R	-3	4,76	3,05	20,32	50,80	0,15	●	●		
CB312080020000R	-3	4,76	3,05	20,32	50,80	–	●	●		
CB314025020006R	-3	4,76	3,56	6,35	50,80	0,15	●	●		
CB314025020000R	-3	4,76	3,56	6,35	50,80	–	●	●		
CB314040020006R	-3	4,76	3,56	10,16	50,80	0,15	●	●		
CB314040020000R	-3	4,76	3,56	10,16	50,80	–	●	●		
CB314050020006R	-3	4,76	3,56	12,70	50,80	0,15	●	●		
CB314050020000R	-3	4,76	3,56	12,70	50,80	–	●	●		
CB314060020006R	-3	4,76	3,56	15,24	50,80	0,15	●	●		
CB314060020000R	-3	4,76	3,56	15,24	50,80	–	●	●		
CB314070020006R	-3	4,76	3,56	17,78	50,80	0,15	●	●		
CB314070020000R	-3	4,76	3,56	17,78	50,80	–	●	●		
CB314075020006R	-3	4,76	3,56	19,05	50,80	0,15	●	●		
CB314075020000R	-3	4,76	3,56	19,05	50,80	–	●	●		
CB314080020006R	-3	4,76	3,56	20,32	50,80	0,15	●	●		
CB314080020000R	-3	4,76	3,56	20,32	50,80	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 4,76mm • Cutting Diameter ≤3,56mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB312025020006L	-3	4,76	3,05	6,35	50,80	0,15	●	●		
CB312025020000L	-3	4,76	3,05	6,35	50,80	–	●	●		
CB312035020006L	-3	4,76	3,05	8,89	50,80	0,15	●	●		
CB312035020000L	-3	4,76	3,05	8,89	50,80	–	●	●		
CB312050020006L	-3	4,76	3,05	12,70	50,80	0,15	●	●		
CB312050020000L	-3	4,76	3,05	12,70	50,80	–	●	●		
CB312060020006L	-3	4,76	3,05	15,24	50,80	0,15	●	●		
CB312060020000L	-3	4,76	3,05	15,24	50,80	–	●	●		
CB312070020006L	-3	4,76	3,05	17,78	50,80	0,15	●	●		
CB312070020000L	-3	4,76	3,05	17,78	50,80	–	●	●		
CB312080020006L	-3	4,76	3,05	20,32	50,80	0,15	●	●		
CB312080020000L	-3	4,76	3,05	20,32	50,80	–	●	●		
CB314025020006L	-3	4,76	3,56	6,35	50,80	0,15	●	●		
CB314025020000L	-3	4,76	3,56	6,35	50,80	–	●	●		
CB314040020006L	-3	4,76	3,56	10,16	50,80	0,15	●	●		
CB314040020000L	-3	4,76	3,56	10,16	50,80	–	●	●		
CB314050020006L	-3	4,76	3,56	12,70	50,80	0,15	●	●		
CB314050020000L	-3	4,76	3,56	12,70	50,80	–	●	●		
CB314060020006L	-3	4,76	3,56	15,24	50,80	0,15	●	●		
CB314060020000L	-3	4,76	3,56	15,24	50,80	–	●	●		
CB314070020006L	-3	4,76	3,56	17,78	50,80	0,15	●	●		
CB314070020000L	-3	4,76	3,56	17,78	50,80	–	●	●		
CB314075020006L	-3	4,76	3,56	19,05	50,80	0,15	●	●		
CB314075020000L	-3	4,76	3,56	19,05	50,80	–	●	●		
CB314080020006L	-3	4,76	3,56	20,32	50,80	0,15	●	●		
CB314080020000L	-3	4,76	3,56	20,32	50,80	–	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CB • Shank Diameter 4,76mm • Cutting Diameter >3,81mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB316025020006R	-3	4,76	4,06	6,35	50,80	0,15	●	●		
CB316025020000R	-3	4,76	4,06	6,35	50,80	–	●	●		
CB316040020006R	-3	4,76	4,06	10,16	50,80	0,15	●	●		
CB316040020000R	-3	4,76	4,06	10,16	50,80	–	●	●		
CB316050020006R	-3	4,76	4,06	12,70	50,80	0,15	●	●		
CB316050020000R	-3	4,76	4,06	12,70	50,80	–	●	●		
CB316060020006R	-3	4,76	4,06	15,24	50,80	0,15	●	●		
CB316060020000R	-3	4,76	4,06	15,24	50,80	–	●	●		
CB316075020006R	-3	4,76	4,06	19,05	50,80	0,15	●	●		
CB316075020000R	-3	4,76	4,06	19,05	50,80	–	●	●		
CB316090020006R	-3	4,76	4,06	22,86	50,80	0,15	●	●		
CB316090020000R	-3	4,76	4,06	22,86	50,80	–	●	●		
CB3160100020006R	-3	4,76	4,06	25,40	50,80	0,15	●	●		
CB3160100020000R	-3	4,76	4,06	25,40	50,80	–	●	●		
Left hand										
CB316025020006L	-3	4,76	4,06	6,35	50,80	0,15	●	●		
CB316025020000L	-3	4,76	4,06	6,35	50,80	–	●	●		
CB316040020006L	-3	4,76	4,06	10,16	50,80	0,15	●	●		
CB316040020000L	-3	4,76	4,06	10,16	50,80	–	●	●		
CB316050020006L	-3	4,76	4,06	12,70	50,80	0,15	●	●		
CB316050020000L	-3	4,76	4,06	12,70	50,80	–	●	●		
CB316060020006L	-3	4,76	4,06	15,24	50,80	0,15	●	●		
CB316060020000L	-3	4,76	4,06	15,24	50,80	–	●	●		
CB316075020006L	-3	4,76	4,06	19,05	50,80	0,15	●	●		
CB316075020000L	-3	4,76	4,06	19,05	50,80	–	●	●		
CB316090020006L	-3	4,76	4,06	22,86	50,80	0,15	●	●		
CB316090020000L	-3	4,76	4,06	22,86	50,80	–	●	●		
CB3160100020006L	-3	4,76	4,06	25,40	50,80	0,15	●	●		
CB3160100020000L	-3	4,76	4,06	25,40	50,80	–	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 6,35mm • Cutting Diameter ≤4,57mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB418035025006R	-3	6,35	4,57	8,89	63,50	0,15	●	●		
CB418035025000R	-3	6,35	4,57	8,89	63,50	–	●	●		
CB418050025006R	-3	6,35	4,57	12,70	63,50	0,15	●	●		
CB418050025000R	-3	6,35	4,57	12,70	63,50	–	●	●		
CB418060025006R	-3	6,35	4,57	15,24	63,50	0,15	●	●		
CB418060025000R	-3	6,35	4,57	15,24	63,50	–	●	●		
CB418075025006R	-3	6,35	4,57	19,05	63,50	0,15	●	●		
CB418075025000R	-3	6,35	4,57	19,05	63,50	–	●	●		
CB418090025006R	-3	6,35	4,57	22,86	63,50	0,15	●	●		
CB418090025000R	-3	6,35	4,57	22,86	63,50	–	●	●		
CB4180100025006R	-3	6,35	4,57	25,40	63,50	0,15	●	●		
CB4180100025000R	-3	6,35	4,57	25,40	63,50	–	●	●		
CB4180110025006R	-3	6,35	4,57	27,94	63,50	0,15	●	●		
CB4180110025000R	-3	6,35	4,57	27,94	63,50	–	●	●		
Left hand										
CB418035025006L	-3	6,35	4,57	8,89	63,50	0,15	●	●		
CB418035025000L	-3	6,35	4,57	8,89	63,50	–	●	●		
CB418050025006L	-3	6,35	4,57	12,70	63,50	0,15	●	●		
CB418050025000L	-3	6,35	4,57	12,70	63,50	–	●	●		
CB418060025006L	-3	6,35	4,57	15,24	63,50	0,15	●	●		
CB418060025000L	-3	6,35	4,57	15,24	63,50	–	●	●		
CB418075025006L	-3	6,35	4,57	19,05	63,50	0,15	●	●		
CB418075025000L	-3	6,35	4,57	19,05	63,50	–	●	●		
CB418090025006L	-3	6,35	4,57	22,86	63,50	0,15	●	●		
CB418090025000L	-3	6,35	4,57	22,86	63,50	–	●	●		
CB4180100025006L	-3	6,35	4,57	25,40	63,50	0,15	●	●		
CB4180100025000L	-3	6,35	4,57	25,40	63,50	–	●	●		
CB4180110025006L	-3	6,35	4,57	27,94	63,50	0,15	●	●		
CB4180110025000L	-3	6,35	4,57	27,94	63,50	–	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 6,35mm • Cutting Diameter ≥5,08mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB420040025006R	-3	6,35	5,08	10,16	63,50	0,15	●	●		
CB420040025000R	-3	6,35	5,08	10,16	63,50	–	●	●		
CB420050025006R	-3	6,35	5,08	12,70	63,50	0,15	●	●		
CB420050025000R	-3	6,35	5,08	12,70	63,50	–	●	●		
CB420060025006R	-3	6,35	5,08	15,24	63,50	0,15	●	●		
CB420060025000R	-3	6,35	5,08	15,24	63,50	–	●	●		
CB420070025006R	-3	6,35	5,08	17,78	63,50	0,15	●	●		
CB420070025000R	-3	6,35	5,08	17,78	63,50	–	●	●		
CB420080025006R	-3	6,35	5,08	20,32	63,50	0,15	●	●		
CB420080025000R	-3	6,35	5,08	20,32	63,50	–	●	●		
CB420090025006R	-3	6,35	5,08	22,86	63,50	0,15	●	●		
CB420090025000R	-3	6,35	5,08	22,86	63,50	–	●	●		
CB4200100025006R	-3	6,35	5,08	25,40	63,50	0,15	●	●		
CB4200100025000R	-3	6,35	5,08	25,40	63,50	–	●	●		
CB4200110025006R	-3	6,35	5,08	27,94	63,50	0,15	●	●		
CB4200110025000R	-3	6,35	5,08	27,94	63,50	–	●	●		
CB4200120025006R	-3	6,35	5,08	30,48	63,50	0,15	●	●		
CB4200120025000R	-3	6,35	5,08	30,48	63,50	–	●	●		
CB4200130025006R	-3	6,35	5,08	33,02	63,50	0,15	●	●		
CB4200130025000R	-3	6,35	5,08	33,02	63,50	–	●	●		
Left hand										
CB420040025006L	-3	6,35	5,08	10,16	63,50	0,15	●	●		
CB420040025000L	-3	6,35	5,08	10,16	63,50	–	●	●		
CB420050025006L	-3	6,35	5,08	12,70	63,50	0,15	●	●		
CB420050025000L	-3	6,35	5,08	12,70	63,50	–	●	●		
CB420060025006L	-3	6,35	5,08	15,24	63,50	0,15	●	●		
CB420060025000L	-3	6,35	5,08	15,24	63,50	–	●	●		
CB420070025006L	-3	6,35	5,08	17,78	63,50	0,15	●	●		
CB420070025000L	-3	6,35	5,08	17,78	63,50	–	●	●		
CB420080025006L	-3	6,35	5,08	20,32	63,50	0,15	●	●		
CB420080025000L	-3	6,35	5,08	20,32	63,50	–	●	●		
CB420090025006L	-3	6,35	5,08	22,86	63,50	0,15	●	●		
CB420090025000L	-3	6,35	5,08	22,86	63,50	–	●	●		
CB4200100025006L	-3	6,35	5,08	25,40	63,50	0,15	●	●		
CB4200100025000L	-3	6,35	5,08	25,40	63,50	–	●	●		
CB4200110025006L	-3	6,35	5,08	27,94	63,50	0,15	●	●		
CB4200110025000L	-3	6,35	5,08	27,94	63,50	–	●	●		
CB4200120025006L	-3	6,35	5,08	30,48	63,50	0,15	●	●		
CB4200120025000L	-3	6,35	5,08	30,48	63,50	–	●	●		
CB4200130025006L	-3	6,35	5,08	33,02	63,50	0,15	●	●		
CB4200130025000L	-3	6,35	5,08	33,02	63,50	–	●	●		

● first choice
○ alternate choice

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

CB • Shank Diameter 7,94mm • Cutting Diameter ≤5,84mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB523040025006R	-3	7,94	5,84	10,16	63,50	0,15	●	●		
CB523040025000R	-3	7,94	5,84	10,16	63,50	–	●	●		
CB523050025006R	-3	7,94	5,84	12,70	63,50	0,15	●	●		
CB523050025000R	-3	7,94	5,84	12,70	63,50	–	●	●		
CB523060025006R	-3	7,94	5,84	15,24	63,50	0,15	●	●		
CB523060025000R	-3	7,94	5,84	15,24	63,50	–	●	●		
CB523070025006R	-3	7,94	5,84	17,78	63,50	0,15	●	●		
CB523070025000R	-3	7,94	5,84	17,78	63,50	–	●	●		
CB523080025006R	-3	7,94	5,84	20,32	63,50	0,15	●	●		
CB523080025000R	-3	7,94	5,84	20,32	63,50	–	●	●		
CB523090025006R	-3	7,94	5,84	22,86	63,50	0,15	●	●		
CB523090025000R	-3	7,94	5,84	22,86	63,50	–	●	●		
CB5230100025006R	-3	7,94	5,84	25,40	63,50	0,15	●	●		
CB5230100025000R	-3	7,94	5,84	25,40	63,50	–	●	●		
CB5230115025006R	-3	7,94	5,84	29,21	63,50	0,15	●	●		
CB5230115025000R	-3	7,94	5,84	29,21	63,50	–	●	●		
CB5230120025006R	-3	7,94	5,84	30,48	63,50	0,15	●	●		
CB5230120025000R	-3	7,94	5,84	30,48	63,50	–	●	●		
CB5230125025006R	-3	7,94	5,84	31,75	63,50	0,15	●	●		
CB5230125025000R	-3	7,94	5,84	31,75	63,50	–	●	●		
CB5230140025006R	-3	7,94	5,84	35,56	63,50	0,15	●	●		
CB5230140025000R	-3	7,94	5,84	35,56	63,50	–	●	●		
CB5230150025006R	-3	7,94	5,84	38,10	63,50	0,15	●	●		
CB5230150025000R	-3	7,94	5,84	38,10	63,50	–	●	●		
CB5230160025006R	-3	7,94	5,84	40,64	63,50	0,15	●	●		
CB5230160025000R	-3	7,94	5,84	40,64	63,50	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 7,94mm • Cutting Diameter ≤5,84mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB523040025006L	-3	7,94	5,84	10,16	63,50	0,15	●	●		
CB523040025000L	-3	7,94	5,84	10,16	63,50	–	●	●		
CB523050025006L	-3	7,94	5,84	12,70	63,50	0,15	●	●		
CB523050025000L	-3	7,94	5,84	12,70	63,50	–	●	●		
CB523060025006L	-3	7,94	5,84	15,24	63,50	0,15	●	●		
CB523060025000L	-3	7,94	5,84	15,24	63,50	–	●	●		
CB523070025006L	-3	7,94	5,84	17,78	63,50	0,15	●	●		
CB523070025000L	-3	7,94	5,84	17,78	63,50	–	●	●		
CB523080025006L	-3	7,94	5,84	20,32	63,50	0,15	●	●		
CB523080025000L	-3	7,94	5,84	20,32	63,50	–	●	●		
CB523090025006L	-3	7,94	5,84	22,86	63,50	0,15	●	●		
CB523090025000L	-3	7,94	5,84	22,86	63,50	–	●	●		
CB5230100025006L	-3	7,94	5,84	25,40	63,50	0,15	●	●		
CB5230100025000L	-3	7,94	5,84	25,40	63,50	–	●	●		
CB5230115025006L	-3	7,94	5,84	29,21	63,50	0,15	●	●		
CB5230115025000L	-3	7,94	5,84	29,21	63,50	–	●	●		
CB5230120025006L	-3	7,94	5,84	30,48	63,50	0,15	●	●		
CB5230120025000L	-3	7,94	5,84	30,48	63,50	–	●	●		
CB5230125025006L	-3	7,94	5,84	31,75	63,50	0,15	●	●		
CB5230125025000L	-3	7,94	5,84	31,75	63,50	–	●	●		
CB5230140025006L	-3	7,94	5,84	35,56	63,50	0,15	●	●		
CB5230140025000L	-3	7,94	5,84	35,56	63,50	–	●	●		
CB5230150025006L	-3	7,94	5,84	38,10	63,50	0,15	●	●		
CB5230150025000L	-3	7,94	5,84	38,10	63,50	–	●	●		
CB5230160025006L	-3	7,94	5,84	40,64	63,50	0,15	●	●		
CB5230160025000L	-3	7,94	5,84	40,64	63,50	–	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

CB • Shank Diameter 7,94mm • Cutting Diameter ≥7,37mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB529050025006R	-3	7,94	7,37	12,70	63,50	0,15	●	●		
CB529050025000R	-3	7,94	7,37	12,70	63,50	–	●	●		
CB529060025006R	-3	7,94	7,37	15,24	63,50	0,15	●	●		
CB529060025000R	-3	7,94	7,37	15,24	63,50	–	●	●		
CB529075025006R	-3	7,94	7,37	19,05	63,50	0,15	●	●		
CB529075025000R	-3	7,94	7,37	19,05	63,50	–	●	●		
CB529090025006R	-3	7,94	7,37	22,86	63,50	0,15	●	●		
CB529090025000R	-3	7,94	7,37	22,86	63,50	–	●	●		
CB5290100025006R	-3	7,94	7,37	25,40	63,50	0,15	●	●		
CB5290100025000R	-3	7,94	7,37	25,40	63,50	–	●	●		
CB5290110025006R	-3	7,94	7,37	27,94	63,50	0,15	●	●		
CB5290110025000R	-3	7,94	7,37	27,94	63,50	–	●	●		
CB5290125025006R	-3	7,94	7,37	31,75	63,50	0,15	●	●		
CB5290125025000R	-3	7,94	7,37	31,75	63,50	–	●	●		
CB5290135025006R	-3	7,94	7,37	34,29	63,50	0,15	●	●		
CB5290135025000R	-3	7,94	7,37	34,29	63,50	–	●	●		
CB5290150025006R	-3	7,94	7,37	38,10	63,50	0,15	●	●		
CB5290150025000R	-3	7,94	7,37	38,10	63,50	–	●	●		
CB5290160025006R	-3	7,94	7,37	40,64	63,50	0,15	●	●		
CB5290160025000R	-3	7,94	7,37	40,64	63,50	–	●	●		
CB5290175025006R	-3	7,94	7,37	44,45	63,50	0,15	●	●		
CB5290175025000R	-3	7,94	7,37	44,45	63,50	–	●	●		
Left hand										
CB529050025006L	-3	7,94	7,37	12,70	63,50	0,15	●	●		
CB529050025000L	-3	7,94	7,37	12,70	63,50	–	●	●		
CB529060025006L	-3	7,94	7,37	15,24	63,50	0,15	●	●		
CB529060025000L	-3	7,94	7,37	15,24	63,50	–	●	●		
CB529075025006L	-3	7,94	7,37	19,05	63,50	0,15	●	●		
CB529075025000L	-3	7,94	7,37	19,05	63,50	–	●	●		
CB529090025006L	-3	7,94	7,37	22,86	63,50	0,15	●	●		
CB529090025000L	-3	7,94	7,37	22,86	63,50	–	●	●		
CB5290100025006L	-3	7,94	7,37	25,40	63,50	0,15	●	●		
CB5290100025000L	-3	7,94	7,37	25,40	63,50	–	●	●		
CB5290110025006L	-3	7,94	7,37	27,94	63,50	0,15	●	●		
CB5290110025000L	-3	7,94	7,37	27,94	63,50	–	●	●		
CB5290125025006L	-3	7,94	7,37	31,75	63,50	0,15	●	●		
CB5290125025000L	-3	7,94	7,37	31,75	63,50	–	●	●		
CB5290135025006L	-3	7,94	7,37	34,29	63,50	0,15	●	●		
CB5290135025000L	-3	7,94	7,37	34,29	63,50	–	●	●		
CB5290150025006L	-3	7,94	7,37	38,10	63,50	0,15	●	●		
CB5290150025000L	-3	7,94	7,37	38,10	63,50	–	●	●		
CB5290160025006L	-3	7,94	7,37	40,64	63,50	0,15	●	●		
CB5290160025000L	-3	7,94	7,37	40,64	63,50	–	●	●		
CB5290175025006L	-3	7,94	7,37	44,45	63,50	0,15	●	●		
CB5290175025000L	-3	7,94	7,37	44,45	63,50	–	●	●		

● first choice
○ alternate choice

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

■ CB • Shank Diameter 9,53mm • Cutting Diameter ≥8,13mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB632050025006R	-3	9,53	8,13	12,70	63,50	0,15	●	●		
CB632050025000R	-3	9,53	8,13	12,70	63,50	–	●	●		
CB632060025006R	-3	9,53	8,13	15,24	63,50	0,15	●	●		
CB632060025000R	-3	9,53	8,13	15,24	63,50	–	●	●		
CB632075025006R	-3	9,53	8,13	19,05	63,50	0,15	●	●		
CB632075025000R	-3	9,53	8,13	19,05	63,50	–	●	●		
CB632090025006R	-3	9,53	8,13	22,86	63,50	0,15	●	●		
CB632090025000R	-3	9,53	8,13	22,86	63,50	–	●	●		
CB6320100025006R	-3	9,53	8,13	25,40	63,50	0,15	●	●		
CB6320100025000R	-3	9,53	8,13	25,40	63,50	–	●	●		
CB6320110025006R	-3	9,53	8,13	27,94	63,50	0,15	●	●		
CB6320110025000R	-3	9,53	8,13	27,94	63,50	–	●	●		
CB6320125025006R	-3	9,53	8,13	31,75	63,50	0,15	●	●		
CB6320125025000R	-3	9,53	8,13	31,75	63,50	–	●	●		
CB6320150025006R	-3	9,53	8,13	38,10	63,50	0,15	●	●		
CB6320150025000R	-3	9,53	8,13	38,10	63,50	–	●	●		
CB6320160025006R	-3	9,53	8,13	40,64	63,50	0,15	●	●		
CB6320160025000R	-3	9,53	8,13	40,64	63,50	–	●	●		
CB6320180025006R	-3	9,53	8,13	45,72	63,50	0,15		●		
CB6320180025006R	-3	9,53	8,13	45,72	63,50	0,15	●			
CB6320180025000R	-3	9,53	8,13	45,72	63,50	–	●	●		
CB6320200040006R	-3	9,53	8,13	50,80	101,60	0,15	●	●		
CB6320200040000R	-3	9,53	8,13	50,80	101,60	–	●	●		
CB6320250040006R	-3	9,53	8,13	63,50	101,60	0,15	●	●		
CB6320250040000R	-3	9,53	8,13	63,50	101,60	–	●	●		
CB6320300040006R	-3	9,53	8,13	76,20	101,60	0,15	●	●		
CB6320300040000R	-3	9,53	8,13	76,20	101,60	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CB • Shank Diameter 9,53mm • Cutting Diameter ≥8,13mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB632050025006L	-3	9,53	8,13	12,70	63,50	0,15	●	●		
CB632050025000L	-3	9,53	8,13	12,70	63,50	–	●	●		
CB632060025006L	-3	9,53	8,13	15,24	63,50	0,15	●	●		
CB632060025000L	-3	9,53	8,13	15,24	63,50	–	●	●		
CB632075025006L	-3	9,53	8,13	19,05	63,50	0,15	●	●		
CB632075025000L	-3	9,53	8,13	19,05	63,50	–	●	●		
CB632090025006L	-3	9,53	8,13	22,86	63,50	0,15	●	●		
CB632090025000L	-3	9,53	8,13	22,86	63,50	–	●	●		
CB6320100025006L	-3	9,53	8,13	25,40	63,50	0,15	●	●		
CB6320100025000L	-3	9,53	8,13	25,40	63,50	–	●	●		
CB6320110025006L	-3	9,53	8,13	27,94	63,50	0,15	●	●		
CB6320110025000L	-3	9,53	8,13	27,94	63,50	–	●	●		
CB6320125025006L	-3	9,53	8,13	31,75	63,50	0,15	●	●		
CB6320125025000L	-3	9,53	8,13	31,75	63,50	–	●	●		
CB6320150025006L	-3	9,53	8,13	38,10	63,50	0,15	●	●		
CB6320150025000L	-3	9,53	8,13	38,10	63,50	–	●	●		
CB6320160025006L	-3	9,53	8,13	40,64	63,50	0,15	●	●		
CB6320160025000L	-3	9,53	8,13	40,64	63,50	–	●	●		
CB6320180025006L	-3	9,53	8,13	45,72	63,50	0,15	●	●		
CB6320180025000L	-3	9,53	8,13	45,72	63,50	–	●	●		
CB6320200040006L	-3	9,53	8,13	50,80	101,60	0,15	●	●		
CB6320200040000L	-3	9,53	8,13	50,80	101,60	–	●	●		
CB6320250040006L	-3	9,53	8,13	63,50	101,60	0,15	●	●		
CB6320250040000L	-3	9,53	8,13	63,50	101,60	–	●	●		
CB6320300040006L	-3	9,53	8,13	76,20	101,60	0,15	●	●		
CB6320300040000L	-3	9,53	8,13	76,20	101,60	–	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB • Shank Diameter 9,53mm • Cutting Diameter ≥9,14mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB636050025006R	-3	9,53	9,14	12,70	63,50	0,15	●	●		
CB636050025000R	-3	9,53	9,14	12,70	63,50	–	●	●		
CB636060025006R	-3	9,53	9,14	15,24	63,50	0,15	●	●		
CB636060025000R	-3	9,53	9,14	15,24	63,50	–	●	●		
CB636075025006R	-3	9,53	9,14	19,05	63,50	0,15	●	●		
CB636075025000R	-3	9,53	9,14	19,05	63,50	–	●	●		
CB636090025006R	-3	9,53	9,14	22,86	63,50	0,15	●	●		
CB636090025000R	-3	9,53	9,14	22,86	63,50	–	●	●		
CB6360100025006R	-3	9,53	9,14	25,40	63,50	0,15	●	●		
CB6360100025000R	-3	9,53	9,14	25,40	63,50	–	●	●		
CB6360115025006R	-3	9,53	9,14	29,21	63,50	0,15	●	●		
CB6360115025000R	-3	9,53	9,14	29,21	63,50	–	●	●		
CB6360125025006R	-3	9,53	9,14	31,75	63,50	0,15	●	●		
CB6360125025000R	-3	9,53	9,14	31,75	63,50	–	●	●		
CB6360150025006R	-3	9,53	9,14	38,10	63,50	0,15	●	●		
CB6360150025000R	-3	9,53	9,14	38,10	63,50	–	●	●		
CB6360160025006R	-3	9,53	9,14	40,64	63,50	0,15	●	●		
CB6360160025000R	-3	9,53	9,14	40,64	63,50	–	●	●		
CB6360180025006R	-3	9,53	9,14	45,72	63,50	0,15	●	●		
CB6360180025000R	-3	9,53	9,14	45,72	63,50	–	●	●		
CB6360200040006R	-3	9,53	9,14	50,80	101,60	0,15	●	●		
CB6360200040000R	-3	9,53	9,14	50,80	101,60	–	●	●		
CB6360250040006R	-3	9,53	9,14	63,50	101,60	0,15	●	●		
CB6360250040000R	-3	9,53	9,14	63,50	101,60	–	●	●		
CB6360300040006R	-3	9,53	9,14	76,20	101,60	0,15	●	●		
CB6360300040000R	-3	9,53	9,14	76,20	101,60	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CB • Shank Diameter 9,53mm • Cutting Diameter ≥9,14mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB636050025006L	-3	9,53	9,14	12,70	63,50	0,15	●	●		
CB636050025000L	-3	9,53	9,14	12,70	63,50	–	●	●		
CB636060025006L	-3	9,53	9,14	15,24	63,50	0,15	●	●		
CB636060025000L	-3	9,53	9,14	15,24	63,50	–	●	●		
CB636075025006L	-3	9,53	9,14	19,05	63,50	0,15	●	●		
CB636075025000L	-3	9,53	9,14	19,05	63,50	–	●	●		
CB636090025006L	-3	9,53	9,14	22,86	63,50	0,15	●	●		
CB636090025000L	-3	9,53	9,14	22,86	63,50	–	●	●		
CB6360100025006L	-3	9,53	9,14	25,40	63,50	0,15	●	●		
CB6360100025000L	-3	9,53	9,14	25,40	63,50	–	●	●		
CB6360115025006L	-3	9,53	9,14	29,21	63,50	0,15	●	●		
CB6360115025000L	-3	9,53	9,14	29,21	63,50	–	●	●		
CB6360125025006L	-3	9,53	9,14	31,75	63,50	0,15	●	●		
CB6360125025000L	-3	9,53	9,14	31,75	63,50	–	●	●		
CB6360150025006L	-3	9,53	9,14	38,10	63,50	0,15	●	●		
CB6360150025000L	-3	9,53	9,14	38,10	63,50	–	●	●		
CB6360160025006L	-3	9,53	9,14	40,64	63,50	0,15	●	●		
CB6360160025000L	-3	9,53	9,14	40,64	63,50	–	●	●		
CB6360180025006L	-3	9,53	9,14	45,72	63,50	0,15	●	●		
CB6360180025000L	-3	9,53	9,14	45,72	63,50	–	●	●		
CB6360200040006L	-3	9,53	9,14	50,80	101,60	0,15	●	●		
CB6360200040000L	-3	9,53	9,14	50,80	101,60	–	●	●		
CB6360250040006L	-3	9,53	9,14	63,50	101,60	0,15	●	●		
CB6360250040000L	-3	9,53	9,14	63,50	101,60	–	●	●		
CB6360300040006L	-3	9,53	9,14	76,20	101,60	0,15	●	●		
CB6360300040000L	-3	9,53	9,14	76,20	101,60	–	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CB • Shank Diameter 12,70mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB849075030006R	-3	12,70	12,45	19,05	76,20	0,15	●	●		
CB849075030000R	-3	12,70	12,45	19,05	76,20	–	●	●		
CB8490100030006R	-3	12,70	12,45	25,40	76,20	0,15	●	●		
CB8490100030000R	-3	12,70	12,45	25,40	76,20	–	●	●		
CB8490125030006R	-3	12,70	12,45	31,75	76,20	0,15	●	●		
CB8490125030000R	-3	12,70	12,45	31,75	76,20	–	●	●		
CB8490150030006R	-3	12,70	12,45	38,10	76,20	0,15	●	●		
CB8490150030000R	-3	12,70	12,45	38,10	76,20	–	●	●		
CB8490200040006R	-3	12,70	12,45	50,80	101,60	0,15	●	●		
CB8490200040000R	-3	12,70	12,45	50,80	101,60	–	●	●		
CB8490250040006R	-3	12,70	12,45	63,50	101,60	0,15	●	●		
CB8490250040000R	-3	12,70	12,45	63,50	101,60	–	●	●		
CB8490260040006R	-3	12,70	12,45	66,04	101,60	0,15	●	●		
CB8490260040000R	-3	12,70	12,45	66,04	101,60	–	●	●		
CB8490275040006R	-3	12,70	12,45	69,85	101,60	0,15	●	●		
CB8490275040000R	-3	12,70	12,45	69,85	101,60	–	●	●		
CB8490300060006R	-3	12,70	12,45	76,20	152,40	0,15	●	●		
CB8490300060000R	-3	12,70	12,45	76,20	152,40	–	●	●		
CB8490350060006R	-3	12,70	12,45	88,90	152,40	0,15	●	●		
CB8490350060000R	-3	12,70	12,45	88,90	152,40	–	●	●		
CB8490400060006R	-3	12,70	12,45	101,60	152,40	0,15	●	●		
CB8490400060000R	-3	12,70	12,45	101,60	152,40	–	●	●		
CB8490450060006R	-3	12,70	12,45	114,30	152,40	0,15	●	●		
CB8490450060000R	-3	12,70	12,45	114,30	152,40	–	●	●		

(continued)

(continued)

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CB • Shank Diameter 12,70mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Left hand										
CB849075030006L	-3	12,70	12,45	19,05	76,20	0,15	●	●		
CB849075030000L	-3	12,70	12,45	19,05	76,20	–	●	●		
CB8490100030006L	-3	12,70	12,45	25,40	76,20	0,15	●	●		
CB8490100030000L	-3	12,70	12,45	25,40	76,20	–	●	●		
CB8490125030006L	-3	12,70	12,45	31,75	76,20	0,15	●	●		
CB8490125030000L	-3	12,70	12,45	31,75	76,20	–	●	●		
CB8490150030006L	-3	12,70	12,45	38,10	76,20	0,15	●	●		
CB8490150030000L	-3	12,70	12,45	38,10	76,20	–	●	●		
CB8490200040006L	-3	12,70	12,45	50,80	101,60	0,15	●	●		
CB8490200040000L	-3	12,70	12,45	50,80	101,60	–	●	●		
CB8490250040006L	-3	12,70	12,45	63,50	101,60	0,15	●	●		
CB8490250040000L	-3	12,70	12,45	63,50	101,60	–	●	●		
CB8490260040006L	-3	12,70	12,45	66,04	101,60	0,15	●	●		
CB8490260040000L	-3	12,70	12,45	66,04	101,60	–	●	●		
CB8490275040006L	-3	12,70	12,45	69,85	101,60	0,15	●	●		
CB8490275040000L	-3	12,70	12,45	69,85	101,60	–	●	●		
CB8490300060006L	-3	12,70	12,45	76,20	152,40	0,15	●	●		
CB8490300060000L	-3	12,70	12,45	76,20	152,40	–	●	●		
CB8490350060006L	-3	12,70	12,45	88,90	152,40	0,15	●	●		
CB8490350060000L	-3	12,70	12,45	88,90	152,40	–	●	●		
CB8490400060006L	-3	12,70	12,45	101,60	152,40	0,15	●	●		
CB8490400060000L	-3	12,70	12,45	101,60	152,40	–	●	●		
CB8490450060006L	-3	12,70	12,45	114,30	152,40	0,15	●	●		
CB8490450060000L	-3	12,70	12,45	114,30	152,40	–	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CB-M • Shank Diameter 3,18mm–4,76mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB210015015004RM	-3	3,18	2,54	3,81	38,10	0,10			●	●
CB210020015004RM	-3	3,18	2,54	5,08	38,10	0,10			●	●
CB210030015004RM	-3	3,18	2,54	7,62	38,10	0,10			●	●
CB210040015004RM	-3	3,18	2,54	10,16	38,10	0,10			●	●
CB210050015004RM	-3	3,18	2,54	12,70	38,10	0,10			●	●
CB210060015004RM	-3	3,18	2,54	15,24	38,10	0,10			●	●
CB210070015004RM	-3	3,18	2,54	17,78	38,10	0,10			●	●
CB211015015004RM	-3	3,18	2,79	3,81	38,10	0,10			●	●
CB211020015004RM	-3	3,18	2,79	5,08	38,10	0,10			●	●
CB211030015004RM	-3	3,18	2,79	7,62	38,10	0,10			●	●
CB211040015004RM	-3	3,18	2,79	10,16	38,10	0,10			●	●
CB211050015004RM	-3	3,18	2,79	12,70	38,10	0,10			●	●
CB211060015004RM	-3	3,18	2,79	15,24	38,10	0,10			●	●
CB211070015004RM	-3	3,18	2,79	17,78	38,10	0,10			●	●
CB312025020006RM	-3	4,76	3,05	6,35	50,80	0,15			●	●
CB312035020006RM	-3	4,76	3,05	8,89	50,80	0,15			●	●
CB312050020006RM	-3	4,76	3,05	12,70	50,80	0,15			●	●
CB312060020006RM	-3	4,76	3,05	15,24	50,80	0,15			●	●
CB312070020006RM	-3	4,76	3,05	17,78	50,80	0,15			●	●
CB312080020006RM	-3	4,76	3,05	20,32	50,80	0,15			●	●
CB314025020006RM	-3	4,76	3,56	6,35	50,80	0,15			●	●
CB314040020006RM	-3	4,76	3,56	10,16	50,80	0,15			●	●
CB314050020006RM	-3	4,76	3,56	12,70	50,80	0,15			●	●
CB314060020006RM	-3	4,76	3,56	15,24	50,80	0,15			●	●
CB314070020006RM	-3	4,76	3,56	17,78	50,80	0,15			●	●
CB314075020006RM	-3	4,76	3,56	19,05	50,80	0,15			●	●
CB314080020006RM	-3	4,76	3,56	20,32	50,80	0,15			●	●
CB316025020006RM	-3	4,76	4,06	6,35	50,80	0,15			●	●
CB316040020006RM	-3	4,76	4,06	10,16	50,80	0,15			●	●
CB316050020006RM	-3	4,76	4,06	12,70	50,80	0,15			●	●
CB316060020006RM	-3	4,76	4,06	15,24	50,80	0,15			●	●
CB316075020006RM	-3	4,76	4,06	19,05	50,80	0,15			●	●
CB316090020006RM	-3	4,76	4,06	22,86	50,80	0,15			●	●
CB3160100020006RM	-3	4,76	4,06	25,40	50,80	0,15			●	●

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

CB-M • Shank Diameter 6,35mm–7,94mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB418035025006RM	-3	6,35	4,57	8,89	63,50	0,15			●	●
CB418050025006RM	-3	6,35	4,57	12,70	63,50	0,15			●	●
CB418060025006RM	-3	6,35	4,57	15,24	63,50	0,15			●	●
CB418075025006RM	-3	6,35	4,57	19,05	63,50	0,15			●	●
CB418090025006RM	-3	6,35	4,57	22,86	63,50	0,15			●	●
CB4180100025006RM	-3	6,35	4,57	25,40	63,50	0,15			●	●
CB4180110025006RM	-3	6,35	4,57	27,94	63,50	0,15			●	●
CB420040025006RM	-3	6,35	5,08	10,16	63,50	0,15			●	●
CB420050025006RM	-3	6,35	5,08	12,70	63,50	0,15			●	●
CB420060025006RM	-3	6,35	5,08	15,24	63,50	0,15			●	●
CB420070025006RM	-3	6,35	5,08	17,78	63,50	0,15			●	●
CB420080025006RM	-3	6,35	5,08	20,32	63,50	0,15			●	●
CB420090025006RM	-3	6,35	5,08	22,86	63,50	0,15			●	●
CB4200100025006RM	-3	6,35	5,08	25,40	63,50	0,15			●	●
CB4200110025006RM	-3	6,35	5,08	27,94	63,50	0,15			●	●
CB4200120025006RM	-3	6,35	5,08	30,48	63,50	0,15			●	●
CB4200130025006RM	-3	6,35	5,08	33,02	63,50	0,15			●	●
CB523040025006RM	-3	7,94	5,84	10,16	63,50	0,15			●	●
CB523050025006RM	-3	7,94	5,84	12,70	63,50	0,15			●	●
CB523060025006RM	-3	7,94	5,84	15,24	63,50	0,15			●	●
CB523070025006RM	-3	7,94	5,84	17,78	63,50	0,15			●	●
CB523080025006RM	-3	7,94	5,84	20,32	63,50	0,15			●	●
CB523090025006RM	-3	7,94	5,84	22,86	63,50	0,15			●	●
CB5230100025006RM	-3	7,94	5,84	25,40	63,50	0,15			●	●
CB5230115025006RM	-3	7,94	5,84	29,21	63,50	0,15			●	●
CB5230120025006RM	-3	7,94	5,84	30,48	63,50	0,15			●	●
CB5230125025006RM	-3	7,94	5,84	31,75	63,50	0,15			●	●
CB5230140025006RM	-3	7,94	5,84	35,56	63,50	0,15			●	●
CB5230150025006RM	-3	7,94	5,84	38,10	63,50	0,15			●	●
CB5230160025006RM	-3	7,94	5,84	40,64	63,50	0,15			●	●
CB529050025006RM	-3	7,94	7,37	12,70	63,50	0,15			●	●
CB529060025006RM	-3	7,94	7,37	15,24	63,50	0,15			●	●
CB529075025006RM	-3	7,94	7,37	19,05	63,50	0,15			●	●
CB529090025006RM	-3	7,94	7,37	22,86	63,50	0,15			●	●
CB5290100025006RM	-3	7,94	7,37	25,40	63,50	0,15			●	●
CB5290110025006RM	-3	7,94	7,37	27,94	63,50	0,15			●	●
CB5290125025006RM	-3	7,94	7,37	31,75	63,50	0,15			●	●
CB5290135025006RM	-3	7,94	7,37	34,29	63,50	0,15			●	●
CB5290150025006RM	-3	7,94	7,37	38,10	63,50	0,15			●	●
CB5290160025006RM	-3	7,94	7,37	40,64	63,50	0,15			●	●
CB5290175025006RM	-3	7,94	7,37	44,45	63,50	0,15			●	●

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ CB-M • Shank Diameter 9,53mm–12,70mm

ISO catalogue number	KRA	D	D min	L4	L	Rε	CG5	CM1	CBN6	CPD1
Right hand										
CB632050025006RM	-3	9,53	8,13	12,70	63,50	0,15			●	●
CB632060025006RM	-3	9,53	8,13	15,24	63,50	0,15			●	●
CB632075025006RM	-3	9,53	8,13	19,05	63,50	0,15			●	●
CB632090025006RM	-3	9,53	8,13	22,86	63,50	0,15			●	●
CB6320100025006RM	-3	9,53	8,13	25,40	63,50	0,15			●	●
CB6320110025006RM	-3	9,53	8,13	27,94	63,50	0,15			●	●
CB6320125025006RM	-3	9,53	8,13	31,75	63,50	0,15			●	●
CB6320150025006RM	-3	9,53	8,13	38,10	63,50	0,15			●	●
CB6320160025006RM	-3	9,53	8,13	40,64	63,50	0,15			●	●
CB6320180025006RM	-3	9,53	8,13	45,72	63,50	0,15			●	●
CB6320200040006RM	-3	9,53	8,13	50,80	101,60	0,15			●	●
CB6320250040006RM	-3	9,53	8,13	63,50	101,60	0,15			●	●
CB6320300040006RM	-3	9,53	8,13	76,20	101,60	0,15			●	●
CB636050025006RM	-3	9,53	9,14	12,70	63,50	0,15			●	●
CB636060025006RM	-3	9,53	9,14	15,24	63,50	0,15			●	●
CB636075025006RM	-3	9,53	9,14	19,05	63,50	0,15			●	●
CB636090025006RM	-3	9,53	9,14	22,86	63,50	0,15			●	●
CB6360100025006RM	-3	9,53	9,14	25,40	63,50	0,15			●	●
CB6360115025006RM	-3	9,53	9,14	29,21	63,50	0,15			●	●
CB6360125025006RM	-3	9,53	9,14	31,75	63,50	0,15			●	●
CB6360150025006RM	-3	9,53	9,14	38,10	63,50	0,15			●	●
CB6360160025006RM	-3	9,53	9,14	40,64	63,50	0,15			●	●
CB6360180025006RM	-3	9,53	9,14	45,72	63,50	0,15			●	●
CB6360200040006RM	-3	9,53	9,14	50,80	101,60	0,15			●	●
CB6360250040006RM	-3	9,53	9,14	63,50	101,60	0,15			●	●
CB6360300040006RM	-3	9,53	9,14	76,20	101,60	0,15			●	●
CB849075030006RM	-3	12,70	12,45	19,05	76,20	0,15			●	●
CB8490100030006RM	-3	12,70	12,45	25,40	76,20	0,15			●	●
CB8490125030006RM	-3	12,70	12,45	31,75	76,20	0,15			●	●
CB8490150030006RM	-3	12,70	12,45	38,10	76,20	0,15			●	●
CB8490200040006RM	-3	12,70	12,45	50,80	101,60	0,15			●	●
CB8490250040006RM	-3	12,70	12,45	63,50	101,60	0,15			●	●
CB8490260040006RM	-3	12,70	12,45	66,04	101,60	0,15			●	●
CB8490275040006RM	-3	12,70	12,45	69,85	101,60	0,15			●	●
CB8490300060006RM	-3	12,70	12,45	76,20	152,40	0,15			●	●
CB8490350060006RM	-3	12,70	12,45	88,90	152,40	0,15			●	●
CB8490400060006RM	-3	12,70	12,45	101,60	152,40	0,15			●	●
CB8490450060006RM	-3	12,70	12,45	114,30	152,40	0,15			●	●

● first choice
○ alternate choice

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

CHB

ISO catalogue number	D	D min	L4	L	CG5	CM1	CBN6	CPD1
CHB20200621500R	3,18	0,51	1,59	38,10	●	●		
CHB20250621500R	3,18	0,64	1,59	38,10	●	●		
CHB20251251500R	3,18	0,64	3,18	38,10	●	●		
CHB20301251500R	3,18	0,76	3,18	38,10	●	●		
CHB20301871500R	3,18	0,76	4,76	38,10	●	●		
CHB20351251500R	3,18	0,89	3,18	38,10	●	●		
CHB20351871500R	3,18	0,89	4,76	38,10	●	●		
CHB20401871500R	3,18	1,02	4,76	38,10	●	●		
CHB20402501500R	3,18	1,02	6,35	38,10	●	●		
CHB20503121500R	3,18	1,27	7,94	38,10	●	●		
CHB20603751500R	3,18	1,52	9,53	38,10	●	●		
CHB20704371500R	3,18	1,78	11,10	38,10	●	●		
CHB20805001500R	3,18	2,03	12,70	38,10	●	●		
CHB20905001500R	3,18	2,29	12,70	38,10	●	●		
CHB21005621500R	3,18	2,54	14,29	38,10	●	●		
CHB21206251500R	3,18	3,05	15,88	38,10	●	●		
CHB212010001500R	3,18	3,05	25,40	38,10	●	●		
CHB31357502000R	4,76	3,43	19,05	50,80	●	●		
CHB313510002000R	4,76	3,43	25,40	50,80	●	●		
CHB315010002000R	4,76	3,81	25,40	50,80	●	●		
CHB315012502000R	4,76	3,81	31,75	50,80	●	●		
CHB318010002000R	4,76	4,57	25,40	50,80	●	●		
CHB318012502000R	4,76	4,57	31,75	50,80	●	●		
CHB318015002000R	4,76	4,57	38,10	50,80	●	●		
CHB421010002500R	6,35	5,33	25,40	63,50	●	●		
CHB421012502500R	6,35	5,33	31,75	63,50	●	●		
CHB421015002500R	6,35	5,33	38,10	63,50	●	●		
CHB424010002500R	6,35	6,10	25,40	63,50	●	●		
CHB424015002500R	6,35	6,10	38,10	63,50	●	●		
CHB424017502500R	6,35	6,10	44,45	63,50	●	●		
CHB530010002500R	7,94	7,62	25,40	63,50	●	●		
CHB530015002500R	7,94	7,62	38,10	63,50	●	●		
CHB530017502500R	7,94	7,62	44,45	63,50	●	●		
CHB636010002500R	9,53	9,14	25,40	63,50	●	●		
CHB636015002500R	9,53	9,14	38,10	63,50	●	●		
CHB636017502500R	9,53	9,14	44,45	63,50	●	●		
CHB636020004000R	9,53	9,14	50,80	101,60	●	●		
CHB636022504000R	9,53	9,14	57,15	101,60	●	●		
CHB636025004000R	9,53	9,14	63,50	101,60	●	●		
CHB848015003000R	12,70	12,19	38,10	76,20	●	●		
CHB848020003000R	12,70	12,19	50,80	76,20	●	●		
CHB848025004000R	12,70	12,19	63,50	101,60	●	●		
CHB848030004000R	12,70	12,19	76,20	101,60	●	●		
CHB848035006000R	12,70	12,19	88,90	152,40	●	●		
CHB848040006000R	12,70	12,19	101,60	152,40	●	●		
CHB848045006000R	12,70	12,19	114,30	152,40	●	●		

The World's Most Comprehensive Grooving Solutions

How to Choose the Correct Grooving Insert

1 Select tool with the largest D min (minimum bore) for the application.

2 Select tool with the smallest L4 (depth of bore).

3 Select the correct CD (cutting depth) and W (grooving width).

Solid Carbide Bars
Carbide Full Radius Inserts

WIDIA CIRCLE

● first choice
○ alternate choice

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

■ CFR • Shank Diameter 6,35mm–7,95mm

ISO catalogue number	D	1 D min	2 L4	L	3 CD	3 W	RC	C05	CM1	CBN6	CPD1
CFR40172502500R	6,35	6,35	6,35	63,50	1,52	0,45	0,22	●	●		
CFR40252502500R	6,35	6,35	6,35	63,50	1,52	0,65	0,32	●	●		
CFR40302502500R	6,35	6,35	6,35	63,50	1,52	0,78	0,39	●	●		
CFR40173752500R	6,35	6,35	9,53	63,50	1,52	0,45	0,22	●	●		
CFR40253752500R	6,35	6,35	9,53	63,50	1,52	0,65	0,32	●	●		
CFR40303752500R	6,35	6,35	9,53	63,50	1,52	0,78	0,39	●	●		
CFR40175002500R	6,35	6,35	12,70	63,50	1,52	0,45	0,22	●	●		
CFR40255002500R	6,35	6,35	12,70	63,50	1,52	0,65	0,32	●	●		

4 Select appropriate grade using grade descriptions on page C74.

5 Select the cutting conditions using speed and feed chart on page C75.

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
Material

C = Carbide

FG
Groove Style

FG	=	Face Grooving
FR	=	Full Radius
OR	=	O-Ring
RR	=	Retaining Ring
UG	=	Undercut
UPG	=	Undercut/Profile

4
Shank Diameter

shown as "D"

4	=	6,35mm
5	=	7,94mm
6	=	9,53mm
8	=	12,70mm
10	=	15,88mm
12	=	19,05mm

017
Groove Width

shown as "W"

017	=	0,43mm/0,45mm
020	=	0,51mm
025	=	0,64mm/0,65mm
030	=	0,76mm/0,78mm
033	=	0,84mm/0,85mm
038	=	0,97mm/0,98mm
040	=	1,02mm
047	=	1,19mm
050	=	1,27mm
056	=	1,42mm
062	=	1,58mm
063	=	1,60mm
070	=	1,78mm
088	=	2,24mm
093	=	2,36mm
094	=	2,39mm
097	=	2,46mm
125	=	3,18mm
126	=	3,20mm
142	=	3,61mm
145	=	3,68mm
157	=	3,99mm
175	=	4,45mm
187	=	4,75mm
188	=	4,78mm
209	=	5,31mm
242	=	6,15mm
250	=	6,35mm

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

250

Bore Depth

shown as "CD" or "L4"

050	=	1,27mm
075	=	1,91mm
100	=	2,54mm
150	=	3,81mm
250	=	6,35mm
375	=	9,53mm
500	=	12,70mm
563	=	14,30mm
625	=	15,88mm
750	=	19,05mm
813	=	20,65mm
938	=	23,83mm
1000	=	25,40mm
1250	=	31,75mm
1500	=	38,10mm

2500

Overall Length

shown as "L"

2500	=	63,50mm
3000	=	76,20mm
4000	=	101,60mm

15

Tool Radius

shown as "Rε/RC"

15	=	0,38mm
40	=	1,02mm

R

Hand of Insert

R = Right hand

L = Left hand

WIN WITH WIDIA™

WIDIA™

Victory™ TN5100™ and TN7100™ Series Inserts

Our new WIDIA™ Victory TN Turning Grades provide significant and measurable productivity gains — no matter how challenging your cut.

TN5100

- Drastically reduce cycle times with up to 50% higher speed and feed capability.
- Get exceptional tool life with as much as 50% better wear resistance.
- Engineered specifically for finishing and roughing of cast irons.

TN7100

- Unique multi-layer coating delivers unparalleled high-speed performance.
- Ideal for finishing to heavy roughing of all steels!

WIDIA VICTORY
Win with WIDIA™

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CFG

ISO catalogue number	D	D min	L	CD	W	CG5	CM1	CBN6	CPD1
CFG40200502500R	6,35	6,60	63,50	1,27	0,51	●	●		
CFG40300502500R	6,35	6,60	63,50	1,27	0,76	●	●		
CFG40400502500R	6,35	6,60	63,50	1,27	1,02	●	●		
CFG40500502500R	6,35	6,60	63,50	1,27	1,27	●	●		
CFG50300502500R	7,94	8,13	63,50	1,27	0,76	●	●		
CFG50400502500R	7,94	8,13	63,50	1,27	1,02	●	●		
CFG50500502500R	7,94	8,13	63,50	1,27	1,27	●	●		
CFG50620752500R	7,94	8,13	63,50	1,91	1,58	●	●		
CFG60300502500R	9,53	9,78	63,50	1,27	0,76	●	●		
CFG60620752500R	9,53	9,78	63,50	1,91	1,58	●	●		
CFG60931002500R	9,53	9,78	63,50	2,54	2,36	●	●		
CFG61251002500R	9,53	9,78	63,50	2,54	3,18	●	●		
CFG80620753000R	12,70	12,95	76,20	1,91	1,58	●	●		
CFG80931003000R	12,70	12,95	76,20	2,54	2,36	●	●		
CFG81251003000R	12,70	12,95	76,20	2,54	3,18	●	●		
CFG81561003000R	12,70	12,95	76,20	2,54	3,96	●	●		
CFG100620753500R	15,88	16,13	88,90	1,91	1,58	●	●		
CFG100931003500R	15,88	16,13	88,90	2,54	2,36	●	●		
CFG101251003500R	15,88	16,13	88,90	2,54	3,18	●	●		
CFG101561003500R	15,88	16,13	88,90	2,54	3,96	●	●		
CFG101871503500R	15,88	16,13	88,90	3,81	4,75	●	●		
CFG120620754000R	19,05	19,30	101,60	1,91	1,58	●	●		
CFG120931004000R	19,05	19,30	101,60	2,54	2,36	●	●		
CFG121251004000R	19,05	19,30	101,60	2,54	3,18	●	●		
CFG121561004000R	19,05	19,30	101,60	2,54	3,96	●	●		
CFG121871504000R	19,05	19,30	101,60	3,81	4,75	●	●		
CFG122502504000R	19,05	19,30	101,60	6,35	6,35	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

CFR • Shank Diameter 6,35mm–7,95mm

ISO catalogue number	D	D min	L4	L	CD	W	RC	CG5	CM1	CBN6	CPD1
CFR40172502500R	6,35	6,35	6,35	63,50	1,52	0,45	0,22	●	●		
CFR40252502500R	6,35	6,35	6,35	63,50	1,52	0,65	0,32	●	●		
CFR40302502500R	6,35	6,35	6,35	63,50	1,52	0,78	0,39	●	●		
CFR40173752500R	6,35	6,35	9,53	63,50	1,52	0,45	0,22	●	●		
CFR40253752500R	6,35	6,35	9,53	63,50	1,52	0,65	0,32	●	●		
CFR40303752500R	6,35	6,35	9,53	63,50	1,52	0,78	0,39	●	●		
CFR40175002500R	6,35	6,35	12,70	63,50	1,52	0,45	0,22	●	●		
CFR40255002500R	6,35	6,35	12,70	63,50	1,52	0,65	0,32	●	●		
CFR40305002500R	6,35	6,35	12,70	63,50	1,52	0,78	0,39	●	●		
CFR40176252500R	6,35	6,35	15,88	63,50	1,52	0,45	0,22	●	●		
CFR40256252500R	6,35	6,35	15,88	63,50	1,52	0,65	0,32	●	●		
CFR40306252500R	6,35	6,35	15,88	63,50	1,52	0,78	0,39	●	●		
CFR50332502500R	7,94	7,93	6,35	63,50	2,79	0,85	0,43	●	●		
CFR50382502500R	7,94	7,93	6,35	63,50	2,79	0,98	0,49	●	●		
CFR50333752500R	7,94	7,93	9,53	63,50	2,79	0,85	0,43	●	●		
CFR50335002500R	7,94	7,93	12,70	63,50	2,79	0,85	0,43	●	●		
CFR50385002500R	7,94	7,93	12,70	63,50	2,79	0,98	0,49	●	●		
CFR50383752500R	7,94	7,93	9,53	63,50	2,79	0,98	0,49	●	●		
CFR50337502500R	7,94	7,93	19,05	63,50	2,79	0,85	0,43	●	●		
CFR50387502500R	7,94	7,93	19,05	63,50	2,79	0,98	0,49	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CFR • Shank Diameter 9,53mm

ISO catalogue number	D	D min	L4	L	CD	W	RC	CG5	CM1	CBN6	CPD1
CFR60402502500R	9,53	9,53	6,35	63,50	2,79	1,02	0,51	●	●		
CFR60472502500R	9,53	9,53	6,35	63,50	2,79	1,19	0,60	●	●		
CFR60562502500R	9,53	9,53	6,35	63,50	2,79	1,42	0,71	●	●		
CFR60632502500R	9,53	9,53	6,35	63,50	2,79	1,60	0,80	●	●		
CFR60702502500R	9,53	9,53	6,35	63,50	2,79	1,78	0,89	●	●		
CFR60882502500R	9,53	9,53	6,35	63,50	2,79	2,24	1,12	●	●		
CFR60403752500R	9,53	9,53	9,53	63,50	2,79	1,02	0,51	●	●		
CFR60473752500R	9,53	9,53	9,53	63,50	2,79	1,19	0,60	●	●		
CFR60563752500R	9,53	9,53	9,53	63,50	2,79	1,42	0,71	●	●		
CFR60633752500R	9,53	9,53	9,53	63,50	2,79	1,60	0,80	●	●		
CFR60703752500R	9,53	9,53	9,53	63,50	2,79	1,78	0,89	●	●		
CFR60883752500R	9,53	9,53	9,53	63,50	2,79	2,24	1,12	●	●		
CFR60405002500R	9,53	9,53	12,70	63,50	2,79	1,02	0,51	●	●		
CFR60475002500R	9,53	9,53	12,70	63,50	2,79	1,19	0,60	●	●		
CFR60565002500R	9,53	9,53	12,70	63,50	2,79	1,42	0,71	●	●		
CFR60635002500R	9,53	9,53	12,70	63,50	2,79	1,60	0,80	●	●		
CFR60705002500R	9,53	9,53	12,70	63,50	2,79	1,78	0,89	●	●		
CFR60885002500R	9,53	9,53	12,70	63,50	2,79	2,24	1,12	●	●		
CFR60407502500R	9,53	9,53	19,05	63,50	2,79	1,02	0,51	●	●		
CFR60477502500R	9,53	9,53	19,05	63,50	2,79	1,19	0,60	●	●		
CFR60567502500R	9,53	9,53	19,05	63,50	2,79	1,42	0,71	●	●		
CFR60637502500R	9,53	9,53	19,05	63,50	2,79	1,60	0,80	●	●		
CFR60707502500R	9,53	9,53	19,05	63,50	2,79	1,78	0,89	●	●		
CFR60887502500R	9,53	9,53	19,05	63,50	2,79	2,24	1,12	●	●		
CFR604010002500R	9,53	9,53	25,40	63,50	2,79	1,02	0,51	●	●		
CFR604710002500R	9,53	9,53	25,40	63,50	2,79	1,19	0,60	●	●		
CFR605610002500R	9,53	9,53	25,40	63,50	2,79	1,42	0,71	●	●		
CFR606310002500R	9,53	9,53	25,40	63,50	2,79	1,60	0,80	●	●		
CFR607010002500R	9,53	9,53	25,40	63,50	2,79	1,78	0,89	●	●		
CFR608810002500R	9,53	9,53	25,40	63,50	2,79	2,24	1,12	●	●		
CFR604012502500R	9,53	9,53	31,75	63,50	2,79	1,02	0,51	●	●		
CFR604712502500R	9,53	9,53	31,75	63,50	2,79	1,19	0,60	●	●		
CFR605612502500R	9,53	9,53	31,75	63,50	2,79	1,42	0,71	●	●		
CFR606312502500R	9,53	9,53	31,75	63,50	2,79	1,60	0,80	●	●		
CFR607012502500R	9,53	9,53	31,75	63,50	2,79	1,78	0,89	●	●		
CFR608812502500R	9,53	9,53	31,75	63,50	2,79	2,24	1,12	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

CFR • Shank Diameter 12,70mm

ISO catalogue number	D	D min	L4	L	CD	W	RC	CG5	CM1	CBN6	CPD1
CFR80945003000R	12,70	12,70	12,70	76,20	4,06	2,39	1,19	●	●		
CFR81265003000R	12,70	12,70	12,70	76,20	4,06	3,20	1,60	●	●		
CFR81575003000R	12,70	12,70	12,70	76,20	4,06	3,99	1,99	●	●		
CFR81885003000R	12,70	12,70	12,70	76,20	4,06	4,78	2,39	●	●		
CFR82505003000R	12,70	12,70	12,70	76,20	4,06	6,35	3,18	●	●		
CFR80947503000R	12,70	12,70	19,05	76,20	4,06	2,39	1,19	●	●		
CFR81267503000R	12,70	12,70	19,05	76,20	4,06	3,20	1,60	●	●		
CFR81577503000R	12,70	12,70	19,05	76,20	4,06	3,99	1,99	●	●		
CFR81887503000R	12,70	12,70	19,05	76,20	4,06	4,78	2,39	●	●		
CFR82507503000R	12,70	12,70	19,05	76,20	4,06	6,35	3,18	●	●		
CFR809410003000R	12,70	12,70	25,40	76,20	4,06	2,39	1,19	●	●		
CFR812610003000R	12,70	12,70	25,40	76,20	4,06	3,20	1,60	●	●		
CFR815710003000R	12,70	12,70	25,40	76,20	4,06	3,99	1,99	●	●		
CFR818810003000R	12,70	12,70	25,40	76,20	4,06	4,78	2,39	●	●		
CFR825010003000R	12,70	12,70	25,40	76,20	4,06	6,35	3,18	●	●		
CFR809412503000R	12,70	12,70	31,75	76,20	4,06	2,39	1,19	●	●		
CFR812612503000R	12,70	12,70	31,75	76,20	4,06	3,20	1,60	●	●		
CFR815712503000R	12,70	12,70	31,75	76,20	4,06	3,99	1,99	●	●		
CFR818812503000R	12,70	12,70	31,75	76,20	4,06	4,78	2,39	●	●		
CFR825012503000R	12,70	12,70	31,75	76,20	4,06	6,35	3,18	●	●		
CFR809415003000R	12,70	12,70	38,10	76,20	4,06	2,39	1,19	●	●		
CFR812615003000R	12,70	12,70	38,10	76,20	4,06	3,20	1,60	●	●		
CFR815715003000R	12,70	12,70	38,10	76,20	4,06	3,99	1,99	●	●		
CFR818815003000R	12,70	12,70	38,10	76,20	4,06	4,78	2,39	●	●		
CFR825015003000R	12,70	12,70	38,10	76,20	4,06	6,35	3,18	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

■ COR

ISO catalogue number	D	D min	L4	L	CD	W	Rε	CG5	CM1	CBN6	CPD1
COR4097500250015R	6,35	6,35	12,70	63,50	2,79	2,46	0,38	●	●		
COR4142563250040R	6,35	6,35	14,30	63,50	2,79	3,61	1,02	●	●		
COR4145625250040R	6,35	6,35	15,88	63,50	2,79	3,68	1,02	●	●		
COR6175750250015R	9,53	9,53	19,05	63,50	3,18	4,45	0,38	●	●		
COR6209813250040R	9,53	9,53	20,65	63,50	3,18	5,31	1,02	●	●		
COR6242938250040R	9,53	9,53	23,83	63,50	3,18	6,15	1,02	●	●		

● first choice
○ alternate choice

		CG5	CM1	CBN6	CPD1
P		●	○		
M		●	○		
K		○	●		
N		○	●		●
S		●	○		
H				●	

CRR • Shank Diameter 6,35mm–7,94mm

ISO catalogue number	D	D min	L4	L	CD	W	CG5	CM1	CBN6	CPD1
CRR40172502500R	6,35	6,35	6,35	63,50	1,52	0,43	●	●		
CRR40252502500R	6,35	6,35	6,35	63,50	1,52	0,64	●	●		
CRR40302502500R	6,35	6,35	6,35	63,50	1,52	0,76	●	●		
CRR40173752500R	6,35	6,35	9,53	63,50	1,52	0,43	●	●		
CRR40253752500R	6,35	6,35	9,53	63,50	1,52	0,64	●	●		
CRR40303752500R	6,35	6,35	9,53	63,50	1,52	0,76	●	●		
CRR40175002500R	6,35	6,35	12,70	63,50	1,52	0,43	●	●		
CRR40255002500R	6,35	6,35	12,70	63,50	1,52	0,64	●	●		
CRR40305002500R	6,35	6,35	12,70	63,50	1,52	0,76	●	●		
CRR40176252500R	6,35	6,35	15,88	63,50	1,52	0,43	●	●		
CRR40256252500R	6,35	6,35	15,88	63,50	1,52	0,64	●	●		
CRR40306252500R	6,35	6,35	15,88	63,50	1,52	0,76	●	●		
CRR50332502500R	7,94	7,94	6,35	63,50	2,79	0,84	●	●		
CRR50382502500R	7,94	7,94	6,35	63,50	2,79	0,97	●	●		
CRR50333752500R	7,94	7,94	9,53	63,50	2,79	0,84	●	●		
CRR50383752500R	7,94	7,94	9,53	63,50	2,79	0,97	●	●		
CRR50335002500R	7,94	7,94	12,70	63,50	2,79	0,84	●	●		
CRR50385002500R	7,94	7,94	12,70	63,50	2,79	0,97	●	●		
CRR50337502500R	7,94	7,94	19,05	63,50	2,79	0,84	●	●		
CRR50387502500R	7,94	7,94	19,05	63,50	2,79	0,97	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CRR • Shank Diameter 9,53mm

ISO catalogue number	D	D min	L4	L	CD	W	CG5	CM1	CBN6	CPD1
CRR60402502500R	9,53	9,53	6,35	63,50	2,79	1,02	●	●		
CRR60472502500R	9,53	9,53	6,35	63,50	2,79	1,19	●	●		
CRR60562502500R	9,53	9,53	6,35	63,50	2,79	1,42	●	●		
CRR60632502500R	9,53	9,53	6,35	63,50	2,79	1,60	●	●		
CRR60702502500R	9,53	9,53	6,35	63,50	2,79	1,78	●	●		
CRR60882502500R	9,53	9,53	6,35	63,50	2,79	2,24	●	●		
CRR60403752500R	9,53	9,53	9,53	63,50	2,79	1,02	●	●		
CRR60473752500R	9,53	9,53	9,53	63,50	2,79	1,19	●	●		
CRR60563752500R	9,53	9,53	9,53	63,50	2,79	1,42	●	●		
CRR60633752500R	9,53	9,53	9,53	63,50	2,79	1,60	●	●		
CRR60703752500R	9,53	9,53	9,53	63,50	2,79	1,78	●	●		
CRR60883752500R	9,53	9,53	9,53	63,50	2,79	2,24	●	●		
CRR60405002500R	9,53	9,53	12,70	63,50	2,79	1,02	●	●		
CRR60475002500R	9,53	9,53	12,70	63,50	2,79	1,19	●	●		
CRR60565002500R	9,53	9,53	12,70	63,50	2,79	1,42	●	●		
CRR60635002500R	9,53	9,53	12,70	63,50	2,79	1,60	●	●		
CRR60705002500R	9,53	9,53	12,70	63,50	2,79	1,78	●	●		
CRR60885002500R	9,53	9,53	12,70	63,50	2,79	2,24	●	●		
CRR60407502500R	9,53	9,53	19,05	63,50	2,79	1,02	●	●		
CRR60477502500R	9,53	9,53	19,05	63,50	2,79	1,19	●	●		
CRR60567502500R	9,53	9,53	19,05	63,50	2,79	1,42	●	●		
CRR60637502500R	9,53	9,53	19,05	63,50	2,79	1,60	●	●		
CRR60707502500R	9,53	9,53	19,05	63,50	2,79	1,78	●	●		
CRR60887502500R	9,53	9,53	19,05	63,50	2,79	2,24	●	●		
CRR604010002500R	9,53	9,53	25,40	63,50	2,79	1,02	●	●		
CRR604710002500R	9,53	9,53	25,40	63,50	2,79	1,19	●	●		
CRR605610002500R	9,53	9,53	25,40	63,50	2,79	1,42	●	●		
CRR606310002500R	9,53	9,53	25,40	63,50	2,79	1,60	●	●		
CRR607010002500R	9,53	9,53	25,40	63,50	2,79	1,78	●	●		
CRR608810002500R	9,53	9,53	25,40	63,50	2,79	2,24	●	●		
CRR604012502500R	9,53	9,53	31,75	63,50	2,79	1,02	●	●		
CRR604712502500R	9,53	9,53	31,75	63,50	2,79	1,19	●	●		
CRR605612502500R	9,53	9,53	31,75	63,50	2,79	1,42	●	●		
CRR606312502500R	9,53	9,53	31,75	63,50	2,79	1,60	●	●		
CRR607012502500R	9,53	9,53	31,75	63,50	2,79	1,78	●	●		
CRR608812502500R	9,53	9,53	31,75	63,50	2,79	2,24	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CRR • Shank Diameter 12,70mm

ISO catalogue number	D	D min	L4	L	CD	W	CG5	CM1	CBN6	CPD1
CRR80945003000R	12,70	12,70	12,70	76,20	4,06	2,39	●	●		
CRR81265003000R	12,70	12,70	12,70	76,20	4,06	3,20	●	●		
CRR81575003000R	12,70	12,70	12,70	76,20	4,06	3,99	●	●		
CRR81885003000R	12,70	12,70	12,70	76,20	4,06	4,78	●	●		
CRR82505003000R	12,70	12,70	12,70	76,20	4,06	6,35	●	●		
CRR80947503000R	12,70	12,70	19,05	76,20	4,06	2,39	●	●		
CRR81267503000R	12,70	12,70	19,05	76,20	4,06	3,20	●	●		
CRR81577503000R	12,70	12,70	19,05	76,20	4,06	3,99	●	●		
CRR81887503000R	12,70	12,70	19,05	76,20	4,06	4,78	●	●		
CRR82507503000R	12,70	12,70	19,05	76,20	4,06	6,35	●	●		
CRR809410003000R	12,70	12,70	25,40	76,20	4,06	2,39	●	●		
CRR812610003000R	12,70	12,70	25,40	76,20	4,06	3,20	●	●		
CRR815710003000R	12,70	12,70	25,40	76,20	4,06	3,99	●	●		
CRR818810003000R	12,70	12,70	25,40	76,20	4,06	4,78	●	●		
CRR825010003000R	12,70	12,70	25,40	76,20	4,06	6,35	●	●		
CRR809412503000R	12,70	12,70	31,75	76,20	4,06	2,39	●	●		
CRR812612503000R	12,70	12,70	31,75	76,20	4,06	3,20	●	●		
CRR815712503000R	12,70	12,70	31,75	76,20	4,06	3,99	●	●		
CRR818812503000R	12,70	12,70	31,75	76,20	4,06	4,78	●	●		
CRR825012503000R	12,70	12,70	31,75	76,20	4,06	6,35	●	●		
CRR809415003000R	12,70	12,70	38,10	76,20	4,06	2,39	●	●		
CRR812615003000R	12,70	12,70	38,10	76,20	4,06	3,20	●	●		
CRR815715003000R	12,70	12,70	38,10	76,20	4,06	3,99	●	●		
CRR818815003000R	12,70	12,70	38,10	76,20	4,06	4,78	●	●		
CRR825015003000R	12,70	12,70	38,10	76,20	4,06	6,35	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

■ CUG

ISO catalogue number	D	D min	L4	L	CD	W	CG5	CM1	CBN6	CPD1
CUG40205002500R	6,35	6,60	12,70	63,50	1,02	0,51	●	●		
CUG40305002500R	6,35	6,60	12,70	63,50	1,27	0,76	●	●		
CUG402010002500R	6,35	6,60	25,40	63,50	1,02	0,51	●	●		
CUG403010002500R	6,35	6,60	25,40	63,50	1,27	0,76	●	●		
CUG50505002500R	7,94	8,26	12,70	63,50	2,54	1,27	●	●		
CUG505010002500R	7,94	8,26	25,40	63,50	2,54	1,27	●	●		
CUG506210002500R	7,94	8,26	25,40	63,50	2,54	1,58	●	●		
CUG506212502500R	7,94	8,26	31,75	63,50	2,54	1,58	●	●		
CUG606210002500R	9,53	9,78	25,40	63,50	2,54	1,58	●	●		
CUG609310002500R	9,53	9,78	25,40	63,50	2,54	2,36	●	●		
CUG612510002500R	9,53	9,78	25,40	63,50	2,54	3,18	●	●		
CUG606212502500R	9,53	9,78	31,75	63,50	2,54	1,58	●	●		
CUG609312502500R	9,53	9,78	31,75	63,50	2,54	2,36	●	●		
CUG612512502500R	9,53	9,78	31,75	63,50	2,54	3,18	●	●		
CUG806210003000R	12,70	12,95	25,40	76,20	3,81	1,58	●	●		
CUG809310003000R	12,70	12,95	25,40	76,20	3,81	2,36	●	●		
CUG812510003000R	12,70	12,95	25,40	76,20	3,81	3,18	●	●		
CUG806215003000R	12,70	12,95	38,10	76,20	3,81	1,58	●	●		
CUG809315003000R	12,70	12,95	38,10	76,20	3,81	2,36	●	●		
CUG812515003000R	12,70	12,95	38,10	76,20	3,81	3,18	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CUPG

ISO catalogue number	D	D min	L4	L	CD	W	Rε	CG5	CM1	CBN6	CPD1
CUPG40205002500R	6,35	6,60	12,70	63,50	1,02	0,51	0,25	●	●		
CUPG40305002500R	6,35	6,60	12,70	63,50	1,27	0,76	0,38	●	●		
CUPG402010002500R	6,35	6,60	25,40	63,50	1,02	0,51	0,25	●	●		
CUPG403010002500R	6,35	6,60	25,40	63,50	1,27	0,76	0,38	●	●		
CUPG50505002500R	7,94	8,26	12,70	63,50	2,54	1,27	0,64	●	●		
CUPG505010002500R	7,94	8,26	25,40	63,50	2,54	1,27	0,64	●	●		
CUPG506210002500R	7,94	8,26	25,40	63,50	2,54	1,58	0,79	●	●		
CUPG506212502500R	7,94	8,26	31,75	63,50	2,54	1,58	0,79	●	●		
CUPG606210002500R	9,53	9,78	25,40	63,50	2,54	1,58	0,79	●	●		
CUPG609310002500R	9,53	9,78	25,40	63,50	2,54	2,36	1,18	●	●		
CUPG612510002500R	9,53	9,78	25,40	63,50	2,54	3,18	1,59	●	●		
CUPG606212502500R	9,53	9,78	31,75	63,50	2,54	1,58	0,79	●	●		
CUPG609312502500R	9,53	9,78	31,75	63,50	2,54	2,36	1,18	●	●		
CUPG612512502500R	9,53	9,78	31,75	63,50	2,54	3,18	1,59	●	●		
CUPG806210003000R	12,70	12,95	25,40	76,20	3,81	1,58	0,79	●	●		
CUPG809310003000R	12,70	12,95	25,40	76,20	3,81	2,36	1,18	●	●		
CUPG812510003000R	12,70	12,95	25,40	76,20	3,81	3,18	1,59	●	●		
CUPG806215003000R	12,70	12,95	38,10	76,20	3,81	1,58	0,79	●	●		
CUPG809315003000R	12,70	12,95	38,10	76,20	3,81	2,36	1,18	●	●		
CUPG812515003000R	12,70	12,95	38,10	76,20	3,81	3,18	1,59	●	●		

WIN WITH WIDIA™

WIDIA-CIRCLE™ Small Hole Tooling Series

The WIDIA™ line of small hole boring tools is an excellent, economical choice for a wide range of applications. Our solid carbide bars provide exceptional machining versatility and rupture strength. Indexable inserts are available in both steel and carbide shanks.

A/B Series

- Unique locking system enables quick, accurate insert changes.

Quadralock™

- V-slots and limit-stop bolts for increased indexability.

Micro Boring Bars

- Free cutting action, better surface finishes, and greater chip evacuation.

Solid Carbide Bars

- Accurate, quick-change tooling and toolholders are ideal for small parts machining applications.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA™
Win with WIDIA™

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.

CATS42004002500R16

C
Material

C = Carbide

ATS
Thread Style

ATS	=	Acme Thread Stub Length
ATR	=	Acme Thread Regular Length
IT	=	60° Single Point Thread
TR	=	Thread Relief

4
Shank Diameter
shown as "D"

2	=	3,18mm
3	=	4,76mm
4	=	6,35mm
5	=	7,94mm
6	=	9,53mm
8	=	12,70mm

200
Minimum Bore
shown as "D min"

040	=	1,02mm
050	=	1,27mm
060	=	1,52mm
080	=	2,03mm
100	=	2,54mm
120	=	3,05mm
125	=	3,18mm
140	=	3,56mm
160	=	4,06mm
180	=	4,57mm
187	=	4,75mm
200	=	5,08mm
230	=	5,84mm
235	=	5,97mm
250	=	6,35mm
290	=	7,37mm
312	=	7,93mm
320	=	8,13mm
360	=	9,14mm
375	=	9,53mm
490	=	12,45mm
500	=	12,70mm

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

400

Bore Depth

shown as "L4"

075	=	1,91mm
100	=	2,54mm
150	=	3,81mm
200	=	5,08mm
250	=	6,35mm
300	=	7,62mm
350	=	8,89mm
375	=	9,53mm
400	=	10,16mm
500	=	12,70mm
600	=	15,24mm
750	=	19,05mm
1000	=	25,40mm
1250	=	31,75mm
1500	=	38,10mm
1750	=	44,45mm
1800	=	45,72mm
2000	=	50,80mm

2500

Overall Length

shown as "L"

1500	=	38,10mm
2000	=	50,80mm
2500	=	63,50mm
3000	=	76,20mm

16

Threads

shown as "TP" Pitch or "TPI" Threads per Inch

R

Hand of Insert

R = Right hand

L = Left hand

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CATR

ISO catalogue number	D	D min	L4	L	CD	W	TPI min	CG5	CM1	CBN6	CPD1
CATR4200400250016R	6,35	5,08	10,16	63,50	1,14	0,53	16	●	●		
CATR4200600250016R	6,35	5,08	15,24	63,50	1,14	0,53	16	●	●		
CATR4200750250016R	6,35	5,08	19,05	63,50	1,14	0,53	16	●	●		
CATR42001000250016R	6,35	5,08	25,40	63,50	1,14	0,53	16	●	●		
CATR5235500250014R	7,94	5,97	12,70	63,50	1,78	0,61	14	●	●		
CATR5235750250014R	7,94	5,97	19,05	63,50	1,78	0,61	14	●	●		
CATR52351000250014R	7,94	5,97	25,40	63,50	1,78	0,61	14	●	●		
CATR52351250250014R	7,94	5,97	31,75	63,50	1,78	0,61	14	●	●		
CATR52351750250014R	7,94	5,97	44,45	63,50	1,78	0,61	14	●	●		
CATR6360500250012R	9,53	9,14	12,70	63,50	2,16	0,71	12	●	●		
CATR6360750250012R	9,53	9,14	19,05	63,50	2,16	0,71	12	●	●		
CATR63601000250012R	9,53	9,14	25,40	63,50	2,16	0,71	12	●	●		
CATR63601250250012R	9,53	9,14	31,75	63,50	2,16	0,71	12	●	●		
CATR63601800250012R	9,53	9,14	45,72	63,50	2,16	0,71	12	●	●		
CATR8490750300010R	12,70	12,45	19,05	76,20	3,05	0,81	10	●	●		
CATR849075030008R	12,70	12,45	19,05	76,20	3,05	1,04	8	●	●		
CATR849075030006R	12,70	12,45	19,05	76,20	3,05	1,45	6	●	●		
CATR849075030005R	12,70	12,45	19,05	76,20	3,05	1,75	5	●	●		
CATR84901500300010R	12,70	12,45	38,10	76,20	3,05	0,81	10	●	●		
CATR8490150030008R	12,70	12,45	38,10	76,20	3,05	1,04	8	●	●		
CATR8490150030006R	12,70	12,45	38,10	76,20	3,05	1,45	6	●	●		
CATR8490150030005R	12,70	12,45	38,10	76,20	3,05	1,75	5	●	●		
CATR84902000300010R	12,70	12,45	50,80	76,20	3,05	0,81	10	●	●		
CATR8490200030008R	12,70	12,45	50,80	76,20	3,05	1,04	8	●	●		
CATR8490200030006R	12,70	12,45	50,80	76,20	3,05	1,45	6	●	●		
CATR8490200030005R	12,70	12,45	50,80	76,20	3,05	1,75	5	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CATS

ISO catalogue number	D	D min	L4	L	CD	W	TPI min	CG5	CM1	CBN6	CPD1
CATS4200400250016R	6,35	5,08	10,16	63,50	1,14	0,61	16	●	●		
CATS4200600250016R	6,35	5,08	15,24	63,50	1,14	0,61	16	●	●		
CATS4200750250016R	6,35	5,08	19,05	63,50	1,14	0,61	16	●	●		
CATS42001000250016R	6,35	5,08	25,40	63,50	1,14	0,61	16	●	●		
CATS5235500250014R	7,94	5,97	12,70	63,50	1,78	0,71	14	●	●		
CATS5235750250014R	7,94	5,97	19,05	63,50	1,78	0,71	14	●	●		
CATS52351000250014R	7,94	5,97	25,40	63,50	1,78	0,71	14	●	●		
CATS52351250250014R	7,94	5,97	31,75	63,50	1,78	0,71	14	●	●		
CATS52351750250014R	7,94	5,97	44,45	63,50	1,78	0,71	14	●	●		
CATS5290750250014R	7,94	7,37	19,05	63,50	1,78	0,71	14	●	●		
CATS52901000250014R	7,94	7,37	25,40	63,50	1,78	0,71	14	●	●		
CATS6360500250012R	9,53	9,14	12,70	63,50	2,16	0,84	12	●	●		
CATS6360750250012R	9,53	9,14	19,05	63,50	2,16	0,84	12	●	●		
CATS63601000250012R	9,53	9,14	25,40	63,50	2,16	0,84	12	●	●		
CATS63601250250012R	9,53	9,14	31,75	63,50	2,16	0,84	12	●	●		
CATS63601800250012R	9,53	9,14	45,72	63,50	2,16	0,84	12	●	●		
CATS8490750300010R	12,70	12,45	19,05	76,20	3,05	0,94	10	●	●		
CATS849075030009R	12,70	12,45	19,05	76,20	3,05	1,07	9	●	●		
CATS849075030008R	12,70	12,45	19,05	76,20	3,05	1,22	8	●	●		
CATS849075030007R	12,70	12,45	19,05	76,20	3,05	1,40	7	●	●		
CATS849075030006R	12,70	12,45	19,05	76,20	3,05	1,65	6	●	●		
CATS849075030005R	12,70	12,45	19,05	76,20	3,05	2,01	5	●	●		
CATS84901500300010R	12,70	12,45	38,10	76,20	3,05	0,94	10	●	●		
CATS8490150030009R	12,70	12,45	38,10	76,20	3,05	1,07	9	●	●		
CATS8490150030008R	12,70	12,45	38,10	76,20	3,05	1,22	8	●	●		
CATS8490150030007R	12,70	12,45	38,10	76,20	3,05	1,40	7	●	●		
CATS8490150030006R	12,70	12,45	38,10	76,20	3,05	1,65	6	●	●		
CATS8490150030005R	12,70	12,45	38,10	76,20	3,05	2,01	5	●	●		
CATS84902000300010R	12,70	12,45	50,80	76,20	3,05	0,94	10	●	●		
CATS8490200030009R	12,70	12,45	50,80	76,20	3,05	1,07	9	●	●		
CATS8490200030008R	12,70	12,45	50,80	76,20	3,05	1,22	8	●	●		
CATS8490200030007R	12,70	12,45	50,80	76,20	3,05	1,40	7	●	●		
CATS8490200030006R	12,70	12,45	50,80	76,20	3,05	1,65	6	●	●		
CATS8490200030005R	12,70	12,45	50,80	76,20	3,05	2,01	5	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CIT • Shank Diameter 6,35mm–7,94mm

ISO catalogue number	D	D min	L4	L	CD	TP max	TP min	CG5	CM1	CBN6	CPD1
Right hand											
CIT41803502500R	6,35	4,57	8,89	63,50	1,02	0,5	1,4	●	●		
CIT41805002500R	6,35	4,57	12,70	63,50	1,02	0,5	1,4	●	●		
CIT41807502500R	6,35	4,57	19,05	63,50	1,02	0,5	1,4	●	●		
CIT418010002500R	6,35	4,57	25,40	63,50	1,02	0,5	1,4	●	●		
CIT42004002500R	6,35	5,08	10,16	63,50	1,14	0,6	1,6	●			
CIT42006002500R	6,35	5,08	15,24	63,50	1,14	0,6	1,6	●	●		
CIT42007502500R	6,35	5,08	19,05	63,50	1,14	0,6	1,6	●	●		
CIT420010002500R	6,35	5,08	25,40	63,50	1,14	0,6	1,6	●	●		
CIT52304002500R	7,94	5,84	10,16	63,50	1,40	0,6	1,8	●	●		
CIT52306002500R	7,94	5,84	15,24	63,50	1,40	0,6	1,8	●	●		
CIT52307502500R	7,94	5,84	19,05	63,50	1,40	0,6	1,8	●	●		
CIT523010002500R	7,94	5,84	25,40	63,50	1,40	0,6	1,8	●	●		
CIT523015002500R	7,94	5,84	38,10	63,50	1,40	0,6	1,8	●	●		
CIT52905002500R	7,94	7,37	12,70	63,50	1,78	0,6	2,1	●	●		
CIT52907502500R	7,94	7,37	19,05	63,50	1,78	0,6	2,1	●	●		
CIT529010002500R	7,94	7,37	25,40	63,50	1,78	0,6	2,1	●	●		
CIT529012502500R	7,94	7,37	31,75	63,50	1,78	0,6	2,1	●	●		
CIT529017502500R	7,94	7,37	44,45	63,50	1,78	0,6	2,1	●	●		
Left hand											
CIT41803502500L	6,35	4,57	8,89	63,50	1,02	0,5	1,4	●	●		
CIT41805002500L	6,35	4,57	12,70	63,50	1,02	0,5	1,4	●	●		
CIT41807502500L	6,35	4,57	19,05	63,50	1,02	0,5	1,4	●	●		
CIT418010002500L	6,35	4,57	25,40	63,50	1,02	0,5	1,4	●	●		
CIT42004002500L	6,35	5,08	10,16	63,50	1,14	0,6	1,6	●			
CIT42006002500L	6,35	5,08	15,24	63,50	1,14	0,6	1,6	●	●		
CIT42007502500L	6,35	5,08	19,05	63,50	1,14	0,6	1,6	●	●		
CIT420010002500L	6,35	5,08	25,40	63,50	1,14	0,6	1,6	●	●		
CIT52304002500L	7,94	5,84	10,16	63,50	1,40	0,6	1,8	●	●		
CIT52306002500L	7,94	5,84	15,24	63,50	1,40	0,6	1,8	●	●		
CIT52307502500L	7,94	5,84	19,05	63,50	1,40	0,6	1,8	●	●		
CIT523010002500L	7,94	5,84	25,40	63,50	1,40	0,6	1,8	●	●		
CIT523015002500L	7,94	5,84	38,10	63,50	1,40	0,6	1,8	●	●		
CIT52905002500L	7,94	7,37	12,70	63,50	1,78	0,6	2,1	●	●		
CIT52907502500L	7,94	7,37	19,05	63,50	1,78	0,6	2,1	●	●		
CIT529010002500L	7,94	7,37	25,40	63,50	1,78	0,6	2,1	●	●		
CIT529012502500L	7,94	7,37	31,75	63,50	1,78	0,6	2,1	●	●		
CIT529017502500L	7,94	7,37	44,45	63,50	1,78	0,6	2,1	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CIT • Shank Diameter 3,18mm–4,76mm

ISO catalogue number	D	D min	L4	L	CD	TP max	TP min	CG5	CM1	CBN6	CPD1
Right hand											
CIT20400751500R	3,18	1,02	1,91	38,10	0,38	0,3	0,6	●	●		
CIT20401001500R	3,18	1,02	2,54	38,10	0,38	0,3	0,6	●	●		
CIT20401501500R	3,18	1,02	3,81	38,10	0,38	0,3	0,6	●	●		
CIT20501001500R	3,18	1,27	2,54	38,10	0,51	0,3	0,6	●	●		
CIT20501501500R	3,18	1,27	3,81	38,10	0,51	0,3	0,6	●	●		
CIT20502001500R	3,18	1,27	5,08	38,10	0,51	0,3	0,6	●	●		
CIT20602001500R	3,18	1,52	5,08	38,10	0,51	0,3	0,6	●	●		
CIT20602501500R	3,18	1,52	6,35	38,10	0,51	0,3	0,6	●	●		
CIT20603001500R	3,18	1,52	7,62	38,10	0,51	0,3	0,6	●	●		
CIT20802501500R	3,18	2,03	6,35	38,10	0,51	0,3	0,8	●	●		
CIT20803501500R	3,18	2,03	8,89	38,10	0,51	0,3	0,8	●	●		
CIT20805001500R	3,18	2,03	12,70	38,10	0,51	0,3	0,8	●	●		
CIT21002501500R	3,18	2,54	6,35	38,10	0,64	0,4	0,8	●	●		
CIT21003501500R	3,18	2,54	8,89	38,10	0,64	0,4	0,8	●	●		
CIT21005001500R	3,18	2,54	12,70	38,10	0,64	0,4	0,8	●	●		
CIT21006001500R	3,18	2,54	15,24	38,10	0,64	0,4	0,8	●	●		
CIT31202502000R	4,76	3,05	6,35	50,80	0,76	0,5	1,1	●	●		
CIT31204002000R	4,76	3,05	10,16	50,80	0,76	0,5	1,1	●	●		
CIT31205002000R	4,76	3,05	12,70	50,80	0,76	0,5	1,1	●	●		
CIT31206002000R	4,76	3,05	15,24	50,80	0,76	0,5	1,1	●	●		
CIT31207502000R	4,76	3,05	19,05	50,80	0,76	0,5	1,1	●	●		
CIT31402502000R	4,76	3,56	6,35	50,80	0,89	0,5	1,3	●	●		
CIT31404002000R	4,76	3,56	10,16	50,80	0,89	0,5	1,3	●	●		
CIT31405002000R	4,76	3,56	12,70	50,80	0,89	0,5	1,3	●	●		
CIT31407502000R	4,76	3,56	19,05	50,80	0,89	0,5	1,3	●	●		
CIT31602502000R	4,76	4,06	6,35	50,80	1,02	0,5	1,4	●	●		
CIT31604002000R	4,76	4,06	10,16	50,80	1,02	0,5	1,4	●	●		
CIT31605002000R	4,76	4,06	12,70	50,80	1,02	0,5	1,4	●	●		
CIT31607502000R	4,76	4,06	19,05	50,80	1,02	0,5	1,4	●	●		
CIT316010002000R	4,76	4,06	25,40	50,80	1,02	0,5	1,4	●	●		

(continued)

(continued)

● first choice
○ alternate choice

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

CIT • Shank Diameter 3,18mm–4,76mm

ISO catalogue number	D	D min	L4	L	CD	TP max	TP min	CG5	CM1	CBN6	CPD1
Left hand											
CIT20400751500L	3,18	1,02	1,91	38,10	0,38	0,3	0,6	●	●		
CIT20401001500L	3,18	1,02	2,54	38,10	0,38	0,3	0,6	●	●		
CIT20401501500L	3,18	1,02	3,81	38,10	0,38	0,3	0,6	●	●		
CIT20501001500L	3,18	1,27	2,54	38,10	0,51	0,3	0,6	●	●		
CIT20501501500L	3,18	1,27	3,81	38,10	0,51	0,3	0,6	●	●		
CIT20502001500L	3,18	1,27	5,08	38,10	0,51	0,3	0,6	●	●		
CIT20602001500L	3,18	1,52	5,08	38,10	0,51	0,3	0,6	●	●		
CIT20602501500L	3,18	1,52	6,35	38,10	0,51	0,3	0,6	●	●		
CIT20603001500L	3,18	1,52	7,62	38,10	0,51	0,3	0,6	●	●		
CIT20802501500L	3,18	2,03	6,35	38,10	0,51	0,3	0,8	●	●		
CIT20803501500L	3,18	2,03	8,89	38,10	0,51	0,3	0,8	●	●		
CIT20805001500L	3,18	2,03	12,70	38,10	0,51	0,3	0,8	●	●		
CIT21002501500L	3,18	2,54	6,35	38,10	0,64	0,4	0,8	●	●		
CIT21003501500L	3,18	2,54	8,89	38,10	0,64	0,4	0,8	●	●		
CIT21005001500L	3,18	2,54	12,70	38,10	0,64	0,4	0,8	●	●		
CIT21006001500L	3,18	2,54	15,24	38,10	0,64	0,4	0,8	●	●		
CIT31202502000L	4,76	3,05	6,35	50,80	0,76	0,5	1,1	●	●		
CIT31204002000L	4,76	3,05	10,16	50,80	0,76	0,5	1,1	●	●		
CIT31205002000L	4,76	3,05	12,70	50,80	0,76	0,5	1,1	●	●		
CIT31206002000L	4,76	3,05	15,24	50,80	0,76	0,5	1,1	●	●		
CIT31207502000L	4,76	3,05	19,05	50,80	0,76	0,5	1,1	●	●		
CIT31402502000L	4,76	3,56	6,35	50,80	0,89	0,5	1,3	●	●		
CIT31404002000L	4,76	3,56	10,16	50,80	0,89	0,5	1,3	●	●		
CIT31405002000L	4,76	3,56	12,70	50,80	0,89	0,5	1,3	●	●		
CIT31407502000L	4,76	3,56	19,05	50,80	0,89	0,5	1,3	●	●		
CIT31602502000L	4,76	4,06	6,35	50,80	1,02	0,5	1,4	●	●		
CIT31604002000L	4,76	4,06	10,16	50,80	1,02	0,5	1,4	●	●		
CIT31605002000L	4,76	4,06	12,70	50,80	1,02	0,5	1,4	●	●		
CIT31607502000L	4,76	4,06	19,05	50,80	1,02	0,5	1,4	●	●		
CIT316010002000L	4,76	4,06	25,40	50,80	1,02	0,5	1,4	●	●		

● first choice
○ alternate choice

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

■ CIT • Shank Diameter 9,53mm–12,70mm

ISO catalogue number	D	D min	L4	L	CD	TP max	TP min	CG5	CM1	CBN6	CPD1
Right hand											
CIT63205002500R	9,53	8,13	12,70	63,50	1,91	0,8	2,5	●	●		
CIT63207502500R	9,53	8,13	19,05	63,50	1,91	0,8	2,5	●	●		
CIT632010002500R	9,53	8,13	25,40	63,50	1,91	0,8	2,5	●	●		
CIT632012502500R	9,53	8,13	31,75	63,50	1,91	0,8	2,5	●	●		
CIT632018002500R	9,53	8,13	45,72	63,50	1,91	0,8	2,5	●	●		
CIT63605002500R	9,53	9,14	12,70	63,50	2,16	0,8	2,5	●	●		
CIT63607502500R	9,53	9,14	19,05	63,50	2,16	0,8	2,5	●	●		
CIT636010002500R	9,53	9,14	25,40	63,50	2,16	0,8	2,5	●	●		
CIT636012502500R	9,53	9,14	31,75	63,50	2,16	0,8	2,5	●	●		
CIT636018002500R	9,53	9,14	45,72	63,50	2,16	0,8	2,5	●	●		
CIT84907503000R	12,70	12,45	19,05	76,20	3,05	0,8	3,2	●	●		
CIT849015003000R	12,70	12,45	38,10	76,20	3,05	0,8	3,2	●	●		
CIT849020003000R	12,70	12,45	50,80	76,20	3,05	0,8	3,2	●	●		
Left hand											
CIT63205002500L	9,53	8,13	12,70	63,50	1,91	0,8	2,5	●	●		
CIT63207502500L	9,53	8,13	19,05	63,50	1,91	0,8	2,5	●	●		
CIT632010002500L	9,53	8,13	25,40	63,50	1,91	0,8	2,5	●	●		
CIT632012502500L	9,53	8,13	31,75	63,50	1,91	0,8	2,5	●	●		
CIT632018002500L	9,53	8,13	45,72	63,50	1,91	0,8	2,5	●	●		
CIT63605002500L	9,53	9,14	12,70	63,50	2,16	0,8	2,5	●	●		
CIT63607502500L	9,53	9,14	19,05	63,50	2,16	0,8	2,5	●	●		
CIT636010002500L	9,53	9,14	25,40	63,50	2,16	0,8	2,5	●	●		
CIT636012502500L	9,53	9,14	31,75	63,50	2,16	0,8	2,5	●	●		
CIT636018002500L	9,53	9,14	45,72	63,50	2,16	0,8	2,5	●	●		
CIT84907503000L	12,70	12,45	19,05	76,20	3,05	0,8	3,2	●	●		
CIT849015003000L	12,70	12,45	38,10	76,20	3,05	0,8	3,2	●	●		
CIT849020003000L	12,70	12,45	50,80	76,20	3,05	0,8	3,2	●	●		

● first choice
○ alternate choice

	CG5	CM1	CBN6	CPD1
P	●	○		
M	●	○		
K	○	●		
N	○	●		●
S	●	○		
H			●	

CTR

ISO catalogue number	D	D min	L4	L	CD	W	CG5	CM1	CBN6	CPD1
CTR21253751500R	3,18	3,18	9,53	38,10	1,27	1,58	●	●		
CTR31873752000R	4,76	4,75	9,53	50,80	1,27	1,98	●	●		
CTR31877502000R	4,76	4,75	19,05	50,80	1,27	1,98	●	●		
CTR42505002500R	6,35	6,35	12,70	63,50	1,52	2,39	●	●		
CTR425010002500R	6,35	6,35	25,40	63,50	1,52	2,39	●	●		
CTR53127502500R	7,94	7,93	19,05	63,50	2,16	2,39	●	●		
CTR531212502500R	7,94	7,93	31,75	63,50	2,16	2,39	●	●		
CTR63757502500R	9,53	9,53	19,05	63,50	2,79	3,18	●	●		
CTR637512502500R	9,53	9,53	31,75	63,50	2,79	3,18	●	●		
CTR850010003000R	12,70	12,70	25,40	76,20	3,43	3,96	●	●		
CTR850015003000R	12,70	12,70	38,10	76,20	3,43	3,96	●	●		

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Whether your operation is turning, milling, or holemaking, WIDIA brands are the high-performance tooling you need. We offer standard and custom solutions for the general engineering market.

Set-Up Recommendations for Bar Overhang

WIDIA-CIRCLE™ cutting tools are the finest quality boring, grooving, profiling, and threading tools available. For over 50 years, WIDIA-CIRCLE has become 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 materials being machined.
- Depth of cut(s).
- Feed rate(s).

Recommended conditions may prove to 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	steel shank (ratio 4:1)	carbide shank (ratio 10:1)
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

Set-Up Information and Recommendations

Tool "D" (above centerline)

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 centerline 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 centerline. The cutting point will be slightly high (against direction of rotation) except when facing to centerline or cutting on outside diameters.

Use WIDIA-CIRCLE precision set-up level or:

1. Use center height gage and position insert as show in illustration.
2. If center point is unavailable, mark the center of the bar stock with a centering punch or square. Position the insert as shown in illustration.
3. Lay a straight edge on the insert to help in positioning the insert parallel to the travel or centerline.

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 center.

Uni-Level Precision Set-Up 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.

Set-Up Information and Recommendations for Boring and Profiling

Set-Up Information and Recommendations for Grooving

CDG Indexable-Type Grooving Inserts

safe overhang conditions:	steel (ratio 4:1)	carbide (ratio 10:1)
surface footage(s):	see pages C34–C35	
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.

Flat Location(s)

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

☐ Ground ☐ Next Day Air ☐ 2nd Day Air ☐ 3rd Day Air

Attention Distributors: Use this worksheet to collect information for your customer.

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.

Flat Location(s)

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.

WIDIA MANCHESTER

Grooving, Cut-Off, and Turning

Grooving Application Guide D2–D3

WMT™ Grooving, Cut-Off, and Turning D4–D29

TopGroove™ D30–D69

ProGroove™ D70–D83

Separator™ D84–D101

Ranger™ Face Grooving D102–D109

S-LOC™ Grooving D110–D115

Grooving

WMT™

- Insert cutting widths: 2,0mm–8,0mm.
- Geometry for deep grooving.
- OD cutting depths: 16,5mm–25,4mm.
- Screw-clamping integral shank/cartridge toolholders available.
- ID boring bar minimum diameter: 57,15mm.

Pages:
D4–D29

TopGroove™

- Insert cutting widths: 0,5mm–6,35mm.
- Insert cutting depths: 0,64mm–12,7mm.
- Integral shank toolholders available.
- ID boring bar minimum bore diameter: 11,2mm.

Pages:
D30–D69

ProGroove™

- Inserts enable precision sintered execution, good tolerances, and repeatability.
- Screw-clamping integral shank toolholders available.
- Grooving and OD turning.
- Insert cutting depths: 10,0mm–40,0mm.

Pages:
D70–D82

S-LOC™

- Insert cutting widths: 1,04mm–3,81mm.
- Maximum cutting depth: 2,4mm.
- Inserts for boring or threading available.
- Screw-clamping integral shank toolholder for ID applications.
- ID boring bar minimum bore diameter: 14,2mm.

Pages:
D110–D115

LG

- Insert cutting widths: 8,0mm–16,0mm.
- OD cutting depths: 20,0mm–32,0mm.
- Wedge-clamping integral shanks tooling available.

Page:
D74

Cut-Off

WMT

- Economical double-sided inserts for rigidity and dimensional accuracy.
- Cut-off widths: 1,5mm–4,0mm; maximum depth: 22,2mm.
- Right-/left-hand styles: 5° and 12° lead angles.
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D4–D29

ProGroove

- Single-edge inserts for maximum depth capacity.
- Cut-off widths: 2,0mm–8,0mm.
- Right-/left-hand styles with 6° lead angles.
- Self-clamping blades/screw-clamping integral shank toolholders available.

Pages:
D70–D82

Separator™

- Cut-off widths: 2,0mm–4,0mm.
- Positive mechanical, self-clamping blades.
- Right-/left-hand style toolholders available.
- Single-edge inserts for maximum depth capacity.

Pages:
D84–D101

Plunge and Turn

WMT

Heavy Stock Removal in Turning Applications

- Double-sided inserts, cutting widths: 2,0mm–8,0mm.
- Screw-clamping integral shank/cartridge toolholders available.
- OD cutting depths: 16,5mm–25,4mm.
- ID boring bar minimum bore diameter: 57,15mm.

Pages:
D4–D29

ProGroove

For Light-Cutting Inserts

- Cutting widths: 2,0mm–8,0mm.
- Single-edge inserts for maximum depth capacity.
- Screw-clamping integral shank toolholders available.
- OD cutting depths: 10,0mm–40,0mm.

Pages:
D70–D82

Face Grooving

WMT

- Minimum face groove diameter: 38,0mm–205,0mm.
- Cutting widths: 3,0mm–6,35mm.
- Cutting depths: 13,0mm–25,4mm.

Pages: D4–D29

Ranger™

- Minimum face groove OD diameter: 57,0mm–400,0mm.
- Cutting widths: 3,18mm–6,35mm.
- Cutting depths: 19,0mm–25,4mm.
- Screw-clamping, adjustable cartridge toolholders with different widths and spindle rotations.
- Square right-angle shank and round shank toolholders available.

Pages: D102–D109

S-LOC

- Minimum face groove diameter: 12,7mm or larger.
- Cutting widths: 1,04mm–3,81mm.
- Maximum cutting depth: 2,4mm.
- Screw-clamping integral toolholder.

Pages: D110–D115

TopGroove

- Standard insert minimum face groove diameter range: 54,0mm–330,0mm.
- NF/NFD face groove insert range: 24,0mm–57,0mm.
- Cutting width range for standard inserts: 0,8mm–9,5mm.
- Cutting width range for NF/NFD face grooving inserts: 2,0mm–6,35mm.
- Cutting depth range for standard inserts: 1,27mm–12,7mm.
- Cutting depth range for NF/NFD face grooving inserts: 3,8mm–6,35mm.
- Cutting depth range for NF: 0,8mm–9,5mm.
- Cutting depth range for NFD: 6,35mm–12,7mm.

Pages: D30–D69

Profiling

WMT

For Heavy Stock Removal

- Full radius insert cutting widths: 3,0mm–8,0mm.
- Screw-clamping integral shank/cartridge toolholders available.
- OD cutting depths: 16,5mm–25,4mm

Pages: D4–D29

TopGroove

Moderate/Heavy Stock Removal at Shallow Profile Depths

- Full-radius insert cutting widths: 1,57mm–6,35mm.
- Insert cutting depths: 2,39mm–6,35mm.
- Integral shank toolholders and Erickson™ heads available.

Pages: D30–D69

ProGroove

For Light Cutting

- Full-radius insert cutting widths: 3,0mm–6,0mm.
- Screw-clamping integral shank/cartridge toolholders available.
- OD cutting depths: 10,0mm–32,0mm.

Pages: D70–D82

Undercutting

TopGroove

- Undercutting insert widths: 2,4mm–4,0mm.
- Economical double-ended inserts.

Pages: D30–D69

WMT™ **System**

One System for Grooving, Cut-Off, Turning, and Profiling.

The WIDIA™ line of WMT Toolholders 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

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

WMT Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycles times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.

Exceptional versatility in one tool for all your OD and ID applications.

Extra-long clamping area for unsurpassed grooving and turning stability.

Interchangeable grooving and cut-off inserts designed for excellent chip control.

WMT SLS

- Adaptable and easy to use, it reduces setup time and downtime between jobs.
- Replaceable cartridge makes changing applications quick and easy.
- A variety of insert widths available to meet your specific needs.
- Integral and modular Serrated Locking System (SLS) accepts SX, SX Ultra, and PT/PC inserts.

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 Materials
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.

WMT™ Grooving, Cut-Off, and Turning

Integral Toolholders

WIDIA MANCHESTER

■ OD Grooving

order number	catalogue number	W (A)	CD (B)	F	H (C)	B (C)	H3	L1	LS	clamp screw
	Right hand									
3650516	250409	1,50	17	25	25	25	–	150	116	606249
3650456	250205	2,00	17	16	16	16	8	125	101	606249
3650458	250207	2,00	17	20	20	20	–	125	92	606249
3650506	250295	2,00	17	25	25	25	–	150	116	606249
3650460	250217	3,00	11	16	16	16	–	125	92	619205
3650462	250219	3,00	22	16	16	16	5	125	83	619205
3650468	250227	3,00	11	20	20	20	–	125	92	619205
3650470	250229	3,00	22	20	20	20	5	125	83	619205
3650479	250241	3,00	11	25	25	25	–	150	117	619205
3650481	250243	3,00	22	25	25	25	–	150	109	619205
3650464	250221	4,00	22	16	16	16	5	125	83	619205
3653751	250231	4,00	20	–	20	–	–	125	83	619205
3650483	250245	4,00	22	25	25	25	–	150	109	619205
3650502	250291	4,00	11	16	16	16	–	125	92	619205
3650504	250293	4,00	11	20	20	20	–	125	92	619205
3653752	250295	4,00	11	25	25	25	–	150	117	619205
3650466	250223	5,00	14	16	16	15	–	125	88	619168
3650473	250233	5,00	14	20	20	19	–	125	88	619168
3650475	250235	5,00	15	20	20	19	5	140	93	619168
3650485	250247	5,00	14	25	25	24	–	150	113	619168
3650487	250249	5,00	25	25	25	24	–	150	104	619168
3650477	250237	6,00	14	20	20	19	–	140	103	619168
3650489	250251	6,00	14	25	25	24	–	150	114	619168
3650491	250253	6,00	25	25	25	24	–	150	104	619168
3650494	250255	8,00	14	25	25	24	–	150	113	619168
3650496	250257	8,00	25	25	25	24	–	150	104	619168
3650498	250275	8,00	14	32	32	31	–	150	113	619168
3650500	250277	8,00	25	32	32	31	–	150	104	619168

(continued)

	application	conventional toolholders	modular blades
	OD Grooving and Cut-Off	pages D10–D12	pages D16–D17
	Face Grooving	pages D13–D14	pages D18–D19
	ID Grooving	—	pages D20–D21
	Plunge and Turn	pages D10–D12	pages D16–D17

4 Select chipbreaker style for the application:

SX-ULTRA	(1st choice) Cut-off
SX	Cut-off with wipers
PT	Grooving and turning
PC	Profiling and turning

NOTE: Chart shows recommended starting feed rates.

See page D22.

WMT™ Inserts

Feed Values for Grooving

WIDIA MANCHESTER

SX Cut-Off Inserts

- 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.

SX-Ultra Cut-Off Inserts

- 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 Grooving Inserts

- Deep grooving tool for plunge and turn OD and face grooving operations.
- High positive rake geometry for low cutting force, especially in soft materials.
- Cuts in both axial and radial direction.
- Delivers chip control over full range of DOC when turning.

PC Grooving and Profiling Inserts

- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.
- Superior chip control.

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A Choose the appropriate insert width "W" for your specific application.

B Select the required corner radius value "RR".

WMT™ Grooving, Cut-Off, and Turning

Integral Toolholders

WIDIA MANCHESTER

Right Hand Tool

■ OD Cut-Off and Grooving

order number	catalogue number	H	W (A)	CD (B)	F	R	H3	L1	LS	clamp screw
	Right hand									
3650456	250205	16,0	2,00	16,5	16,0	15,5	6	125	101	606249
3650460	250217	16,0	3,00	11,0	16,0	15,6	–	125	82	619205
3650402	250219	16,0	3,00	22,0	16,0	15,6	5	125	83	619205
3650464	250221	16,0	4,00	22,0	16,0	15,5	5	125	83	619205
3650902	250261	16,0	4,00	11,0	16,0	15,5	–	125	82	619205
3650466	250223	16,0	5,00	14,0	16,0	15,2	–	125	88	619168
3650458	250207	20,0	2,00	16,5	20,0	19,5	–	125	82	606249

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		TN6016	TN6026	TN6016	TN6016	TN6026	TN6026
varying depth of cut, casting, or forging skin		TN6016	TN6026	TN6016	TN6016	TN6026	TN6026
lightly interrupted cut		TN6031	TN6026	TN6031	TN6031	TN6026	TN6026
heavily interrupted cut		TN6031	TN6026	TN6031	TN6031	TN6026	TN6026

See page D23 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 D24 for cutting data.

WMT™ Grooving, Cut-Off, and Turning
Recommended Cutting Speed Starting Conditions

WIDIA MANCHESTER

ANSI ISO 513	VDI 3323	Cutting Speed • vc m/min								
Material Group		min	Start	max	min	Start	max	min	Start	max
		TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
P	1	170	**200**	230	140	**170**	195	130	**150**	175
	2	170	**200**	230	140	**170**	195	130	**150**	175
	3	130	**170**	200	115	**140**	170	105	**130**	150
	4	150	**185**	215	130	**155**	180	115	**140**	165
	5	135	**170**	200	115	**140**	170	105	**130**	150
	6	135	**170**	200	115	**140**	170	105	**130**	150
	7	165	**195**	225	140	**165**	190	125	**150**	175
	8	135	**170**	200	115	**140**	170	105	**130**	150
	9	135	**170**	200	115	**140**	170	105	**130**	150
	10	145	**175**	205	125	**150**	175	110	**135**	155
	11	120	**150**	185	105	**130**	155	95	**115**	140
	12	135	**170**	200	115	**140**	170	105	**130**	150
	13.1	135	**170**	200	115	**140**	170	105	**130**	150
	13.2	120	**150**	185	105	**130**	155	95	**115**	140
		TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
M	14.1	105	**135**	170	90	**115**	140	80	**105**	130
	14.2	85	**115**	145	75	**100**	125	65	**90**	110
	14.3	70	**100**	130	60	**85**	110	50	**75**	100
	14.4	55	**85**	115	45	**70**	95	40	**65**	85
		TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
K	15	165	**215**	245	155	**180**	205	140	**165**	185
	16	130	**170**	200	115	**140**	170	105	**130**	150
	17	150	**185**	215	130	**155**	180	115	**140**	165
	18	145	**175**	205	125	**150**	175	110	**135**	155
	19	200	**230**	260	170	**195**	220	150	**175**	200
	20	135	**170**	200	115	**140**	170	105	**130**	150
		TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
N	21	305	**335**	365	260	**285**	310			
	22	245	**275**	305	205	**235**	260			
	23	305	**335**	365	260	**285**	310			
	24	245	**275**	305	205	**235**	260			
	25	215	**245**	275	180	**205**	235			
	26	150	**185**	215	130	**155**	180			
	27	150	**185**	215	130	**155**	180			
	28	150	**185**	215	130	**155**	180			
	29	135	**170**	200	115	**140**	170			
	30	135	**170**	200	115	**140**	170			
		TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
S	31	50	**80**	115	45	**70**	95	35	**60**	80
	32	35	**65**	100	30	**55**	85	25	**50**	70
	33	40	**70**	100	30	**60**	85	30	**50**	70
	34	30	**60**	90	25	**50**	80	20	**45**	65
	35	35	**65**	95	30	**55**	80	25	**45**	70
	36	65	**100**	130	55	**85**	110	50	**70**	90
	37	40	**70**	100	30	**60**	85	30	**50**	70

Right Hand Tool

OD Cut-Off and Grooving

order number	catalogue number	H	W	CD	F	B	H3	L1	LS	clamp screw
	Right hand									
3650456	250205	16,0	2,00	16,5	16,0	15,5	6	125	101	606249
3650460	250217	16,0	3,00	11,0	16,0	15,6	—	125	92	619205
3650462	250219	16,0	3,00	22,0	16,0	15,6	5	125	83	619205
3650464	250221	16,0	4,00	22,0	16,0	15,5	5	125	83	619205
3650502	250281	16,0	4,00	11,0	16,0	15,5	—	125	92	619205
3650466	250223	16,0	5,00	14,0	16,0	15,2	—	125	88	619168
3650458	250207	20,0	2,00	16,5	20,0	19,5	—	125	92	606249
3650468	250227	20,0	3,00	11,0	20,0	19,5	—	125	92	619205
3650470	250229	20,0	3,00	22,0	20,0	19,5	5	125	83	619205
3653751	250231	20,0	4,00	20,0	—	—	—	125	83	619205
3650504	250283	20,0	4,00	11,0	20,0	19,5	—	125	92	619205
3650473	250233	20,0	5,00	14,0	20,0	19,2	—	125	88	619168
3650475	250235	20,0	5,00	15,0	20,0	19,2	5	140	93	619168
3650477	250237	20,0	6,00	14,0	20,0	19,2	—	140	103	619168
3650516	250409	25,0	1,50	16,5	25,0	24,5	—	150	116	606249
3650506	250295	25,0	2,00	16,5	25,0	24,5	—	150	116	606249
3650479	250241	25,0	3,00	11,0	25,0	24,5	—	150	117	619205
3650481	250243	25,0	3,00	22,0	25,0	24,5	—	150	109	619205
3650483	250245	25,0	4,00	22,0	25,0	24,5	—	150	109	619205
3653752	250285	25,0	4,00	11,0	25,0	24,7	—	150	117	619205
3650485	250247	25,0	5,00	14,0	25,0	24,1	—	150	113	619168
3650487	250249	25,0	5,00	25,0	25,0	24,1	—	150	104	619168
3650489	250251	25,0	6,00	14,0	25,0	24,1	—	150	114	619168
3650491	250253	25,0	6,00	25,0	25,0	24,1	—	150	104	619168
3650494	250255	25,0	8,00	14,0	25,0	23,9	—	150	113	619168
3650496	250257	25,0	8,00	25,0	25,0	23,9	—	150	104	619168
3650498	250275	32,0	8,00	14,0	32,0	30,9	—	150	113	619168
3650500	250277	32,0	8,00	25,0	32,0	30,9	—	150	104	619168

(continued)

(continued)

Right Hand Tool

OD Cut-Off and Grooving

order number	catalogue number	H	W	CD	F	B	H3	L1	LS	clamp screw
	Left hand									
3650457	250206	16,0	2,00	16,5	16,0	15,5	6	125	101	606249
3650461	250218	16,0	3,00	11,0	16,0	15,5	—	125	92	619205
3650463	250220	16,0	3,00	22,0	16,0	15,5	5	125	83	619205
3650465	250222	16,0	4,00	22,0	16,0	15,5	5	125	83	619205
3650503	250282	16,0	4,00	11,0	16,0	15,5	—	125	92	619205
3650467	250224	16,0	5,00	14,0	16,0	15,2	—	125	88	619168
3650459	250208	20,0	2,00	16,5	20,0	19,5	—	125	92	606249
3650469	250228	20,0	3,00	11,0	20,0	19,5	—	125	92	619205
3650471	250230	20,0	3,00	22,0	20,0	19,5	5	125	83	619205
3650472	250232	20,0	4,00	22,0	20,0	19,7	5	125	83	619205
3650505	250284	20,0	4,00	11,0	20,0	19,5	—	125	92	619205
3650474	250234	20,0	5,00	14,0	20,0	19,2	—	125	88	619168
3650476	250236	20,0	5,00	15,0	20,0	19,2	5	140	93	619168
3650478	250238	20,0	6,00	14,0	20,0	19,3	—	140	103	619168
3650507	250296	25,0	2,00	16,5	25,0	24,5	—	150	116	606249
3653332	250410	25,0	2,00	16,5	25,3	24,5	—	150	116	606249
3650480	250242	25,0	3,00	11,0	25,0	24,5	—	150	116	619205
3650482	250244	25,0	3,00	22,0	25,0	24,5	—	150	109	619205
3650484	250246	25,0	4,00	22,0	25,0	24,5	—	150	109	619205
3653763	250286	25,0	4,00	11,0	25,0	24,7	—	150	117	619205
3650486	250248	25,0	5,00	14,0	25,0	24,1	—	150	113	619168
3650488	250250	25,0	5,00	25,0	25,0	24,1	—	150	104	619168
3650490	250252	25,0	6,00	14,0	25,0	24,1	—	150	114	619168
3650493	250254	25,0	6,00	25,0	25,0	24,1	—	150	104	619168
3650495	250256	25,0	8,00	14,0	25,0	23,9	—	150	113	619168
3650497	250258	25,0	8,00	25,0	25,0	23,9	—	150	104	619168
3650499	250276	32,0	8,00	14,0	32,0	30,9	—	150	113	619168
3650501	250278	32,0	8,00	25,0	32,0	30,9	—	150	104	619168

Left Hand Tool

Swiss Grooving and Cut-Off

order number	catalogue number	W	D max	B	H	H2	F	L1	L2	clamp screw
	Right hand									
3650508	**250401**	1,50	20	10,0	10,0	16	10,0	100	21	**606249**
3650510	**250403**	1,50	20	12,0	12,0	18	12,0	100	21	**606249**
3650512	**250405**	1,50	26	15,9	16,0	24	16,0	125	24	**606266**
3650514	**250407**	1,50	26	19,9	20,0	28	20,0	125	24	**606266**
3653413	**250411**	2,00	20	10,0	10,0	16	10,0	100	21	**606249**
3653415	**250413**	2,00	20	12,0	12,0	18	12,0	100	21	**606249**
3653417	**250415**	2,00	26	15,8	16,0	24	16,0	125	24	**606266**
3653419	**250417**	2,00	26	19,8	20,0	28	20,0	125	24	**606266**
	Left hand									
3650509	**250402**	1,50	20	10,0	10,0	16	10,0	100	21	**606249**
3650511	**250404**	1,50	20	12,0	12,0	18	12,0	100	21	**606249**
3650513	**250406**	1,50	26	15,9	16,0	24	16,0	125	24	**606266**
3650515	**250408**	1,50	26	19,9	20,0	28	20,0	125	24	**606266**
3653414	**250412**	2,00	20	10,0	10,0	16	10,0	100	21	**606249**
3653416	**250414**	2,00	20	12,0	12,0	18	12,0	100	21	**606249**
3653418	**250416**	2,00	26	15,8	16,0	24	16,0	125	24	**606266**
3653420	**250418**	2,00	26	19,8	20,0	28	20,0	125	24	**606266**

NOTE: Insert exterior edge in line with toolholder edge for 10,0mm and 12,0mm shank toolholders.

Blade Style	Part Shape	Left Hand	Right Hand
Curve In			
Curve Out			

Curve Out

order number	catalogue number	W	CD	D max	D min	FS	H2	H	B	L1	L2	clamp	clamp screw
	Right hand												
3653421	**251217**	3,00	13,0	52	38	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653425	**251221**	3,00	16,0	100	70	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653423	**251219**	3,00	16,0	70	52	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653427	**251223**	3,00	19,0	205	100	23,5	32	25,0	24,8	150	37	**–**	**619205**
3653764	**251265**	4,00	12,5	52	32	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653768	**251269**	4,00	15,5	100	70	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653766	**251267**	4,00	15,5	70	52	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653770	**251271**	4,00	18,5	205	100	23,0	32	24,8	24,8	150	37	**–**	**619205**
3653429	**251233**	5,00	16,0	52	38	22,5	34	25,0	24,6	150	38	**446102**	**619168**
3653433	**251237**	5,00	19,0	100	70	22,5	34	24,8	24,8	150	42	**446104**	**619168**
3653431	**251235**	5,00	19,0	70	52	22,5	34	24,8	24,8	150	38	**446102**	**619168**
3653435	**251239**	5,00	25,0	205	100	22,5	34	24,8	24,8	150	42	**446104**	**619168**
3653437	**251249**	6,00	16,0	52	38	22,0	35	24,8	24,8	150	38	**446102**	**619168**
3653441	**251253**	6,00	19,0	100	70	22,0	36	24,8	24,8	150	42	**446104**	**619168**
3653439	**251251**	6,00	19,0	70	52	22,0	34	24,8	24,8	150	38	**446102**	**619168**
3653443	**251255**	6,00	25,0	205	100	22,0	34	24,8	24,8	150	42	**446104**	**619168**
	Left hand												
3653422	**251218**	3,00	13,0	52	38	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653424	**251220**	3,00	16,0	70	52	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653426	**251222**	3,00	16,0	100	70	23,5	32	24,8	24,8	150	34	**–**	**619205**
3653428	**251224**	3,00	19,0	205	100	23,5	32	24,8	24,8	150	37	**–**	**619205**
3653765	**251266**	4,00	12,5	52	32	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653769	**251270**	4,00	15,5	100	70	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653767	**251268**	4,00	15,5	70	52	23,0	32	24,8	24,8	150	34	**–**	**619205**
3653771	**251272**	4,00	18,5	205	100	23,0	32	24,8	24,8	150	37	**–**	**619205**
3653430	**251234**	5,00	16,0	52	38	22,5	34	24,8	24,8	150	38	**446101**	**619168**
3653432	**251236**	5,00	19,0	70	52	22,5	34	24,8	24,8	150	38	**446101**	**619168**
3653434	**251238**	5,00	19,0	100	70	22,5	34	24,8	24,8	150	42	**446103**	**619168**
3653436	**251240**	5,00	25,0	205	100	22,5	34	24,8	24,8	150	42	**446103**	**619168**
3653438	**251250**	6,00	16,0	52	38	22,0	35	24,8	24,8	150	38	**446101**	**619168**
3653440	**251252**	6,00	19,0	70	52	22,0	34	24,8	24,8	150	38	**446101**	**619168**
3653442	**251254**	6,00	19,0	100	70	22,0	34	24,8	24,8	150	42	**446103**	**619168**
3653444	**251256**	6,00	25,0	205	100	22,0	34	24,8	24,8	150	42	**446103**	**619168**

NOTE: Insert cutting edge for WMT Face Grooving system is positioned +0,75mm above center.
The WMT Face Grooving system is not designed to cut diameters of less than 12,6mm.
Toolholders that accept 3,0mm width inserts have an integral clamp.
Toolholders that accept 5,0mm and 6,0mm width inserts are supplied with a detachable clamp.

Left Hand Tool

Curve In

order number	catalogue number	W	CD	D max	D min	FS	H2	H	B	L1	L2	clamp	clamp screw
	Right hand												
3634282	**252209M**	3,00	15,9	100	70	23,5	32	24,8	24,8	150	34	**–**	**MS326**
3634284	**252211M**	3,00	19,1	205	100	23,5	32	24,8	24,8	150	37	**–**	**MS326**
3634286	**252217M**	5,00	19,1	100	70	22,5	34	24,8	24,8	150	42	**446104**	**619168**
3634288	**252219M**	5,00	25,4	205	100	22,5	34	24,8	24,8	150	42	**446104**	**619168**
3634290	**252225M**	6,00	19,1	100	70	22,0	34	24,8	24,8	150	42	**446104**	**619168**
3634292	**252227M**	6,00	25,4	205	100	22,0	34	24,8	24,8	150	42	**446104**	**619168**
	Left hand												
3634283	**252210M**	3,00	15,9	100	70	23,5	32	24,8	24,8	150	34	**–**	**MS326**
3634285	**252212M**	3,00	19,1	205	100	23,5	32	24,8	24,8	150	37	**–**	**MS326**
3634287	**252218M**	5,00	19,1	100	70	22,5	34	24,8	24,8	150	42	**446103**	**619168**
3634289	**252220M**	5,00	25,4	205	100	22,5	34	24,8	24,8	150	42	**446103**	**619168**
3634291	**252226M**	6,00	19,1	100	70	22,0	34	24,8	24,8	150	42	**446103**	**619168**
3634293	**252228M**	6,00	25,4	205	100	22,0	34	24,8	24,8	150	42	**446103**	**619168**

NOTE: Insert cutting edge for WMT Face Grooving system is positioned +0,75mm above center.
The WMT Face Grooving system is not designed to cut diameters of less than 12,6mm.
Toolholders that accept 3,0mm width inserts have an integral clamp.
Toolholders that accept 5,0mm and 6,0mm width inserts are supplied with a detachable clamp.

WIN WITH WIDIA™

WMT™ System

The WIDIA™ WMT System is the economical and reliable option for all of 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.

WMT Toolholders

- Guarantees fast cycles times and limited turret indexes.
- Precise insert positioning for accurate machining.

WMT SLS

- A variety of insert widths available to meet your specific needs.
- Integral and modular Serrated Locking System (SLS) accepts SX, SX Ultra, and PT/PC inserts.

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

WIDIA™
Win with WIDIA™

Left Hand Tool

Right Hand Assembly

Grooving, Cut-Off, and Face Grooving

order number	catalogue number	H	B	L	L1	F	H3	cartridge screw	clamp screw
	Right hand								
3653445	**253201**	16,0	20,0	101	70,4	14,8	9	**606255**	**619168**
3653447	**253203**	20,0	20,0	101	70,4	14,8	5	**606255**	**619168**
3653451	**253207**	25,0	25,0	126	95,4	19,8	—	**619419**	**619168**
3653449	**253205**	32,0	32,0	126	95,4	26,8	—	**619419**	**619168**
	Left hand								
3653446	**253202**	16,0	20,0	101	70,4	14,8	9	**606255**	**619168**
3653448	**253204**	20,0	20,0	101	70,4	14,8	5	**606255**	**619168**
3653452	**253208**	25,0	25,0	126	95,4	19,8	—	**619419**	**619168**
3653450	**253206**	32,0	32,0	126	95,4	26,8	—	**619419**	**619168**

Left Hand Tool

Right Hand Assembly

Grooving and Cut-Off

order number	catalogue number	W	CD	L1	FS
	Right hand				
3653461	**348101**	1,50	16,5	49,1	5,2
3653463	**348103**	2,00	16,5	49,1	5,0
3653465	**348105**	2,38	19,1	52,1	4,7
3653467	**348107**	3,00	22,2	54,6	4,4
3653469	**348109**	4,00	22,2	54,6	4,8
3653703	**348111**	4,76	25,4	57,1	4,3
3653705	**348113**	6,36	25,4	57,2	4,0
	Left hand				
3653462	**348102**	1,50	16,5	49,1	5,2
3653464	**348104**	2,00	16,5	49,1	5,0
3653466	**348106**	2,38	19,1	52,1	4,7
3653468	**348108**	3,00	22,2	54,6	4,4
3653470	**348110**	4,00	22,2	54,6	4,8
3653704	**348112**	4,76	25,4	57,1	4,3
3653706	**348114**	6,36	25,4	57,2	4,0

NOTE: Widths of 4,0mm; 5,0mm; and 6,0mm are not recommended for 16,0mm shank toolholders.
Width of 6,0mm is not recommended for 20,0mm shank toolholders.

L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2 - 0,787mm

Left Hand Tool

Right Hand Assembly

Face Grooving • Curve Out

order number	catalogue number	W	D min	D max	CD	FS	L1
	Right hand						
3653707	349101	3,0	38	51	12,7	4,4	50,3
3653708	349102	3,0	51	70	15,9	4,4	50,3
3653709	349103	3,0	70	102	15,9	4,4	50,3
3653710	349104	3,0	102	203	19,1	4,4	52,7
3653715	349109	4,0	38	51	12,7	4,8	50,3
3653716	349110	4,0	51	70	15,9	4,8	50,3
3653717	349111	4,0	70	102	15,9	4,8	50,3
3653718	349112	4,0	102	203	19,1	4,8	52,7
3653723	349117	5,0	38	51	15,9	4,3	52,7
3653724	349118	5,0	51	70	19,1	4,3	52,7
3653725	349119	5,0	70	102	19,1	4,3	56,6
3653726	349120	5,0	102	203	25,4	4,3	56,6
3653731	349125	6,0	30	51	15,9	5,6	52,7
3653732	349126	6,0	51	70	19,1	5,6	52,7
3653733	349127	6,0	70	102	19,1	5,6	56,6
3653734	349128	6,0	102	203	25,4	5,6	56,6

NOTE: Width of 6,0mm is not recommended for 20,0mm shank toolholders.
See page D16 for shank tooling.

(continued)

(continued)

Left Hand Tool

Right Hand Assembly

Face Grooving • Curve Out

order number	catalogue number	W	D min	D max	CD	FS	L1
	Left hand						
3653711	**349105**	3,0	38	51	12,7	4,4	50,3
3653712	**349106**	3,0	51	70	15,9	4,4	50,3
3653713	**349107**	3,0	70	102	15,9	4,4	50,3
3653714	**349108**	3,0	102	203	19,1	4,4	52,7
3653719	**349113**	4,0	38	51	12,7	4,8	50,3
3653720	**349114**	4,0	51	70	15,9	4,8	50,3
3653721	**349115**	4,0	70	102	15,9	4,8	50,3
3653722	**349116**	4,0	102	203	19,1	4,8	52,7
3653727	**349121**	5,0	38	51	15,9	4,3	52,7
3653728	**349122**	5,0	51	70	19,1	4,3	52,7
3653729	**349123**	5,0	70	102	19,1	4,3	56,6
3653730	**349124**	5,0	102	203	25,4	4,3	56,6
3653735	**349129**	6,0	30	51	15,9	5,6	52,7
3653736	**349130**	6,0	51	70	19,1	5,6	52,7
3653737	**349131**	6,0	70	102	19,1	5,6	56,6
3653738	**349132**	6,0	102	203	25,4	5,6	56,6

Blade Style	Part Shape		Left Hand	Right Hand
Curve In				
Curve Out				

L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2 - 0,787mm

Right Hand Tool

Left Hand Assembly

ID Grooving

order number	catalogue number	D	F	L1	CS	cartridge screw	coolant spout	coolant support screw	clamp screw
	Right hand								
3653454	**254202**	25	-16,0	194,0	1/4-18 NPT	**606256**	**614126**	**619151**	**619168**
3653456	**254204**	32	-16,0	244,0	1/4-18 NPT	**606256**	**614126**	**619151**	**619168**
3653458	**254206**	40	-16,0	294,0	1/4-18 NPT	**606256**	**614126**	**619151**	**619168**
3653459	**254207**	50	-13,0	298,9	1/4-18 NPT	**606256**	**614125**	**619151**	**619168**
3653460	**254208**	50	-13,0	298,9	1/4-18 NPT	**606256**	**614126**	**619151**	**619168**
	Left hand								
3653453	**254201**	25	-16,0	194,0	1/4-18 NPT	**606256**	**614125**	**619151**	**619168**
3653455	**254203**	32	-16,0	244,0	1/4-18 NPT	**606256**	**614125**	**619151**	**619168**
3653457	**254205**	40	-16,0	294,0	1/4-18 NPT	**606256**	**614125**	**619151**	**619168**

NOTE: Right-hand toolholders use left-hand cartridges.

L1 Assy = L1 (holder) + FS (blade) + W/2 - 0,787mm
F Assy = F (holder) + L1 (blade)

Left Hand Tool

Left Hand Assembly

ID Grooving

order number	catalogue number	W	CD	FS	L1
	Right hand				
3653739	**350103**	2,00	12,7	5,0	49,1
3653741	**350105**	2,50	15,9	4,7	52,1
3653743	**350107**	3,00	19,1	4,4	54,6
3653745	**350109**	4,00	19,1	4,8	54,6
3653747	**350111**	5,00	21,6	4,3	57,1
3653749	**350113**	6,00	21,6	4,0	57,2
	Left hand				
3653740	**350104**	2,00	12,7	5,0	49,1
3653742	**350106**	2,50	15,9	4,7	52,1
3653744	**350108**	3,00	19,1	4,4	54,6
3653746	**350110**	4,00	19,1	4,8	54,6
3653748	**350112**	5,00	21,6	4,3	57,1
3653750	**350114**	6,00	21,6	4,0	57,2

NOTE: Widths of 5,0mm and 6,0mm are not recommended for 25,0mm shank toolholders.
Right-hand toolholders use left-hand cartridges.

SX Cut-Off Inserts

- 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.

① Recommended feed

SX-Ultra Cut-Off Inserts

① Recommended feed

- 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 Grooving Inserts

- Deep grooving tool for plunge and turn OD and face grooving operations.
- High positive rake geometry for low cutting force, especially in soft materials.
- Cuts in both axial and radial direction.
- Delivers chip control over full range of DOC when turning.

① Recommended feed

PC Grooving and Profiling Inserts

① Recommended feed

- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.
- Superior chip control.

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

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

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
TN6016	HC-P15	An advanced PVD-TiAlN coating over a tough, fine-grained carbide substrate with increased resistance to heat. Recommended on medium to higher cutting speeds under moderate conditions.	P									
			M									
			K									
			N									
			S									
TN6026	HC-M25	An advanced PVD-TiAlN coating over a superior 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									
			S									
			H									
TN6031	HC-P30	An advanced PVD-TiAlN 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									
			H									

WIDIA MANCHESTER

ANSI ISO 513	VDI 3323									
Material Group		Cutting Speed • vc m/min								
		min	Start	max	min	Start	max	min	Start	max
P			TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)	
	1	170	**200**	230	140	**170**	195	130	**150**	175
	2	170	**200**	230	140	**170**	195	130	**150**	175
	3	135	**170**	200	115	**140**	170	105	**130**	150
	4	150	**185**	215	130	**155**	180	115	**140**	165
	5	135	**170**	200	115	**140**	170	105	**130**	150
	6	135	**170**	200	115	**140**	170	105	**130**	150
	7	165	**195**	225	140	**165**	190	125	**150**	175
	8	135	**170**	200	115	**140**	170	105	**130**	150
	9	135	**170**	200	115	**140**	170	105	**130**	150
	10	145	**175**	205	125	**150**	175	110	**135**	155
	11	120	**150**	185	105	**130**	155	95	**115**	140
	12	135	**170**	200	115	**140**	170	105	**130**	150
	13.1	135	**170**	200	115	**140**	170	105	**130**	150
	13.2	120	**150**	185	105	**130**	155	95	**115**	140
M			TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)	
	14.1	105	**135**	170	90	**115**	140	80	**105**	130
	14.2	85	**115**	145	75	**100**	125	65	**90**	110
	14.3	70	**100**	130	60	**85**	110	50	**75**	100
	14.4	55	**85**	115	45	**70**	95	40	**65**	85
K			TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)	
	15	185	**215**	245	155	**180**	205	140	**165**	185
	16	135	**170**	200	115	**140**	170	105	**130**	150
	17	150	**185**	215	130	**155**	180	115	**140**	165
	18	145	**175**	205	125	**150**	175	110	**135**	155
	19	200	**230**	260	170	**195**	220	150	**175**	200
	20	135	**170**	200	115	**140**	170	105	**130**	150
N			TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)	
	21	305	**335**	365	260	**285**	310			
	22	245	**275**	305	205	**235**	260			
	23	305	**335**	365	260	**285**	310			
	24	245	**275**	305	205	**235**	260			
	25	215	**245**	275	180	**205**	235			
	26	150	**185**	215	130	**155**	180			
	27	150	**185**	215	130	**155**	180			
	28	150	**185**	215	130	**155**	180			
	29	135	**170**	200	115	**140**	170			
	30	135	**170**	200	115	**140**	170			
S			TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)	
	31	50	**80**	115	45	**70**	95	35	**60**	80
	32	35	**65**	100	30	**55**	85	25	**50**	70
	33	40	**70**	100	30	**60**	85	30	**50**	70
	34	30	**60**	90	25	**50**	80	20	**45**	65
	35	35	**65**	95	30	**55**	80	25	**45**	70
	36	65	**100**	130	55	**85**	110	50	**70**	90
	37	40	**70**	100	30	**60**	85	30	**50**	70

RR = RL

● first choice
○ alternate choice

		TN6016	TN6026	TN6031
P		○	●	●
M		○	●	●
K		●	○	●
N		●		○
S			●	○
H				○

WMT-SX

catalogue number	W	LI	RR	α°	hand	TN6016	TN6026	TN6031
583160	1,50	19,31	0,08	—	N - Neutral			●
583125	2,00	19,21	0,08	—	N - Neutral	●		●
583135	3,00	25,38	0,17	—	N - Neutral	●		●
583175	4,00	25,40	0,17	—	N - Neutral	●		●

catalogue number	W	LI	RR	α°	hand	TN6016	TN6026	TN6031
583162	1,50	19,31	0,08	5	L - Left			●
583164	1,50	19,35	0,08	12	L - Left			●
583127	2,00	19,26	0,08	5	L - Left	●		●
583129	2,00	19,28	0,08	12	L - Left			●
583137	3,00	25,35	0,17	5	L - Left	●		●
583139	3,00	25,40	0,17	12	L - Left			●
583177	4,00	25,44	0,17	5	L - Left	●		●
583179	4,00	25,45	0,17	12	L - Left			●

catalogue number	W	LI	RL	α°	hand	TN6016	TN6026	TN6031
583161	1,50	19,31	0,08	5	R - Right			●
583163	1,50	19,35	0,08	12	R - Right			●
583126	2,00	19,26	0,08	5	R - Right	●		●
583128	2,00	19,28	0,08	12	R - Right			●
583136	3,00	25,35	0,17	5	R - Right	●		●
583138	3,00	25,40	0,17	12	R - Right			●
583176	4,00	25,44	0,17	5	R - Right	●		●
583178	4,00	25,45	0,17	12	R - Right			●

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

● first choice
○ alternate choice

WMT-SX Ultra

catalogue number	W	RR	LI	α°	hand	TN6016	TN6026	TN6031
583165	1,50	0,08	19,31	—	N - Neutral		●	
583170	2,00	0,08	19,21	—	N - Neutral		●	
583155	3,00	0,17	25,38	—	N - Neutral		●	
583180	4,00	0,17	25,35	—	N - Neutral		●	

catalogue number	W	RR	LI	α°	hand	TN6016	TN6026	TN6031
583167	1,50	0,08	19,31	5	L - Left		●	
583169	1,50	0,08	19,35	12	L - Left		●	
583172	2,00	0,08	19,26	5	L - Left		●	
583174	2,00	0,08	19,26	12	L - Left		●	
583157	3,00	0,17	25,35	5	L - Left		●	
583159	3,00	0,17	25,40	12	L - Left		●	
583182	4,00	0,17	25,43	5	L - Left		●	
583184	4,00	0,17	25,43	12	L - Left		●	

catalogue number	W	RL	LI	α°	hand	TN6016	TN6026	TN6031
583166	1,50	0,08	19,31	5	R - Right		●	
583168	1,50	0,08	19,35	12	R - Right		●	
583171	2,00	0,08	19,26	5	R - Right		●	
583173	2,00	0,08	19,26	12	R - Right		●	
583156	3,00	0,17	25,35	5	R - Right		●	
583158	3,00	0,17	25,40	12	R - Right		●	
583181	4,00	0,17	25,43	5	R - Right		●	
583183	4,00	0,17	25,43	12	R - Right		●	

RR = RL

● first choice
○ alternate choice

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

WMT-PT

catalogue number	W	RR	LI	hand	TN6016	TN6026	TN6031
582131	2,00	0,15	19,10	N - Neutral	●		●
582129	2,00	0,15	19,10	N - Neutral	●		●
582130	2,00	0,31	19,10	N - Neutral	●		●
582113	3,00	0,31	25,40	N - Neutral	●		●
582114	3,00	0,61	25,40	N - Neutral	●		●
582115	4,00	0,31	25,40	N - Neutral	●		●
582116	4,00	0,61	25,40	N - Neutral	●		●
582117	5,00	0,31	28,63	N - Neutral	●		●
582118	5,00	0,61	28,63	N - Neutral	●		●
582119	6,00	0,31	28,63	N - Neutral	●		●
582120	6,00	0,61	28,63	N - Neutral	●		●
582122	8,00	0,61	28,58	N - Neutral	●		●
582149	8,00	1,50	28,58	N - Neutral	●		●

NOTE: 582131 is exclusively for ID applications.

WMT-PC

catalogue number	W	RC	LI			
581107	3,00	1,50	25,40	●		●
581108	4,00	2,00	25,45	●		●
581109	5,00	2,50	28,88	●		●
581110	6,00	3,00	28,65	●		●
581111	8,00	4,00	29,08	●		●

Troubleshooting

When groove width is greater than insert width, two methods are possible:

1 Multiple-Pass Grooving

Use the widest possible insert width to achieve optimal chip control and tool life. Make grooves 1, 2, and 3 first, then connect with passes 4 and 5. For passes 4 and 5, the material removed should be no more than 0,8 x the insert width.

1.

2 Grooving and Turning

For small and unstable workpieces, this is the preferred method to reduce vibrations experienced when axial grooving. The depth of cut in longitudinal turning should generally be 60–70% of the groove width. Turning in both directions improves tool life.

2.

Choosing the Best Method:

A When the groove depth is greater than the groove width, multiple-pass plunge grooving offers the best results.

B When the groove width is greater than the groove depth, groove and turn (plunge/longitudinal turning) is easier and faster.

Finish Profiling

When finish profile machining internal chamfers or radii, take into account that the effective feed rate and chip cross section are reduced (the tool is cutting in both radial and axial directions). The drawing (right) shows the suggested processing sequence for the final pass to reduce vibrations.

WMT Grooving Tool Application Guidelines

- Always use good general machining practices.
- Make the machine and workpiece setup as rigid as possible.
- Integral shank toolholders offer the best rigidity. When possible, they should be your first toolholder choice.
- When changing inserts, make sure the new insert locates securely against the toolholder's positive stop.
- Never tighten the clamping screw without an insert in the pocket.
- Toolholder extension out of the tool block should be as short as possible.
- Inserts should cut as close to the center as possible or slightly above.
- Dwell time in bottom of groove should be less than three revolutions.
- Recommended cutting speeds and feeds are a starting point. Adjust as needed for optimum tool life and chip control.

On the Web

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Whether your operation is turning, milling, or holemaking, WIDIA brands are the high-performance tooling you need.
We offer standard and custom solutions for the general engineering market.

WIDIA™ TopGroove™

WIDIA has set the industry standard for threading and grooving productivity with the TopGroove clamping design. The proven performance of this system has been enhanced with the addition of new insert geometries and the expansion of our carbide grade offering.

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 patented 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 includes uncoated grades, PVD-coated grades, CVD-coated grades, and advanced material grades, including cermets, ceramics, PCBNs, and PCDs.
- New, improved PVD TiAlN-coated grades are designed to cut a variety of workpiece materials.
- New CVD TN7110 grade.
- Versatile design enables one system to handle OD and ID 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.

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:

- Groove depth, width, and profile.
- Material being machined.
- Application to be performed (face, OD, or ID 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 D4.

TopGroove™ for Internal, External, and Face Grooving Applications

System Capabilities			minimum	maximum
	OD/ID Grooving	width	0,79mm	9,53mm
		depth	—	12,7mm
	Face Grooving	width	2,00mm	6,35mm
		depth	—	12,7mm
	Internal Grooving	diameter	11,2mm	—
	Face Grooving Diameter	standard	23,9mm	—
		deep	—	—
	Deep OD/ID Grooving	width	1,57mm	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 Materials
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 MANCHESTER

■ NS

order number	catalogue number	C H	C B	F	L1	L2	B4	B CD	A gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand											
3641682	NSR1010E2	10,0	10,0	14,0	70	19	9	3,5	N.2R	CM74	MS1200	T10
3641660	NSR1212F2	12,0	12,0	16,0	80	19	9	3,5	N.2R	CM74	MS1200	T10
3636542	NSR1616H2	16,0	16,0	20,0	100	19	9	3,5	N.2R	CM74	MS1200	T10
3638589	NSR2020K2	20,0	20,0	25,0	125	19	9	3,5	N.2R	CM74	MS1200	T10
3636590	NSR2525M2	25,0	25,0	32,0	150	19	9	3,3	N.2R	CM74	MS1200	T10
3636588	NSR2020K3	20,0	20,0	25,0	125	32	13	5,3	N.3R	CM72LP	MS2111	25 IP
3636536	NSR2525M3	25,0	25,0	32,0	150	32	13	5,3	N.3R	CM72LP	MS2111	25 IP
3641664	NSR3225P3	32,0	25,0	32,0	170	32	13	5,3	N.3R	CM72LP	MS2111	25 IP
3641666	NSR3232P3	32,0	32,0	40,0	170	32	13	5,3	N.3R	CM72LP	MS2111	25 IP
3636540	NSR2525M4	25,0	25,0	32,0	150	35	14	7,5	N.4R	CM72LP	MS2111	25 IP
3641675	NSR3225P4	32,0	25,0	32,0	170	35	14	7,5	N.4R	CM72LP	MS2111	25 IP
3641669	NSR3232P4	32,0	32,0	40,0	170	35	14	7,5	N.4R	CM72LP	MS2111	25 IP
3641673	NSR3232P5	32,0	32,0	40,0	170	51	16	10,5	N.5R	CM80	MS352	6mm
	Left hand											
3641683	NSL1010E2	10,0	10,0	14,0	70	19	9	3,5	N.2L	CM75	MS1200	T10
3641681	NSL1212F2	12,0	12,0	16,0	80	19	9	3,5	N.2L	CM75	MS1200	T10
3636545	NSL1616H2	16,0	16,0	20,0	100	19	9	3,5	N.2L	CM75	MS1200	T10
3639045	NSL2020K2	20,0	20,0	25,0	125	19	9	3,5	N.2L	CM75	MS1200	T10
3639047	NSL2525M2	25,0	25,0	32,0	150	19	9	3,5	N.2L	CM75	MS1200	T10
3639046	NSL2020K3	20,0	20,0	32,0	125	32	13	5,3	N.3L	CM73LP	MS2111	25 IP
3636539	NSL2525M3	25,0	25,0	32,0	150	32	13	5,3	N.3L	CM73LP	MS2111	25 IP
3641670	NSL3225P3	32,0	25,0	32,0	170	32	13	5,3	N.3L	CM73LP	MS2111	25 IP
3641671	NSL3232P3	32,0	32,0	40,0	170	32	13	5,3	N.3L	CM73LP	MS2111	25 IP
3636544	NSL2525M4	25,0	25,0	32,0	150	35	14	7,5	N.4L	CM73LP	MS2111	25 IP
3641678	NSL3225P4	32,0	25,0	32,0	170	35	14	7,5	N.4L	CM73LP	MS2111	25 IP

	application	conventional toolholders	modular blades
	OD Grooving and Plunge and Turn	page D38	—
	ID Grooving	page D41	—

4 Select chipbreaker style for the application:

See application guide on page D42 for a complete list of insert styles.

NOTE: Chart shows recommended starting feed rates.

See page D43.

WIDIA MANCHESTER

TopGroove™ Inserts

Feed Values for Grooving

TopGroove • NG-K, NG-1L, and NG

NG-K

NG

NG-1L

- For general-purpose, O-ring, and circlip grooving applications.
- Chip control enables true optimization and productivity.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

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.

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.

A Choose the appropriate insert width "W" for your specific application.

B Select the required corner radius value "RR".

WIDIA MANCHESTER

TopGroove™

Grooving Inserts

- first choice
- alternate choice

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

■ NG

catalogue number	A W	Ap max	B RR	T	insert size	TN6010	TN6025	TNT110	THM
Right hand									
NG2031R	0,79	–	0,09	1,27	2	●	●		●
NG2041R	1,04	–	0,09	1,27	2		●		
NG2056R	1,47	–	0,19	1,27	2		●		
NG2062R	1,58	–	0,19	2,79	2	●	●		●
NG3047R	1,19	–	0,19	1,91	3	●	●		●
NG3062R	1,58	–	0,19	2,39	3	●	●		●
NG3094R	2,39	–	0,19	3,81	3	●	●		●
NG3125R	3,18	–	0,19	3,81	3	●	●		●
NG4250R	6,35	–	0,57	6,35	4	●	●		

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	TN6010	TN6010
varying depth of cut, casting, or forging skin		TN6010	TN6010	TN6010	TN6010	TN6010	TN6010
lightly interrupted cut		TN6025	TN6025	TN6025	TN6025	TN6025	TN6025
heavily interrupted cut		TN6025	TN6025	TN6025	TN6025	TN6025	TN6025

See page D44 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 D46 for cutting data.

TopGroove™
Recommended Cutting Speed Starting Conditions

WIDIA MANCHESTER

ANSI ISO 513	VDI 3323	Cutting Speed • vc m/min											
Material Group		min	Start	max	min	Start	max	min	Start	max	min	Start	max
			TN6010			TN6025			TN7110			THM	
P	1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	130	**160**	190	120	**160**	200	190	**245**	300	90	**105**	140
	3	110	**140**	170	100	**130**	160	160	**205**	250	70	**90**	110
	4	120	**150**	180	120	**150**	180	180	**230**	280	80	**105**	130
	5	100	**130**	160	100	**130**	160	150	**195**	240	70	**90**	110
	6	120	**150**	180	120	**150**	180	180	**230**	280	80	**105**	130
	7	100	**130**	160	90	**125**	160	140	**190**	240	60	**85**	110
	8	90	**120**	150	80	**110**	140	120	**170**	220	50	**75**	100
	9	60	**90**	120	60	**80**	100	90	**125**	160	40	**50**	70
	10	90	**105**	120	80	**95**	110	130	**150**	170	60	**70**	80
	11	50	**65**	80	50	**65**	80	80	**105**	130	40	**50**	60
	12	120	**155**	190	120	**140**	160	180	**210**	240	80	**95**	110
	13.1	90	**120**	150	80	**105**	130	130	**160**	200	60	**75**	90
	13.2	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
			TN6010			TN6025			TN7110			THM	
M	14.1	90	**115**	140	60	**75**	90				60	**75**	90
	14.2	75	**95**	115	50	**60**	75				50	**60**	75
	14.3	55	**70**	90	40	**50**	55				40	**50**	55
	14.4	45	**60**	70	30	**40**	45				30	**40**	45
			TN6010			TN6025			TN7110			THM	
K	15	140	**170**	200	70	**90**	100	190	**240**	300	70	**90**	100
	16	100	**130**	160	50	**65**	80	160	**200**	250	50	**65**	80
	17	120	**150**	180	60	**70**	80	180	**230**	280	60	**70**	80
	18	90	**120**	150	40	**55**	70	120	**170**	220	40	**55**	70
	19	150	**180**	210	80	**95**	110	190	**240**	300	80	**95**	110
	20	110	**140**	170	60	**75**	90	180	**230**	280	60	**75**	90
			TN6010			TN6025			TN7110			THM	
N	21	600	**750**	900	600	**750**	900				600	**750**	900
	22	500	**650**	800	500	**650**	800				500	**650**	800
	23	600	**750**	900	600	**750**	900				600	**750**	900
	24	500	**650**	800	500	**650**	800				500	**650**	800
	25	230	**300**	370	230	**300**	370				230	**300**	370
	26	150	**200**	250	150	**200**	250				150	**200**	250
	27	150	**200**	250	150	**200**	250				150	**200**	250
	28	110	**140**	170	110	**140**	170				110	**140**	170
	29	60	**80**	100	60	**80**	100				60	**80**	100
	30	80	**100**	120	80	**100**	120				80	**100**	120
			TN6010			TN6025			TN7110			THM	
S	31	37	**45**	55	26	**37**	45				26	**37**	45
	32	30	**36**	45	21	**30**	36				21	**30**	36
	33	24	**28**	35	17	**24**	28				17	**24**	28
	34	15	**18**	25	11	**15**	18				11	**15**	18
	35	18	**18**	25	11	**16**	18				11	**16**	18
	36	60	**72**	80	42	**60**	72				42	**60**	72
	37	30	**36**	45	21	**30**	36				21	**30**	36

TopGroove
Holder Identification System

N — Insert Holding Method

N — TopGroove*

*Proprietary standard only.

S — Insert Mounting Location

End mount

Side mount
Offset

Side mount
No offset

NRR Undercut

R — Hand of Tool

End mount

Side mount

Drop Head

16 — Shank Size

Shank height and width in mm and holder length according to ISO standard.

4 — Insert Size

insert size	W1
2	3,81mm
3	4,95mm
4	6,98mm
5	9,65mm
6	9,73mm
8	11,13mm

M — Tool Length

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

Q — Qualified Surface and Length

Q –
qualified metric holder

NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.

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

Metric bars:

M	150,0mm
Q	180,0mm
R	200,0mm
S	250,0mm
T	300,0mm
U	350,0mm

insert size	T
1	3,54mm
2	3,81mm
3	5,35mm
4	6,40mm
5	9,65mm
6	9,73mm
8	11,13mm

Bar diameter in millimetres

N — TopGroove

End mount

Side mount

Right hand

Left hand

NS

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand											
3641682	**NSR1010E2**	10,0	10,0	14,0	70	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3641660	**NSR1212F2**	12,0	12,0	16,0	80	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3636542	**NSR1616H2**	16,0	16,0	20,0	100	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638589	**NSR2020K2**	20,0	20,0	25,0	125	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638590	**NSR2525M2**	25,0	25,0	32,0	150	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638588	**NSR2020K3**	20,0	20,0	25,0	125	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3636536	**NSR2525M3**	25,0	25,0	32,0	150	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641664	**NSR3225P3**	32,0	25,0	32,0	170	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641666	**NSR3232P3**	32,0	32,0	40,0	170	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3636540	**NSR2525M4**	25,0	25,0	32,0	150	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641675	**NSR3225P4**	32,0	25,0	32,0	170	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641669	**NSR3232P4**	32,0	32,0	40,0	170	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641673	**NSR3232P5**	32,0	32,0	40,0	170	51	16	10,5	N.5R	**CM80**	**MS352**	6mm
	Left hand											
3641683	**NSL1010E2**	10,0	10,0	14,0	70	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3641681	**NSL1212F2**	12,0	12,0	16,0	80	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3636545	**NSL1616H2**	16,0	16,0	20,0	100	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639045	**NSL2020K2**	20,0	20,0	25,0	125	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639047	**NSL2525M2**	25,0	25,0	32,0	150	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639046	**NSL2020K3**	20,0	20,0	32,0	125	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3636539	**NSL2525M3**	25,0	25,0	32,0	150	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641670	**NSL3225P3**	32,0	25,0	32,0	170	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641671	**NSL3232P3**	32,0	32,0	40,0	170	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3636544	**NSL2525M4**	25,0	25,0	32,0	150	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641678	**NSL3225P4**	32,0	25,0	32,0	170	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641679	**NSL3232P4**	32,0	32,0	40,0	170	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641688	**NSL3232P5**	32,0	32,0	40,0	170	51	16	10,5	N.5L	**CM81**	**MS352**	6mm

NAS

order number	catalogue number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	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

NE

order number	catalogue number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand												
3641674	**NER1616H2**	16	16	20	100	15	25	—	3,5	N.2L	**CM75**	**MS1200**	T10
3641658	**NER2020K2**	20	20	25	125	15	25	6	3,5	N.2L	**CM75**	**MS1200**	T10
3641665	**NER2525M2**	25	25	32	150	15	25	12	3,5	N.2L	**CM75**	**MS1200**	T10
3636541	**NER2525M3**	25	25	32	150	22	51	—	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641680	**NER3225P3**	32	25	32	170	22	51	—	3,8	N.3L	**CM73LP**	**MS2111**	25 IP
3641672	**NER2525M4**	25	25	35	150	24	51	—	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641689	**NER3225P4**	32	25	35	170	24	51	—	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641693	**NER3232P4**	32	32	40	170	24	51	—	6,4	N.4L	**CM73LP**	**MS2111**	25 IP
3641692	**NER3232P5**	32	32	50	170	35	51	—	10,5	N.5L	**CM81**	**MS352**	6mm
	Left hand												
3641684	**NEL1616H2**	16	16	20	100	15	25	—	3,5	N.2R	**CM74**	**MS1200**	T10
3641677	**NEL2020K2**	20	20	25	125	15	25	6	3,5	N.2R	**CM74**	**MS1200**	T10
3641676	**NEL2525M2**	25	25	32	150	15	25	12	3,5	N.2R	**CM74**	**MS1200**	T10
3636543	**NEL2525M3**	25	25	32	150	22	51	—	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641685	**NEL3225P3**	32	25	32	170	22	51	—	3,8	N.3R	**CM72LP**	**MS2111**	25 IP
3641668	**NEL2525M4**	25	25	35	150	24	51	—	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641694	**NEL3225P4**	32	25	35	170	24	51	—	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641696	**NEL3232P4**	32	32	40	170	24	51	—	6,4	N.4R	**CM72LP**	**MS2111**	25 IP
3641695	**NEL3232P5**	32	32	50	170	35	51	—	10,5	N.5R	**CM80**	**MS352**	6mm

Steel shank with through coolant.

A-NNT

order number	catalogue number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	hex/ Torx plus
	Right hand									
3641644	**A12MNNTOR2**	12	18,5	150	11	1/16-27 NPT	N.2L	**CM147**	**MS1200**	2.5mm
3641643	**A16MNNTOR2**	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641645	**A20QNNTOR2**	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641651	**A25RNNTOR2**	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641622	**A25RNNTOR3**	25	34,0	200	17	1/4-18 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	N.2R	**CM146**	**MS1200**	2.5mm
3641649	**A16MNNTOL2**	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	2.5mm
3641652	**A20QNNTOL2**	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	2.5mm
3641657	**A25RNNTOL2**	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	2.5mm
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 D64–D65 for details.

Necked steel shank with through coolant.

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	8,7	125	31,75	7	3,2	—	N.1L	**CM109**	**MS1034**	1.5mm
3641647	**A12MNNTOR1**	12	11,5	8,7	150	31,30	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5mm

NOTE: Minimum bore capability varies with depth of groove. See pages D64–D65 for details.

insert style	application	rake angle	page(s)
NG	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	neutral	**D47**
NG-K	• Chip control geometry. • General-purpose grooving. • O-ring grooving. • Circlip grooving. • Light turning.	10° positive	**D48**
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	**D51**
NGP	• General-purpose grooving. • O-ring grooving. • Circlip grooving.	5° positive	**D52**
NF*	• Face grooving. • Additional side clearance.	neutral	—
NF-K	• Face grooving with chip control. • Additional side clearance.	10° positive	**D53**
NFD-K	• Deep face grooving with chip control. • Additional side clearance.	10° positive	**D53**

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 **NPK-K**	• Turning. • Back turning positive. • Profiling with chip control.	10° positive	**D54**
NR	• Full radius grooving. • Turning and profiling.	neutral	**D55**
NR-K	• Chip control geometry. • Full radius grooving, turning, and profiling.	10° positive	**D56**
NRD	• Deep grooving. • Full radius end-form.	neutral	**D56**
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.	—	**D57**

*Inserts are available as custom solutions.

TopGroove • NG-K, NG-1L, and NG

NG-K

NG

NG-1L

- For general-purpose, O-ring, and circlip grooving applications.
- Chip control enables true optimisation and productivity.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

① Recommended 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 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 feed

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

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

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
TN6010	HC-S10	Coated carbide. PVD — TiAlN Nano-multi-layer. Light machining. For difficult-to-machine alloys.	P		■	■	■					
			M		■	■	■					
			K		■	■	■					
			N		■	■	■					
			S		■	■	■					
			H		■							
TN6025	HC-S25	Coated carbide. PVD — TiAlN Nano-multi-layer. Light and medium machining. For difficult-to-machine alloys.	P				■	■	■			
			M				■	■	■			
			K				■	■	■			
			N				■	■	■			
			S				■	■	■			
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		■	■	■					

TopGroove
Insert Identification System

N — Type of Insert

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

P — Additional Information

D — Deep grooving

P — Positive

C — Groove and chamfer

3 — Insert Size

insert size	S	W1
1	2,54	2,54mm
2	5,56	3,81mm
3	8,74	4,95mm
4	11,51	6,98mm
5	17,48	9,65mm
6	11,51	9,73mm

M — Size Identification

M — Metric insert groove width

C — Circlip groove insert width is nominal circlip size

125 — Groove Size**

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.

125 = 1,25mm

Width Tolerance: ±0,025mm unless otherwise specified

**Omit position for TopGroove NB-style blanks.

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

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
			TN6010			TN6025			TN7110			THM	
P	1	140	**175**	210	130	**140**	150	200	**215**	230	90	**95**	100
	2	130	**160**	190	120	**160**	200	190	**245**	300	90	**105**	140
	3	110	**140**	170	100	**130**	160	160	**205**	250	70	**90**	110
	4	120	**150**	180	120	**150**	180	180	**230**	280	80	**105**	130
	5	100	**130**	160	100	**130**	160	150	**195**	240	70	**90**	110
	6	120	**150**	180	120	**150**	180	180	**230**	280	80	**105**	130
	7	100	**130**	160	90	**125**	160	140	**190**	240	60	**85**	110
	8	90	**120**	150	80	**110**	140	120	**170**	220	50	**75**	100
	9	60	**90**	120	60	**80**	100	90	**125**	160	40	**50**	70
	10	90	**105**	120	80	**95**	110	130	**150**	170	60	**70**	80
	11	50	**65**	80	50	**65**	80	80	**105**	130	40	**50**	60
	12	120	**155**	190	120	**140**	160	180	**210**	240	80	**95**	110
	13.1	90	**120**	150	80	**105**	130	130	**165**	200	60	**75**	90
	13.2	45	**60**	75	40	**55**	65	65	**85**	100	30	**40**	45
			TN6010			TN6025			TN7110			THM	
M	14.1	90	**115**	140	60	**75**	90				60	**75**	90
	14.2	75	**95**	115	50	**60**	75				50	**60**	75
	14.3	55	**70**	90	40	**50**	55				40	**50**	55
	14.4	45	**60**	70	30	**40**	45				30	**40**	45
			TN6010			TN6025			TN7110			THM	
K	15	140	**170**	200	70	**90**	100	190	**240**	300	70	**90**	100
	16	100	**130**	160	50	**65**	80	160	**200**	250	50	**65**	80
	17	120	**150**	180	60	**70**	80	180	**230**	280	60	**70**	80
	18	90	**120**	150	40	**55**	70	120	**170**	220	40	**55**	70
	19	150	**180**	210	80	**95**	110	190	**240**	300	80	**95**	110
	20	110	**140**	170	60	**75**	90	180	**230**	280	60	**75**	90
			TN6010			TN6025			TN7110			THM	
N	21	600	**750**	900	600	**750**	900				600	**750**	900
	22	500	**650**	800	500	**650**	800				500	**650**	800
	23	600	**750**	900	600	**750**	900				600	**750**	900
	24	500	**650**	800	500	**650**	800				500	**650**	800
	25	230	**300**	370	230	**300**	370				230	**300**	370
	26	150	**200**	250	150	**200**	250				150	**200**	250
	27	150	**200**	250	150	**200**	250				150	**200**	250
	28	110	**140**	170	110	**140**	170				110	**140**	170
	29	60	**80**	100	60	**80**	100				60	**80**	100
	30	80	**100**	120	80	**100**	120				80	**100**	120
			TN6010			TN6025			TN7110			THM	
S	31	37	**45**	55	26	**37**	45				26	**37**	45
	32	30	**36**	45	21	**30**	36				21	**30**	36
	33	24	**28**	35	17	**24**	28				17	**24**	28
	34	15	**18**	25	11	**15**	18				11	**15**	18
	35	16	**18**	25	11	**16**	18				11	**16**	18
	36	60	**72**	80	42	**60**	72				42	**60**	72
	37	30	**36**	45	21	**30**	36				21	**30**	36

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●	○	
K		●	●	○	○
N		○	○		●
S		●	●		●
H		○			

■ NG

catalogue number	W	Ap max	RR	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NG2031R	0,79	—	0,09	1,27	2	●	●		●
NG2041R	1,04	—	0,09	1,27	2		●		
NG2058R	1,47	—	0,19	1,27	2		●		
NG2062R	1,58	—	0,19	2,79	2	●	●		●
NG3047R	1,19	—	0,19	1,91	3	●	●		●
NG3062R	1,58	—	0,19	2,39	3	●	●		●
NG3094R	2,39	—	0,19	3,81	3	●	●		●
NG3125R	3,18	—	0,19	3,81	3	●	●		●
NG4250R	6,35	—	0,57	6,35	4	●	●		
Left hand									
NG2031L	0,79	—	0,09	1,27	2		●		
NG2058L	1,47	—	0,19	1,27	2		●		
NG2062L	1,58	—	0,19	2,79	2		●		
NG3047L	1,19	—	0,19	1,91	3	●	●		●
NG3062L	1,58	—	0,19	2,39	3	●	●		●
NG3094L	2,39	—	0,19	3,81	3	●	●		●
NG3125L	3,18	—	0,19	3,81	3	●	●		●
NG4250L	6,35	—	0,57	6,35	4	●	●		
NG5M500L	5,00	—	0,32	9,52	5		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

■ NG-1L

catalogue number	W	Ap max	RR	T	insert size	cutting edges	TN6010	TN6025	TN7110	THM
Left hand										
NG1047L	1,19	—	0,19	1,91	1	1		●		
NG1062L	1,58	—	0,19	1,91	1	1		●		
NG1094L	2,39	—	0,19	1,91	1	1		●		

NOTE: Width tolerance is +/- 0,076mm on NG-1L inserts.

● first choice
○ alternate choice

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

NG-K

catalogue number	W	Ap max	RR	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NG2M050RK	0,50	0,64	0,09	0,64	2	●	●		
NG2031RK	0,79	0,76	0,09	1,27	2	●	●		
NG2M080RK	0,80	0,76	0,09	1,27	2	●	●		
NG2M100RK	1,00	0,76	0,09	1,27	2	●	●		
NG2047RK	1,19	0,76	0,09	1,27	2	●	●		
NG2M120RK	1,20	0,76	0,09	1,27	2	●	●		
NG2M140RK	1,40	0,76	0,09	1,27	2	●	●		
NG2M150RK	1,50	1,09	0,19	2,79	2		●		
NG2062RK	1,58	1,09	0,19	2,79	2	●	●		
NG2M170RK	1,70	1,09	0,19	2,79	2	●	●		
NG2M175RK	1,75	1,09	0,19	2,79	2		●		
NG2M195RK	1,95	1,09	0,19	2,79	2	●	●		
NG2M200RK	2,00	1,09	0,19	2,79	2	●	●		
NG2M220RK	2,20	1,09	0,19	2,79	2		●		
NG2M225RK	2,25	1,09	0,19	2,79	2	●	●		
NG2094RK	2,39	1,09	0,19	2,79	2	●	●		
NG2M250RK	2,50	1,09	0,19	2,79	2		●		
NG2M275RK	2,75	1,09	0,19	2,79	2	●	●		
NG2M300RK	3,00	1,09	0,19	2,79	2	●	●		
NG2125RK	3,18	1,09	0,19	2,79	2	●	●		
NG2M325RK	3,25	1,09	0,19	2,79	2		●		
NG3M100RK	1,00	0,76	0,19	1,91	3		●		
NG3047RK	1,19	0,76	0,19	1,91	3	●	●		
NG3M120RK	1,20	0,76	0,19	1,91	3	●	●		
NG3M150RK	1,50	1,02	0,19	2,39	3		●	●	
NG3062RK	1,58	1,02	0,19	2,39	3	●	●	●	
NG3M175RK	1,75	1,02	0,19	2,39	3		●		
NG3072RK	1,83	1,02	0,19	2,39	3	●	●		
NG3078RK	1,98	1,02	0,19	2,39	3	●	●		
NG3M200RK	2,00	1,02	0,19	2,39	3		●	●	
NG3M220RK	2,20	1,02	0,19	2,39	3		●		
NG3M225RK	2,25	1,02	0,19	2,39	3	●	●	●	
NG3094RK	2,39	1,02	0,19	3,81	3	●	●		
NG3M250RK	2,50	1,02	0,19	3,81	3		●	●	
NG3M275RK	2,75	1,02	0,19	3,81	3	●	●		
NG3M300RK	3,00	1,02	0,19	3,81	3	●	●	●	
NG3125RK	3,18	1,02	0,19	3,81	3	●	●		
NG3M320RK	3,20	1,02	0,19	3,81	3		●		
NG3M325RK	3,25	1,02	0,19	3,81	3		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

(continued)

(continued)

● first choice
○ alternate choice

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

■ NG-K

catalogue number	W	Ap max	RR	T	insert size	TN6010	TN6025	TN7110	THM
NG3M350RK	3,50	2,92	0,32	3,81	3		●		
NG3156RK	3,96	2,92	0,19	3,81	3	●	●		
NG3M400RK	4,00	2,92	0,32	3,81	3	●	●	●	
NG3M425RK	4,25	2,92	0,32	3,81	3	●	●		
NG3M450RK	4,50	2,92	0,32	3,81	3		●		
NG3189RK	4,80	2,92	0,57	3,81	3	●	●	●	
NG4M300RK	3,00	1,02	0,19	3,81	4		●		
NG4125RK	3,18	1,02	0,19	3,81	4	●	●		
NG4M350RK	3,50	2,92	0,57	6,35	4		●	●	
NG4M400RK	4,00	2,92	0,57	6,35	4	●	●	●	
NG4M450RK	4,50	2,92	0,57	6,35	4		●		
NG4189RK	4,80	2,92	0,57	6,35	4	●	●		
NG4M500RK	5,00	2,92	0,32	6,35	4	●	●	●	
NG4M550RK	5,50	3,81	0,57	6,35	4		●		
NG4M600RK	6,00	3,81	0,57	6,35	4		●	●	
NG4250RK	6,35	3,81	0,57	6,35	4	●	●		
Left hand									
NG2M050LK	0,50	0,64	0,09	0,64	2	●	●		
NG2031LK	0,79	0,76	0,09	1,27	2	●	●		
NG2M080LK	0,80	0,76	0,09	1,27	2	●	●		
NG2M100LK	1,00	0,76	0,09	1,27	2	●	●		
NG2047LK	1,19	0,76	0,09	1,27	2		●		
NG2M120LK	1,20	0,76	0,09	1,27	2	●	●		
NG2M140LK	1,40	0,76	0,09	1,27	2	●	●		
NG2M150LK	1,50	1,09	0,19	2,79	2		●		
NG2062LK	1,58	1,09	0,19	2,79	2	●	●		
NG2M170LK	1,70	1,09	0,19	2,79	2	●	●		
NG2M175LK	1,75	1,09	0,19	2,79	2		●		
NG2M195LK	1,95	1,09	0,19	2,79	2	●	●		
NG2M200LK	2,00	1,09	0,19	2,79	2	●	●		
NG2M220LK	2,20	1,09	0,19	2,79	2		●		
NG2M225LK	2,25	1,09	0,19	2,79	2	●	●		
NG2094LK	2,39	1,09	0,19	2,79	2	●	●		
NG2M250LK	2,50	1,09	0,19	2,79	2		●		
NG2M275LK	2,75	1,09	0,19	2,79	2	●	●		
NG2M300LK	3,00	1,09	0,19	2,79	2	●	●		
NG2125LK	3,18	1,09	0,19	2,79	2	●	●		
NG2M325LK	3,25	1,09	0,19	2,79	2		●		
NG3M100LK	1,00	0,76	0,19	1,91	3		●		
NG3047LK	1,19	0,76	0,19	1,91	3	●	●		

(continued)

(continued)

● first choice
○ alternate choice

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

NG-K

catalogue number	W	Ap max	RR	T	insert size	TN6010	TN6025	TN7110	THM
NG3M120LK	1,20	0,76	0,19	1,91	3	●	●		
NG3M150LK	1,50	1,02	0,19	2,39	3		●	●	
NG3062LK	1,58	1,02	0,19	2,39	3	●	●	●	
NG3M175LK	1,75	1,02	0,19	2,39	3		●		
NG3072LK	1,83	1,02	0,19	2,39	3	●	●		
NG3078LK	1,98	1,02	0,19	2,39	3	●	●		
NG3M200LK	2,00	1,02	0,19	2,39	3		●	●	
NG3M220LK	2,20	1,02	0,19	2,39	3		●		
NG3M225LK	2,25	1,02	0,19	2,39	3	●	●	●	
NG3094LK	2,39	1,02	0,19	3,81	3	●	●		
NG3M250LK	2,50	1,02	0,19	3,81	3		●	●	
NG3M275LK	2,75	1,02	0,19	3,81	3	●	●		
NG3M300LK	3,00	1,02	0,19	3,81	3	●	●	●	
NG3125LK	3,18	1,02	0,19	3,81	3	●	●		
NG3M320LK	3,20	1,02	0,19	3,81	3		●		
NG3M325LK	3,25	1,02	0,19	3,81	3		●		
NG3M350LK	3,50	2,92	0,32	3,81	3		●		
NG3156LK	3,96	2,92	0,19	3,81	3	●	●		
NG3M400LK	4,00	2,92	0,32	3,81	3	●	●	●	
NG3M425LK	4,25	2,92	0,32	3,81	3	●	●		
NG3M450LK	4,50	2,92	0,32	3,81	3		●		
NG3189LK	4,80	2,92	0,57	3,81	3	●	●	●	
NG4M300LK	3,00	1,02	0,19	3,81	4		●		
NG4125LK	3,18	1,02	0,19	3,81	4	●	●		
NG4M350LK	3,50	2,92	0,57	6,35	4		●	●	
NG4M400LK	4,00	2,92	0,57	6,35	4	●	●	●	
NG4M450LK	4,50	2,92	0,57	6,35	4		●		
NG4189LK	4,80	2,92	0,57	6,35	4	●	●		
NG4M500LK	5,00	2,92	0,32	6,35	4	●	●	●	
NG4M550LK	5,50	3,81	0,57	6,35	4		●		
NG4M600LK	6,00	3,81	0,57	6,35	4		●	●	
NG4250LK	6,35	3,81	0,57	6,35	4	●	●		

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●	○	
K		●	●	○	○
N		○	○		●
S		●	●		●
H		○			

■ NGD-K

catalog number	W	Ap max	RR	T	insert size	cutting edges	TN6010	TN6025	TN7110	THM
Right hand										
NGD2M150RK	1,50	1,09	0,19	4,06	2	1	●	●		
NGD2M200RK	2,00	1,09	0,19	5,08	2	1	●	●		
NGD2M250RK	2,50	1,09	0,19	5,08	2	1	●	●		
NGD3062RK	1,58	1,02	0,19	3,18	3	2	●	●		
NGD3M200RK	2,00	1,02	0,19	4,06	3	1	●	●		
NGD3094RK	2,39	1,02	0,19	6,35	3	1	●	●		●
NGD3M250RK	2,50	1,02	0,19	6,35	3	1	●	●		
NGD3M300RK	3,00	1,02	0,19	6,35	3	1	●	●		
NGD3125RK	3,18	1,02	0,19	6,35	3	1	●	●		
NGD3M350RK	3,50	2,92	0,32	6,35	3	1	●	●		
NGD3M400RK	4,00	2,92	0,32	6,35	3	1	●	●		
NGD3189RK	4,80	2,92	0,57	6,35	3	1	●	●		
NGD4125RK	3,18	1,02	0,19	6,35	4	2	●	●		
NGD4M400RK	4,00	2,92	0,57	9,53	4	1	●	●		
NGD4M450RK	4,50	2,92	0,57	12,70	4	1	●	●		
NGD4189RK	4,80	2,92	0,57	9,53	4	1	●	●		
NGD4M500RK	5,00	2,92	0,57	12,70	4	1	●	●		
NGD4M550RK	5,50	3,81	0,57	12,70	4	1	●	●		
NGD4250RK	6,35	3,81	0,57	12,70	4	1	●	●		
Left hand										
NGD2M150LK	1,50	1,09	0,19	4,06	2	1	●	●		
NGD2M200LK	2,00	1,09	0,19	5,08	2	1	●	●		
NGD2M250LK	2,50	1,09	0,19	5,08	2	1	●	●		
NGD3062LK	1,58	1,02	0,19	3,18	3	2	●	●		
NGD3M200LK	2,00	1,02	0,19	4,06	3	1	●	●		
NGD3094LK	2,39	1,02	0,19	6,35	3	1	●	●		●
NGD3M250LK	2,50	1,02	0,19	6,35	3	1	●	●		
NGD3M300LK	3,00	1,02	0,19	6,35	3	1	●	●		
NGD3125LK	3,18	1,02	0,19	6,35	3	1	●	●		
NGD3M350LK	3,50	2,92	0,32	6,35	3	1	●	●		
NGD3M400LK	4,00	2,92	0,32	6,35	3	1	●	●		
NGD3189LK	4,80	2,92	0,57	6,35	3	1	●	●		
NGD4125LK	3,18	1,02	0,19	6,35	4	2	●	●		
NGD4M400LK	4,00	2,92	0,57	9,53	4	1	●	●		
NGD4M450LK	4,50	2,92	0,57	12,70	4	1	●	●		
NGD4189LK	4,80	2,92	0,57	9,53	4	1	●	●		
NGD4M500LK	5,00	2,92	0,57	12,70	4	1	●	●		
NGD4M550LK	5,50	3,81	0,57	12,70	4	1	●	●		
NGD4250LK	6,35	3,81	0,57	12,70	4	1	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●	○	
K		●	●	○	○
N		○	○		●
S		●	●		●
H		○			

■ NGP

catalogue number	W	Ap max	T	RR	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NGP2M150R	1,50	–	2,79	0,19	2	●			●
NGP2062R	1,58	–	2,79	0,19	2	●			
NGP2M200R	2,00	–	2,79	0,19	2	●			●
NGP2M250R	2,50	–	2,79	0,19	2	●			●
NGP2M300R	3,00	–	2,79	0,19	2	●			●
NGP3M150R	1,50	–	1,90	0,19	3	●			●
NGP3M200R	2,00	–	2,79	0,19	3	●			●
NGP3M250R	2,50	–	3,81	0,19	3	●			●
NGP3M300R	3,00	–	3,81	0,19	3	●			●
Left hand									
NGP2M150L	1,50	–	2,79	0,19	2	●			●
NGP2062L	1,58	–	2,79	0,19	2	●			
NGP2M200L	2,00	–	2,79	0,19	2	●			●
NGP2M250L	2,50	–	2,79	0,19	2	●			●
NGP2M300L	3,00	–	2,79	0,19	2	●			●
NGP3M150L	1,50	–	1,90	0,19	3	●			●
NGP3M200L	2,00	–	2,79	0,19	3	●			●
NGP3M250L	2,50	–	3,81	0,19	3	●			●
NGP3M300L	3,00	–	3,81	0,19	3	●			●

NOTE: 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

catalogue number	W	Ap max	RR	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NF3M200RK	2,00	1,02	0,19	1,78	3		●		
NF3M300RK	3,00	1,02	0,19	3,81	3		●		
NF3125RK	3,18	1,02	0,19	3,81	3		●		
Left hand									
NF3M200LK	2,00	1,02	0,19	1,78	3		●		
NF3M300LK	3,00	1,02	0,19	3,81	3		●		
NF3125LK	3,18	1,02	0,19	3,81	3		●		
NF3156LK	3,96	2,92	0,19	3,81	3		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

NFD-K

catalogue number	W	Ap max	RR	T	insert size	cutting edges	TN6010	TN6025	TN7110	THM
Right hand										
NFD3M300RK	3,00	1,02	0,19	6,35	3	1		●		
NFD3125RK	3,18	1,02	0,19	6,35	3	1		●		
NFD4189RK	4,80	2,92	0,57	9,53	4	1		●		
NFD4250RK	6,35	3,81	0,57	12,70	4	1		●		
Left hand										
NFD3M300LK	3,00	1,02	0,19	6,35	3	1		●		
NFD3125LK	3,18	1,02	0,19	6,35	3	1		●		
NFD4189LK	4,80	2,92	0,57	9,53	4	1		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

	TN6010	TN6025	TN7110	THM
P	●	●	●	
M	●	●	○	
K	●	●	○	○
N	○	○		●
S	●	●		●
H	○			

NP-K

catalogue number	W	Ap max	RL	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NP2002RK	3,68	—	0,25	2,79	2	●	●		
NP3002RK	4,83	—	0,25	5,08	3	●	●		
NP3012RK	4,83	—	0,25	5,08	3		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.
Width tolerance is +/- 0,13mm.

● first choice
○ alternate choice

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

■ NR

catalogue number	W	Ap max	RC	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NR2M050R	1,00	–	0,50	1,27	2	●	●	●	
NR2M075R	1,50	–	0,75	2,79	2	●	●	●	
NR2031R	1,58	–	0,79	2,79	2	●	●		
NR2M100R	2,00	–	1,00	2,79	2	●	●	●	
NR2047R	2,39	–	1,19	2,79	2		●		
NR2M125R	2,50	–	1,25	2,79	2	●	●	●	
NR2M150R	3,00	–	1,50	2,79	2	●	●	●	
NR2M175R	3,50	–	1,75	2,79	2	●	●	●	
NR3031R	1,58	–	0,79	2,39	3	●	●		●
NR3M100R	2,00	–	1,00	2,39	3	●	●	●	
NR3047R	2,39	–	1,19	3,81	3	●	●		●
NR3M125R	2,50	–	1,25	3,81	3	●	●	●	
NR3M150R	3,00	–	1,50	3,81	3	●	●	●	
NR3062R	3,18	–	1,59	3,81	3	●	●		●
NR3M175R	3,50	–	1,75	3,81	3	●	●	●	
NR3M200R	4,00	–	2,00	3,81	3	●	●	●	
NR3M225R	4,50	–	2,25	3,81	3	●	●	●	
NR3094R	4,78	–	2,39	3,81	3	●	●		
NR4M200R	4,00	–	2,00	6,35	4	●	●	●	
NR4M225R	4,50	–	2,25	6,35	4	●	●	●	
NR4M250R	5,00	–	2,50	6,35	4	●	●	●	
NR4125R	6,35	–	3,18	6,35	4	●	●		
Left hand									
NR2M050L	1,00	–	0,50	1,27	2	●	●	●	
NR2M075L	1,50	–	0,75	2,79	2	●	●	●	
NR2031L	1,58	–	0,79	2,79	2	●	●		
NR2M100L	2,00	–	1,00	2,79	2	●	●	●	
NR2047L	2,39	–	1,19	2,79	2		●		
NR2M125L	2,50	–	1,25	2,79	2	●	●	●	
NR2M150L	3,00	–	1,50	2,79	2	●	●	●	
NR2M175L	3,50	–	1,75	2,79	2	●	●	●	
NR3031L	1,58	–	0,79	2,39	3	●	●		●
NR3M100L	2,00	–	1,00	2,39	3	●	●	●	
NR3047L	2,39	–	1,19	3,81	3	●	●		●
NR3M125L	2,50	–	1,25	3,81	3	●	●	●	
NR3M150L	3,00	–	1,50	3,81	3	●	●	●	
NR3062L	3,18	–	1,59	3,81	3	●	●		●
NR3M175L	3,50	–	1,75	3,81	3	●	●	●	
NR3M200L	4,00	–	2,00	3,81	3	●	●	●	
NR3M225L	4,50	–	2,25	3,81	3	●	●	●	
NR3094L	4,78	–	2,39	3,81	3	●	●		
NR4M200L	4,00	–	2,00	6,35	4	●	●	●	
NR4M225L	4,50	–	2,25	6,35	4	●	●	●	
NR4M250L	5,00	–	2,50	6,35	4	●	●	●	
NR4125L	6,35	–	3,18	6,35	4	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●	○	
K		●	●	○	○
N		○	○		●
S		●	●		●
H		○			

NR-K

catalogue number	W	Ap max	RC	T	insert size	TN6010	TN6025	TN7110	THM
Right hand									
NR3031RK	1,58	1,98	0,79	2,39	3	●	●		
NR3047RK	2,39	1,91	1,19	3,81	3	●	●		
NR3062RK	3,18	2,92	1,59	3,81	3	●	●		
NR3078RK	3,96	2,54	1,98	3,81	3	●	●		
NR4062RK	3,18	2,92	1,59	3,81	4	●	●		
NR4094RK	4,78	3,81	2,39	6,35	4	●	●		
NR4125RK	6,35	3,81	3,18	6,35	4	●	●		
Left hand									
NR3031LK	1,58	1,98	0,79	2,39	3	●	●		
NR3047LK	2,39	1,91	1,19	3,81	3	●	●		
NR3062LK	3,18	2,92	1,59	3,81	3	●	●		
NR3078LK	3,96	2,54	1,98	3,81	3	●	●		
NR4062LK	3,18	2,92	1,59	3,81	4	●	●		
NR4094LK	4,78	3,81	2,39	6,35	4	●	●		
NR4125LK	6,35	3,81	3,18	6,35	4	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

NRD

catalogue number	W	Ap max	RC	T	insert size	cutting edges	TN6010	TN6025	TN7110	THM
Right hand										
NRD3031R	1,58	—	0,79	3,18	3	2	●	●		
NRD3062R	3,18	—	1,59	6,35	3	1	●	●		
NRD4062R	3,18	—	1,59	6,35	4	2	●	●		
NRD4125R	6,35	—	3,18	12,70	4	1	●	●		
Left hand										
NRD3031L	1,58	—	0,79	3,18	3	2	●	●		
NRD3062L	3,18	—	1,59	6,35	3	1	●	●		
NRD4062L	3,18	—	1,59	6,35	4	2	●	●		
NRD4125L	6,35	—	3,18	12,70	4	1	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

● first choice
○ alternate choice

■ NB

catalogue number	W	insert size	TN6010	TN6025	TN7110	THM
Right hand						
NB2R	3,81	2				●
NB3R	4,95	3				●
Left hand						
NB2L	3,81	2				●
NB3L	4,95	3				●

		TN6010	TN6025	TN7110	THM
P		●	●	●	
M		●	●	○	
K		●	●	○	○
N		○	○		●
S		●	●		●
H		○			

NOTE: Right-hand insert shown; left-hand insert is mirror image.
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 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 or NF2-R-SK	**NG2-L-SK or NF2-L-SK**	0,66–1,42 1,45–3,43	0,00–0,18 0,08–0,33	1,27 2,79	3,810	carbide grades quoted upon request. **See page D44.**
NG3-R-SK or NF3-R-SK	**NG3-L-SK or NF3-L-SK**	1,07–1,70 1,73–1,93 1,96–2,39 2,41–2,67 2,69–3,18 3,20–3,40 3,43–3,96 3,99–4,42 4,67–4,98	0,08–0,33 0,13–0,51 0,13–0,76 0,13–0,51 0,13–0,76 0,13–0,51 0,13–0,76 0,20–0,46 0,46–0,71	2,39 2,39 3,81 3,81 3,81 3,81 3,81 3,81 3,81	4,950	
NG4-R-SK or NF4-R-SK	**NG4-L-SK or NF4-L-SK**	2,54–2,79 2,82–3,18 3,20–3,33 3,35–3,96 3,99–4,11 3,89–4,80 4,83–4,85 4,88–5,18 6,22–6,53	0,13–0,51 0,13–0,76 0,13–0,51 0,13–0,76 0,13–0,51 0,13–0,76 0,46–0,71 0,20–0,46 0,46–0,64	3,81 3,81 3,81 3,81 3,81 6,35 6,35 6,35 6,35	6,480	

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=2,29; R_1=0,25; R_2=0,25; grade TN6010.

Standard tolerance of ±0,03mm on width (W) will be applied unless specified otherwise. Standard tolerance of ±0,06mm on radii (R_1 and R_2) will be applied unless specified otherwise.

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 written above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

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 or NFD3-R-SK	**NGD3-L-SK or NFD3-L-SK**	1,45–1,75 2,26–2,57* 3,05–3,35* 4,67–4,98*	.008–.033 .008–.033 .008–.033 .046–.071	3,18 6,35 6,35 6,35	4,95	carbide grades quoted upon request. **See page D44.**
NGD4-R-SK or NFD4-R-SK	**NGD4-L-SK or NFD4-L-SK**	3,05–3,35* 4,57–4,98* 6,22–6,53*	.008–.033 .046–.071 .046–.071	6,35 9,53 12,70	6,48	

**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=2,0; R_1=0,09; R_2=0,09; grade TN6010.

Unless otherwise specified, a standard tolerance of ±0,025mm on width (W) will be applied, and a standard tolerance of ±0,063mm 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 written 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 D44.**
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	–	–

**25,0mm 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 center 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 center 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
burr	1. Ensure tool center 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 center 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 center 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.

- Center height of insert should be positioned at the center 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.

- 0,79mm–1,6mm wide insert can cut up to 0,6mm deep.
- 1,7mm–3,3mm wide insert can cut up to 1,0mm deep.
- 3,5mm–4,8mm wide insert can cut up to 2,0mm deep.
- 5,0mm–6,35mm wide insert can cut up to 3,0mm deep.

Groove Limits		
insert catalogue number	maximum internal groove depth mm	minimum bore diameter mm
NG-1094L	1,91 1,02	20,32 11,18
NG-2031R/L NG-2041R/L NG-2047R/L NG-2058R/L	1,27	18,54
NG-2062R/L NG-2094R/L NG-2125R/L	2,79 2,59 2,49 2,03 1,40	63,50 44,45 38,10 25,40 18,54
NG-3047R/L NG-3062R/L NG-3072R/L NG-3078R/L NG-3088R/L	2,39 2,29 1,91	44,45 41,28 34,93
NG-3094R/L NG-3097R/L NG-3105R/L NG-3110R/L NG-3122R/L NG-3125R/L NG-3142R/L NG-3156R/L NG-3178R/L NG-3185R/L NG-3189R/L	3,81 3,68 3,51 3,18 2,79	60,33 53,98 47,63 41,28 34,93
NG-4125R/L	3,81	69,85
NG-4189R/L NG-4213R/L NG-4219R/L NG-4250R/L	6,35 6,22 6,10 5,54 5,08	146,05 127,00 114,30 82,55 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.

Finish Turning the Groove

1. Plunge both sides of groove width.
2. Plunge center 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.

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	add to F dimension
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.

See page D44 for carbide grade selection and more technical information.

left-hand insert right-hand insert

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 centers 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	9,53	(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)

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 D mm	minimum groove diameter E mm
NFD-3-KI	6,35	63,5 *NOTE: Also check minimum bore diameter of boring bar. See page D41.*

ProGroove™

ProGroove™ Grooving and Cut-Off

Features and Benefits:

- 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.

Right Hand Tool

Grooving and Cut-Off

order number	catalogue number	W	CD	H	B	F	L1	L2	H1	cap screw	wrench
	Right hand										
2007136	**12251782000**	2,00	16,0	16	16	16,2	100	27	16	**12146012600**	**12148041100**
2022560	**12251783000**	3,00	20,0	20	20	20,3	125	32	20	**12148596200**	**12148041200**
2007142	**12251783200**	3,00	25,0	25	25	25,3	150	40	25	**12148596200**	**12148041200**
2008153	**12251783600**	3,00	25,0	32	25	25,3	170	40	32	**12148596200**	**12148041200**
2022562	**12251784000**	4,00	25,0	20	20	20,4	125	40	20	**12148596200**	**12148041200**
2007148	**12251784200**	4,00	25,0	25	25	25,4	150	40	25	**12148596200**	**12148041200**
2015814	**12251784400**	4,00	32,0	32	25	25,4	170	53	32	**12148596200**	**12148041200**
2022564	**12251785200**	5,00	32,0	25	25	25,4	150	53	25	**12148596200**	**12148041200**
2022566	**12251785400**	5,00	32,0	32	25	25,4	170	53	32	**12148596200**	**12148041200**
2022568	**12251786400**	6,00	32,0	32	25	25,5	170	53	32	**12146012700**	**12148041300**
2022569	**12251788400**	8,00	40,0	32	25	25,6	170	66	32	**12146012700**	**12148041300**
	Left hand										
2007139	**12251782100**	2,00	16,0	16	16	16,2	100	27	16	**12146012600**	**12148041100**
2022561	**12251783100**	3,00	20,0	20	20	20,3	125	32	20	**12148596200**	**12148041200**
2007145	**12251783300**	3,00	25,0	25	25	25,3	150	40	25	**12148596200**	**12148041200**
2008150	**12251783700**	3,00	25,0	32	25	25,3	170	40	32	**12148596200**	**12148041200**
2022563	**12251784100**	4,00	25,0	20	20	20,4	125	40	20	**12148596200**	**12148041200**
2007151	**12251784300**	4,00	25,0	25	25	25,4	150	40	25	**12148596200**	**12148041200**
2015816	**12251784500**	4,00	32,0	32	25	25,4	170	53	32	**12148596200**	**12148041200**
2022565	**12251785300**	5,00	32,0	25	25	25,4	150	53	25	**12148596200**	**12148041200**
2022567	**12251785500**	5,00	32,0	32	25	25,4	170	53	32	**12148596200**	**12148041200**
2015839	**12251786500**	6,00	32,0	32	25	25,5	170	53	32	**12146012700**	**12148041300**
2015842	**12251788500**	8,00	40,0	32	25	25,6	170	66	32	**12146012700**	**12148041300**

Right Hand Tool

Grooving and Profiling

order number	catalogue number	W	CD	D max	H	B	F	L1	L2	H1	cap screw	wrench
	Right hand											
2007105	**12251762000**	2,00	10,0	25,4	16	16	16,2	100	26	16	**12146012600**	**12148041100**
2007832	**12251762200**	2,00	10,0	25,4	20	20	20,2	125	26	25	**12146012600**	**12148041100**
2021637	**12251762400**	2,00	10,0	25,4	25	25	25,2	150	26	25	**12146012600**	**12148041100**
2007127	**12251763400**	3,00	10,0	25,4	16	16	16,3	100	26	25	**12148596200**	**12148041200**
2015754	**12251763000**	3,00	10,0	25,4	20	20	20,3	125	26	25	**12148596200**	**12148041200**
2007111	**12251763200**	3,00	10,0	25,4	25	25	25,3	150	26	20	**12148596200**	**12148041200**
2022548	**12251764000**	4,00	12,5	32,0	20	20	20,4	125	31	20	**12148596200**	**12148041200**
2007130	**12251764200**	4,00	12,5	32,0	25	25	25,4	150	31	25	**12148596200**	**12148041200**
2022550	**12251764400**	4,00	12,5	32,0	32	25	25,4	170	31	32	**12148596200**	**12148041200**
2022552	**12251765200**	5,00	12,5	—	25	25	25,5	150	31	25	**12148596200**	**12148041200**
2022554	**12251765400**	5,00	12,5	—	32	25	25,5	170	31	32	**12148596200**	**12148041200**
2022555	**12251766200**	6,00	16,0	—	25	25	25,6	150	35	25	**12146012700**	**12148041300**
2022557	**12251766400**	6,00	16,0	—	32	25	25,6	170	35	32	**12146012700**	**12148041300**
2021638	**12251768200**	8,00	16,0	—	25	25	25,7	150	36	25	**12146012700**	**12148041300**
2015792	**12251768400**	8,00	16,0	—	32	25	25,7	170	36	32	**12146012700**	**12148041300**
	Left hand											
2007108	**12251762100**	2,00	10,0	25,4	16	16	16,2	100	26	16	**12146012600**	**12148041100**
2021631	**12251762300**	2,00	10,0	25,4	20	20	20,2	125	26	16	**12146012600**	**12148041100**
2021636	**12251762500**	2,00	10,0	25,4	25	25	25,2	150	26	25	**12146012600**	**12148041100**
2021627	**12251763500**	3,00	10,0	25,4	16	16	16,3	100	26	32	**12148596200**	**12148041200**
2022547	**12251763100**	3,00	10,0	25,4	20	20	20,3	125	26	20	**12148596200**	**12148041200**
2007124	**12251763300**	3,00	10,0	25,4	25	25	25,3	150	26	20	**12148596200**	**12148041200**
2022549	**12251764100**	4,00	12,5	32,0	20	20	20,4	125	31	20	**12148596200**	**12148041200**
2007133	**12251764300**	4,00	12,5	32,0	25	25	25,4	150	31	25	**12148596200**	**12148041200**
2022551	**12251764500**	4,00	12,5	32,0	32	25	25,4	170	31	32	**12148596200**	**12148041200**
2022553	**12251765300**	5,00	12,5	—	25	25	25,5	150	31	25	**12148596200**	**12148041200**
2015782	**12251765500**	5,00	12,5	—	32	25	25,5	170	31	20	**12148596200**	**12148041200**
2022556	**12251766300**	6,00	16,0	—	25	25	25,6	150	35	25	**12146012700**	**12148041300**
2022558	**12251766500**	6,00	16,0	—	32	25	25,6	170	35	32	**12146012700**	**12148041300**
2007863	**12251768300**	8,00	16,0	—	25	25	25,7	150	36	25	**12146012700**	**12148041300**
2022559	**12251768500**	8,00	16,0	—	32	25	25,7	170	36	32	**12146012700**	**12148041300**

NOTE: Select shorter CD dimension for added stability.

Cut-Off Blades

order number	catalogue number	W	H	H1	L1	B	CD	wrench
2021629	12251332000	2,0	19	15,7	90	1,7	20	12146003800
2021639	12251342000	2,0	26	21,4	110	1,7	25	12146003800
2008113	12251352000	2,0	32	25,0	150	1,7	25	12146003800
2021640	12251343000	3,0	26	21,4	110	2,4	40	12146003800
2008116	12251353000	3,0	32	25,0	150	2,4	50	12146003800
2021641	12251344000	4,0	26	21,4	110	3,2	40	12146003800
2008119	12251354000	4,0	32	25,0	150	3,2	50	12146003800
2008122	12251355000	5,0	32	25,0	150	4,2	60	12146003800
2008135	12251356000	6,0	32	25,0	150	5,0	60	12146009500
2008138	12251358000	8,0	32	25,0	150	6,8	60	12146009500
2021743	12251368000	8,0	53	45,0	250	6,8	100	12146009500

Cut-Off Blade Holders

order number	catalogue number	HW	H	B	F	H2	B2	H3	L	cap screw	wrench
2021625	12251221900	19	16	16	28,3	30	30	4	100	12148036000	12148041300
2021634	12251212500	19	25	19	17,3	25	19	—	100	12148036000	12148041300
2021626	12251221600	26	16	16	31,0	40	36	12	100	12148036000	12148041300
2007826	12251222000	26	20	18	33,0	40	38	8	100	12148036000	12148041300
2008141	12251213200	26	32	20	15,0	32	20	—	125	12148036000	12148041300
2021635	12251222500	32	25	20	35,0	50	40	10	125	12148036000	12148041300
2008156	12251223200	32	32	25	40,0	50	45	3	125	12146013400	12148041400
2008159	12251233200	53	32	25	50,0	82	57	30	160	12146013400	12148041400
2021723	12251234000	53	40	40	58,0	82	65	22	160	12146013400	12148041400

Right Hand Tool

Grooving

order number	catalogue number	W	CD	H	H1	B	L1	F
	Right hand							
2022446	**12250110100**	8	20	32	32	25	170	25,5
2008147	**12250110300**	10	20	32	32	25	170	25,5
2021719	**12250110500**	12	25	40	40	32	200	33,0
2021721	**12250110700**	14	28	40	40	32	200	33,0
2008521	**12250110900**	16	32	40	40	32	200	33,0
	Left hand							
2022447	**12250110200**	8	20	32	32	25	170	25,5
2008144	**12250110400**	10	20	32	32	25	170	25,5
2021718	**12250110600**	12	25	40	40	32	200	33,0
2021720	**12250110800**	14	28	40	40	32	200	33,0
2021722	**12250111000**	16	32	40	40	32	200	33,0

Spare Parts

catalogue number	clamping bolt	wedge clamp	clamping screw	wrench for clamping 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**	**12148041200**	**12148041000**
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**	**12148041200**	**12148041000**

1. Clamping bolt
2. Wedge clamp
3. Clamping screw

Grooving

order number	catalogue number	W	H1	H	B	L1	L2	γP°	insert 1
2022921	**12191061900**	10,4	20	20	9,5	125	21	3	TP..1103../TP..22..
2007414	**12191062086**	15,3	20	20	13,0	150	27	3	TP..1603../TP..32..
2022922	**12191062586**	15,3	25	25	13,0	150	27	3	TP..1603../TP..32..
2058066	**12191062686**	20,2	25	25	18,0	150	35	3	TP..2204../TP..43..
2022923	**12191063286**	20,2	32	32	18,0	180	35	3	TP..2204../TP..43..

NOTE: Holders 276-STP are supplied without chipbreaker. For chipbreaker order numbers, see below.

For Grooving without Chipbreaker

catalogue number	clamp	clamp screw	shim	shim screw	washer	wrench
12191061900	**12148589300**	**12148589800**	**12148032586**	**12148021900**	**–**	**12148041100**
12191062086	**12148583800**	**12148586000**	**12148031686**	**12148024100**	**12148024200**	**12148041200**
12191062586	**12148583800**	**12148586000**	**12148031686**	**12148024100**	**12148024200**	**12148041200**
12191062686	**12148586900**	**12148021100**	**12148032086**	**12148024500**	**12148024800**	**12148041200**
12191063286	**12148586900**	**12148021100**	**12148032086**	**12148024500**	**12148024800**	**12148041200**

For Grooving with Chipbreaker (order additional clamp and chipbreaker)

			chipbreakers					
			B — edge width					
insert	clamp with chipbreaker	D	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**	**–**
TP...2204...	**12148586900**	12,70	**–**	**–**	**12148580411**	**12148580511**	**12148580611**	**12148582511**

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.

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 multi-layer coating provides better wear resistance.

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

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
TN6030	HC-P30	PVD-TiAlN Nano-multi-layer 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									

ProGroove • U

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 feed

ProGroove • M

neutral

① Recommended 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.

ProGroove • S

left hand neutral right hand

For low-burr parting with straight flanks and smooth surface finishes. All inserts are recommended for parting and grooving slender workpieces, part diameter <32,0mm, and thin-wall tubes.

① Recommended feed

ProGroove • R

① Recommended 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 feed

ANSI ISO 513	VDI 3323																		
Material Group		Cutting Speed • vc m/min																	
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
			TN6030			TN7525			TN7535			TN8025			THM			TTM	
P	1	130	**140**	150	200	**215**	230	140	**175**	210							90	**95**	100
	2	120	**160**	200	190	**245**	300	130	**160**	190							90	**105**	140
	3	100	**130**	160	160	**205**	250	110	**140**	170							70	**90**	110
	4	120	**150**	180	180	**230**	280	120	**150**	180							80	**105**	130
	5	100	**130**	160	150	**195**	240	100	**130**	160							70	**90**	110
	6	120	**150**	180	180	**230**	280	120	**150**	180							80	**105**	130
	7	90	**125**	160	140	**190**	240	100	**130**	160							60	**85**	110
	8	80	**110**	140	120	**170**	220	90	**120**	150							50	**75**	100
	9	60	**80**	100	90	**125**	160	60	**90**	120							40	**50**	70
	10	80	**95**	110	130	**150**	170	90	**105**	120							60	**70**	80
	11	50	**65**	80	80	**105**	130	50	**65**	80							40	**50**	60
	12	120	**140**	160	180	**210**	240	120	**155**	190							80	**95**	110
	13.1	80	**105**	130	130	**165**	200	90	**120**	150							60	**75**	90
	13.2	40	**55**	65	65	**85**	100	45	**60**	75							30	**40**	45
			TN6030			TN7525			TN7535			TN8025			THM			TTM	
M	14.1	90	**110**	140							90	**120**	150				60	**75**	90
	14.2	75	**90**	115							75	**100**	120				50	**60**	75
	14.3	55	**70**	90							55	**75**	95				40	**50**	55
	14.4	45	**60**	70							45	**60**	75				30	**40**	45
			TN6030			TN7525			TN7535			TN8025			THM			TTM	
K	15	70	**90**	100	140	**170**	200							70	**90**	100			
	16	50	**65**	80	100	**130**	160							50	**65**	80			
	17	60	**70**	80	120	**150**	180							60	**70**	80			
	18	40	**55**	70	90	**120**	150							40	**55**	70			
	19	80	**95**	110	150	**180**	210							80	**95**	110			
	20	60	**75**	90	110	**140**	170							60	**75**	90			
			TN6030			TN7525			TN7535			TN8025			THM			TTM	
N	21													600	**750**	900			
	22													500	**650**	800			
	23													600	**750**	900			
	24													500	**650**	800			
	25													230	**300**	370			
	26													150	**200**	250			
	27													150	**200**	250			
	28													110	**140**	170			
	29													60	**80**	100			
	30													80	**100**	120			
			TN6030			TN7525			TN7535			TN8025			THM			TTM	
S	31													26	**37**	45			
	32													21	**30**	36			
	33													17	**24**	28			
	34													11	**15**	18			
	35													11	**16**	18			
	36													42	**60**	72			
	37													21	**30**	36			

● first choice
○ alternate choice

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

■ PGU

catalogue number	W	RR	α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567320	2,10	0,20	—	N - Neutral	●	●	●	●	●	
123567330	3,10	0,30	—	N - Neutral	●	●	●	●	●	
123567340	4,10	0,30	—	N - Neutral	●	●	●		●	
123567350	5,10	0,30	—	N - Neutral	●	●	●	●	●	
123567360	6,10	0,40	—	N - Neutral	●	●	●	●	●	
123567380	8,15	0,60	—	N - Neutral	●	●	●	●	●	

catalogue number	W	RR	α°	hand						
123567231	3,10	0,25	6	L - Left	●	●	●			
123567241	4,10	0,25	6	L - Left	●	●	●			

catalogue number	W	RL	α°	hand						
123567230	3,10	0,25	6	R - Right	●	●	●			
123567240	4,10	0,25	6	R - Right	●	●	●			

NOTE: W tolerance on all = ±0,05mm.

■ PGM

catalogue number	W	RR	α°						
123567420	2,10	0,20	—	●	●	●			
123567430	3,10	0,30	—	●	●	●			
123567440	4,10	0,30	—	●	●	●			
123567450	5,10	0,30	—	●	●	●			
123567460	6,10	0,40	—	●	●	●			
123567480	8,15	0,60	—	●	●	●			

NOTE: W tolerance on all = ±0,05mm.

● first choice
○ alternate choice

	TN6030	TN7525	TN7535	TN8025	THM	TTM
P	●	●	●			●
M	●	●	●	●		●
K	●	●	●		●	
N					●	
S					●	
H					●	

PGS

catalogue number	W	RR	α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567702	2,25	0,20	—	N - Neutral			●	●		
123567703	3,25	0,20	—	N - Neutral			●	●		
123567704	4,25	0,20	—	N - Neutral			●	●		

catalogue number	W	RR	α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567721	2,25	0,20	6	L - Left			●	●		
123567731	3,25	0,20	6	L - Left			●	●		
123567741	4,25	0,20	6	L - Left			●	●		

catalogue number	W	RL	α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567720	2,25	0,20	6	R - Right			●	●		
123567730	3,25	0,20	6	R - Right			●	●		
123567740	4,25	0,20	6	R - Right			●	●		

NOTE: W tolerance on all = ±0,05mm.

PGR

catalogue number	W	RC	TN6030	TN7525	TN7535	TN8025	THM	TTM
123567803	3,00	1,50		●				
123567804	4,00	2,00		●				
123567805	5,00	2,50		●				
123567806	6,00	3,00		●				

NOTE: W tolerance on all = ±0,07mm.

RR = RL

● 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		●	●		●	●
123568100	10,15	0,80		●	●		●	●
123568120	12,20	0,80		●	●		●	●
123568140	14,20	0,80		●	●		●	●
123568160	16,20	0,80		●	●		●	●

NOTE: W tolerance on all = ±0,05mm.

RR = RL

LGN1

catalogue number	W	RR	TN6030	TN7525	TN7535	TN8025	THM	TTM
123568081	8,15	0,80					●	
123568101	10,15	0,80					●	
123568121	12,20	0,80					●	
123568141	14,20	0,80					●	
123568161	16,20	0,80					●	

NOTE: W tolerance on all = ±0,05mm.

WIN WITH WIDIA™

WIDIA™

ProGroove™

With easy-to-change inserts available in multiple high-performance carbide grades, the ProGroove system ensures accurate, reliable, and reproducible cutting edge performance.

ProGroove Grooving and Cut-Off

- Single-end inserts for grooving and cut-off.
- Offered with integral shanks and blades.
- Shallow, deep grooving, and cut-off capabilities.
- Available in four different geometries.

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

WIDIA™
Win with WIDIA™

Separator™

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

Features:

- Insert widths 2,0mm–4,0mm.
- Toolholder shank sizes 10,0mm–31,75mm.
- Cut-off up 76,0mm bar capacity.

Benefits:

- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.

Left Hand Tool

Left Hand Tool

Right Hand Tool

Square Shank

order number	catalogue number	W	D max	CD	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**
3538704	**206263**	2,50	20,00	—	9,75	8,80	10,00	21,51	74,96	**435170**	**MS318**
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**
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										
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**
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**

Left Hand Tool

Left Hand Tool

Right Hand Tool

12,0mm and 20,0mm Shank Toolholders

order number	catalogue number	H	B	B2	L	L1	H2	F	support blade screw	clamp screw
	Right hand									
3538772	**206518**	11,91	11,54	24,99	102,77	84,68	19,05	20,56	**606247**	**MS1495**
3614344	**206522**	20,00	20,00	—	102,77	84,68	—	15,55	**606247**	**MS1495**
	Left hand									
3538773	**206519**	11,91	11,54	25,00	102,77	84,68	19,05	20,55	**606247**	**MS1495**
3538774	**206523**	20,00	20,00	—	102,77	84,68	—	15,55	**606247**	**MS1495**

Right Hand Tool

L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

12,0mm and 20,0mm Shank Blades

order number	catalogue number	W	D max	FS	L	L1	clamp
	Right hand						
3539522	**333111**	2,00	41,28	3,40	44,88	40,13	**435194**
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**
	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**

Left Hand Tool

Right Hand Tool

25,0mm and 32,0mm Shank Toolholders

order number	catalogue number	H	B	L	L1	F	support blade screw	clamp screw
	Right hand							
3538710	**206271**	25,00	24,61	131,90	112,16	21,41	**MS1073**	**MS1071**
3538749	**206439**	32,00	31,60	132,03	112,18	28,42	**MS1073**	**MS1071**
	Left hand							
3538703	**206262**	25,00	24,61	131,91	112,17	21,41	**MS1073**	**MS1071**
3615305	**206440**	32,00	31,60	132,03	112,18	28,42	**MS1073**	**MS1071**

Left Hand Tool

L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

25,0mm and 32,0mm Shank Blades

order number	catalogue number	W	CD	FS	L1	L	clamp
	Right hand						
3563591	**331117**	2,50	12,70	2,39	29,60	36,03	**435142**
3539504	**331101**	3,00	20,64	1,98	37,63	43,80	**435128**
3539508	**331109**	4,00	20,64	1,98	37,63	43,80	**435128**
	Left hand						
3539510	**331118**	2,50	12,70	2,39	29,60	36,03	**435143**
3539505	**331102**	3,00	20,64	1,98	37,63	43,80	**435129**
3539509	**331110**	4,00	20,64	1,98	37,63	43,80	**435129**

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														
3538768	**206508**	2,50	42,00	19,75	18,81	20,00	37,71	7,62	140,00	96,57	42,66	**MS518**	**409184**	**606244**	**613139**
3538770	**206510**	3,00	42,00	19,76	18,50	20,00	37,50	7,62	140,00	96,57	42,68	**MS518**	**409186**	**606244**	**613139**
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**
3538771	**206511**	3,00	42,00	19,77	18,50	20,00	37,52	7,62	140,00	96,57	42,68	**MS518**	**409187**	**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**

WIN WITH WIDIA™

Separator™

Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

Separator Toolholders and Inserts

- Insert widths 2,0mm–4,0mm.
- Toolholder shank sizes 10,0mm–31,75mm.
- Cut-off up to 76,0mm 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 **www.widia.com**.

WIDIA™
Win with WIDIA™

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 Materials
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.

Separator™
Toolholders

WIDIA MANCHESTER

■ Square Shank

order number	catalogue number	W (A)	D max	CD (B)	B (C)	FS	H (C)	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	–	18,86	19,00	20,00	32,84	125,00	435202	MS412
3538704	206263	2,50	20,00	–	9,75	8,80	10,00	21,51	74,96	435170	MS318
3538706	206265	2,50	20,00	–	11,74	10,81	12,00	21,51	99,95	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

4 Select chipbreaker style for the application:

See the application guide on page D93 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**	—

5 Select grade:

	Recommended Grades				
machining condition	**steel**	**stainless steel**	**cast iron**	**non-ferrous metals**	**high-temp alloys**
high performance for optimal conditions (clean cuts, good machine condition, higher speed capability)	**M-93**	**M433B**	**M-93**	**M-93**	**M-433B**
	—	**M-93**	—	—	**M-93**
general purpose (1st choice for general machining)	**M-43**	**M-43**	**M-43**	**M-43**	**M-43**
unfavourable conditions (interrupted cuts, low speeds, etc.)	**M-45**	**M-45**	**M-45**	**M-45**	**M-45**
	M-40	**M-40**	**M-40**	**M-40**	**M-40**

See page D92 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 D94 for cutting data.

Separator™
Recommended Cutting Speed Starting Conditions

WIDIA MANCHESTER

ANSI ISO 513	VDI 3323	Cutting Speed • vc m/min											
	Material Group	min	Start	max	min	Start	max	min	Start	max	min	Start	max
			C2			C5			GC			M40	
P	1				90	**120**	150	175	**200**	220	40	**80**	115
P	2				75	**110**	140	150	**170**	190	35	**70**	100
P	3				65	**85**	105	125	**140**	160	30	**50**	75
P	4				65	**95**	120	140	**150**	165	30	**60**	90
P	5				60	**85**	110	115	**130**	145	25	**50**	70
P	6				70	**95**	120	140	**150**	165	30	**60**	90
P	7				60	**80**	110	120	**135**	150	25	**50**	70
P	8				55	**80**	105	105	**120**	135	25	**45**	70
P	9				40	**60**	80	70	**90**	110	20	**35**	55
P	10				60	**75**	95	110	**120**	130	25	**50**	70
P	11				30	**60**	80	60	**95**	125	20	**35**	50
P	12				70	**95**	120	135	**155**	175	35	**70**	100
P	13.1				65	**80**	90	105	**120**	135	30	**45**	65
P	13.2				30	**45**	55	50	**60**	70	15	**30**	40
			C2			C5			GC			M40	
M	14.1	50	**60**	70							30	**45**	60
M	14.2	45	**55**	65							25	**40**	50
M	14.3	40	**45**	50							20	**30**	40
M	14.4	25	**30**	40							15	**25**	30
			C2			C5			GC			M40	
K	15	135	**170**	200							75	**105**	135
K	16	115	**135**	150							50	**80**	110
K	17	130	**150**	175							60	**95**	130

A

B

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 multi-layer coating provides better wear resistance.

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

Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
C2 HW-K15	A general-purpose tungsten carbide for use on cast irons, non-ferrous alloys, and many high-temperature alloys.									
		M			M	M				
		K		K	K	K				
		N			N	N				
		S			S	S				
C5 HW-P35	A general-purpose, alloyed tungsten carbide for steel cutting.									
		P					P	P	P	
		M						M		
GC HC-P20	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				
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					P	P	P	
		M						M	M	
		K						K	K	
		N					N	N	N	
		S						S	S	
		H						H	H	
M43 HC-P25	PVD-TiAlN multi-layer 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			P	P	P	P		
		M				M	M	M		
		K				K	K	K		
		S				S	S	S		
		H				H	H	H		
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.									
		M			M	M	M			
		S			S	S	S			
		H				H	H	H		
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				P	P	P	P	
		M					M	M	M	
		K					K	K	K	
		N					N	N	N	
		S					S	S	S	
		H					H	H	H	
M93 HC-P20	PVD-TiAlN multi-layer coating over a tough, fine-grained carbide substrate with increased resistance to heat. Recommended for medium to higher cutting speeds under moderate conditions.									
		P			P	P	P			
		M			M	M	M			
		K			K	K	K			
		S				S	S			

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 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 steel, nickel-based alloys, tool steel, INCONEL, and titanium at moderate to high speeds and feeds.

① Recommended feed

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
			C2			C5			GC			M40	
P	1				90	**120**	150	175	**200**	220	40	**80**	115
	2				75	**110**	140	150	**170**	190	35	**70**	100
	3				65	**85**	105	125	**140**	160	30	**50**	75
	4				65	**95**	120	140	**150**	165	30	**60**	90
	5				60	**85**	110	115	**130**	145	25	**50**	70
	6				70	**95**	120	140	**150**	165	30	**60**	90
	7				60	**80**	110	120	**135**	150	25	**50**	70
	8				55	**80**	105	105	**120**	135	25	**45**	70
	9				40	**60**	80	70	**90**	110	20	**35**	55
	10				60	**75**	95	110	**120**	130	25	**50**	70
	11				30	**60**	80	60	**95**	125	20	**35**	50
	12				70	**95**	120	135	**155**	175	35	**70**	100
	13.1				65	**80**	90	105	**120**	135	30	**45**	65
	13.2				30	**45**	55	50	**60**	70	15	**30**	40
			C2			C5			GC			M40	
M	14.1	50	**60**	70							30	**45**	60
	14.2	45	**55**	65							25	**40**	50
	14.3	40	**45**	50							20	**30**	40
	14.4	25	**30**	40							15	**25**	30
			C2			C5			GC			M40	
K	15	135	**170**	200							75	**105**	135
	16	115	**135**	150							50	**80**	110
	17	130	**150**	175							60	**95**	130
	18	90	**115**	140							45	**75**	100
	19	150	**185**	215							85	**115**	145
	20	120	**145**	170							55	**90**	120
			C2			C5			GC			M40	
N	21	305	**410**	520							210	**370**	520
	22	245	**350**	460							150	**305**	460
	23	305	**410**	520							210	**365**	520
	24	245	**350**	460							150	**305**	460
	25	210	**245**	275							135	**205**	275
	26	150	**170**	185							90	**135**	185
	27	150	**170**	185							90	**135**	185
	28	90	**105**	120							60	**90**	120
	29	60	**75**	90							45	**70**	90
	30	75	**90**	105							45	**75**	110
			C2			C5			GC			M40	
S	31	35	**45**	50							25	**40**	50
	32	25	**30**	35							20	**25**	30
	33	20	**25**	30							15	**20**	25
	34	15	**20**	25							10	**15**	20
	35	15	**20**	25							10	**15**	20
	36	55	**60**	65							35	**45**	60
	37	25	**30**	35							15	**25**	30

												VDI 3323	ANSI ISO 513
Cutting Speed • vc m/min												Material Group	
min	Start	max	min	Start	max	min	Start	max	min	Start	max		
	M43			M433B			M45			M93			
110	**160**	210	—	—	—	45	**85**	125	150	**200**	245	**1**	
85	**140**	190	—	—	—	40	**75**	110	130	**170**	215	**2**	
75	**110**	150	—	—	—	35	**60**	80	110	**145**	175	**3**	
80	**125**	170	—	—	—	40	**70**	100	120	**150**	185	**4**	
65	**105**	145	—	—	—	30	**55**	75	100	**130**	160	**5**	
80	**125**	170	—	—	—	40	**70**	100	120	**150**	185	**6**	
65	**105**	145	—	—	—	35	**55**	75	105	**135**	165	**7**	**P**
60	**100**	140	—	—	—	25	**50**	70	90	**120**	150	**8**	
45	**80**	115	—	—	—	20	**40**	60	60	**90**	120	**9**	
65	**95**	120	—	—	—	30	**50**	75	100	**120**	145	**10**	
35	**75**	115	30	**70**	115	20	**40**	60	55	**100**	135	**11**	
85	**120**	155	85	**125**	160	40	**75**	110	120	**155**	190	**12**	
80	**100**	120	80	**105**	130	35	**55**	75	90	**120**	150	**13.1**	
35	**50**	65	35	**50**	70	20	**30**	45	45	**60**	75	**13.2**	
	M43			M433B			M45			M93			
50	**75**	100	55	**90**	130	35	**50**	65	90	**120**	150	**14.1**	
45	**60**	80	45	**75**	105	30	**50**	60	75	**100**	120	**14.2**	**M**
35	**50**	65	35	**60**	80	25	**35**	50	55	**75**	95	**14.3**	
25	**40**	50	25	**45**	65	20	**30**	40	45	**60**	75	**14.4**	
	M43			M433B			M45			M93			
105	**150**	200	230	**290**	350	90	**120**	150	150	**200**	245	**15**	
75	**115**	150	170	**230**	290	60	**100**	135	105	**150**	200	**16**	
90	**135**	175	200	**260**	320	70	**110**	150	120	**170**	215	**17**	**K**
60	**100**	135	180	**245**	305	50	**85**	115	115	**160**	205	**18**	
120	**170**	215	245	**305**	365	100	**130**	160	165	**180**	260	**19**	
80	**125**	170	215	**275**	335	65	**105**	145	110	**140**	215	**20**	
	M43			M433B			M45			M93			
275	**440**	610				245	**400**	550	305	**490**	670	**21**	
210	**380**	550				180	**335**	490	245	**430**	610	**22**	
275	**440**	610				245	**395**	550	305	**490**	670	**23**	
210	**380**	550				180	**335**	490	245	**430**	610	**24**	
180	**260**	335				150	**230**	305	210	**305**	400	**25**	**N**
120	**170**	215				105	**150**	200	150	**200**	245	**26**	
120	**170**	215				105	**150**	200	150	**200**	245	**27**	
75	**105**	135				70	**100**	130	90	**135**	185	**28**	
55	**80**	110				45	**75**	100	60	**90**	120	**29**	
60	**90**	120				50	**85**	115	75	**120**	150	**30**	
	M43			M433B			M45			M93			
30	**45**	55	35	**50**	60	30	**40**	55	35	**50**	70	**31**	
20	**30**	40	25	**35**	40	25	**30**	35	30	**35**	45	**32**	
15	**20**	30	20	**25**	30	15	**20**	25	25	**30**	35	**33**	
15	**20**	25	15	**20**	25	10	**15**	20	20	**25**	30	**34**	**S**
15	**20**	25	15	**20**	25	10	**15**	20	20	**25**	30	**35**	
35	**50**	65	40	**55**	70	35	**50**	65	55	**65**	80	**36**	
25	**30**	35	25	**30**	40	20	**25**	35	30	**35**	45	**37**	

● first choice
○ alternate choice

	C2	C5	GC	M40	M43	M433B	M45	M93
P		○	○	●	●	●	●	●
M	○			●	●	●	●	●
K	○			○				
N	○				●	●		
S				○	●	●	●	○
H	●							

X²

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507363	2,50	0,13	—	N - Neutral					●		●	●
507372	3,00	0,15	—	N - Neutral					●		●	●

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507365	2,50	0,13	5	L - Left					●		●	●
507374	3,00	0,15	5	L - Left					●		●	●

catalogue number	W	RL	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507364	2,50	0,13	5	R - Right					●		●	●
507373	3,00	0,15	5	R - Right					●		●	●

X² Ultra

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507366	2,50	0,15	—	N - Neutral						●		
507369	3,00	0,15	—	N - Neutral						●		

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507368	2,50	0,13	5	L - Left						●		
507371	3,00	0,15	5	L - Left						●		

catalogue number	W	RL	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507383	2,00	—	5	R - Right						●		
507367	2,50	0,13	5	R - Right						●		
507370	3,00	0,15	5	R - Right						●		

● first choice
○ alternate choice

	C2	C5	GC	M40	M43	M433B	M45	M93
P		○	○	●	●	●	●	●
M	○			●	●	●	●	●
K	○			○				
N	○				●	●		
S				○	●	●	●	○
H	●							

S²

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507295	3,00	0,25	—	N - Neutral					●		●	●
507378	4,00	0,25	—	N - Neutral					●		●	●

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507297	3,00	0,20	5	L - Left					●		●	●
507380	4,00	0,25	5	L - Left					●		●	●

catalogue number	W	RL	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507296	3,00	0,20	5	R - Right					●		●	●
507379	4,00	0,25	5	R - Right					●		●	●

S² Ultra

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507348	2,50	0,15	—	N - Neutral						●		
507351	3,00	0,15	—	N - Neutral						●		

catalogue number	W	RR	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507350	2,50	0,15	5	L - Left						●		
507353	3,00	0,15	5	L - Left						●		

catalogue number	W	RL	α°	hand	C2	C5	GC	M40	M43	M433B	M45	M93
507349	2,50	0,15	5	R - Right						●		
507352	3,00	0,15	5	R - Right						●		

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 burr of cut-off faces:

- Use lead angle-type inserts (Figures 1 and 2). Lead angle on a cut-off insert reduces the burr 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 center stub or burr on part and produces clean stock surface.

Figure 2
Insert selection **right-hand lead**

Right-hand lead insert leaves center stub or burr on stock and produces clean part surface.

- Check total height and maintain on center with part diameter.

- The cutting edge height should be within ±0,1mm to the center; recommended cutting position is 0,05mm above center.

Figure 3
Above center

- If 0° lead angle is mandatory, use the narrowest possible cut-off insert and blade. This will minimise the center stub or cut-off burr 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 ID, align ID 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.

Figure A

Coolant on cut-off tool Preferred method of applying coolant

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 F2.
- 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 center height 0,0mm to 0,0001mm above center (see Figure B).

Figure B

Improve surface finish:

- For low to moderate speed (sfpm), use Separator F2.
- 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).

Minimise edge chipping:

- Check to see if tool is significantly above or below center.
- 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 ID and/or OD 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 narrower 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 center.
- Avoid machine dwell.
- Use S^2 or X^2 to reduce cutting forces.

Reduce cut-off nib on solid bar or ID burr on tubing:

- Check tool height. Insert cutting edge should be on center to 0,05mm above centerline 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 burr 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 burr 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 D99).

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 OD 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**

Ranger™

Ranger™ Adjustable Face Grooving System

Features:

- Enables the adjustment of the support blade from 57,0mm to 406,0mm diameter for initial plunge.
- Insert widths 3,2mm; 4,9mm; and 6,4mm.

Benefits:

- Available in both CW and CCW rotation and in both sweep-in or sweep-out styles.
- 57,0mm to 406,0mm OD face grooving with one adjustable assembly.

Right Hand Tool

Right Hand Tool

Left Hand Assembly

Square Shank

order number	catalogue number	B	B3	H	H1	H2	H3	F	L	L1	LS	support bladescrew	nut
	Right hand												
3538807	**235204**	27	11	20	20	43	5	-5	152	151,46	113,665	**606218**	**613137**
3538808	**235205**	27	11	25	25	43	—	-5	152	151,46	113,665	**606218**	**613137**
3538809	**235206**	27	11	32	32	49	—	-5	152	151,46	113,665	**606218**	**613137**
	Left hand												
3538810	**235207**	27	11	20	20	43	5	-5	152	151,46	113,665	**606218**	**613137**
3538811	**235208**	27	11	25	25	43	—	-5	152	151,46	113,665	**606218**	**613137**
3538812	**235209**	27	11	32	32	49	—	-5	152	151,46	113,665	**606218**	**613137**

NOTE: These holders can only use curve-out cartridge assembly.
Right-hand holder uses left-hand cartridge assembly.

Left Hand Assembly

Round Shank

order number	catalogue number	D	L1	LS	F	support blade screw	washer
3538804	**235201**	25	143,51	139,70	19	**619155**	**613135**
3538805	**235202**	30	143,51	139,70	19	**619155**	**613135**
3538806	**235203**	32	143,51	139,70	19	**619155**	**613135**

NOTE: Toolholders can be used as left hand or right hand.
These holders can use curve-in and curve-out cartridge assembly.

Left Hand Tool

Blade Style	Part Shape		Left Hand	Right Hand
Curve In				
Curve Out				

Curve In

order number	catalogue number	W	CD	D min	D max	FS	L	hand	clamp	clamp screw
3539561	**338223**	3,18	19	57	400	-1,80	58	L - Left	**440203**	**606219**
3539562	**338224**	4,76	25	57	400	-2,39	58	L - Left	**440204**	**606219**
3539570	**338232**	6,35	25	57	400	-3,18	58	L - Left	**4402122**	**606219**
3539559	**338221**	3,17	19	57	400	-1,80	58	R - Right	**440201M**	**606219**
3539560	**338222**	4,76	25	57	400	-2,39	58	R - Right	**440202**	**606219**
3539569	**338231**	6,35	25	57	400	-3,18	58	R - Right	**440211**	**606219**

NOTE: RH cartridge goes with LH toolholder.
LH cartridge goes with RH toolholder.

For Round Shank
F Assy = W/2 + F (holder) + FS (blade)
L1 Assy = L1 (holder) + L (blade)

Left Hand Tool

Curve Out

order number	catalogue number	W	CD	D min	D max	FS	L	hand	clamp	clamp screw
3539563	**338225**	3,18	19	57	400	-1,47	58	L - Left	**440205**	**606219**
3539564	**338226**	4,76	25	57	400	-2,39	58	L - Left	**440206**	**606219**
3539565	**338227**	6,35	25	57	400	-3,18	58	L - Left	**440207**	**606219**
3539566	**338228**	3,18	19	57	400	-1,47	58	R - Right	**440208**	**606219**
3539567	**338229**	4,76	25	57	400	-2,39	58	R - Right	**440209**	**606219**
3539568	**338230**	6,35	25	57	400	-3,18	58	R - Right	**440210M**	**606219**

NOTE: RH cartridge goes with LH toolholder.
LH cartridge goes with RH toolholder.

For Square Shank
F Assy = F (holder) + L (blade)
L1 Assy = W/2 + L1 (holder) + FS (blade)

For Round Shank
F Assy = W/2 + F (holder) + FS (blade)
L1 Assy = L1 (holder) + L (blade)

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

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

Grade	Coating	Grade Description	05	10	15	20	25	30	35	40	45
C2	HW-K15	A general-purpose tungsten carbide for use on cast irons, non-ferrous alloys, and many high-temperature alloys.									
			M			M	M				
			K		K	K	K				
			N			N	N				
			S			S	S				
GC	HC-P15	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					
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					P	P	P	
			M						M	M	
			K						K	K	
			N					N	N	N	
			S						S	S	
M43	HC-P30	PVD-TiAlN multi-layer 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			P	P	P	P		
			M				M	M	M		
			K				K	K	K		
			S				S	S	S		

Ranger • Face Grooving

- Inserts available for plunge-groove and full-nose radii.
- Geometry design to provide clearance for deep grooving.
- Superior chip control.

① Recommended feed

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
			C2			GC			M40			M43	
P	1				175	**200**	220	40	**80**	115	110	**160**	210
	2				150	**170**	190	35	**70**	100	85	**140**	190
	3				125	**140**	160	30	**50**	75	75	**110**	150
	4				140	**150**	165	30	**60**	90	80	**125**	170
	5				115	**130**	145	25	**50**	70	65	**105**	145
	6				140	**150**	165	30	**60**	90	80	**125**	170
	7				120	**135**	150	25	**50**	70	65	**105**	145
	8				105	**120**	135	25	**45**	70	60	**100**	140
	9				70	**90**	110	20	**35**	55	45	**80**	115
	10				110	**120**	130	25	**50**	70	65	**95**	120
	11				60	**95**	125	20	**35**	50	35	**75**	115
	12				135	**155**	175	35	**70**	100	85	**120**	155
	13.1				105	**120**	135	30	**45**	65	80	**100**	120
	13.2				50	**60**	70	15	**30**	40	35	**50**	65
			C2			GC			M40			M43	
M	14.1	50	**60**	70				30	**45**	60	50	**75**	100
	14.2	45	**55**	65				25	**40**	50	45	**60**	80
	14.3	40	**45**	50				20	**30**	40	35	**50**	65
	14.4	25	**30**	40				15	**25**	30	25	**40**	50
			C2			GC			M40			M43	
K	15	135	**170**	200				75	**105**	135	105	**150**	200
	16	115	**135**	150				50	**80**	110	75	**115**	150
	17	130	**150**	175				60	**95**	130	90	**135**	175
	18	90	**115**	140				45	**75**	100	60	**100**	135
	19	150	**185**	215				85	**115**	145	120	**170**	215
	20	120	**145**	170				55	**90**	120	80	**125**	170
			C2			GC			M40			M43	
N	21	305	**410**	520				210	**370**	520	275	**440**	610
	22	245	**350**	460				150	**305**	460	210	**380**	550
	23	305	**410**	520				210	**365**	520	275	**440**	610
	24	245	**350**	460				150	**305**	460	210	**380**	550
	25	210	**245**	275				135	**205**	275	180	**260**	335
	26	150	**170**	185				90	**135**	185	120	**170**	215
	27	150	**170**	185				90	**135**	185	120	**170**	215
	28	90	**105**	120				60	**90**	120	75	**105**	135
	29	60	**75**	90				45	**70**	90	55	**80**	110
	30	75	**90**	105				45	**75**	110	60	**90**	120
			C2			GC			M40			M43	
S	31	35	**45**	50				25	**40**	50	30	**45**	55
	32	25	**30**	35				20	**25**	30	20	**30**	40
	33	20	**25**	30				15	**20**	25	15	**20**	30
	34	15	**20**	25				10	**15**	20	15	**20**	25
	35	15	**20**	25				10	**15**	20	15	**20**	25
	36	55	**60**	65				35	**45**	60	35	**50**	65
	37	25	**30**	35				15	**25**	30	25	**30**	35

● first choice
○ alternate choice

	C2	GC	M40	M43
P		○	●	●
M			●	●
K				
N	●		●	●
S			○	
H				

Face Grooving

catalogue number	W	RR	RC	C2	GC	M40	M43
506104	3,18	—	1,59	●		●	
506101	3,18	0,25	—	●	●	●	●
506102	3,18	0,25	—	●	●	●	
506105	3,18	—	1,59	●		●	
506106	4,78	—	2,39			●	
506103	4,78	0,25	—	●	●		●
506108	6,35	—	3,18			●	
506107	6,35	0,25	—			●	

NOTE: Inserts 506101 and 506104 are to be used for counterclockwise rotation only.
Inserts 506102 and 506105 are to be used for clockwise rotation only.

Technical Recommendations • Ranger Tool Systems

Application Information:

- When changing inserts, be sure the new insert locates against the positive stop on the clamp.
- Never tighten the insert clamping screw without an insert in the pocket. Permanent damage to the clamp could occur.
- Toolholder projection length out of the tool block should be as short as possible to maintain rigidity.
- Slower speeds and feeds are recommended compared to OD grooving.

Face Grooving Ranges per Setting

given diameter setting	plunge range at diameter setting	
	smallest OD	largest OD
57,15	57,91	60,33
63,50	60,33	66,68
69,85	65,09	74,61
76,20	66,68	85,73
88,90	77,79	100,01
101,60	88,90	114,30
127,00	107,95	146,05
152,40	127,00	177,80
203,20	165,10	241,30
254,00	203,20	279,40
279,40–406,40	228,60	406,40

NOTE: This chart is a general guide for face groove entry at outside diameters both smaller and larger than each given OD setting on the tool. Example: If the tool is adjusted for 101,6mm OD, plunge cuts from 88,9mm OD to 114,3mm OD can be made without changing the 101,6mm OD setting.

Widening a Face Groove

Additional clearance is generated on the workpiece after the first groove cut. Without further adjustment, the tool may then be used to widen the groove toward the center or the OD of the workpiece.

WMT™ Face Grooving Clearances

The cutting edge of the WMT face grooving system is +0,762mm above center to improve cutting clearances. This tool should not be repositioned on center. When facing toward center, this system does not have sufficient clearance to cut at <21,59mm diameters.

Adjusting Information for Ranger Tooling

The following instructions are for style 1 Ranger tools. Instructions for style 2 tools are in [brackets].

- Appropriate diameter range setting can be accomplished as follows:

Step 1 Loosen the support blade locking screw and rotate the support blade so that the 2.25 mark is above the top line on the toolholder. [Below the line on toolholder for style 2.]

2.25 Diameter Settings

style 1 style 2

Step 2 Slowly rotate the support blade down until the 2.25 mark is aligned with the top line of the toolholder. [Rotate the support blade up until the 2.25 mark is aligned with the bottom line on the toolholder for style 2.] At this point, the support blade assembly is properly aligned to cut face grooves at 2.25" OD.

For diameters larger than 2.25" OD, continue to rotate the support blade in the same direction until the desired diameter range has been aligned.

7.0 Diameter Setting

4.0 Diameter Setting 11–16 Diameter Setting

Example: The 7.0" diameter setting falls between the 6.0" and 8.0" diameter settings.

Step 3 Tighten the support blade screw. Inspect the scale to ensure that the desired diameter range is aligned.

NOTE: It is important that these instructions are followed. Failure to do so may result in damage to the tool and the workpiece.

S-LOC™

S-LOC • ID Boring, Grooving, Face Grooving, and Threading

Features and Benefits:

- Specifically for ID grooving and threading applications.
- Bar diameters range from 12,5mm to 19,0mm.
- Maximum depth of cut 2,39mm.

Right Hand Assembly

ID Grooving

order number	catalogue number	CD	L1	D	F	D min	clamp screw
3538783	**218134**	2,40	152,50	12,00	8,00	14,20	**606193**
3538784	**218142**	2,40	150,00	16,00	8,00	14,20	**606193**
3538785	**218143**	2,40	200,00	20,00	13,00	24,00	**606193**

NOTE: Can be used with right- or left-hand inserts.
Right-hand assemblies use left-hand inserts.

Left Hand Tool

Face Grooving

order number	catalogue number	CD	L1	D	F	D min	clamp screw
	Right hand						
3538779	**218125**	2,39	152,40	15,88	6,35	16,26	**606190**
	Left hand						
3538780	**218126**	2,39	152,40	15,88	6,35	16,26	**606190**

NOTE: 12,0mm and larger outside diameter.

- Side clearance angles as noted.
- Use left-hand tooling for counterclockwise rotation only.
- Use right-hand tooling for clockwise rotation only.

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

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

Grade	Coating	Grade Description	05	10	15	20	25	30	35	40	45
C2	HW-K15	A general-purpose tungsten carbide for use on cast irons, non-ferrous alloys, and many high-temperature alloys.									
			M			M	M				
			K		K	K	K				
			N			N	N				
			S			S	S				
C5	HW-P30	A general-purpose alloyed tungsten carbide for steel cutting.	P					P	P	P	
			M						M		
GC	HC-P15	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				
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					P	P	P	
			M						M	M	
			K						K	K	
			N					P	N	N	
			S						S	S	

S-LOC

- Unique clamping surface on inserts.
- Used in ID boring and grooving applications.
- Superior chip control.

① Recommended feed

ANSI ISO 513	VDI 3323												
Material Group		Cutting Speed • vc m/min											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
			C2			C5			GC			M40	
P	1				90	**120**	150	175	**200**	220	40	**80**	115
	2				75	**110**	140	150	**170**	190	35	**70**	100
	3				65	**85**	105	125	**140**	160	30	**50**	75
	4				65	**95**	120	140	**150**	165	30	**60**	90
	5				60	**85**	110	115	**130**	145	25	**50**	70
	6				70	**95**	120	140	**150**	165	30	**60**	90
	7				60	**80**	110	120	**135**	150	25	**50**	70
	8				55	**80**	105	105	**120**	135	25	**45**	70
	9				40	**60**	80	70	**90**	110	20	**35**	55
	10				60	**75**	95	110	**120**	130	25	**50**	70
	11				30	**60**	80	60	**95**	125	20	**35**	50
	12				70	**95**	120	135	**155**	175	35	**70**	100
	13.1				65	**80**	90	105	**120**	135	30	**45**	65
	13.2				30	**45**	55	50	**60**	70	15	**30**	40
M			C2			C5			GC			M40	
	14.1	50	**60**	70							30	**45**	60
	14.2	45	**55**	65							25	**40**	50
	14.3	40	**45**	50							20	**30**	40
	14.4	25	**30**	40							15	**25**	30
K			C2			C5			GC			M40	
	15	135	**170**	200							75	**105**	135
	16	115	**135**	150							50	**80**	110
	17	130	**150**	175							60	**95**	130
	18	90	**115**	140							45	**75**	100
	19	150	**185**	215							85	**115**	145
	20	120	**145**	170							55	**90**	120
N			C2			C5			GC			M40	
	21	305	**410**	520							210	**370**	520
	22	245	**350**	460							150	**305**	460
	23	305	**410**	520							210	**365**	520
	24	245	**350**	460							150	**305**	460
	25	210	**245**	275							135	**205**	275
	26	150	**170**	185							90	**135**	185
	27	150	**170**	185							90	**135**	185
	28	90	**105**	120							60	**90**	120
	29	60	**75**	90							45	**70**	90
	30	75	**90**	105							45	**75**	110
S			C2			C5			GC			M40	
	31	35	**45**	50							25	**40**	50
	32	25	**30**	35							20	**25**	30
	33	20	**25**	30							15	**20**	25
	34	15	**20**	25							10	**15**	20
	35	15	**20**	25							10	**15**	20
	36	55	**60**	65							35	**45**	60
	37	25	**30**	35							15	**25**	30

Left Hand Insert

Boring Insert

● first choice
○ alternate choice

P	●
M	●
K	○
N	●
S	○
H	

ID Grooving

catalogue number	W	T	αR	M40
Right hand				
510124	1,04	2,08	–	●
510128	1,63	2,92	–	●
510104	2,39	2,92	–	●
510132	2,50	2,92	–	●
510134	2,71	2,92	–	●
Left hand				
510113	1,04	2,08	–	●
510114	1,21	2,08	–	●
510115	1,36	2,08	–	●
510116	1,37	2,08	–	●
510117	1,63	2,92	–	●
510118	1,80	2,92	–	●
510119	1,94	2,39	–	●
510120	2,22	2,92	–	●
510101	2,39	2,92	–	●
510121	2,50	2,92	–	●
510122	2,64	2,92	–	●
510123	2,71	2,92	–	●
510102	3,81	2,39	4.00	●

NOTE: Insert 510102 is used for boring.

Left Hand Insert

- Side clearance angles as noted.
- Use left-hand tooling for counterclockwise rotation only.
- Use right-hand tooling for clockwise rotation only.

● first choice
○ alternate choice

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

Face Grooving

catalogue number	W	T	C2	C5	GC	M40
Right hand						
510136	1,98	2,39	●	●	●	●
510108	2,39	2,39	●			●
510138	2,59	2,39				●
Left hand						
510135	1,98	2,39		●		●
510107	2,39	2,39				●
510137	2,59	2,39				●

Left Hand Insert

Threading

catalogue number	T				
Right hand					
510106	2,38	●			●
Left hand					
510103	2,38	●	●	●	●

NOTE: Minimum 10 threads per inch.

WIDIA

Threading

Threading Application Guide **E4–E5**

TopThread™ **E6–E33**
- Insert Selection Guide E8–E9
- Insert Overview E10–E11
- Grades and Grade Descriptions E11
- Toolholder Identification System E12
- Toolholders E14–E16
- Boring Bar Identification System E18
- Boring Bars E19
- Insert Identification System E20
- Inserts E21–E30
- Speed Chart E31
- Custom Solutions E32
- Hardware E33

Laydown Threading **E34–E62**
- Insert Selection Guide E36–E37
- Insert Overview E38
- Grades and Grade Descriptions E39
- Toolholder Identification System E40
- Toolholders E41
- Boring Bar Identification System E42
- Boring Bars E44–E45
- Insert Identification System E46
- Inserts E47–E60
- Hardware E62

Technical Information **E63–E86**
- Screw Thread Definition E63
- Common Thread Forms E64
- Failure and Solution Guide E66–E67

WIDIA™ Threading Systems

The WIDIA line offers two standard tooling systems, the TopThread™ and Laydown Threading, to address all of your demanding threading operation requirements. Simply choose the system that best suits your specific needs and applications!

TopThread

With the largest selection of insert geometries and carbide grades available on the market today, the TopThread system is the best choice for fine or coarse pitch and single or multi-tooth threading applications.

- Rigid insert clamping design ensures the best tool life, surface finish, and workpiece quality.
- Simple design does not require shim selection for thread helix angles.
- Excellent choice for heavy-duty applications like Acme, Buttress, and Round threads machining.
- Use the same toolholders and boring bars for threading and grooving inserts.
- Ideal for special insert shapes and toolholders.

Reduce your cost per part with the addition of the third cutting edge with the Laydown Threading platform.

Eliminate the need for shims with the rigid Top Clamp design.

Laydown Threading

The Laydown Threading design is specially engineered to enable single-point threading in small diameter bores.

- Extensive selection of metric (ISO) and common European thread forms.
- Inserts available in PVD-coated carbide grade for high-performance applications.
- Low-profile design enables unrestricted chip flow.
- Three cutting edges per insert for superior, consistent results.

TopThread External Threading

Square Shank Toolholder Sizes:
- 10,0mm–32,0mm

Fine Pitch

Cresting (Full Profile):
UN maximum TPI of 32
ISO minimum pitch of 1,5mm

Partial Profile — Flat Top (NTF and NTK):
UN maximum TPI of 44
ISO minimum pitch of 0,6mm

Partial Profile — Chip Control (NT-K):
UN maximum TPI of 36
ISO minimum pitch of 0,7mm

Coarse Pitch/Heavy Duty

Cresting (Full Profile):
UN minimum TPI of 7
ISO maximum pitch of 3,0mm

Partial Profile — Flat Top and Chip Control (NT-C and NT-CK):
UN minimum TPI of 4.5
ISO maximum pitch of 5,5mm

TopThread Internal Threading

Boring Bar Diameters:
- 10,0mm–50,0mm
- Minimum bore — 11,5mm
- Steel

Fine Pitch

Cresting (Full Profile):
UN maximum TPI of 16
ISO minimum pitch of 1,5mm

Partial Profile — Flat Top (NT-1L, NTF and NTK):
UN maximum TPI of 24
ISO minimum pitch of 1,0mm

Partial Profile — Chip Control (NT-K):
UN maximum TPI of 20
ISO minimum pitch of 1,25mm

Coarse Pitch/Heavy Duty

Cresting (Full Profile):
UN minimum TPI of 8
ISO maximum pitch of 3,0mm

Partial Profile — Flat Top and Chip Control (NT-C and NT-CK):
UN minimum TPI of 4.5
ISO maximum pitch of 5,5mm

Laydown External Threading

Square Shank Toolholder Sizes:
- 8,0mm–40,0mm

Fine Pitch

Cresting (Full Profile) and Partial Profile:
UN maximum TPI of 48
ISO minimum pitch of 0,5mm

Coarse Pitch/Heavy Duty

Cresting (Full Profile):
UN minimum TPI of 8
ISO maximum pitch of 5,0mm

Partial Profile:
UN minimum TPI of 5
ISO maximum pitch of 5,0mm

Laydown Internal Threading

Boring Bar Diameters:
- 12,0mm–50,0mm
- Minimum bore — 13,0mm
- Steel and carbide

Fine Pitch

Cresting (Full Profile) and Partial Profile:
UN maximum TPI of 48
ISO minimum pitch of 0,5mm

Coarse Pitch/Heavy Duty

Cresting (Full Profile):
UN minimum TPI of 8
ISO maximum pitch of 5,0mm

Partial Profile:
UN minimum TPI of 5
ISO maximum pitch of 5,0mm

WIDIA™ TopThread™

Threading operations place extraordinary demands upon carbide inserts. Extreme tangential forces converge on the very small insert nose radius. In addition, thread pitch often requires a high feed rate (compared to regular turning operations), the insert cutting edge requires clearance, and high heat is generated in the cut. The WIDIA TopThread system is the best way to address these problems.

A superior choice for heavy-duty applications like machining Acme, Buttress, and API threads, the WIDIA TopThread system is the best solution for coarse pitch and multi-tooth threading applications.

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 break 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.
- Carbide grades are available for outstanding performance.
- Excellent choice for special thread forms and toolholder designs.

The versatility of the TopThread steel enables you to use both threading and grooving inserts in the same toolholder.

TopThread™ inserts are available in TN6010 and TN6025 grades to withstand the unusually harsh demands placed on the cutting edge of the threading insert.

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 high feed rate applications.
- Good quality threads, minimised insert breakage, and improved tool life and surface finishes.
- Locking forces in three directions for superior resistance to thrust and 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 • standard helix

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

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).

The insert size must match the gage insert size of your toolholder selection:

catalogue number	gage insert
NSR2020K3	N.3R
NSR2525M4	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 angle and the recommended infeed values.

See the Technical section on pages E71–E76 of this catalogue.

For internal threading, minimum bore varies depending on thread type. See page E76 for details.

Step 3 • Choose Insert for Application

- See threading insert overview on page E10.
- 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. Chip control is only available with partial profile inserts.
- 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** 50–230	**TN6010** 50–185	**TN6010** 70–210	—	**TN6010** 20–120
first choice	**TN6025** 40–200	**TN6025** 40–135	**TN6025** 60–145	**TN6025** 50–360	**TN6025** 10–100

** NOTE: Also available as an optimum cutting tool for steel and stainless steel or partial profile threading. Increase speed by 15% over the recommendations above.*

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: A40TNNTOR3
gage insert: N.3L
speed: 150 m/min
infeed passes*: 12 passes

** Infeed recommendations given in technical data section on pages E71–E75.*

style			thread profile	standard	tolerance class	cresting	application	page(s)
chip control — K	neutral	positive						
NT-K	NT	NTP	Partial Profile 60º	—	—	N	General use for 60º thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**E21–E22**
NT-CK			Partial Profile 60º — coarse pitch	—	—	N	Coarse pitch 60º thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**E23**
	NTF	NTK	Partial Profile 60º — fine pitch	—	—	N	Fine pitch 60º 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.	**E23–E24**
	NTU		Partial Profile 60º — four-edged insert	—	—	N	Four-edged insert for 60° partial profile threading. Requires NSU-style toolholder for size 4U insert.	**E24**
	NTC		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60º V-form for all industries.	**E25**
		NJP	UNJ	SAEA588791	3A/3B	N	Controlled root radius on external threads for military and aerospace industries.	**E26**
		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.	**E26**
	NDC-V		NPT	ANSI/ACME B1.201: 1983	Standard NPT	Y	National Pipe Thread standard forms for pipe fittings.	**E27**
	NDC-V-M		NPT — multi-tooth	ANSI/ACME B1.201: 1983	Standard NPT	Y	High-productivity multi-tooth threading inserts for NPT threads.	**E27**
	NWC		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.	**E28**
	NDC-RD		API Round	API STD. 5B:1979	Standard API RD	Y	60º V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	**E28**
	NA		Acme	ANSI B1.5:1988	3G	N	29º truncated thread form for motion applications in a wide variety of industries.	**E29**

(continued)

(continued)

style			thread profile	standard	tolerance class	cresting	application	page(s)
chip control — K	neutral	positive						
	NAS		Stub Acme	ANSI B1.8:1988	2G	N	Shallow-depth 29º truncated thread form for motion applications in a wide variety of industries.	**E30**
	NTB-B		American Buttress — 45º 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 45º clearance flank is the leading edge.	**E30**

- 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 page E11 for carbide grade selection and more technical information.

left-hand insert	right-hand insert

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 multi-layer coating provides better wear resistance.

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

Grade	Coating	Grade Description		05	10	15	20	25	30	35	40	45
TN6010	HC-P10	PVD-TiAlN multi-layer coated carbide. For finishing and general machining of steels, stainless steels, cast irons, non-ferrous materials, and difficult-to-machine materials. Recommended at high cutting speeds under stable conditions.	P									
			M									
			K									
			N									
			S									
TN6025	HC-P25	PVD-TiAlN multi-layer 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									
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									
			H									

TopThread
Holder Identification System

N — Insert Holding Method

N — TopThread*

*Proprietary standard only.

S — Insert Mounting Location

End mount

Side mount, offset

Side mount, no offset

R — Hand of Tool

End mount

Side mount

Drop Head

2525 — Shank Size

Shank height and width in mm and holder.

M — Tool Length

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

4 — Insert Size

insert size	W1
2	3,81
3	4,95
4	6,98
5	9,65
6	9,73
8	11,13

Q — Qualified Holder

Q – qualified holder

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See pages E10–E11 for inserts.

Right Hand Tool

NS

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand											
3641682	**NSR1010E2**	10	10	14	70	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3641660	**NSR1212F2**	12	12	16	80	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3636542	**NSR1616H2**	16	16	20	100	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638589	**NSR2020K2**	20	20	25	125	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638590	**NSR2525M2**	25	25	32	150	19	9	3,5	N.2R	**CM74**	**MS1200**	T10
3638588	**NSR2020K3**	20	20	25	125	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3636536	**NSR2525M3**	25	25	32	150	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641664	**NSR3225P3**	32	25	32	170	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641666	**NSR3232P3**	32	32	40	170	32	13	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3636540	**NSR2525M4**	25	25	32	150	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641675	**NSR3225P4**	32	25	32	170	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641669	**NSR3232P4**	32	32	40	170	35	14	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641673	**NSR3232P5**	32	32	40	170	51	16	10,5	N.5R	**CM80**	**MS352**	6mm
	Left hand											
3641683	**NSL1010E2**	10	10	14	70	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3641681	**NSL1212F2**	12	12	16	80	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3636545	**NSL1616H2**	16	16	20	100	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639045	**NSL2020K2**	20	20	25	125	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639047	**NSL2525M2**	25	25	32	150	19	9	3,5	N.2L	**CM75**	**MS1200**	T10
3639046	**NSL2020K3**	20	20	32	125	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3636539	**NSL2525M3**	25	25	32	150	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641670	**NSL3225P3**	32	25	32	170	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641671	**NSL3232P3**	32	32	40	170	32	13	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3636544	**NSL2525M4**	25	25	32	150	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641678	**NSL3225P4**	32	25	32	170	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641679	**NSL3232P4**	32	32	40	170	35	14	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641688	**NSL3232P5**	32	32	40	170	51	16	10,5	N.5L	**CM81**	**MS352**	6mm

NOTE: F dimension shown over N-style gage insert.

See pages E10–E11 for inserts.

Right Hand Tool

NAS

order number	catalogue number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand													
3641667	**NASR1010M2Q**	10	10	10	150	19	9	3,5	2,03	19	N.2R	**CM182**	**MS1200**	T10
3641662	**NASR1212M2Q**	12	12	12	150	19	9	3,5	—	—	N.2R	**CM182**	**MS1200**	T10
3639048	**NASR1616K3Q**	16	16	16	125	32	12	5,3	—	—	N.3R	**CM184LP**	**MS2111**	25 IP
	Left hand													
3641691	**NASL1010M2Q**	10	10	10	150	19	9	3,5	2,03	19	N.2L	**CM183**	**MS1200**	T10
3641686	**NASL1212M2Q**	12	12	12	150	19	9	3,5	—	—	N.2L	**CM183**	**MS1200**	T10
3641687	**NASL1616K3Q**	16	16	16	125	32	12	5,3	—	—	N.3L	**CM185LP**	**MS2111**	25 IP

NOTE: F dimension shown over N-style gage insert.

See pages E10–E11 for inserts.

Right Hand Tool

NE

order number	catalogue number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand												
3641674	**NER1616H2**	16	16	20	100	15	25	—	3,5	N.2L	**CM75**	**MS1200**	T10
3641658	**NER2020K2**	20	20	25	125	15	25	6	3,5	N.2L	**CM75**	**MS1200**	T10
3641665	**NER2525M2**	25	25	32	150	15	25	12	3,5	N.2L	**CM75**	**MS1200**	T10
3636541	**NER2525M3**	25	25	32	150	22	51	—	5,3	N.3L	**CM73LP**	**MS2111**	25 IP
3641680	**NER3225P3**	32	25	32	170	22	51	—	3,8	N.3L	**CM73LP**	**MS2111**	25 IP
3641672	**NER2525M4**	25	25	35	150	24	51	—	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641689	**NER3225P4**	32	25	35	170	24	51	—	7,5	N.4L	**CM73LP**	**MS2111**	25 IP
3641693	**NER3232P4**	32	32	40	170	24	51	—	6,4	N.4L	**CM73LP**	**MS2111**	25 IP
3641692	**NER3232P5**	32	32	50	170	35	51	—	10,5	N.5L	**CM81**	**MS352**	6mm
	Left hand												
3641684	**NEL1616H2**	16	16	20	100	15	25	—	3,5	N.2R	**CM74**	**MS1200**	T10
3641677	**NEL2020K2**	20	20	25	125	15	25	6	3,5	N.2R	**CM74**	**MS1200**	T10
3641676	**NEL2525M2**	25	25	32	150	15	25	12	3,5	N.2R	**CM74**	**MS1200**	T10
3636543	**NEL2525M3**	25	25	32	150	22	51	—	5,3	N.3R	**CM72LP**	**MS2111**	25 IP
3641685	**NEL3225P3**	32	25	32	170	22	51	—	3,8	N.3R	**CM72LP**	**MS2111**	25 IP
3641668	**NEL2525M4**	25	25	35	150	24	51	—	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641694	**NEL3225P4**	32	25	35	170	24	51	—	7,5	N.4R	**CM72LP**	**MS2111**	25 IP
3641696	**NEL3232P4**	32	32	40	170	24	51	—	6,4	N.4R	**CM72LP**	**MS2111**	25 IP
3641695	**NEL3232P5**	32	32	50	170	35	51	—	10,5	N.5R	**CM80**	**MS352**	6mm

NOTE: F dimension shown over N-style gage insert.

See pages E10–E11 for inserts.

Right Hand Tool

NSU

order number	catalogue number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand											
3851386	**NSUR2020K4Q**	20	20	23	125	32	13	6,1	NTU4R	**CM72LP**	**MS2111**	25 IP
3851387	**NSUR2525M4Q**	25	25	28	150	32	13	6,1	NTU4R	**CM72LP**	**MS2111**	25 IP
	Left hand											
3851384	**NSUL2020K4Q**	20	20	23	125	32	13	6,1	NTU4L	**CM73LP**	**MS2111**	25 IP
3851385	**NSUL2525M4Q**	25	25	28	150	32	13	6,1	NTU4L	**CM73LP**	**MS2111**	25 IP

NOTE: F dimension shown over N-style gage insert.
NSU toolholders only for NTU4 threading inserts.

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WIDIA™
Win with WIDIA™

TopThread
Boring Bar Identification System

A25RNNTOR2

A	25	R	N	N	T	O	R	2
Bar Type	Bar Diameter	Bar Length	Insert Holding Method	Insert Shape	Insert Location	Rake Angle 0 = 0°	Hand of Tool	Insert Size

Bar Type

Steel with coolant

Bar Diameter

Bar diameter in millimetres

Insert Holding Method

N* — TopThread

Insert Size

insert size	W1
1	3,54
2	3,81
3	5,35
4	6,40
5	9,65
6	9,73
8	11,13

Bar Length

Bars

K = 125,0mm
M = 150,0mm
Q = 180,0mm
R = 200,0mm
S = 250,0mm
T = 300,0mm
U = 350,0mm

Insert Location

End mount

Hand of Tool

Right hand

Left hand

Steel shank with through coolant.
See pages E10–E11 for inserts.

Right Hand Tool

A-NNT

order number	catalogue number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	hex/ Torx plus
	Right hand									
3641644	**A12MNNTOR2**	12	18,5	150	11	1/16-27 NPT	N.2L	**CM147**	**MS1200**	2.5mm
3641643	**A16MNNTOR2**	16	22,0	150	11	1/8-27 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641645	**A20QNNTOR2**	20	26,0	180	13	1/8-27 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641651	**A25RNNTOR2**	25	34,0	200	17	1/4-18 NPT	N.2L	**CM75**	**MS1200**	2.5mm
3641622	**A25RNNTOR3**	25	34,0	200	17	1/4-18 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	N.2R	**CM146**	**MS1200**	2.5mm
3641649	**A16MNNTOL2**	16	22,0	150	11	1/8-27 NPT	N.2R	**CM74**	**MS1200**	2.5mm
3641652	**A20QNNTOL2**	20	26,0	180	13	1/8-27 NPT	N.2R	**CM74**	**MS1200**	2.5mm
3641657	**A25RNNTOL2**	25	34,0	200	17	1/4-18 NPT	N.2R	**CM74**	**MS1200**	2.5mm
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: F dimension shown over N-style gage insert.

Necked steel shank
with through coolant.
See pages E10–E11 for inserts.

Right Hand Tool

A-NNT-1

order number	catalogue number	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex
	Right hand												
3641648	**A10KNNTOR1**	10	11,5	8,7	125	31,75	7	3,2	—	N.1L	**CM109**	**MS1034**	1.5mm
3641647	**A12MNNTOR1**	12	11,5	8,7	150	31,30	7	4,0	1/16-27 NPT	N.1L	**CM109**	**MS1034**	1.5mm

NOTE: F dimension shown over N-style gage insert.

TopThread
Insert Identification System

NDC38RDR75

N — Type of Insert

N — TopThread*

*Proprietary standard only.

D — Insert Style

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

NJF

NDC-V-M

NTC

NA

NT

NT-K

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

- Thread pitch (TP).
- "A" or "B" type Buttress insert.
- Taper per foot — API threads.

Additional Information

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

Partial Profile 60°

● first choice
○ alternate choice

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	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3RK	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4RK	0,17	3,25	4	1,25–6,25	2,00–6,25	4–20	4–12		●	
Left hand										
NT2LK	0,10	1,91	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3LK	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	

Partial Profile 60°
Internal

NT-1L

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI			
Left hand										
NT1L	0,08	1,09	1	–	1,00–2,00	–	12–24	●	●	

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	1,91	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3R	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4R	0,17	3,25	4	1,25–6,25	2,00–6,25	4–20	4–12	●	●	
Left hand										
NT2L	0,10	1,91	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3L	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4L	0,17	3,25	4	1,25–6,25	2,00–6,25	4–20	4–12		●	

Partial Profile 60°

NTP

catalogue number	RC	E	insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI			
Right hand										
NTP2R	0,10	1,91	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NTP3R	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NTP4R	0,17	3,25	4	1,25–6,25	2,00–6,25	4–20	4–12		●	
Left hand										
NTP2L	0,10	1,91	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NTP3L	0,17	2,49	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	

Partial Profile 60°

● first choice
○ alternate choice

		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

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	2,50–4,00	4,00	6–11	6	●	●	

Partial Profile 60°

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	1,00–2,00	14–44	12–24	●	●	
NTF3R Left hand	0,08	3,58	3	0,60–2,50	1,00–2,50	10–44	9–24	●	●	
NTF3L	0,08	3,58	3	0,60–2,50	1,00–2,50	10–44	9–24	●	●	

Partial Profile 60°

● first choice
○ alternate choice

		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

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	1,00–2,00	14–44	12–24	●	●	
NTK3R	0,08	3,58	3	0,60–2,50	1,00–2,50	10–44	9–24	●	●	
Left hand										
NTK3L	0,08	3,58	3	0,60–2,50	1,00–2,50	10–44	9–24		●	

Partial Profile 60°
External

NTU

catalogue number	RC	E	insert size	thread pitch mm	internal thread pitch mm	external TPI	internal TPI			
Right hand										
NTU4R	0,11	3,18	4U	1,25–6,25	–	4–20	–		●	
Left hand										
NTU4L	0,11	3,18	4U	1,25–6,25	–	4–20	–		●	

American
UN-External

● first choice
○ alternate choice

		TN6010	TN6025	THM
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	–	●	●	
NTC3R14E	0,22	3,76	3	–	–	14	–	●		
NTC3R12E	0,25	3,76	3	–	–	12	–	●	●	

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		●	

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	–		●	

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	–	●		

NPT

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

● first choice
○ alternate choice

NDC-V

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
Right hand								
NDC3115VR75	0,10	3,66	3	11,5	.750	●		

NPT

NDC-V-M

catalogue number	RC	E	insert size	TPI	TPF			
Right hand								
NDC8115VR75M	0,10	2,59	8	11,5	.750	●		
NDC88VR75M	0,13	2,41	8	8	.750	●		

Whitworth BSW,
BSP-External

● first choice
○ alternate choice

		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NWC-E

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
Right hand								
NWC3R14E	0,24	3,43	3	14	–		●	
NWC3R11E	0,30	3,43	3	11	–		●	

API
Round

NDC-RD

catalogue number	RC	E	insert size	TPI	TPF	TN6010	TN6025	THM
Right hand								
NDC38RDR75	0,43	3,18	3	8	.750		●	
Left hand								
NDC310RDL75	0,36	3,18	3	10	.750		●	
NDC38RDL75	0,43	3,18	3	8	.750		●	

ACME

● first choice
○ alternate choice

		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

■ NA

catalogue number	RC	CF	E	insert size	TPI	TPF	TN6010	TN6025	THM
Right hand									
NA3R8	–	1,04	3,79	3	8	–		●	
NA3R6	–	1,44	3,79	3	6	–		●	
NA3R4	–	2,22	3,38	3	4	–		●	
NA4R4	–	2,22	5,13	4	4	–		●	
NA6R3	–	3,01	7,19	6	3	–		●	
NA6R2	–	4,58	7,19	6	2	–		●	
Left hand									
NA3L8	–	1,04	3,79	3	8	–		●	
NA3L6	–	1,44	3,79	3	6	–		●	
NA3L4	–	2,22	3,38	3	4	–		●	
NA4L4	–	2,22	5,13	4	4	–		●	
NA6L3	–	3,01	7,19	6	3	–		●	
NA6L2	–	4,58	7,19	6	2	–		●	

Stub ACME

● first choice
○ alternate choice

		TN6010	TN6025	THM
P		●	●	
M		●	●	
K		●	●	○
N		○	○	●
S		●	●	●
H		○		

NAS

catalogue number	RC	CF	E	insert size	TPI	TPF	TN6010	TN6025	THM
Right hand									
NAS3R8	–	1,21	3,79	3	8	–		●	
Left hand									
NAS3L12	–	0,83	3,79	3	12	–		●	
NAS3L8	–	1,21	3,79	3	8	–		●	
NAS3L6	–	1,66	3,79	3	6	–		●	

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	–		●	

ANSI ISO 513	VDI 3323						
Material Group		Cutting Speed • vc m/min					
		min	Start	max	min	Start	max
P			TN6010			TN6025	
	1	140	**175**	210	130	**140**	150
	2	130	**160**	190	120	**160**	200
	3	110	**140**	170	100	**130**	160
	4	120	**150**	180	120	**150**	180
	5	100	**130**	160	100	**130**	160
	6	120	**150**	180	120	**150**	180
	7	100	**130**	160	90	**125**	160
	8	90	**120**	150	80	**110**	140
	9	60	**90**	120	60	**80**	100
	10	90	**105**	120	80	**95**	110
	11	50	**65**	80	50	**65**	80
	12	120	**155**	190	120	**140**	160
	13.1	90	**120**	150	80	**105**	130
	13.2	45	**60**	75	40	**55**	65
M			TN6010			TN6025	
	14.1	90	**115**	140	60	**75**	90
	14.2	75	**95**	115	50	**60**	75
	14.3	55	**70**	90	40	**50**	55
	14.4	45	**60**	70	30	**40**	45
K			TN6010			TN6025	
	15	140	**170**	200	70	**90**	100
	16	100	**130**	160	50	**65**	80
	17	120	**150**	180	60	**70**	80
	18	90	**120**	150	40	**55**	70
	19	150	**180**	210	80	**95**	110
	20	110	**140**	170	60	**75**	90
N			TN6010			TN6025	
	21	600	**750**	900	600	**750**	900
	22	500	**650**	800	500	**650**	800
	23	600	**750**	900	600	**750**	900
	24	500	**650**	800	500	**650**	800
	25	230	**300**	370	230	**300**	370
	26	150	**200**	250	150	**200**	250
	27	150	**200**	250	150	**200**	250
	28	110	**140**	170	110	**140**	170
	29	60	**80**	100	60	**80**	100
	30	80	**100**	120	80	**100**	120
S			TN6010			TN6025	
	31	37	**45**	55	26	**37**	45
	32	30	**36**	45	21	**30**	36
	33	24	**28**	35	17	**24**	28
	34	15	**18**	25	11	**15**	18
	35	16	**18**	25	11	**16**	18
	36	60	**72**	80	42	**60**	72
	37	30	**36**	45	21	**30**	36

TopThread Custom Solutions

WIDIA high-performance carbide grades, coupled with our rigid TopThread clamping design, offer the metal working industry optimum threading productivity.

When WIDIA's large inventory of 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	–	–
Utility threading				
NTU-4R	CM-72	S-412	–	–
NTU-4L	CM-73	S-412	–	–

**25,0mm 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 ID and OD threading applications. With variable shim angles and the proper cutting geometry, the Laydown Threading system maximises tool life and improves thread quality.

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 by up to 30%.
- 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.

- Four insert sizes available to cover a wide range of threadmaking operations.
- Ideal for fine-pitch threads, 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.

Step 1 • Select Threading Method and Hand of Tooling

Required Information:

- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.

Feed direction toward the chuck • standard helix

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

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).

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

Select the appropriate holder for the insert size and hand:

Step 3 • Choose Insert for Application

- See threading insert overview on page E38.
- 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	●

Step 4 • Select Appropriate Shim

Required Information:

- Thread form (TPI or pitch).
- Pitch diameter.
- Helix method (hand of tool, feed direction, hand of thread).

Select the proper shim: SMYE... for external RH or internal LH
SMYI... for internal RH or external LH

*denotes shim size: 3 = insert size 16 (3/8" D)
4 = insert size 22 (1/2" D)

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 above. Also see detailed shim selection information above.

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** 40–200	**TN6025** 40–135	**TN6025** 60–145	**TN6025** 50–360	**TN6025** 10–100

style			thread profile	standard	tolerance class	cresting	application	page(s)
	60		Partial profile 60º	—	—	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	**E47–E48**
	ISO		Metric ISO	ISO R262, DIN 13	6g/6H	Y	Widely used metric 60° V-form for all industries.	**E49–E50**
	UN		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	**E51–E52**
	NPT		NPT	ANSI/ASME B1.20.1S1983	Standard NPT	N	National Pipe Thread standard 60° thread form for pipe fittings.	**E53**
	55		Partial profile 55º	—	—	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.	**E54**
	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.	**E55–E56**
	APIRD		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.	**E56–E57**
	PG		PG	DIN 404B0	—	Y	80° steel conduit thread.	**E57–E58**
	RD		Round	DIN 405	7e/7H	Y	Round thread form for tube fittings in the chemical and food industries.	**E58–E59**
	TR		Trapez	DIN 103	7e/7H	N	30° truncated metric thread form for motion applications.	**E59–E60**

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 multi-layer coating provides better wear resistance.

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

Grade	Coating	Grade Description	05	10	15	20	25	30	35	40	45
TN6025	HC-P25	PVD-TiAlN multi-layer 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
Toolholder Identification System

A	L	25	3	R
Toolholder Construction	Toolholder Style	Shank Size	Insert Size	Hand of Tool

A —
With shim

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 E38 for inserts.

N/A

order number	catalogue number	H	B	F	L1	L2	insert size	shim	shim screw	Torx	insert screw	Torx
	Right hand											
2022340	**NL82R**	8	8	11	136	18	2	**–**	**–**	–	**SSN2T**	T8
2009587	**AL163R**	16	16	16	100	25	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009591	**AL203R**	20	20	20	128	30	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009594	**AL253R**	25	25	25	153	30	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009600	**AL323R**	32	32	32	173	30	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009597	**AL254R**	25	25	25	155	36	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009603	**AL324R**	32	32	32	175	36	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2016118	**AL404R**	40	40	40	205	36	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2022589	**AL325R**	32	32	32	176	40	5	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
2016122	**AL405R**	40	40	40	206	40	5	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
	Left hand											
2071294	**AL163L**	16	16	16	100	25	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2071295	**AL203L**	20	20	20	125	30	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2065128	**AL253L**	25	25	25	150	30	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2114772	**AL254L**	25	25	25	150	36	4	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20

Laydown Threading
Boring Bar Identification System

AVRC203R

A
Shim Requirement

A —
Shim required

N —
No shim required

O —
Miniature Holder

VR
Tool Type

VR — Internal round shank

C
Coolant Capability

C —
With coolant

20
Shank Head Diameter

10, 12, 13, 16, 20, 25, 32, 40 ,50

6.2 (Mini adjust)

8.0 (Mini adjust)

3
Insert Size

symbol	d	L1
2	6,35	11
3	9,52	16
4	12,7	22
5	15,88	27

R
Hand of Tool

RH —
Thread symbol R

LH —
Thread symbol L

WIN WITH WIDIA™

WIDIA™

Laydown Threading System

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.

- Extensive selection of metric (ISO) and common European thread forms.
- Low-profile design enables unrestricted chip flow.
- Precision-ground thread forms for precise cuts.
- Ideal choice for fine-pitch threads, high-helix/multi-start threads, and single-point threading in small diameter bores.

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

WIDIA™
Win with WIDIA™

Steel shank without through coolant.
See page E38 for inserts.

N/A-VR

order number	catalogue number	D	D min	D2	F	L1	L2	γF°	γP°	insert size	shim	shim screw	Torx	insert screw	Torx
	Right hand														
2025828	**NVR102R**	20	13	10	7,3	180	25	-15.0	-1.5	2	**–**	**–**	–	**SSN2T**	T8
2022342	**NVR132R**	20	16	13	8,9	180	32	-15.0	-1.5	2	**–**	**–**	–	**SSN2T**	T8
2012307	**NVR163R**	20	20	16	11,5	180	40	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009609	**AVR203R**	20	24	20	13,4	180	50	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009628	**AVR25D3R**	25	29	25	16,1	200	45	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009612	**AVR253R**	32	29	25	16,3	250	60	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009640	**AVR32D3R**	32	36	32	19,6	250	60	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2009643	**AVR403R**	40	44	40	23,8	300	60	-15.0	-1.5	3	**SMYE3**	**SSY3T**	T10	**SSA3T**	T10
2022343	**NVR204R**	20	27	20	15,6	180	50	-15.0	-1.5	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009631	**AVR25D4R**	25	32	25	17,2	200	45	-15.0	-1.5	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009625	**AVR254R**	32	32	25	17,4	250	60	-15.0	-1.5	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009634	**AVR324R**	32	39	32	21,5	250	60	-15.0	-1.5	4	**SMYE4**	**SSY4T**	T20	**SSA4T**	T20
2009637	**AVR325R**	32	40	32	22,4	250	60	-15.0	-1.5	5	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
2009646	**AVR405R**	40	48	40	26,4	300	60	-15.0	-1.5	5	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
2009649	**AVR505R**	50	58	50	31,4	350	75	-15.0	-1.5	5	**SMYE5**	**SSY5T**	T25	**SSA5T**	T25
	Left hand														
2071313	**NVR102L**	20	13	10	7,3	180	25	-15.0	-1.5	2	**–**	**–**	–	**SSN2T**	T8
2071317	**NVR163L**	20	20	16	11,5	180	40	-15.0	-1.5	3	**SMYI3**	**SSY3T**	–	**SSA3T**	T10
2071318	**AVR203L**	20	24	20	13,4	180	40	-15.0	-1.5	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2065134	**AVR25D3L**	25	29	25	16,1	200	45	-15.0	-1.5	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2114832	**AVR253L**	32	29	25	16,3	250	60	-15.0	-1.5	3	**SMYI3**	**SSY3T**	T10	**SSA3T**	T10
2065135	**AVR25D4L**	25	32	25	17,2	200	45	-15.0	-1.5	4	**SMYI4**	**SSY4T**	T20	**SSA4T**	T20

NOTE: Items listed without a shim are designed for a 1.5° inclination angle.

See page E38 for inserts.

OVR

order number	catalogue number	D	D min	D2	F	L1	L2	γF°	γP°	insert size	screw	Torx driver	Torx
	Right hand												
2012325	**OVR122R**	12	13	10	7	100	25	-15.0	-0.5	2	**12147789100**	**12148001100**	T8
2022345	**OVR152R**	15	16	13	9	100	32	-15.0	-0.5	2	**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 hard metal 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.

Laydown Threading
Insert Identification System

3	E	R	A	ISO	
Insert Size	Insert Type	Hand of Insert	Thread Pitch	Thread Profile	Number of Teeth

Insert Type

E — External thread

I — Internal thread

UE — External thread

UI — Internal thread

VE — External thread

VI — Internal thread

Hand of Insert

R — Right-hand thread

L — Left-hand thread

Number of Teeth

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	6,35	11
3	9,52	16
4	12,7	22
5	15,88	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 TP	0,5–0,4

55	Partial Profile 55°
60	Partial Profile 60°
ISO	ISO Metric 60°
TR	ISO Trapezoidal
UN	ISO Inch/American UN 60°
UNJ	Controlled Root Radius 60°
ACME	American ACME
W	Whitworth 55°
BSPT	British Standard Pipe Thread 55°
NPT	American National Pipe Thread 60°
BUT	API Buttress Casing
EL	API Extreme Line
RD	Round
PG	Steel Conduit
APIRD	API Round
API	American Petroleum Institute
H-90	Hughes Oil Pipe
VAM	French Oil Pipe

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	–	●
3ERAG60	0,08	1,2	1,7	3	0,50–3,0	48–8	–	●
3ERA60	0,05	0,8	0,9	3	0,50–1,5	48–16	–	●
3ERG60	0,28	1,2	1,7	3	1,75–3,0	14–8	–	●
4ERN60	0,53	1,7	2,5	4	3,5–5,0	7–5	–	●
5ERQ60	0,64	2,1	3,1	5	5,5–6,0	4,5–4	–	●
Left hand								
3ELAG60	0,08	1,2	1,7	3	0,50–3,0	48–8	–	●
3ELA60	0,05	0,8	0,9	3	0,50–1,5	48–16	–	●
3ELG60	0,28	1,2	1,7	3	1,75–3,0	14–8	–	●
4ELN60	0,53	1,7	2,5	4	3,5–5,0	7–5	–	●

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	–	●
3IRAG60	0,05	1,2	1,7	3	0,50–3,0	48–8	–	●
3IRA60	0,05	0,8	0,9	3	0,50–1,5	48–16	–	●
3IRG60	0,15	1,2	1,7	3	1,75–3,0	14–8	–	●
4IRN60	0,31	1,7	2,5	4	3,5–5,0	7–5	–	●
5IRQ60	0,30	1,8	2,7	5	5,5–6,0	4,5–4	–	●
Left hand								
2ILA60	0,05	0,8	0,9	2	0,50–1,5	48–16	–	●
3ILAG60	0,05	1,2	1,7	3	0,50–3,0	48–8	–	●
3ILA60	0,05	0,8	0,9	3	0,50–1,5	48–16	–	●
3ILG60	0,15	1,2	1,7	3	1,75–3,0	14–8	–	●
4ILN60	0,31	1,7	2,5	4	3,5–5,0	7–5	–	●

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	PN120	TTS
Right hand									
44315900	0,05	0,8	0,9	3	0,50–1,5	48–8	–	●	●
44315901	0,28	1,2	1,7	3	1,75–3,0	14–8	–	●	●

ISO Metric-External

● 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							
2ER175ISO	1,1	0,8	2	1,75	–	–	●
2ER15ISO	1,0	0,8	2	1,5	–	–	●
3ER30ISO	1,2	1,6	3	3,0	–	–	●
3ER25ISO	1,1	1,5	3	2,5	–	–	●
3ER20ISO	1,0	1,3	3	2,0	–	–	●
3ER175ISO	0,9	1,2	3	1,75	–	–	●
3ER15ISO	0,8	1,0	3	1,5	–	–	●
3ER125ISO	0,8	0,9	3	1,25	–	–	●
3ER10ISO	0,7	0,7	3	1,0	–	–	●
3ER08ISO	0,6	0,6	3	0,80	–	–	●
3ER075ISO	0,6	0,6	3	0,75	–	–	●
3ER07ISO	0,6	0,6	3	0,70	–	–	●
3ER05ISO	0,6	0,4	3	0,50	–	–	●
3ER035ISO	0,4	0,8	3	0,35	–	–	●
4ER50ISO	1,7	2,5	4	5,0	–	–	●
4ER35ISO	1,6	2,3	4	4,5	–	–	●
4ER45ISO	1,7	2,4	4	4,5	–	–	●
4ER40ISO	1,6	2,3	4	4,0	–	–	●
5ER60ISO	2,9	2,0	5	6,0	–	–	●
5ER55ISO	2,7	1,9	5	5,5	–	–	●
Left hand							
3EL30ISO	1,2	1,6	3	3,0	–	–	●
3EL25ISO	1,1	1,5	3	2,5	–	–	●
3EL20ISO	1,3	1,0	3	2,0	–	–	●
3EL175ISO	0,9	1,2	3	1,75	–	–	●
3EL15ISO	0,8	1,0	3	1,5	–	–	●
3EL125ISO	0,8	0,9	3	1,25	–	–	●
3EL10ISO	0,7	0,7	3	1,0	–	–	●
3EL075ISO	0,6	0,6	3	0,75	–	–	●
3EL05ISO	0,6	0,4	3	0,50	–	–	●
4EL40ISO	1,6	2,3	4	4,0	–	–	●
4EL35ISO	1,6	2,3	4	3,5	–	–	●

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							
2IR20ISO	0,9	1,1	2	2,0	–	–	●
2IR175ISO	0,9	1,1	2	1,75	–	–	●
2IR15ISO	0,8	1,0	2	1,5	–	–	●
2IR125ISO	0,6	0,7	2	1,25	–	–	●
2IR10ISO	0,6	0,7	2	1,0	–	–	●
2IR08ISO	0,6	0,6	2	0,80	–	–	●
2IR075ISO	0,6	0,3	2	0,75	–	–	●
2IR05ISO	0,6	0,6	2	0,50	–	–	●
3IR30ISO	1,1	1,5	3	3,0	–	–	●
3IR25ISO	1,1	1,5	3	2,5	–	–	●
3IR20ISO	1,0	1,3	3	2,0	–	–	●
3IR175ISO	0,9	1,2	3	1,75	–	–	●
3IR15ISO	0,8	1,0	3	1,5	–	–	●
3IR125ISO	0,8	0,9	3	1,25	–	–	●
3IR10ISO	0,6	0,7	3	1,0	–	–	●
3IR08ISO	0,6	0,6	3	0,80	–	–	●
3IR075ISO	0,6	0,6	3	0,75	–	–	●
3IR05ISO	0,6	0,6	3	0,50	–	–	●
4IR50ISO	1,6	2,3	4	5,0	–	–	●
4IR45ISO	1,6	2,4	4	4,5	–	–	●
4IR40ISO	1,6	2,3	4	4,0	–	–	●
4IR35ISO	1,6	2,3	4	3,5	–	–	●
5IR60ISO	1,8	2,5	5	6,0	–	–	●
Left hand							
2IL20ISO	0,9	1,1	2	2,0	–	–	●
2IL15ISO	0,8	1,0	2	1,5	–	–	●
2IL125ISO	0,8	0,9	2	1,25	–	–	●
2IL10ISO	0,6	0,7	2	1,0	–	–	●
2IL075ISO	0,6	0,6	2	0,75	–	–	●
2IL05ISO	0,6	0,4	2	0,50	–	–	●
3IL30ISO	1,1	1,5	3	3,0	–	–	●
3IL25ISO	1,1	1,5	3	2,5	–	–	●
3IL20ISO	1,0	1,3	3	2,0	–	–	●
3IL15ISO	0,8	1,0	3	1,5	–	–	●
3IL10ISO	0,6	0,7	3	1,0	–	–	●
3IL075ISO	0,6	0,6	3	0,75	–	–	●
3IL05ISO	0,6	0,4	3	0,50	–	–	●
4IL50ISO	1,6	2,3	4	5,0	–	–	●
4IL40ISO	1,6	2,3	4	4,0	–	–	●
4IL35ISO	1,6	2,3	4	3,5	–	–	●
5IL60ISO	1,8	2,5	5	6,0	–	–	●
5IL55ISO	1,6	2,3	5	5,5	–	–	●

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	–	●
3ER40UN	0,6	0,6	3	–	40	–	●
3ER36UN	0,6	0,6	3	–	36	–	●
3ER32UN	0,6	0,6	3	–	32	–	●
3ER28UN	0,6	0,7	3	–	28	–	●
3ER27UN	0,8	0,7	3	–	27	–	●
3ER24UN	0,7	0,8	3	–	24	–	●
3ER20UN	0,8	0,9	3	–	20	–	●
3ER18UN	0,8	1,0	3	–	18	–	●
3ER16UN	0,9	1,1	3	–	16	–	●
3ER14UN	1,0	1,2	3	–	14	–	●
3ER13UN	1,3	1,0	3	–	13	–	●
3ER12UN	1,1	1,4	3	–	12	–	●
3ER11UN	1,1	1,5	3	–	11	–	●
3ER10UN	1,1	1,5	3	–	10	–	●
3ER8UN	1,2	1,6	3	–	8	–	●
Left hand							
3EL16UN	0,9	1,1	3	–	16	–	●
3EL12UN	1,1	1,4	3	–	12	–	●
3EL10UN	1,1	1,5	3	–	10	–	●
3EL8UN	1,2	1,6	3	–	8	–	●

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	–	●
2IR27UN	0,8	0,7	2	–	28	–	●
2IR28UN	0,6	0,7	2	–	28	–	●
2IR24UN	0,7	0,8	2	–	24	–	●
2IR20UN	0,8	0,9	2	–	20	–	●
2IR18UN	0,8	1,0	2	–	18	–	●
2IR16UN	0,9	1,1	2	–	16	–	●
3IR36UN	0,6	0,6	3	–	36	–	●
3IR32UN	0,6	0,6	3	–	32	–	●
3IR28UN	0,6	0,7	3	–	28	–	●
3IR24UN	0,7	0,8	3	–	24	–	●
3IR20UN	0,8	0,9	3	–	20	–	●
3IR18UN	0,8	1,0	3	–	18	–	●
3IR16UN	0,9	1,1	3	–	16	–	●
3IR14UN	0,9	1,2	3	–	14	–	●
3IR12UN	1,1	1,4	3	–	12	–	●
3IR11UN	1,1	1,5	3	–	11	–	●
3IR10UN	1,1	1,5	3	–	10	–	●
3IR8UN	1,1	1,5	3	–	8	–	●
Left hand							
2IL32UN	0,6	0,6	2	–	32	–	●
3IL12UN	1,1	1,4	3	–	12	–	●
3IL8UN	1,1	1,5	3	–	8	–	●

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							
3ER27NPT	0,7	0,8	3	–	27	.75	●
3ER18NPT	0,8	1,0	3	–	18	.75	●
3ER14NPT	0,9	1,2	3	–	14	.75	●
3ER115NPT	1,1	1,5	3	–	11,5	.75	●
3ER8NPT	1,3	1,8	3	–	8	.75	●
Left hand							
3EL27NPT	0,7	0,8	3	–	27	.75	●
3EL18NPT	0,8	1,0	3	–	18	.75	●
3EL115NPT	1,1	1,5	3	–	11,5	.75	●
3EL8NPT	1,3	1,8	3	–	8	.75	●

NPT-Internal

IR/L-NPT

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	
Right hand							
3IR27NPT	0,7	0,8	3	–	27	.75	●
3IR18NPT	0,8	1,0	3	–	18	.75	●
3IR14NPT	0,9	1,2	3	–	14	.75	●
3IR115NPT	1,1	1,5	3	–	11,5	.75	●
3IR8NPT	1,3	1,8	3	–	8	.75	●
Left hand							
3IL14NPT	0,9	1,2	3	–	14	.75	●

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								
3ERAG55	0,08	1,2	1,7	3	0,50–3,0	48–8	–	●
3ERA55	0,05	0,8	0,9	3	0,50–1,5	48–16	–	●
3ERG55	0,20	1,2	1,7	3	1,75–3,0	14–8	–	●
4ERN55	0,43	1,7	2,5	4	3,5–5,0	7–5	–	●
Left hand								
3ELG55	0,20	1,2	1,7	3	1,75–3,0	14–8	–	●

Partial Profile
55° Internal

IR/L-55

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF
Right hand							
2IRA55	0,05	0,8	0,9	2	0,50–1,5	48–16	–
3IRAG55	0,07	1,2	1,7	3	0,50–3,0	48–8	–
3IRA55	0,05	0,8	0,9	3	0,50–1,5	48–16	–
3IRG55	0,21	1,2	1,7	3	1,75–3,0	14–8	–
4IRN55	0,43	1,7	2,5	4	3,5–5,0	7–5	–
Left hand							
3ILAG55	0,07	1,2	1,7	3	0,50–3,0	48–8	–
3ILA55	0,05	0,8	0,9	3	0,50–1,5	48–16	–
3ILG55	0,21	1,2	1,7	3	1,75–3,0	14–8	–

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							
3ER36W	0,6	0,6	3	–	36	–	●
3ER32W	0,6	0,6	3	–	32	–	●
3ER28W	0,6	0,7	3	–	28	–	●
3ER26W	0,8	0,7	3	–	26	–	●
3ER24W	0,7	0,8	3	–	24	–	●
3ER20W	0,8	0,9	3	–	20	–	●
3ER19W	0,8	1,0	3	–	19	–	●
3ER18W	0,8	1,0	3	–	18	–	●
3ER16W	0,9	1,1	3	–	16	–	●
3ER14W	1,0	1,2	3	–	14	–	●
3ER12W	1,1	1,4	3	–	12	–	●
3ER11W	1,1	1,5	3	–	11	–	●
3ER10W	1,1	1,5	3	–	10	–	●
3ER9W	1,2	1,7	3	–	9	–	●
3ER8W	1,2	1,5	3	–	8	–	●
4ER7W	1,6	2,3	4	–	7	–	●
4ER6W	1,6	2,3	4	–	6	–	●
Left hand							
3EL11W	1,1	1,5	3	–	11	–	●
3EL8W	1,2	1,5	3	–	8	–	●

0,137P
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	–	●
2IR18W	1,0	0,8	2	–	18	–	●
2IR16W	1,1	0,9	2	–	16	–	●
2IR14W	0,9	1,1	2	–	14	–	●
3IR19W	0,8	0,9	3	–	19	–	●
3IR18W	0,8	1,0	3	–	18	–	●
3IR16W	0,9	1,1	3	–	16	–	●
3IR14W	1,0	1,2	3	–	14	–	●
3IR12W	1,1	1,4	3	–	12	–	●
3IR11W	1,1	1,5	3	–	11	–	●
3IR8W	1,2	1,5	3	–	8	–	●
4IR7W	1,6	2,3	4	–	7	–	●
4IR6W	1,6	2,3	4	–	6	–	●
Left hand							
2IL19W	0,8	1,0	2	–	19	–	●
2IL14W	0,9	1,1	2	–	14	–	●
3IL14W	1,0	1,2	3	–	14	–	●
3IL11W	1,1	1,5	3	–	11	–	●

API Round-External

d=1/2 arctan (TPF/12)

ER/L-APIRD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	
3ER10APIRD	0,34	1,2	1,4	3	–	10	.75	●
3ER8APIRD	0,40	1,3	1,5	3	–	8	.75	●

API Round-Internal

● first choice
○ alternate choice

P		●
M		●
K		●
N		○
S		●
H		

IR/L-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	.75	●
3IR8APIRD	0,40	1,3	1,5	3	–	8	.75	●

Defined by: DIN 40430

ER/L-PG

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	
Right hand								
3ER20PG	0,07	0,9	0,8	3	–	20	–	●
3ER18PG	0,09	1,0	0,8	3	–	18	–	●
3ER16PG	0,11	1,1	0,9	3	–	16	–	●

Defined by: DIN 40430

● first choice
○ alternate choice

P	●
M	●
K	●
N	○
S	●
H	

IR/L-PG

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	TN6025
Right hand								
2IR18PG	0,09	1,0	0,8	2	–	18	–	●
3IR18PG	0,09	0,1	0,8	3	–	18	–	●
3IR16PG	0,11	1,1	0,8	3	–	16	–	●

Round External

ER/L-RD

catalogue number	RC	EX	E	insert size	thread pitch mm	TPI	TPF	
Right hand								
3ER10RD	0,61	1,1	1,2	3	–	10	–	●
3ER8RD	0,76	1,4	1,3	3	–	8	–	●
4ER6RD	1,01	1,5	1,7	4	–	6	–	●
4ER4RD	1,52	2,3	2,2	4	–	4	–	●
Left hand								
3EL8RD	0,76	1,4	1,3	3	–	8	–	●

Round-Internal

P	●
M	●
K	●
N	○
S	●
H	

● first choice
○ alternate choice

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	–	●
3IR8RD	0,70	1,4	1,4	3	–	8	–	●
3IR6RD	0,94	1,5	1,4	3	–	6	–	●
4IR6RD	0,93	1,5	1,7	4	–	6	–	●
4IR4RD	1,40	2,3	2,2	4	–	4	–	●
Left hand								
3IL8RD	0,06	1,4	1,4	3	–	8	–	●

Trapez-External

ER/L-TR

catalogue number	EX	E	insert size	thread pitch mm	TPI	TPF	
Right hand							
3ER3TR	1,3	1,5	3	3,0	–	–	●
3ER2TR	1,1	1,3	3	2,0	–	–	●
3ER15TR	1,0	1,1	3	1,5	–	–	●
4ER5TR	2,1	2,5	4	5,0	–	–	●
4ER4TR	1,7	1,9	4	4,0	–	–	●
5ER6TR	2,3	2,7	5	6,0	–	–	●
Left hand							
3EL3TR	1,3	1,5	3	3,0	–	–	●
3EL2TR	1,1	1,3	3	2,0	–	–	●
4EL4TR	1,7	1,9	4	4,0	–	–	●
5EL6TR	2,3	2,7	5	6,0	–	–	●

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	3,0	–	–	●
3IR15TR	1,0	1,1	3	1,5	–	–	●
4IR5TR	2,1	2,5	4	5,0	–	–	●
4IR4TR	1,7	1,9	4	4,0	–	–	●
5IR6TR	2,3	2,7	5	6,0	–	–	●
Left hand							
3IL3TR	1,3	1,5	3	3,0	–	–	●
4IL5TR	2,1	2,5	4	5,0	–	–	●

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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 E84–E86.

insert size and style	insert screw	shim	shim screw and washer	clamp assembly
3ER 3EL	S-SA3T S-SA3T	SM-YE3 SM-YI3	S-SY3T S-SY3T	CK-C3 CK-C3
4ER 4EL	S-SA4T S-SA4T	SM-YE4 SM-YI4	S-SY4T S-SY4T	CK-C4 CK-C4
Laydown Threading boring bars				
2IR 2IL	S-SN2T S-SN2T	– –	– –	– –
3IR 3IL	S-SA3T S-SA3T	SM-YI3 SM-YE3	S-SY3T S-SY3T	CK-C3 CK-C3
4IR 4IL	S-SA4T S-SA4T	SM-YI4 SM-YE4	S-SY4T S-SY4T	CK-C4 CK-C4

SM	-	Y	E	3	-	2P
Shim		Y-shim for Laydown standard inserts	E — External I — Internal	IC — 16,0mm		Shim Angle

2P	2° positive
1P	1° positive
—	0°
1N	1° negative
2N	2° negative
3N	3° negative

resultant angle		3.5°	2.5°	1.5°	0.5°	-0.5°	-1.5°
insert size (IC)	toolholder	shim ordering code					
16,0mm	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
22,0mm	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

Since 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)	shim size (D) ordering code	contains slanted shims
3x	16,0mm	ABY3	SM-YE3-2P, 1P, 1N, 2N, 3N SM-YI3-2P, 1P, 1N, 2N, 3N
4x	22,0mm	ABY4	SM-YE4-2P, 1P, 1N, 2N, 3N SM-YI4-2P, 1P, 1N, 2N, 3N

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 Rotary Shoulder Connection

NOTE: Taper shown exaggerated.

API Casing and Tubing Round Thread Form

NOTE: Taper shown exaggerated.

API Buttress

Suggested Grades and Speeds for Threading Various Workpiece Materials

workpiece group	workpiece material	recommendations surface speed – m/min		
		uncoated	PVD coated	
		THM	TN6010	TN6025
free-machining carbon steel	10L18, 10L45, 1213, 12L13, 12L14, 1140, 1141, 11L44, 1151, 10L50	—	91–198	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	30–122
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	45–198	30–160
free-machining aluminium alloys	2024-T4, 2014-T6, 6061-T6 2011-T3, 3003-H18, A2, Alcan, Alcoa 510, Duralumin	122–244	122–365	—
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	• Burrs. • Torn finish. • Steps.	• Use positive rake or full profile insert. • Increase coolant concentration. • Alter infeed. • Increases m/min. • Check machine “Z” travel axis. • Check insert form. • Check for correct shim in LT system.
chatter	• Poor rigidity. • Incorrect speed. • Insert movement. • Improper infeed. • Off centerline. • Wrong edge prep.	• Minimise tool overhang. • Check for workpiece deflection. • Adjust m/min. • Check insert and clamp. • Use modified feed angle. • Verify that tool cutting position is at workpiece centerline. • Adjust hone level by ordering special insert.
built-up edge	• Speed too low. • Insufficient coolant. • Chip load. • Wrong edge prep.	• Increase m/min. • Increase coolant concentration and/or flow. • Adjust infeed angle. • Increase depth of cut per pass. • Adjust hone level by ordering special insert.
deformation	• Wrong grade. • Speed too high. • Improper infeed angle. • Insufficient coolant.	• Use a more wear-resistant grade (e.g., TN6010). • Reduce m/min. • Alter infeed method/angle. • Increase coolant flow.
chipping	• Improper infeed. • Chip load. • Wrong grade. • Incorrect speed. • Poor rigidity. • Wrong edge prep.	• Alter infeed to modified flank. • Adjust chip load. • 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. • Check for possible part deflection. • Adjust hone size by ordering special insert.
broken nose	• Heavy chip load. • Small nose radius. • Wrong grade. • Improper infeed. • Wrong edge prep.	• Decrease chip load. • Use large nose radius if allowable. • Use tougher grade (e.g., TN6025). • Alter infeed to modified flank. • Adjust hone size by ordering special insert.
flank wear	• Wrong grade. • Insufficient coolant. • Off centerline.	• Use a more wear-resistant grade (e.g., TN6025). • Increase coolant flow. • Check the centerline height of the tool. (The smaller the diameter, the more critical the need for centerline accuracy.)

Practical Solutions to Common Threading Problems

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 center height	begin cutting threads 12,0mm before workpiece
chatter	●			●							●	●				●	
burr 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 patented WIDIA recessed chip groove, when used according to our recommendations, breaks 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 0,025 to 0,076mm (spring) pass may be used to improve surface finish, however, chip breaking 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 programs 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.
- Burr condition is increased.
- Entire cutting edge is engaged at finish of thread, causing increased tendency to chatter.

Flank

Advantage —
- Cutting with the leading edge of the threading tool gives the chip a definite flow out of the thread form area. This reduces the burr problem on the trailing edge of the tool. To avoid bad surface finish, chipping, or excessive flank wear due to rubbing of the trailing edge, the infeed angle should be 3° to 5° smaller than the angle of the thread. This is a type of modified flank.

Disadvantage —
- Trailing edge of threading insert may drag or rub and tends to chip.
- Torn or poor surface finish threads result when cutting soft, gummy materials like low-carbon steels, aluminium, and stainless steels.

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.

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.
- Outside/core diameters must be accurately pre-turned.

Full Profile

Tooth profile with full profile shape including tooth height:
- For burr-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 runout.
- 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

Maximum 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 formula:

$$\text{maximum cutting speed (m/min)} = \text{part diameter (mm)} \times 3.14 \times (1/\text{pitch}) \times \frac{\text{max mm/min}}{1000{,}0\text{mm}}$$

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	0,80–1,0	1,25–1,5	1,75–2,0	2,5–3,0	3,5–4,0	4,5–6,0	8,0
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 workhardening 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. This is the case as these programs do not satisfy the 0,05mm minimum depth of cut specification recommended.

Example:
Infeed per pass formula: accumulated depth = initial doc x √ # pass
For example, an 8-pitch external thread has a depth of 2,0mm.
25% of 2,0mm = approximately 0,50mm
(This is the infeed/doc for the first pass.)

0,500mm x √ (2) = 0,708mm
0,708mm - 0,500mm = 0,207mm (This is the infeed/doc for the second pass.)

0,500mm x √ (3) = 0,867mm
0,867mm - 0,708mm = 0,159mm (This is the infeed/doc for the third pass.)

0,500mm x √ (4) = 1,001mm
1,001mm - 0,867mm = 0,134mm (This is the infeed/doc for the fourth pass.)

Using Radial Infeed

Bending stress on the cutting edge caused by V-shaped chips from long-chippping steel workpiece materials.

High cutting forces with small cutting thicknesses require sharp edges with high strength.

Its application is recommended for tough and hard, wear-resistant carbides with good resistance to thermal and mechanical shocks.

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.

When turning short threads with short engagement times, there is a good resistance to thermal and mechanical shocks.

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)	6,0	5,5	5,0	4,5	4,0	3,5	3,0	2,5	2,0	1,8	1,5	1,3	1,0	0,8	0,5
total depth	3,84	3,53	3,20	2,87	2,54	2,24	1,93	1,60	1,24	1,12	0,94	0,81	0,66	0,48	0,36
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	X/Z	X/Z
1	0,46	0,43	0,41	0,38	0,08	0,33	0,28	0,28	0,23	0,20	0,20	0,20	0,20	0,15	0,13
2	0,43	0,41	0,38	0,33	0,33	0,30	0,25	0,23	0,23	0,20	0,20	0,18	0,15	0,15	0,10
3	0,36	0,33	0,33	0,28	0,25	0,25	0,20	0,20	0,18	0,18	0,18	0,15	0,13	0,10	0,08
4	0,30	0,28	0,28	0,23	0,23	0,20	0,18	0,18	0,15	0,15	0,15	0,10	0,10	0,08	0,05
5	0,28	0,25	0,25	0,23	0,20	0,20	0,18	0,15	0,15	0,13	0,13	0,10	0,08		
6	0,25	0,23	0,23	0,20	0,18	0,18	0,15	0,15	0,13	0,10	0,08	0,08			
7	0,23	0,20	0,23	0,20	0,18	0,15	0,15	0,13	0,10	0,08					
8	0,23	0,20	0,20	0,18	0,15	0,15	0,13	0,10	0,08	0,08					
9	0,23	0,18	0,18	0,18	0,15	0,15	0,13	0,10							
10	0,20	0,18	0,18	0,15	0,13	0,13	0,10	0,08							
11	0,18	0,18	0,15	0,15	0,13	0,10	0,10								
12	0,15	0,15	0,15	0,13	0,10	0,08	0,08								
13	0,15	0,15	0,13	0,13	0,10										
14	0,15	0,13	0,10	0,10	0,08										
15	0,13	0,13													
16	0,10	0,10													

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
depth h1	0,271	0,406	0,541	0,677	0,812	0,947	1,083	1,353	1,624	1,894	2,165	2,436	2,706
number of passes	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	0,108/-	0,162/-	0,182/-	0,196/-	0,235/-	0,212/-	0,243/-	0,243/-	0,263/-	0,277/-	0,261/-	0,269/-	0,277/-
2	0,067/0,039	0,102/0,058	0,120/0,069	0,137/0,079	0,165/0,095	0,166/0,096	0,190/0,110	0,213/0,123	0,243/0,140	0,272/0,157	0,288/0,166	0,313/0,180	0,336/0,194
3	0,052/0,030	0,077/0,045	0,092/0,053	0,105/0,061	0,126/0,073	0,128/0,074	0,146/0,084	0,163/0,094	0,187/0,108	0,209/0,120	0,221/0,127	0,240/0,138	0,258/0,149
4	0,044/0,025	0,065/0,038	0,078/0,045	0,089/0,051	0,107/0,062	0,108/0,062	0,123/0,071	0,138/0,079	0,157/0,091	0,176/0,102	0,186/0,107	0,202/0,117	0,218/0,126
5			0,069/0,040	0,078/0,045	0,94/0,054	0,095/0,055	0,108/0,063	0,121/0,070	0,139/0,080	0,155/0,089	0,164/0,095	0,178/0,103	0,192/0,111
6				0,072/0,041	0,085/0,049	0,086/0,050	0,098/0,057	0,110/0,063	0,125/0,072	0,140/0,081	0,148/0,086	0,161/0,093	0,173/0,100
7						0,079/0,046	0,090/0,052	0,101/0,058	0,115/0,067	0,129/0,074	0,136/0,079	0,148/0,086	0,159/0,092
8						0,073/0,042	0,084/0,048	0,094/0,054	0,107/0,062	0,120/0,069	0,127/0,073	0,138/0,080	0,148/0,086
9								0,088/0,051	0,101/0,058	0,113/0,065	0,119/0,069	0,129/0,075	0,139/0,080
10								0,082/0,048	0,095/0,055	0,106/0,061	0,113/0,065	0,122/0,071	0,132/0,076
11									0,092/0,052	0,101/0,058	0,107/0,062	0,116/0,067	0,125/0,072
12										0,097/0,056	0,102/0,059	0,111/0,064	0,120/0,069
13											0,098/0,057	0,107/0,062	0,115/0,066
14											0,095/0,055	0,103/0,059	0,111/0,064
15												0,099/0,057	0,107/0,062
16													0,103/0,060

UN Thread, External Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
depth	0,649	0,779	0,866	0,974	1,113	1,299	1,416	1,558	1,731	1,948	2,226	2,597	3,116
number of passes	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	0,206/-	0,210/-	0,233/-	0,226/-	0,196/-	0,229/-	0,220/-	0,214/-	0,210/-	0,211/-	0,213/-	0,218/-	0,229/-
2	0,148/0,086	0,163/0,094	0,181/0,104	0,188/0,109	0,189/0,110	0,222/0,128	0,228/0,132	0,240/0,139	0,256/0,148	0,276/0,160	0,304/0,176	0,343/0,198	0,399/0,230
3	0,114/0,066	0,125/0,072	0,139/0,080	0,145/0,083	0,146/0,084	0,170/0,098	0,176/0,102	0,184/0,106	0,196/0,113	0,212/0,122	0,234/0,135	0,263/0,152	0,306/0,177
4	0,096/0,055	0,105/0,061	0,117/0,068	0,122/0,070	0,123/0,071	0,143/0,083	0,148/0,086	0,155/0,090	0,165/0,095	0,179/0,103	0,197/0,114	0,222/0,128	0,258/0,149
5	0,085/0,049	0,093/0,054	0,103/0,059	0,107/0,062	0,108/0,062	0,126/0,073	0,131/0,075	0,137/0,079	0,146/0,084	0,158/0,091	0,173/0,100	0,195/0,113	0,227/0,131
6		0,084/0,048	0,093/0,054	0,097/0,056	0,098/0,056	0,114/0,066	0,118/0,068	0,124/0,072	0,132/0,076	0,142/0,082	0,157/0,091	0,177/0,102	0,205/0,119
7				0,089/0,052	0,090/0,052	0,105/0,061	0,109/0,063	0,114/0,066	0,121/0,070	0,131/0,076	0,144/0,083	0,163/0,094	0,189/0,109
8					0,084/0,048	0,098/0,056	0,101/0,058	0,106/0,061	0,113/0,065	0,122/0,070	0,134/0,078	0,151/0,087	0,176/0,101
9					0,079/0,045	0,092/0,053	0,095/0,055	0,100/0,057	0,106/0,061	0,114/0,066	0,126/0,073	0,142/0,082	0,165/0,095
10							0,090/0,052	0,094/0,054	0,100/0,058	0,108/0,063	0,119/0,069	0,134/0,078	0,156/0,090
11								0,090/0,052	0,095/0,055	0,103/0,059	0,113/0,065	0,128/0,074	0,149/0,086
12									0,091/0,053	0,098/0,057	0,108/0,063	0,122/0,071	0,142/0,082
13										0,094/0,054	0,104/0,060	0,117/0,068	0,136/0,079
14											0,100/0,058	0,113/0,065	0,131/0,076
15												0,109/0,063	0,126/0,073
16													0,122/0,071

UN Thread, Internal Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
depth	0,573	0,687	0,764	0,860	0,982	1,146	1,250	1,375	1,528	1,719	1,964	2,291	2,750
number of passes	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	0,193/-	0,200/-	0,222/-	0,219/-	0,220/-	0,228/-	0,250/-	0,247/-	0,246/-	0,252/-	0,262/-	0,278/-	0,302/-
2	0,127/0,073	0,239/0,081	0,155/0,089	0,161/0,093	0,173/0,100	0,190/0,110	0,207/0,120	0,216/0,125	0,229/0,132	0,247/0,142	0,271/0,156	0,304/0,176	0,353/0,204
3	0,098/0,056	0,107/0,062	0,119/0,069	0,124/0,072	0,132/0,076	0,146/0,084	0,159/0,092	0,166/0,096	0,176/0,101	0,189/0,109	0,208/0,120	0,234/0,135	0,271/0,156
4	0,082/0,048	0,090/0,052	0,100/0,058	0,104/0,060	0,112/0,064	0,123/0,071	0,134/0,077	0,140/0,081	0,148/0,086	0,160/0,092	0,175/0,101	0,197/0,114	0,228/0,132
5	0,073/0,042	0,072/0,041	0,088/0,051	0,092/0,053	0,098/0,057	0,108/0,062	0,118/0,068	0,123/0,071	0,130/0,075	0,141/0,081	0,154/0,089	0,173/0,100	0,201/0,116
6			0,080/0,046	0,083/0,048	0,089/0,051	0,098/0,056	0,107/0,062	0,111/0,064	0,118/0,068	0,127/0,073	0,140/0,081	0,157/0,091	0,182/0,105
7				0,077/0,044	0,082/0,047	0,090/0,052	0,098/0,057	0,102/0,059	0,108/0,063	0,117/0,067	0,128/0,074	0,144/0,083	0,167/0,097
8					0,076/0,044	0,084/0,048	0,091/0,053	0,095/0,055	0,101/0,058	0,109/0,063	0,119/0,069	0,134/0,078	0,156/0,090
9						0,079/0,045	0,086/0,050	0,090/0,052	0,095/0,055	0,102/0,059	0,112/0,065	0,126/0,073	0,146/0,084
10								0,085/0,049	0,090/0,052	0,097/0,056	0,106/0,061	0,119/0,069	0,138/0,080
11									0,085/0,049	0,092/0,053	0,101/0,058	0,113/0,065	0,131/0,076
12										0,088/0,051	0,096/0,056	0,108/0,063	0,126/0,073
13											0,092/0,053	0,104/0,060	0,121/0,070
14												0,100/0,058	0,116/0,067
15													0,112/0,065

NPT Thread, External, and Internal Machining

pitch, Gg/Z	27,0	18,0	14,0	11,5	8,0
depth	0,0750	1,129	1,451	1,767	2,540
number of passes	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	0,19/—	0,22/—	0,240/—	0,24/—	0,255/—
2	0,15/0,087	0,181/0,104	0,200/0,115	0,208/0,120	0,250/0,144
3	0,13/0,075	0,152/0,088	0,170/0,098	0,182/0,105	0,245/0,141
4	0,11/0,063	0,141/0,081	0,150/0,086	0,168/0,097	0,230/0,133
5	0,09/0,052	0,131/0,075	0,140/0,081	0,155/0,089	0,210/0,121
6	0,08/0,046	0,121/0,070	0,130/0,075	0,145/0,084	0,195/0,112
7		0,101/0,058	0,120/0,069	0,138/0,079	0,180/0,104
8		0,082/0,047	0,110/0,063	0,124/0,072	,175/0,101
9			0,100/0,058	0,117/0,067	0,170/0,098
10			0.091/0,052	0,105/0,060	0,155/0,089
11				0,095/0,055	0,140/0,080
12				0,090/0,052	0,125/0,072
13					0,110/0,063
14					0,100/0,058

BSPT Thread, External, and Internal Machining

pitch, Gg/Z	28	19	14	11
depth	0,581	0,856	1,162	BSPT thread
number of passes	5	6	8	10
	values for flank infeed (X/Z)			
order of passes	X/Z	X/Z	X/Z	X/Z
1	0,179/—	0,223/—	0,222/—	0,214/—
2	0,134/0,070	0,181/0,094	0,213/0,111	0,242/0/0,126
3	0,103/0,054	0,139/0,072	0,163/0,085	0,186/0,097
4	0,087/0,045	0,1171/0,061	0,138/0,072	0,157/0,082
5	0,078/0,040	0,103/0,054	0,121/0,063	0,138/0,072
6		0,093/0,049	0,110/0,057	0,125/0,065
7			0,101/0,052	0,115/0,060
8			0,094/0,049	0,107/0,056
9				0,100/0,052
10				0,095/0,049

Trapezoid Thread to DIN 103, External, and Internal Machining

pitch	27,0	18,0	14,0	11,5	8,0
depth	0,0750	1,129	1,451	1,767	2,540
number of passes	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	0,240/—	0,250/—	0,260/—	0,265/—	0,285/—
2	0,190/0,051	0,230/0,062	,245/0,066	0,270/0,072	0,295/0,079
3	0,137/0,037	0,175/0,047	0,220/0,059	0,250/0,067	0,275/0,074
4	0,124/0,033	0,149/0,040	0,200/0,054	0,230/0,062	0,255/0,068
5	0,110/0,029	0,126/0,034	0,175/0,047	0,210/0,056	0,235/0,063
6	0,099/0,027	0,114/0,031	0,160/0,043	0,190/0,051	0,215/0,058
7		0,106/0,028	0,145/0,039	0,175/0,047	0,200/0,054
8		0,100/0,028	0,103/0,035	0,160/0,043	0,185/0,050
9			0,115/0,031	0,145/0,039	0,170/0,046
10			0,100/0,027	0,130/0,035	0,155/0,042
11				0,120/0,032	0,140/0,038
12				0,105/0,028	0,125/0,033
13					0,115/0,031
14					0,100/0,027

Round Thread to DIN 405, External, and Internal Machining

pitch, Gg/Z	10	8	6
depth	1,31	1,63	2,17
number of passes	8	10	12
	values for flank infeed (X/Z)		
order of passes	X/Z	X/Z	X/Z
1	0,210/—	0,220/—	0,206/—
2	0,205/0,055	0,210/0,058	0,250/0,067
3	0,195/0,052	0,200/0,055	0,024/0,064
4	0,180/0,048	0,190/0,051	0,230/0,062
5	0,160/0,042	0,175/0,047	0,215/0,059
6	0,140/0m037	0,160/0,043	0,195/0,54
7	0,115/0,031	0,145/0,039	0,180/0,048
8	0,090/0,024	0,1360/0,035	0,160/0,043
9		0,110/0,029	0,140/0,038
10		0,140/0,038	0,120/0,032
11			0,100/0,027
12			0,080/0,024

Whitworth, External, and Internal Thread Cutting

pitch, TPI	28	20	19	16	14	12	11	10	9	8	7	6	5
depth	0,581	0,813	0,813	0,856	1,017	1,355	1,479	1,626	1,807	2,033	2,324	2,711	3,251
number of passes	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	0,179/—	0,211/—	0,223/—	0,196/—	0,223/—	0,226/—	0,246/—	0,236/—	0,230/—	0,255/—	0,195/—	0,197/—	0,204/—
2	0,134/0,070	0,172/0,089	0,181/0,0,094	0,186/0,097	0,213/0,111	0,234/0,122	0,255/0133	0,266/0,139	0,282/0,147	0,304/0,158	0,322/0,167	0,361/0,189	0,421/0,219
3	0,104/0,054	0,132/0,069	0,139/0,072	0,142/0,074	0,163/0,085	0,180/0,093	0,197/0,102	0,206/0,106	0,216/0,113	0,233/0,121	0,247/0,128	0,278/0,145	0,323/0,168
4	0,087/0,045	0,111/0,058	0,117/0,061	0,120/0,063	0,138/0,072	0,15/0,079	0,165/0,086	0,172/0,090	0,182/0,095	0,197/0,102	0,208/0,108	0,234/0,122	0,272/0,0,142
5	0,077/0,040	0,098/0,051	0,103/0,054	0,160/0,055	0,121/0,063	0,133/0,069	0,1450,076	0,152/0,079	0,161/0,084	0,173/0,090	0,183/0,095	0,207/0,108	0,240/0,125
6		0,098/0,051	0,093/0,049	0,096/0,050	0,110/0,057	0,121/0,063	0,131/0,068	0,137/0,071	0,145/0,076	0,157/0,082	0,166/0,086	0,187/0,097	0,217/0,113
7				0,088/0,046	0,101/0,052	0,111/0,058	0,121/0,063	0,126/0,066	0,134/0,070	0,144/0,075	0,152/0,079	0,172/0,089	0,200/0,104
8				0,082/0,043	0,093/0,049	0,103/0,054	0,113/0,059	0,117/0,061	0,124/0,0065	0,134/0,070	0,142/0,074	0,160/0,083	0,186/0,097
9						0,97/0,050	0,106/0,055	0,110/0,057	0,117/0,061	0,126/0,066	0,133/0,069	,150/0,078	0,174/0,091
10								0,104/0,054	0,111/0,058	0,119/0,062	0,126/0,066	0,135/0,074	0,165/0,086
11									0,105/0,055	0,113/0,059	0,120/0,062	,135/0,070	0,157/0,082
12										0,108/0,056	0,114/0,060	0,129/0,067	0,150/0,078
13											0,110/0,057	,124/0,064	0,144/0,075
14											0,106/0,055	0,119/0,062	0,138/0,072
15												0,115/0,060	0,133/0,069
16													0,129/0,067

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	11,684	11,684	1,778	0,939	0,939	12,446	12,446	18,796	15,748	17,526	17,526	2,540
pass 1,0mm	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	16,25	2,00
NTC-8R/L8IM	8	8 UN	1,19	15,36	1,88
NTC-8R/L10EM	8	10 UN	0,92	1,27	1,60
NTC-8R/L10IM	8	10 UN	0,90	12,06	1,52
NTC-8R/L12EM	8	12 UN	0,76	10,41	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	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

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 1,0mm and less can be cut with an NT-2 insert provided the core thread diameter is 25,0mm or larger (11,0mm or larger with NT-1).

internal threading limitations
NT-3 and NT-4 60° V-threading inserts

TP	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 35,0mm 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	
		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 36,5 mm 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

feed direction

NTC crest turning insert
for (P ≤ 2,0mm) and finer.

feed direction

NTC crest turning insert
for (P ≥ 3,0mm) and coarser.

NOTE: NTC inserts automatically control root to crest dimensions. Therefore, in setting up threading operations with NTC inserts, check the OD or ID at the thread crest for correct dimensions.

60° V-Thread Crest Turning Application Data

insert catalogue number	nose radius on insert (inch)	thread radius per MIL-S-8879A (inch)
NJ-3014R/L12 NJK-3008R/L20	.0125/.0135 .0075/.0085	.0125/.0150 .0075/.0090

"J" thread note for catalog

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	1,91	1,12	—	24–12	—	1,00–2,00
	NT-2	2,87	1,91	36–8	20–7	0,70–3,00	1,25–3,50
	NT-2-K	2,87	1,91	36–8	20–7	0,70–3,00	1,25–3,50
	NTF-2	1,57	1,02	44–14	24–12	0,60–1,75	1,00–2,00
	NTK-2	1,57	1,02	44–14	24–12	0,60–1,75	1,00–2,00
	NTP-2	2,87	1,91	36–8	20–7	0,70–3,00	1,25–3,50
	NT-3	3,76	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-K	3,76	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-C	3,76	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
	NT-3-CK	3,76	2,46	11–6	6 (only)	2,50–4,00	4,00 (only)
	NTF-3	2,11	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTK-3	2,11	1,37	44–10	24–9	0,60–2,50	1,00–2,50
	NTP-3	3,76	2,46	20–6	12–5	1,25–4,00	2,00–5,00
	NT-4	4,98	3,23	20–4	12–4	1,25–6,25	2,00–6,25
	NT-4-K	4,98	3,23	20–4	12–4	1,25–6,25	2,00–6,25
	NTP-4	4,98	3,23	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)

thread form	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	.0286	.0375	.0476	.0572	.0714

NOTE: Special Buttress forms are available upon request.

American Buttress Application Guidelines for the TopThread System

American Buttress (45° Clearance Flank Leading): NTB-B Inserts • PULL-type

Internal Buttress
45° clearance flank leading

External Buttress
45° clearance flank leading

45° clearance flank leading

Reference Dimensions

Infeed Angle vs. Chip Load: 45° Clearance Flank Leading

NTB-B insert

insert	D (inch)	"A" ref. (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.

WIN WITH WIDIA™

TopThread™ System

A superior choice for heavy-duty applications like machining Acme, Buttress, and API threads. The WIDIA™ TopThread system is the best solution for coarse pitch and multi-tooth threading applications. With unmatched tooling technology, you can trust WIDIA TopThread tools for all of your threading and grooving needs.

- Largest selection of insert geometries and grades in the industry.
- Rigid insert clamping design ensures the best tool life, surface finish, and workpiece quality.
- Minimises built-up edges, reduces cutting forces, and precisely cuts most common materials.
- Ensures accurate, high-quality threads. Excellent for internal threading operations.

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

WIDIA™
Win with WIDIA™

Required Information

From Part Drawing:

material: 316SS, 200 HB
thread form: ISO R262 1,00mm pitch
operation: external threading
pitch diameter: 50,0mm x 25,0mm deep

From Machine Set-Up Data:

tooling: 20,0mm x 20,0mm
spindle rotation: counterclockwise
feed: toward chuck

Steps for a Successful Threading Operation

Step 1 • Determine Threading Method

Need to Know:

- Operation (external).
- Spindle rotation (CCW).
  Counterclockwise 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 1,00mm 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
	KC6025
	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
ALA203R	3	SM-YE3

First choice: LSASR2020K16 holder

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (1,00mm pitch).
- Pitch diameter (50,0mm).
- Helix method (standard).
  See LT shim selection chart.

Select SM-YE3

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 2,50mm pitch
operation: internal threading
pitch diameter: 40,0mm x 35,0mm deep

From Machine Set-Up Data:

tooling: 20,0mm 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	
	general purpose	style
internal	TN6025	ISO Metric
	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 (40,0mm).
- Type of tooling — toolholder, boring bar (boring bar).
- Hand of tool (left hand).
- Insert size (16).

Options:

catalogue number	insert size	minimum bore diameter	shim
A2020LSEL16	3	24	SM-YI3

First choice: S1212-LSEL3 bar

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (2,50mm pitch).
- Pitch diameter (40,0mm).
- Helix method (reverse).
  See LT shim selection chart.

Select SM-YI3

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YI3.

Laydown Threading Shim Selection Guidelines

The following questions must be answered before a successful threading operation can begin:

A — Select your method of thread cutting:
- machining toward the chuck (standard helix)
- machining away from the chuck (reverse helix)

B — Select lead angle and choose shim.

C — Select insert and toolholder size.

D — Select insert grade.

E — Select speed.

F — Select number of thread passes.

G — Select infeed method.

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

NOTE: Arctan equals Tan⁻¹ (See chart below for approximate lead angles.)

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 (from equasion at left).

Cutting edge height is constant at every shim and insert combination. All toolholders are supplied with 1-1/2° lead angle.

Laydown Selection Chart

pitch (mm)

pitch (mm)

*denotes shim size: 3 = insert size 16 (3/8" D)
4 = insert size 22 (1/2" D)

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.

Laydown Threading Shim Selection Table • Metric

	toolholder									
insert size	**external**	**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 TP 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.

WIN WITH WIDIA™

WIDIA™

Laydown Threading System

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.

- Extensive selection of metric (ISO) and common European thread forms.
- Low-profile design enables unrestricted chip flow.
- Precision-ground thread forms for precise cuts.
- Ideal choice for fine-pitch threads, high-helix/multi-start threads, and single-point threading in small diameter bores.

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WIDIA VALUE

WIDIA™ Value

Chipbreaker Geometry • Negative F2–F3

Chipbreaker Geometry • Positive F3

Grades and Grade Descriptions F4

Speed and Feed Chart F6–F7

Catalogue Numbering System F8–F9

Carbide Inserts F10–F21

Double-Sided, Negative Inserts

22

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

FL

Double-sided insert with adjusted inclination angle for good chip control at low depths of cut.

FM

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.

FR

Double-sided insert with medium positive geometry. Adjusted inclination angle reduces cutting forces, provides good chip control over wide range of feed rates.

49

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.

5

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

..MA

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

..MG

For light machining to light roughing.

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

Single-Sided, Negative Inserts

8

Stable cutting edge for heaviest chip sections and highest metal removal rates. For interrupted cut and applications involving high cutting edge loading. Depths of cut up to 16,0mm and feeds up to 1,6mm.

Single-Sided, Positive Inserts

MU

Medium universal turning includes rough machining with medium chip loads and finish machining with low chip loads.

..MT

Stabilised cutting edge for medium chip sections. Effective in operations that make high demands on toughness or involve interrupted cuts.

Round, Positive Inserts

RCMT/RCMX

For straight turning, facing, and profile turning. Used at small depths of cut and high feeds up to 0,1 x D.

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

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

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

Grade

Coating		Grade Description	05	10	15	20	25	30	35	40	45
TN1000	HC-P10	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated hard metal grade with cobalt-enriched substrate has high deformation resistance. CVD coating consists of thick MTCVD – TiCN for wear resistance and thermally stable Al_2O_3 for crater resistance. TN1000 is a highly wear-resistant carbide grade, recommended for finishing and medium machining of steels and cast iron.	P, K	P, K	P, K	P, K					
TN2000	HC-P20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated cobalt-enriched substrate has required bulk toughness added with multi-layer MTCVD coating that provides the wear resistance and crater resistance required in steel machining. TN2000 is an optimum grade and the first choice in medium machining of steel. TN2000 provides required chip impact resistance to give longer tool life.	P		P	P	P	P			
TN4000	HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated hard metal substrate with higher cobalt content imparting good toughness required for roughing applications. Substrate has cobalt-enriched top layer to give the cutting edge the extra strength required in roughing applications. TN4000 is the first choice for roughing applications and can take heavy depths of cut and interrupted cuts.	P, M	M	M		P	P	P	P	
HK1500	HC-K15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated wear-resistant carbide substrate with thick TiCN and alpha alumina coating that provides the wear resistance required for machining materials that form discontinous chips, such as cast iron. TN1500 is suitable for machining cast iron. Finds applications in light and medium machining of cast irons.	K	K	K	K	K				
TTS	HW-P25	Universal uncoated grade for steel machining. Recommended for rough and finish turning of long chipping materials with large chip cross selection at medium cutting speeds. Also useful for grooving and threading.	P				P	P	P		
TTR-X	HW-P25	Very tough, uncoated grade. Suitable for rough machining of steel and stainless steel. Also for difficult-to-machine conditions with low cutting speeds.	P, M					M	M	M	
THM-X	HW-K15	Uncoated grade with good edge stability. Ideal grade for medium machining of cast irons and non-ferrous materials.	K, N		K, N	K, N	K, N				
THMF-X	HW-K10	Micro, fine-grain with good compressive strength. Used for light- to medium-duty machining of hard iron materials and alloy grey cast iron. Also suitable for non-ferrous metals and hard plastics. Ideal for finish machining of cast iron.	K, N	K, N	K, N						

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Whether your operation is turning, milling, or holemaking, WIDIA brands are the high-performance tooling you need.
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DIN ISO 513	VDI 3323	A • Finishing (ap x f = 1 x 0,1)			B • Medium (ap x f = 2 x 0,2)						C • Roughing (ap x f = 4 x 0,25)					
Material Group		Cutting Speed • vc m/min														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [mm]	- / -FL / -FR			-22 / -49 / - / -FR / -FM / -5						-49 / - / -5 / -8					
	f [mm]	0,3–2,0			0,3–2,5						0,3–2,5					
		0,05–0,35			0,10–0,40						0,10–0,40					
		TN1000			TN1000			TN2000			TN2000			TN4000		
	1	340	**490**	590	280	**400**	480	250	**360**	430	200	**290**	350	180	**260**	310
	2	340	**480**	580	260	**370**	440	240	**340**	410	190	**270**	320	130	**190**	230
	3	290	**420**	500	180	**260**	310	170	**240**	290	160	**230**	280	130	**180**	220
	4	260	**370**	440	190	**270**	320	180	**250**	300	130	**190**	230	110	**150**	180
	5	200	**280**	340	140	**200**	240	130	**190**	230	90	**130**	160	75	**110**	130
	6	270	**390**	470	200	**290**	350	190	**270**	320	140	**200**	240	110	**160**	190
	7	260	**370**	440	190	**270**	320	180	**250**	300	130	**190**	230	110	**150**	180
	8	220	**320**	380	160	**230**	280	150	**210**	250	110	**150**	180	85	**120**	140
	9	200	**280**	340	140	**200**	240	130	**190**	230	90	**130**	160	75	**110**	130
	10	270	**390**	470	200	**290**	350	190	**270**	320	140	**200**	240	110	**160**	190
	11	200	**280**	340	130	**190**	230	120	**170**	200	90	**130**	160	75	**110**	130
	12	150	**220**	260	140	**200**	240	130	**180**	220	120	**170**	200	110	**160**	190
	13.1	130	**190**	230	120	**170**	200	110	**150**	180	100	**140**	170	90	**130**	160
	13.2	65	**95**	115	60	**85**	100	55	**75**	90	50	**70**	85	45	**65**	80
K	ap [mm]	- / -5														
	f [mm]	0,2–2														
		0,05–0,2														
		HK1500														
	15	180	**260**	310												
	16	140	**200**	240												
	17	180	**250**	300												
	18	150	**210**	250												
	19	240	**340**	410												
	20	180	**260**	310												
N	ap [mm]	1,00 – 4,00			1,00 – 4,00						1,00 – 4,00					
	f [mm]	0,10 – 0,40			0,10 – 0,40						0,10 – 0,40					
		THM-X			THM-X						THM-X					
	21	800	**1000**	3000	800	**1000**	3000				300	**1000**	2000			
	22	400	**1000**	2000	400	**1000**	2000				300	**1000**	1500			
	23	600	**1000**	1500	600	**1000**	1500				200	**700**	1200			
	24	600	**1000**	1500	600	**1000**	1500				200	**700**	1200			
	25	400	**700**	1000	400	**700**	1000				200	**500**	700			
	26	400	**500**	600	400	**500**	600				250	**350**	400			
	27	400	**500**	600	400	**500**	600				200	**300**	400			
	28	200	**300**	400	200	**300**	400				100	**200**	300			
	29	100	**150**	200	100	**150**	200				80	**120**	150			
	30	150	**200**	250	150	**200**	250				100	**150**	200			

DIN ISO 513	VDI 3323	A • Finishing (ap x f = 1 x 0,1)			B • Medium (ap x f = 2 x 0,2)						C • Roughing (ap x f = 4 x 0,25)					
Material Group		Cutting Speed • vc m/min														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
		– / –R / –MU			– / – 2 / –MU						– / –MU					
	ap [mm]	0,3–2			0,3–2,5						0,7–5					
	f [mm]	0,05–0,35			0,10–0,40						0,12–0,4					
		TN1000			TN1000			TN2000			TN2000			TN4000		
P	1	340	**490**	590	280	**400**	480	250	**360**	430	200	**290**	350	180	**260**	310
	2	340	**480**	580	260	**370**	440	240	**340**	410	190	**270**	320	130	**190**	230
	3	290	**420**	500	180	**260**	310	170	**240**	290	160	**230**	280	130	**180**	220
	4	260	**370**	440	190	**270**	320	180	**250**	300	130	**190**	230	110	**150**	180
	5	200	**280**	340	140	**200**	240	130	**190**	230	90	**130**	160	75	**110**	130
	6	270	**390**	470	200	**290**	350	190	**270**	320	140	**200**	240	110	**160**	190
	7	260	**370**	440	190	**270**	320	180	**250**	300	130	**190**	230	110	**150**	180
	8	220	**320**	380	160	**230**	280	150	**210**	250	110	**150**	180	85	**120**	140
	9	200	**280**	340	140	**200**	240	130	**190**	230	90	**130**	160	75	**110**	130
	10	270	**390**	470	200	**290**	350	190	**270**	320	140	**200**	240	110	**160**	190
	11	200	**280**	340	130	**190**	230	120	**170**	200	90	**130**	160	75	**110**	130
	12	150	**220**	260	140	**200**	240	130	**180**	220	120	**170**	200	110	**160**	190
	13.1	130	**190**	230	120	**170**	200	110	**150**	180	100	**140**	170	90	**130**	160
	13.2	65	**95**	115	60	**85**	100	55	**75**	90	50	**70**	85	45	**65**	80
		– / –MU			– / –MU											
	ap [mm]	0,2–2			0,3–4,5											
	f [mm]	0,05–0,2			0,08–0,35											
		HK1500			HK1500											
K	15	290	**410**	490	230	**330**	400									
	16	230	**330**	400	180	**250**	300									
	17	250	**360**	430	210	**300**	360									
	18	240	**340**	410	190	**270**	320									
	19	340	**490**	590	290	**410**	490									
	20	290	**410**	490	230	**330**	400									
	ap [mm]	1,00 – 4,00			1,00 – 4,00						1,00 – 4,00					
	f [mm]	0,10 – 0,20			0,10 – 0,20						0,10 – 0,40					
		THM-X			THM-X						THM-X					
N	21	800	**1000**	3000	500	**1000**	2500				300	**1000**	2000			
	22	400	**1000**	2000	300	**1000**	1800				300	**1000**	1500			
	23	600	**1000**	1500	500	**800**	1300				200	**700**	1200			
	24	600	**1000**	1500	500	**800**	1300				200	**700**	1200			
	25	400	**700**	1000	300	**600**	800				200	**500**	700			
	26	400	**500**	600	300	**400**	500				250	**350**	400			
	27	400	**500**	600	300	**400**	500				200	**300**	400			
	28	200	**300**	400	150	**250**	350				100	**200**	300			
	29	100	**150**	200	100	**140**	180				80	**120**	150			
	30	150	**200**	250	120	**180**	220				100	**150**	200			

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	Special Design

12 — Size

Code for metric cutting edge length "L10"

"D" mm	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 in size column ±0,013		
U	See tables in size column ±0,013		

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

04

Thickness
shown as "S"

symbol mm	thickness 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

08

Corner Radius
shown as "Rε"

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	

Hand of Insert
(optional)

R = Right hand

L = Left hand

N = Neutral

Cutting Edge
(optional)

F

Sharp

E

Rounded

T

Chamfered

S

Chamfered and Rounded

K

Double-Chamfered

P

Double-Chamfered and Rounded

FM

Chipbreaker
(optional)

5
Medium Roughing

8
Heavy Roughing

22
Finishing

49
Medium Stainless

FL
Finish Light

FM
Finish Medium

FR
Finish Rough

MU
Medium Universal

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

CCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CCMT060204	6,35	6,45	2,38	0,4	2,80	●	●	●	●	●			●	
CCMT090304	9,53	9,67	3,18	0,4	4,40		●	●	●	●			●	
CCMT090308	9,53	9,67	3,18	0,8	4,40		●	●	●				●	
CCMT09T304	9,53	9,67	3,97	0,4	4,40		●	●	●	●			●	
CCMT09T308	9,53	9,67	3,97	0,8	4,40		●	●	●	●			●	
CCMT120408	12,70	12,90	4,76	0,8	5,50		●						●	

CCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CCMT09T304MU	9,53	9,67	3,97	0,4	4,40		●						●	
CCMT09T308MU	9,53	9,67	3,97	0,8	4,40		●						●	
CCMT090304MU	9,53	9,67	3,18	0,4	4,40		●							

CCMT-R

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CCMT060208R	6,35	6,45	2,38	0,8	2,80		●							

CCMW

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CCMW060204	6,35	6,45	2,38	0,4	2,80								●	
CCMW090304	9,53	9,67	3,18	0,4	4,40								●	
CCMW090308	9,53	9,67	3,18	0,8	4,40								●	
CCMW120408	12,70	12,90	4,76	0,8	5,50								●	

CGGN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CGGN120304	12,70	12,90	3,18	0,4	–								●	

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

CNMA

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMA120404	12,70	12,90	4,76	0,4	5,16				●				●	
CNMA120408	12,70	12,90	4,76	0,8	5,16				●				●	●
CNMA120412	12,70	12,90	4,76	1,2	5,16				●					●

CNMG

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG120404	12,70	12,90	4,76	0,4	5,16		●	●	●	●			●	
CNMG120408	12,70	12,90	4,76	0,8	5,16		●	●	●	●		●	●	
CNMG120412	12,70	12,90	4,76	1,2	5,16		●							●
CNMG190612	19,05	19,34	6,35	1,2	7,93		●	●	●	●			●	
CNMG190616	19,05	19,34	6,35	1,6	7,93		●	●	●	●			●	

CNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG12040422	12,70	12,90	4,76	0,4	5,16		●							
CNMG12040822	12,70	12,90	4,76	0,8	5,16		●							

CNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG12040849	12,70	12,90	4,76	0,8	5,16		●	●						

CNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG1204085	12,70	12,90	4,76	0,8	5,16		●	●	●					
CNMG1204125	12,70	12,90	4,76	1,2	5,16		●	●	●					
CNMG1906125	19,05	19,34	6,35	1,2	7,93		●	●						
CNMG1906165	19,05	19,34	6,35	1,6	7,93		●	●						

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

CNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG120408FM	12,70	12,90	4,76	0,8	5,16		●							

CNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMG120408FR	12,70	12,90	4,76	0,8	5,16	●	●							
CNMG120412FR	12,70	12,90	4,76	1,2	5,16	●								

CNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
CNMM1906168	19,05	19,34	6,35	1,6	7,93			●						

DCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DCMT11T304	9,53	11,63	3,97	0,4	4,40		●		●				●	
DCMT11T308	9,53	11,63	3,97	0,8	4,40		●		●				●	

DCMT-MU

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DCMT11T308MU	9,53	11,63	3,97	0,8	4,40		●							

DCMW

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DCMW11T304	9,53	11,63	3,97	0,4	4,40								●	

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

■ DNMG

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DNMG150604	12,70	15,50	6,35	0,4	5,16		●	●		●				
DNMG150608	12,70	15,50	6,35	0,8	5,16		●	●	●				●	
DNMG150612	12,70	15,50	6,35	1,2	5,16			●						

■ DNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DNMG15060422	12,70	15,50	6,35	0,4	5,16		●							

■ DNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DNMG15060849	12,70	15,50	6,35	0,8	5,16		●							

■ DNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DNMG1104085	9,53	11,63	4,76	0,8	3,81		●	●						
DNMG11T3085	9,53	11,63	3,97	0,8	4,05		●							
DNMG1506085	12,70	15,50	6,35	0,8	5,16		●	●						
DNMG1506125	12,70	15,50	6,35	1,2	5,16	●	●							
DNMG1506165	12,70	15,50	6,35	1,6	5,16			●						

■ DNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
DNMG110408FM	9,53	11,63	4,76	0,8	3,81		●							

■ KNUX

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
KNUX160405L11	9,52	19,72	16,15	4,76	0,5		●	●		●				
KNUX160405R11	9,52	19,72	16,15	4,76	0,5		●	●		●				
KNUX160410L11	9,52	19,72	16,15	4,76	1,0		●							
KNUX160410L12	9,52	19,72	16,15	4,76	1,0			●						
KNUX160410R11	9,52	19,72	16,15	4,76	1,0		●							
KNUX160410R12	9,52	19,72	16,15	4,76	1,0			●						
KNUX160415R12	9,52	19,72	16,15	4,72	1,5			●						

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

RCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
RCMT0602M0	6,00	–	2,38	–	2,80		●						●	

RCMX

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
RCMX1003M0	10,00	–	3,18	–	3,70			●						
RCMX1204M0	12,00	–	4,76	–	5,50		●	●						●
RCMX2006M0	20,00	–	6,35	–	6,65		●					●	●	
RCMX2507M0	25,00	–	7,94	–	7,40							●		
RCMX3209M0	32,00	–	9,53	–	10,35							●		

SCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SCMT120408	12,70	12,70	4,76	0,8	5,50			●						

SCMX

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SCMX190412	19,05	19,05	4,76	1,2	5,80							●		

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

SNMA

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNMA120404	12,70	12,70	4,76	0,4	5,13				●					
SNMA120408	12,70	12,70	4,76	0,8	5,16				●				●	●
SNMA120412	12,70	12,70	4,76	1,2	5,16				●					●
SNMA250724	25,40	25,40	7,94	2,4	9,12							●	●	

SNMG

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNMG120404	12,70	12,70	4,76	0,4	5,16		●							
SNMG120408	12,70	12,70	4,76	0,8	5,16		●	●	●	●			●	
SNMG120412	12,70	12,70	4,76	1,2	5,16				●					
SNMG190612	19,05	19,05	6,35	1,2	7,93		●	●		●		●	●	
SNMG190616	19,05	19,05	6,35	1,6	7,93			●						
SNMG250716	25,40	25,40	7,94	1,6	9,12		●	●						
SNMG250724	25,40	25,40	7,94	2,4	9,12			●				●		

SNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNMG1204085	12,70	12,70	4,76	0,8	5,16		●	●						
SNMG1204125	12,70	12,70	4,76	1,2	5,16		●	●						
SNMG1906125	19,05	19,05	6,35	1,2	7,93		●	●						

SNMM

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNMM190616	19,05	19,05	6,35	1,6	7,93			●						
SNMM250724	25,40	25,40	7,94	2,4	9,12			●				●		

SNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNMM1204088	12,70	12,70	4,76	0,8	5,16			●						
SNMM1906168	19,05	19,05	6,35	1,6	7,93			●						
SNMM2507248	25,40	25,40	7,94	2,4	9,12			●						

● first choice
○ alternate choice

		TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P		●	●	●		●	●	●		
M								●		
K		○	○	○	●				●	●
N										
S										
H										

SNUN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SNUN120408	12,70	12,70	4,76	0,8	—					●			●	
SNUN190416	19,05	19,05	4,76	1,6	—					●				

SPUN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
SPUN090308	9,53	9,53	3,18	0,8	—					●				
SPUN120308	12,70	12,70	3,18	0,8	—		●		●	●			●	●
SPUN120312	12,70	12,70	3,18	1,2	—					●			●	
SPUN190416	19,05	19,05	4,76	1,6	—					●			●	

TCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TCMT110204	6,35	11,00	2,38	0,4	2,80		●		●	●			●	
TCMT16T304	9,53	16,50	3,97	0,4	4,40		●							
TCMT16T308	9,53	16,50	3,97	0,8	4,40		●	●					●	

TCMT-R

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TCMT110208R	6,35	11,00	2,38	0,8	2,80		●		●					

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

TEGN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TEGN110304	6,35	11,00	3,18	0,4	–								●	
TEGN160304	9,53	16,50	3,18	0,1	–								●	
TEGN160308	9,53	16,50	3,18	0,8	–								●	

TNMA

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMA160408	9,53	16,50	4,76	0,8	3,81				●				●	●

TNMG

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG160404	9,53	16,50	4,76	0,4	3,81		●		●				●	
TNMG160408	9,53	16,50	4,76	0,8	3,81		●	●	●	●			●	●
TNMG160412	9,53	16,50	4,76	1,2	3,81		●		●					
TNMG220408	12,70	22,00	4,76	0,8	5,16		●	●						
TNMG220412	12,70	22,00	4,76	1,2	5,16		●	●	●				●	
TNMG220416	12,70	22,00	4,76	1,6	5,16			●						

TNMG-22

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG16040422	9,53	16,50	4,76	0,4	3,81		●	●						
TNMG16040822	9,53	16,50	4,76	0,8	3,81		●							

TNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG16040849	9,53	16,50	4,76	0,8	3,81		●	●						

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

TNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG1604085	9,53	16,50	4,76	0,8	3,81		●	●	●				●	
TNMG1604125	9,53	16,50	4,76	1,2	3,81		●	●						
TNMG2204085	12,70	22,00	4,76	0,8	5,16		●	●						
TNMG2204125	12,70	22,00	4,76	1,2	5,16		●	●	●					
TNMG2204165	12,70	22,00	4,76	1,6	5,16			●						

TNMG-FL

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG160404FL	9,53	16,50	4,76	0,4	3,81	●								
TNMG160408FL	9,53	16,50	4,76	0,8	3,81	●								

TNMG-FM

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG160404FM	9,53	16,50	4,76	0,4	3,81	●	●							
TNMG160408FM	9,53	16,50	4,76	0,8	3,81		●							

TNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMG160408FR	9,53	16,50	4,76	0,8	3,81	●								
TNMG160412FR	9,53	16,50	4,76	1,2	3,81	●								

TNMM-8

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNMM2204168	12,70	22,00	4,76	1,6	5,16			●						

TNUN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TNUN160308	9,53	16,50	3,18	0,8	–					●				
TNUN160408	9,53	16,50	4,76	0,8	–					●				
TNUN220412	12,70	22,00	4,76	1,2	–					●				

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

■ TPGN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TPGN110304	6,35	11,00	3,18	0,4	–								●	

■ TPMR

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TPMR110304	6,35	11,00	3,18	0,4	–		●			●			●	
TPMR110308	6,35	11,00	3,18	0,8	–		●	●						
TPMR160304	9,53	16,50	3,18	0,4	–		●			●				
TPMR160308	9,53	16,50	3,18	0,8	–		●							

■ TPUN

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
TPUN110304	6,35	11,00	3,18	0,4	–					●			●	
TPUN110308	6,35	11,00	3,18	0,8	–					●			●	●
TPUN160304	9,53	16,50	3,18	0,4	–		●	●		●		●	●	●
TPUN160308	9,53	16,50	3,18	0,8	–		●	●	●	●		●	●	●
TPUN160312	9,53	16,50	3,18	1,2	–					●			●	●
TPUN220412	12,70	22,00	4,76	1,2	–					●		●	●	

■ VBMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
VBMT160404	9,53	16,61	4,76	0,4	4,40		●	●						
VBMT160408	9,53	16,61	4,76	0,8	4,40		●	●	●				●	

■ VBMT-T

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
VBMT160412T	9,53	16,60	4,76	1,2	4,40		●							

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

VCMT

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
VCMT16T304	9,53	16,61	3,97	0,4	4,40		●						●	
VCMT16T308	9,53	16,61	3,97	0,8	4,40		●	●	●					

VNMG

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
VNMG12T304	7,14	12,45	3,97	0,4	3,60	●	●	●						
VNMG12T308	7,14	12,45	3,97	0,8	3,65		●		●					

● first choice
○ alternate choice

	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
P	●	●	●		●	●	●		
M							●		
K	○	○	○	●				●	●
N									
S									
H									

■ WNMG-49

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
WNMG08040849	12,70	8,69	4,76	0,8	5,16		●							

■ WNMG-5

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
WNMG0604085	9,53	6,52	4,76	0,8	3,81		●	●	●					
WNMG0804085	12,70	8,69	4,76	0,8	5,16		●	●	●					
WNMG0804125	12,70	8,69	4,76	1,2	5,16		●		●					

■ WNMG-FL

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
WNMG060404FL	9,53	6,52	4,76	0,4	3,81	●								

■ WNMG-FR

ISO catalogue number	D	L10	S	Rε	D1	TN1000	TN2000	TN4000	HK1500	TTS	TTMS	TTR-X	THM-X	THMF-X
WNMG060408FR	9,53	6,52	4,76	0,8	3,81	●								
WNMG060412FR	9,53	6,52	4,76	1,2	3,81	●								

WIDIA

WIDIA™ Specialty Toolholders

Meaning of Bar Peeling in Bar Manufacturing **G4**

Application Range of WIDIA Bar Peeling Tools **G5**

Application Hints for WIDIA Bar Peeling Tools **G5–G6**

Uncoated and Coated WIDIA Carbide Grades **G7**

Catalogue Numbering System **G8**

Grades and Grade Descriptions **G9**

WIDIA Indexable Inserts for Bar Peeling **G10–G14**

WIDIA Bar Peeling Toolholders **G15–G23**
- WDHF 20, WDH 20, WDH 50 T, and WDH 50 Adjustable G15
- WDH 50, WDH 50 K, and WDH 75 T G16–G17
- WDHE 80, WDH 100, WDH 360, and S 80 . . . . . G18–G19

WIDIA Basic Holders for Cassettes WDH 75 T and WDHE 80 . . . . . **G20**

WIDIA Cassettes WDH 75 . . . . . **G21**

WIDIA Bar Peeling Heads WDH 75 T and WDHE 80 . . . . . **G22–G23**

WIDIA Tools for Railways • Wheel Machining **G24–G50**
- Toolholders G28–G37
- Cassettes for Toolholders G38–G39
- Tooling Recommendations G40–G48
- Indexable Inserts G49
- Grades and Grade Descriptions G50

WIDIA Tools for Heavy-Duty Machining **G52–G60**
- Indexable Inserts G54–G59
- Grades and Grade Descriptions G60

Tailor-Made Toolholders

We offer special toolholders for all bar peeling, railway wheel and axle, and heavy duty turning machines, designed and manufactured with only the most modern technology. Computer Aided Design (CAD) and numerical-controlled machine tools are our speciality.

WIDIA™ Tools for Bar Peeling

Bar peeling is a unique and economical machining operation for the production of cylindrical surfaces on blank bars (e.g., round bars, wires, blocks, and pipes) with high surface finishes and dimensional accuracy. During the bar peeling process, scales, cracks, and sand enclosures (or other errors) are removed. This generally involves a rotating multi-tooth tool head under an application with high feed rates.

Screw clamping system for indexable inserts with countersunk hole.

Compact design using a minimum of spare parts for high reliability and cost efficiency.

A carbide shim provides additional tool protection.

Top clamping system for negative indexable inserts.

This universal clamping system is robust and easy to handle.

A carbide shim provides additional tool protection.

WIDIA™ can offer bar peeling toolholders, tool heads, inserts, and accessories for all your bar peeling needs.

What Does Bar Peeling Mean to Bar Manufacturing?

Bar peeling is preferably applied in the manufacture of bright bars, a product with a blank, relatively smooth surface finish and high dimensional accuracy. Blank bar material is used in modern mass production (e.g., automotive industry and its sub-suppliers). Due to the development of appropriate high-performance machines, bar peeling provides an increased awareness for steel producers, as well as for the intermediate machining of round products produced by spring and pipe manufacturers. On wrought, forged, or injection-molded round blocks, round bars, or rods, operations such as blasting, flaming, and grinding can be eliminated and replaced by bar peeling. This process is not only more economical, it is also helpful to make the workplace run more efficiently.

The WIDIA™ carbide six-edged, N-style insert is applied at many manufacturing plants all over the world. This multi-edged indexable insert with a positive chip angle is screw- or top-clamped in the holder or cartridge. Insert seat and clamping are designed to eliminate any offset of the insert while it is being cut. The favourable cutting edge geometry provides a smooth cut approach. The geometry itself is designed for good chip control and safe chip breaking.

Our current offering is comprised of a vast range of tooling for different bar peeling methods. For the various machine tool setups, different combinations of…

- Holders (e.g., cartridges)
- Indexable inserts (shape and size)
- Insert clamping types
- Main cutting edge geometries
- Carbide grades (coated or uncoated WIDIA grades)

…are possible to provide optimum cutting elements for each type of application. The development of additional cutting tools will continue as dictated by market demands and requirements.

Additionally, peeled bars offer great advantages:

- Remove casting and forging skin, pollution, cracks, and other surface errors.
- Achieve high dimensional and roundness accuracy.
- Obtain smooth surface finishes.

Because of peeled bars, better and more consistent conditions for further metal removal operations are being achieved.

Application Range of WIDIA™ Bar Peeling Tools

New bar peeling machines require a high level of utilisation and demand high performance from the cutting tools. WIDIA offers specially developed WIDIA tools with indexable inserts for bar peeling, which are capable of meeting these demands, making manufacturing more cost efficient.

Application Hints for WIDIA Bar Peeling Tools

The choice of the appropriate carbide grade for bar peeling follows the same criteria as that of conventional turning, including machinability of the workpiece material, chip cross section, and cutting speed.

(continued)

Application Hints for WIDIA™ Bar Peeling Tools *(continued)*

The most important performance influences include the stiffness of machine, workpiece, and tool system; the kind and amount of coolant used; and the total machine power. Under unfavourable machining conditions (i.e., unstable, bad bar conditioning), carbide grades with high toughness need to be applied.

Under favourable conditions, wear-resistant carbide grades can be applied, which enable high cutting speeds. High cutting speeds are generally desirable, as the machine tool costs for bar peeling are very high and, therefore, a high level of utilisation is appropriate. The tooling costs only have secondary importance in the total manufacturing costs, as higher tooling costs (due to higher cutting speeds) are compensated for by manifold cost savings on the machine tool costs.

The optimum data for cutting speeds and feed rates are to be optimised under consideration of the previously mentioned points. The application of coolant in bar peeling operations is absolutely necessary. This will reduce the wear on the tooling, as well as reduce the heat in the surrounding machine parts and components. Coolant supply should be sufficient with appropriate pressure.

Uncoated and Coated Carbide Grades for Bar Peeling

WIDIA™ TTX HW-P10

Main uncoated carbide grade for bar peeling of alloyed and unalloyed steel, as well as cast steel, under favourable machining conditions. The good heat strength of this TiC- and TaC-containing grade has high wear and crater resistance with excellent toughness.

WIDIA TTM HW-P25

Universal uncoated carbide grade for bar peeling steel with low tensile strength. This grade offers sufficient toughness and good wear resistance under unfavourable conditions.

Coated Carbide Grades

WIDIA TN7115, HC-P15

TiN-TiCN (MT)-TiOCN-alpha Al_2O_3-TiN coating
Main coated carbide grade for bar peeling of alloyed and unalloyed steel, as well as cast steel, under favourable machining conditions. Excellent wear resistance for extended tool life and reduced friction for better surface finishes.

WIDIA TN7125, HC-P25

TiN-TiCN (MT)-TiOCN-alpha Al_2O_3-TiN coating
Supplement for TN7115 with extra edge strength and toughness for bar peeling of alloyed and unalloyed, as well as cast steel, under unfavourable machining conditions.

WIDIA TN8025, HC-M25

MT-CVD/CVD — TiN-TiCN-Al_2O_3-ZrCN coating
Good balance of wear resistance and toughness properties. Light and medium machining for austenitic stainless steel AISI 300 series.

Bar Peeling
ID System

H	N	U	X	22	10	25	
Insert Shape	Clearance Angle	Tolerance IC	Geometry and Clamping Details	Insert Size	Insert Thickness	Radius/ Angle	Additional Chipbreaker Information

H Insert Shape

- H
- L
- N
- R
- S
- T
- O
- Z

N Clearance Angle

- N 0°

U Tolerance IC

G	± .001
H	± .0005
K	from ± .002 to ± .006 according to size
M	from ± .002 to ± .006 according to size
U	from ± .003 to ± .010 according to size

X Geometry and Clamping Details

N, R, F	Without bore
A, M	With cylindrical bore
G	
T, W	With countersink bore for screws with 40–60° taper single-sided countersink.
U, Q	With countersink bore for screws with 40–60° taper double-sided countersink.
H	With countersink bore for screws with 70–90° taper single-sided countersink.
J, C	With countersink bore for screws with 70–90° taper double-sided countersink.
X	Indexable inserts with special design features.

22 Insert Size

10 Insert Thickness

25 Radius/ Angle

- H β
- L β
- N β
- R
- S
- T
- O
- Z β

Additional Chipbreaker Information

- -1
- -10
- -11
- -12
- -13
- -1A
- -1B
- -1C
- -1D

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

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

Grade

Coating		Grade Description	05	10	15	20	25	30	35	40	45
TN8025	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 300 series.	M	M	M	M	M	M			
TN7125	HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good toughness properties. Medium and heavy machining. For steels.	P, M	P, M	P, M	P, M	P, M	P, M			
TN7115	HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P	P	P	P					
TN5120	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Light and medium machining. For cast irons.	K	K	K	K	K				
TN6010	HC-S10	Coated carbide. PVD — TiAlN Nano-multi-layer. Light machining. For difficult-to-machine alloys.	S	S	S						
TN6025	HC-S25	Coated carbide. PVD — TiAlN Nano-multi-layer. Light and medium machining. For difficult-to-machine alloys.	S	S	S	S	S	S			
TTX	HW-P35	Uncoated carbide. Very wear-resistant grade. Light machining. To be used in favourable conditions.	P, M	P, M	P, M						
TTM	HW-K15	Uncoated carbide. Medium machining. For steels and nodular cast iron.	P, M	P, M	P, M	P, M	P, M	P, M			
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	K, N, S, H	K, N, S, H	K, N, S, H					

HNUH...

Single-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUH160615	15,88	5,50	6,35	15°	—	—	19,85	1,60	7,94	—
22	HNUH220725	22,00	7,00	7,00	25°	—	—	26,00	2,00	11,00	—
32	HNUH321425	31,75	9,00	14,00	25°	—	—	37,93	2,00	15,875	0,60

HNUN...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUN160615	15,88	—	6,35	15°	—	—	19,85	1,60	7,94	0,60
22	HNUN221015	22,00	—	10,00	15°	—	—	27,66	2,00	11,00	—
	HNUN221025	22,00	—	10,00	25°	—	—	26,00	2,00	11,00	—

HNUQ...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUQ160612	15,88	5,50	6,35	15°	—	—	19,85	1,60	7,94	—

NOTE: Products available upon request.

HNUR...

Single-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
22	HNUR220725	22,00	—	7,00	25°	—	—	26,00	2,00	11,00	—
	HNUR221025	22,00	—	10,00	25°	—	—	26,00	2,00	11,00	—

HNUU...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
12	HNUU120625	12,70	4,40	6,35	25°	—	—	14,99	1,20	6,35	—
16	HNUU160615	15,88	5,50	6,35	15°	—	—	19,85	1,60	7,94	0,50

HNUX...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
12	HNUX120625	12,70	—	6,35	25°	—	—	14,99	1,20	6,35	—
16	HNUX160615	15,88	—	6,35	15°	—	—	19,85	1,60	7,94	0,50
	HNUX160625	15,88	—	6,35	25°	—	—	18,70	1,60	7,94	0,50
	HNUX160725	15,88	—	7,94	25°	—	—	18,70	1,60	7,94	0,20
22	HNUX221015	22,00	—	10,00	15°	—	—	27,65	2,00	11,00	—
	HNUX221025–1A	22,00	—	10,00	25°	—	—	26,00	2,00	11,00	0,60
	HNUX221025	22,00	—	10,00	25°	—	—	26,00	2,00	11,00	1,10
28	HNUX280930	28,58	—	8,94	30°	—	—	33,32	1,20	7,62	—

Single-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
22	HNUX221025–10	22,00	—	10,00	25°	—	—	26,00	2,00	11,00	0,50
28	HNUX280930–10	28,58	—	9,64	30°	—	—	33,32	1,20	7,62	0,35

NOTE: Products available upon request.

LNMX...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
18	LNMX181220–HP	18,00	—	12,50	—	20,00	—	—	—	—	0,50
	LNMX181220–SP	18,00	—	12,50	—	20,00	—	—	—	—	1,00

LNUN...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
30	LNUN301020	—	—	10,00	20°	24,00	30,00	—	0,80	10,00	—
38	LNUN381020	—	—	10,00	20°	30,00	38,00	—	0,80	10,00	—
40	LNUN401020	—	—	10,00	20°	30,00	38,00	—	0,80	10,00	—
50	LNUN501020	—	—	10,00	20°	32,00	50,00	—	0,80	10,00	—

NNGJ...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
28	NNGJ281020	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	0,50
	NNGJ281020–1A	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	0,50
	NNGJ281020–1D	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	1,00
	NNGJ281020–HP	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	0,50
	NNGJ281020–SP	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	1,00

NOTE: Products available upon request.

NNUJ...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
22	NNUJ220820–11	22,00	7,00	8,00	20°	16,00	—	2,10	1,00	10,00	0,60
	NNUJ220820–12	22,00	7,00	8,00	20°	16,00	—	2,10	1,00	10,00	0,60
	NNUJ221020–12	22,00	7,00	10,00	20°	16,00	—	2,10	1,00	10,00	0,60
28	NNUJ280820	28,00	7,00	8,00	20°	22,00	—	2,10	1,00	10,00	0,50
	NNUJ281020–1A	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	0,50
	NNUJ281020–10	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	1,00
	NNUJ281020–1B	28,00	7,00	10,00	20°	22,00	—	2,90	5,00	10,00	1,00

NNUN...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
22	NNUN220820	22,00	—	8,00	20°	16,00	—	2,10	1,00	10,00	0,50
	NNUN221020	22,00	—	10,00	20°	16,00	—	2,10	1,00	10,00	0,50
28	NNUN281020	28,00	—	10,00	20°	22,00	—	2,90	5,00	10,00	0,50

NOTE: Products available upon request.

NNUX...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
22	NNUX220820	22,00	—	8,00	20°	16,00	—	2,10	1,00	10,00	0,60
	NNUX220820–10	22,00	—	8,00	20°	16,00	—	2,10	1,00	10,00	0,60
	NNUX220820–11	22,00	—	8,00	20°	16,00	—	2,10	1,00	10,00	0,60
	NNUX221020	22,00	—	10,00	20°	16,00	—	2,10	1,00	10,00	—
	NNUX221020–1	22,00	—	10,00	20°	16,00	—	2,10	1,00	10,00	0,60
28	NNUX281020	28,00	—	10,00	20°	22,00	—	2,90	5,00	10,00	—

RNMG...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
09	RNMG090300	9,52	3,81	3,18	—	—	—	—	—	—	—
12	RNMG120400	12,70	5,16	4,76	—	—	—	—	—	—	—
15	RNMG150600	15,88	6,35	6,35	—	—	—	—	—	—	—
19	RNMG190600	19,05	7,94	6,35	—	—	—	—	—	—	—
28	RNMG250900	25,45	9,12	9,52	—	—	—	—	—	—	—

RNM...

Single-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
28	RNMH281000	28,50	8,80	10,50	—	—	—	—	—	—	—
38	RNMH381200–11	38,10	12,70	12,70	—	—	—	—	—	—	—
	RNMH381200–13	38,10	12,70	12,70	—	—	—	—	—	—	—
	RNMM381200	38,10	12,70	12,70	—	—	—	—	—	—	—
50	RNMH501800	50,00	12,70	18,00	—	—	—	—	—	—	—

ZNU...

Double-Sided

	ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
12	ZNUX120715L	12,00	—	7,00	15°	30,50	13,50	—	—	—	0,50
18	ZNUG181215	18,00	—	12,00	15°	37,00	14,50	—	—	—	—
	ZNUN181215	18,00	—	12,00	15°	37,00	14,50	—	—	—	—
	ZNUX181215–1	18,00	—	12,00	15°	37,00	14,50	—	—	—	0,60
	ZNUX181215L	18,00	—	12,00	15°	36,00	15,80	—	—	—	—
25	ZNUX251815L	25,00	—	18,00	15°	47,60	19,50	—	—	—	—
30	ZNUX302020–1	30,00	—	20,00	20°	56,00	28,00	—	—	—	1,10

ZNUR...

Single-Sided

ISO catalogue number	D	D1	S	β	L	L1	M	r	R	chamfer
ZNUR181215	18,00	—	12,00	15°	37,00	14,50	—	—	—	—

NOTE: Products available upon request.

Catalogue Number			Technical Dimension						
diameter	WDHF 20	WDH 20	B	B1	F	H	H1	L	indexable inserts
8–20	**219.40**.801	—	42	17,5	18	13	33,4	68	NNU...220820
8–13	—	**219.40**.601	38	17,5	18	12,5	28,5	64,25	
10–15	—	...602	38	17,5	18	12,5	28,5	62,65	
15–20	—	...603	38	17,5	18	12,5	28,5	60,15	

Catalogue Number		Technical Dimension						
diameter	WDH 50 T	B	B1	F	H	H1	L	indexable inserts
8–20	**219.40**.520	40	18	23,5	17,5	44	113	NNU...220820
18–30	...521	40	18	23,5	17,5	44	108	
28–40	...522	40	18	23,5	17,5	44	103	
38–50	...523	40	18	23,5	17,5	44	98	

Catalogue Number		Technical Dimension			
diameter	WDH 50 Adjustable	B	B1	L	indexable inserts
8–22	**219.40**.554	30	13	94,4	HNUX...160615

Catalogue Number • Spare Parts

	tension sleeve	shim	retention clamp	clamping screw	double threaded screw	spacer	cylinder screw	hex nut
WDHF, WDH 20	—	—	**214.75**.340	—	**214.85**.740	—	—	—
WDH 50 T	—	—	...340	—	...740	—	—	—
WDH 50 Adjustable	**214.75**.382	**214.80**.070	**214.80**.447	**214.80**.448		**214.77**.516	**214.87**.005	**214.77**.515

NOTE: Products available upon request.

Catalogue Number		Technical Dimension					
diameter	WDH 50 with offset shank	B	B1	H	H1	L	indexable inserts
38–50	**219.40**.562	26	12,7	15	12,7	63	**HNUX...120625**

Catalogue Number	Technical Dimension					
WDH 50	B	B1	H	H1	L	indexable inserts
219.40.730	20	12	12	12	62	**HNUX...120625**

Catalogue Number • Spare Parts		
	retention clamp	clamping screw
219.40.562	**214.80**.447	**214.80**.448
219.40.730	...447	...448

NOTE: Products available upon request.

Catalogue Number		Technical Dimension						
diameter	WDH 50 K	B	B1	F	H	H1	L	indexable inserts
7–50	**219.40**.560	28,6	22	16	20,5	20,5	82	**HNU...160615**

Catalogue Number		Technical Dimension							
diameter	WDH 75 T	B	B1	F	H	H1	H2	L	indexable inserts
8–20	**219.40**.700	44,5	20	19	24,5	51	41,9	113,6	**NNU...220820**
19–32	...701	44,5	20	19	24,5	51	41,9	107,6	
31–44	...703	44,5	20	19	24,5	51	41,9	101,6	
43–56	...704	44,5	20	19	24,5	51	41,9	95,6	
55–68	...705	44,5	20	19	24,5	51	41,9	89,6	
67–80	...706	44,5	20	19	24,5	51	41,9	83,6	

Catalogue Number • Spare Parts

	retention clamp	clamping screw	double threaded screw	tension sleeve	shim
WDH 50 K	**214.80**.447	**214.80**.448	—	**214.75**.382	**214.80**.070
WDH 75 T	**214.75**.340	—	**214.85**.740	...382	...034

NOTE: Products available upon request.

With Retention Screw

With Retention Clamp

With Screw

Catalogue Number		Technical Dimension							
diameter	WDHE 80	B	B1	F	H	H1	H2	L	indexable inserts
with retention screw									
12–20	**219.40**.810	52	20	28	34	47	38	113,6	**NNU...220820**
19–32	...811	52	20	28	34	47	38	107,6	
31–44	...813	52	20	28	34	47	38	101,6	
43–56	...814	52	20	28	34	47	38	95,6	
55–68	...815	52	20	28	34	47	38	89,6	
67–80	...816	52	20	28	34	47	38	83,6	
with retention clamp									
8–20	**219.40**.820	40	20	19	34	47	38	113,6	**NNU...220820**
19–32	...821	40	20	19	34	47	38	107,6	
31–44	...823	40	20	19	34	47	38	101,6	
43–56	...824	40	20	19	34	47	38	95,6	
55–68	...825	40	20	19	34	47	38	89,6	
67–80	...826	40	20	19	34	47	38	83,6	
with screw									
12–20	**219.40**.830	40	20	19	34	47	38	113,6	**NNUX...220820**
19–32	...831	40	20	19	34	47	38	107,6	

Catalogue Number • Spare Parts

	retention clamp	clamping screw	retention screw	set screw	tension sleeve	shim
219.40.810 to...816	—	**214.76**.708	**214.75**.344	**214.80**.459	**214.75**.382	**214.80**.034
219.40.820 to...826	**214.75**.340	**214.85**.740	—	—	...382	...034
219.40.830 and...831	—	**214.80**.372	—	—	—	**214.76**.787

NOTE: Products available upon request.

Catalogue Numbers

diameter	WDH 100
20–60	**219.40**.100
60–105	...105

Technical Dimension

F	H	H1	L	indexable inserts
22	32,5	65	157	NNU...221020
22	32,5	65	134	

Catalogue Numbers

WDH 360
219.40.732

Technical Dimension

	indexable inserts
Technical details available upon request.	ZNU...302020

Catalogue Number

diameter	S 80
20–60	**219.40**.100
60–105	...105

Technical Dimension

F	H	H1	L	indexable inserts
72	28	47	128	NNU...221020
62	28	47	128	

Catalogue Number • Spare Parts

	1		2			3	4				
	set screw	clamping screw	set screw	clamping screw	rentention clamp	tension screw	set screw	shim	tension sleeve	shim	pressure piece
WDH 100	—	**214.85**.740	—	—	**214.75**.340	—	—	**214.80**.034	**214.75**.263	—	—
S 80	**214.75**.407	**214.75**.391	**214.85**.515	**214.75**.392	...351	**214.75**.352	**214.85**.863	...067	(2x)...263	**214.80**.066	**214.75**.354

NOTE: Products available upon request.

Catalogue Number		Technical Dimension	
diameter	WDH 75 T	L	for cassettes
31–44	**219.49**.010	94,63	HNUX...120625
43–56	...011	88,63	
55–68	...012	82,63	
67–80	...013	76,63	

Catalogue Number		Technical Dimension	
diameter	WDH 75 T	L	for cassettes
31–44	**219.49**.015	94,63	WDH 75 WDHE 80
43–56	..016	88,63	
55–68	...017	82,63	
67–80	...018	76,63	

Catalogue Number • Spare Parts		
	tension screw	clamping screw
219.40.562	**214.77**.512	**214.77**.511

NOTE: Products available upon request.

Catalogue Number	Technical Dimension				
WDH cassettes	H	B	L	for basic holder	indexable inserts
219.40.716	22,0	42,0	39,0	**WDH 75 T and WDHE 80**	NNUX...220820
...718	24,5	43,5	39,0		HNU...221025
...722	22,0	45,0	44,5		HNU...280930
...724	22,0	41,8	38,8		ZNUX...181215
...726	22,0	42,0	39,0		ZNUX...181215
...728	22,0	42,0	39,0		NNU...220820

Catalogue Number • Spare Parts

cassettes	retention screw	retention clamp	clamping screw	shim	tension sleeve	sink screw
219.40.716	**214.75**.344	—	**214.76**.708	**214.80**.329	**214.75**.382	—
...718	...344	—	...708	—	—	—
...722	—	**214.85**.999	**214.77**.005	**214.77**.502	—	—
...724	**214.75**.344	—	**214.76**.711	—	—	—
...726	—	**214.75**.340	**214.85**.740	**214.77**.513	—	**214.80**.214
...728	—	...340	...740	**214.76**.787	—	—

NOTE: Products available upon request.

Catalogue Numbers	Technical Dimension			
WDH 75 T	D	D1	B	for bar peeling holder
219.46.200	85	215	41	WDH 75 T

Catalogue Number • Spare Parts				
rail	guide	spring blade	bolt	sink screw M 5x10
219.45.012	**219.45**.011	**219.45**.009	**219.45**.010	**214.77**.006

NOTE: Products available upon request.

Catalogue Number	Technical Dimension			
WDHE 80	D	D1	B	for bar peeling holder
219.46.200	85	210	41	WDHE 80

Catalogue Number • Spare Parts				
rail	guide	spring blade	bolt	sink screw M 5x10
219.45.013	**219.45**.014	**219.45**.009	**219.45**.010	**214.77**.006

NOTE: Products available upon request.

WIDIA™ Tools for Railways and Wheel Machining

WIDIA offers a complete line of tooling for wheel and axle maintenance in railroad shops. All tools incorporate the latest in tooling technology for maximum metal removal and higher productivity. All tools are proven performers in actual use over extended periods of time, under a wide range of operating conditions. Standard off-the-shelf inserts and fewer pieces of hardware reduce inventory and operating costs. Included in this range are tools for reconditioning mounted wheel sets, wheel boring, wheel truing, axle turning, and journal burnishing.

Machining conditions for these tools vary with the type of service the wheel has seen.

- Skid flat areas.
- Overheating of spinning wheels.
- Accidental torch burns.
- Excessive mushroom and rollovers that are hardened by unusual hump retarder pressure.
- Mismatched wheels that cause excessive wear on the side of the flange.

Each of these conditions requires a different machining speed and depth of cut. Even under these tough conditions, WIDIA tools have produced superior results through reduced production time and lower maintenance costs.

Wheelset Reconditioning — Advantages of WIDIA™ Wheel Lathe Tools:

- No top clamp to wear out or interfere with chip flow. Insert locks against two walls in the toolholder to prevent insert movement under heavy cutting loads.
- Hardened-steel locking unit provides positive insert seating and holder protection.
- Fast, trouble-free insert indexing — just unlock one screw to release the insert.
- Quick removal of the steel locking unit and insert for cleaning or replacement.
- Heavy-duty steel locking unit design ensures longer life and reduces operating costs.
- Fewer parts to inventory.
- Toolholders and steel locking units, made from heat-treated alloy steel, provide support to withstand severe roughing cuts on work-hardened wheels.

Toolholders for Railway Wheel Set Turning

The WIDIA™ Products Group offers toolholders and indexable inserts for all types of wheel lathes being used in the industry. We have developed this tooling in close cooperation with the Machine Tool Manufacturers and Railway Workshops.

Machining conditions for these tools vary with the type of service condition to which the wheel has been subjected. The profile of the wheel is subjected to wear while negotiating a curve or during braking. The wear on the profile is also due to skidding, mismatched wheels, etc. Therefore, different conditions of the wheel call for different machining parameters. Despite difficult machining conditions, our toolholders and indexable inserts have produced the best results in reducing production time and lowering tool costs.

The WIDIA Products Group toolholders for wheel set machining adopts the robust LS-system of clamping. The insert has a built-in chipbreaker and is clamped onto the toolholder by means of a lever and clamp screw. For heavy-duty wheel re-turning operations, the inserts are of upended design, enhancing the insert strength. Inserts are mounted onto an insert holder (cassette), which is mounted onto the toolholder. As a result, only the inexpensive cassettes have to be replaced in case of damage to the insert pocket.

The upended inserts are neutral and common for either hand of toolholders, reducing variety and inventory costs. Another standardising feature of this design is that the same cassette-insert combination can be used on different toolholders for various applications.

We also offer toolholders in our KS-system for wheel set turning. In this system of clamping, the insert and chipbreaker are directly clamped onto the toolholder body with the help of a top clamp. Tungsten carbide shims are used to minimise the damage to the precision insert pocket on the toolholder. The KS-system is also adopted for tyre top and bottom grooving.

Axle re-turning involves an intricate copying operation, necessitating a copying insert and small included angle. The solution is the 35° copying insert mounted on a toolholder with a shim and clamped by a screw (WIDIA-LR system).

Advantages of WIDIA™ Toolholders and Inserts:

- Toolholder bodies are made out of heat-treated alloy steel, providing a rigid support to the insert for heavy, rough cuts on work-hardened wheels.
- Specially developed, highly wear-resistant coated carbide grade for wheel machining enables very close control of the profile. This grade has been tailor-made for railway wheel machining with a state-of-the-art “gradient sintering” substrate for good toughness and coating for improved wear resistance.
- Standardised manufacturing program for toolholders, inserts, and spare parts, providing easy availability of these items at short notice.

Our sales and application team can provide more details on how to apply specific toolholders and inserts for maximum productivity. They will also review and recommend special tooling design exclusively for your needs. Please call the nearest WIDIA branch office for further clarification.

Clamping System P for Models:

Hegenscheidt 167 and HEC Hegenscheidt LW 140B-A

Compound Toolholder

Chopper Toolholder

Facing Toolholder

Hegenscheidt 105 and HEC Hegenscheidt LUW 165

(under floor lathe)

Compound Toolholder

HEC Hegenschedit LUW 160B

(under floor lathe)

Compound Toolholder

Chopper Toolholder

Hegenscheidt 166 and HEC Hegenscheidt LW 110B, LW 140B, LW 110M, LW 140M

Compound Toolholder

Chopper Toolholder

Rafamet UBB 112/2

Compound Toolholder

Chopper Toolholder

Rafamet UGB 150

(under floor lathe)

Compound Toolholder

Sculfort

(under floor lathe)

Compound Toolholder

Hegenscheidt 102

(under floor lathe)

Compound Toolholder

NOTE: Products available upon request.

Clamping System C for Models:

Hegenscheidt 102	Sculfort
(under floor lathe)	(under floor lathe)

Chopper Toolholder

Compound Toolholder

Cassettes for WIDIA-LS Toolholders

Turning Cassette

Facing Cassette

Turning Cassette

Tooling Recommendations

- Tooling for wheel tire machining on Webster & Bennett CNC VTLs
  See page G40.
- Tooling for wheel hub machining on Webster & Bennett CNC VTLs
  See page G41.
- Tooling for wheel tire machining on conventional VTLs
  See page G42.
- Tooling for wheel hub machining on conventional VTLs
  See page G43.
- Tooling for machining roller bearing axle on TAKISAWA® CNC lathe — TS 40 (for ICF Coach)
  See page G44.
- Tooling for machining roller bearing axle on TAKISAWA® CNC lathe — TS 40 (for BEML Coach)
  See page G45.
- Tooling for machining roller bearing axle on TAKISAWA® CNC lathe — TS 40 (for EMU Trailer Coach)
  See page G46.
- Tooling for machining plain bearing axle on CNC lathe — TS 40
  See page G47.
- Tooling for axle journal re-turning and burnishing on AJTB Hegenscheidt
  See page G48.

NOTE: Products available upon request.

Hegenscheidt 167 L and HEC Hegenscheidt LW 140B-A

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex 1	locking screw	hex 2	adjusting screw
69.391.458.10	69.393.186.10	69.393.221.10	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.20	69.393.186.20	69.393.220.20	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.10	69.393.187.10	—	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.458.20	69.393.188.20	—	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577

Chopper Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette		retaining screw	hex 1	locking screw	hex 2	adjusting screw
69.391.476.10	69.393.186.10	LNUX301940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.476.20	69.393.186.20	LNUX301940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.476.10	69.393.187.10	LNUX191940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.476.20	69.393.188.20	LNUX191940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577

(continued)

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

Hegenscheidt 167 L and HEC Hegenscheidt LW 140B-A

(continued)

Facing Toolholder

Catalogue Number • Spare Parts

toolholder		lever	shim	shim pin	shim pin punch	clamp screw	hex
63.391.492.10	SNMG1906	73.085.603	214.85.615	214.85.610	73.398.941	214.85.628	214.80.412
63.391.492.10	SNMG1906	73.085.603	214.85.615	214.85.610	73.398.941	214.85.628	214.80.412

NOTE: The toolholders are supplied with all spares duly mounted except the inserts, which should be ordered separately.

Hegenscheidt 105 L and HEC Hegenscheidt LUW 165

(under floor lathe)

Compound Toolholders

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex	adjusting screw
69.391.431.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965	73.398.577
69.391.431.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965	73.398.577
69.391.431.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965	73.398.577
69.391.431.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965	73.398.577

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

Hegenscheidt 166, HEC Hegenscheidt LW 110B, LW 140B, LW 110M, LW 140M

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex 1	locking screw	hex 2	adjusting screw
69.391.393.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.393.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.393.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577
69.391.393.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965	73.398.589	73.398.931	73.398.577

Chopper Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette		retaining screw	hex 1	locking screw	hex 2	adjusting screw
69.391.334.10	69.393.186.10	LNUX301940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.334.20	69.393.186.20	LNUX301940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.334.10	69.393.187.10	LNUX191940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577
69.391.334.20	69.393.188.20	LNUX191940	73.085.863	73.398.965	73.498.517	73.398.931	73.398.577

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

Rafamet UBB 112/2

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex
69.391.390.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965
69.391.390.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.390.10	69.393.187.10	69.393.190.10	LNUX301940	73.085.863	73.398.965
69.391.390.20	69.393.188.20	69.393.189.20	LNUX301940	73.085.863	73.398.965

Chopper Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette		retaining screw	hex
69.391.389.10	69.393.186.10	LNUX301940	73.085.863	73.398.965
69.391.389.20	69.393.186.20	LNUX301940	73.085.863	73.398.965
69.391.389.10	69.393.187.10	LNUX191940	73.085.863	73.398.965
69.391.389.20	69.393.188.20	LNUX191940	73.085.863	73.398.965

For many Rafamet lathes, the overall dimensions of toolholders vary from shop to shop.
These toolholders are manufactured by us as a special request. Please send us your enquiry along with the drawing for necessary action.

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

HEC Hegenscheidt LUW 160B
(under floor lathe)

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex
69.391.465.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965
69.391.465.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.465.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965
69.391.465.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965

Chopper Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette		retaining screw	hex
69.391.488.10	69.393.186.10	LNUX301940	73.085.863	73.398.965
69.391.488.20	69.393.186.20	LNUX301940	73.085.863	73.398.965
69.391.488.10	69.393.187.10	LNUX191940	73.085.863	73.398.965
69.391.488.20	69.393.188.20	LNUX191940	73.085.863	73.398.965

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

Rafamet UGB 150
(under floor lathe)

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex
69.391.391.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965
69.391.391.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.391.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965
69.391.391.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965

For many Rafamet lathes, the overall dimensions of toolholders vary from shop to shop.
These toolholders are manufactured by us as a special request. Please send us your enquiry along with the drawing for necessary action.

Sculfort
(under floor lathe)

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex
69.391.392.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965
69.391.392.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.392.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965
69.391.392.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965

NOTE: The toolholders are supplied without the cassettes and inserts. However, the necessary screws for clamping the cassettes, locking and adjusting screws, and hex wrenches are supplied with the toolholders. Products available upon request.

Hegenscheidt 102
(under floor lathe)

Compound Toolholder

Catalogue Number • Spare Parts

toolholder	turning cassette	facing cassette		retaining screw	hex
69.391.465.10	69.393.186.10	—	LNUX301940	73.085.863	73.398.965
69.391.465.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.465.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965
69.391.465.20	69.393.188.20	69.393.189.20	LNUX191940	73.085.863	73.398.965

NOTE: The toolholders are supplied without the cassettes and inserts.

KS — Hegenscheidt 102
(under floor lathe)

Chopper Toolholder

Catalogue Number • Spare Parts

toolholder		clamp	clamp screw	shim	shim screw	washer	hex
63.388.005.10	44.315.983	73.085.999	73.080.215	73.332.001	73.080.245	73.085.971	214.80.414
63.388.005.20	44.315.983	73.085.999	73.080.215	73.332.001	73.080.245	73.085.971	214.80.414

NOTE: The chipbreaker used on the above holder is 73.398.272.
Products available upon request.

Sculfort
(under floor lathe)

Compound Toolholder

Catalogue Number • Spare Parts

toolholder		clamp	clamp screw	shim	shim screw	washer	hex
69.388.001.10	44.315.986	73.085.999	73.080.215	73.398.353	73.080.245	73.085.971	214.80.414
69.388.001.20	44.315.986	73.085.999	73.080.215	73.398.353	73.080.245	73.085.971	214.80.414

NOTE: The chipbreakers used on the above holder are 73.398.246 and 73.398.247.
Products available upon request.

Cassettes

Turning Cassette

Catalogue Number • Spare Parts

cassette	H	B	L1	L2	C	A		lever	clamp screw	hex
69.393.186.10	32	22,6	42,2	35	23	30,00	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.186.20	32	22,6	42,2	35	23	30,00	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.187.10	32	22,6	42,2	35	23	19,05	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.188.20	32	22,6	42,2	35	23	19,05	LNUX191940	214.85.667	214.85.627	73.398.965

Facing Cassette

Catalogue Number • Spare Parts

cassette	H	B	L1	L2	A		lever	clamp screw	hex
69.393.220.10	32	34,6	30,2	23	30,00	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.221.20	32	34,6	30,2	23	30,00	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.189.10	32	18,6	42,2	35	19,05	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.190.20	32	18,6	42,2	35	19,05	LNUX191940	214.85.667	214.85.627	73.398.965

NOTE: The cassettes are supplied without the inserts, which should be ordered separately.
Products available upon request.

Cassettes

Turning Cassette

Catalogue Number • Spare Parts

cassette	H	L1	L2			lever	clamp screw	hex	shim	shim pin	shim pin punch
69.393.167.10	32	42,2	35	LNUX191940	TNMM220416	214.85.667	214.85.627	73.398.965	—	—	—
69.393.167.20	32	42,2	35	LNUX191940	TNMM220416	214.85.601	214.85.626	214.80.411	214.85.620	214.85.608	73.398.917

NOTE: 69.393.167.10 and 69.393.167.20 are both right hand.
The cassettes are supplied without the inserts, which should be ordered separately.
Products available upon request.

On Webster & Bennett CNC VTLs

Catalogue Number • Spare Parts

toolholder	hand	tool number	H	B	L	insert	shim/ anvil	shim pin/ screw	lever/ clamp	clamp screw	shim pin punch/ washer/spring	hex
69.391.734.20 **69.391.785.10**	L R	1 and 5 2	40 40	40 50	220 300	SNMG.25.07.16	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.327.477	N	3	32	32	250	44.325.368	73.334.757	73.080.245	73.344.758	73.498.697	73.498.950	214.80.414
69.497.834.10	R	4	40	40	200	44.415.588	73.331.120	73.498.549	73.085.999	73.080.215	73.085.971	214.80.414
69.395.129.10	R	6	40	40	200	VCMT.16.T3.12	73.332.177	214.80.083	73.331.361	73.498.544	73.398.615	73.398.999 214.80.411
69.391.413.10	R	7	25	25	150	CNMG.12.04.12	214.85.622	214.85.608	214.85.601	214.85.626	73.398.917	214.80.41

NOTE: Products available upon request.

On Webster & Bennett CNC VTLs

Catalogue Number • Spare Parts

toolholder	hand	tool number	H	B	L	insert	shim	shim pin	lever/ clamp	clamp screw	shim pin punch/washer	hex
69.391.735.10	R	1	40	40	230	SNMG.25.07.16	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.391.474.20	L	2	25	20	70							
69.391.461.10	R	3 and 4	25	20	70	TNMG.22.04.12	214.85.620	214.85.608	214.85.601	214.85.626	73.398.917	214.80.411
69.391.736.20	L	5	20	20	120							
69.391.736.10	R	6	20	20	120	CNMG.12.04.12	214.85.622	214.85.608	214.85.601	214.85.626	73.398.917	214.80.411
69.497.825.20	L	7	25	20	140							
69.497.825.10	R	8	25	20	140	44.415.646	—	—	73.085.869	73.080.210	73.080.248	214.80.412

NOTE: For tool numbers 2, 3, and 4, use radial adjusting screw 73.085.895 and axial adjusting screw 73.398.585.

NOTE: Products available upon request.

On Conventional VTLs

Catalogue Number • Spare Parts

toolholder	hand	tool number	H	B	L	insert	shim/ anvil	shim pin/ screw	lever/ clamp	clamp screw	shim pin punch/ washer/spring	hex
70.67.3232	L	1	32	32	170	SNMG.19.06.12	214.85.615	214.85.610	214.85.603	214.85.628	73.398.941	214.80.412
70.67.4040	L	1A	40	40	250	SNMG.25.07.16	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.497.757.10	R	2	32	40	180							
69.497.834.10	R	2A	40	40	200	44.415.588	73.331.120	73.498.549	73.085.999	73.080.215	73.085.971	214.80.414
69.327.477	N	3	32	32	250							
69.327.478	N	3A	40	40	250	44.325.368	73.334.757	73.080.245	73.334.758	73.498.697	73.498.950	214.80.412
69.397.973.10	R	4	32	32	150	44.315.690	73.332.078	73.080.245	73.085.999	73.080.215	73.085.971	214.80.414

NOTE: Products available upon request.

On Conventional VTLs

Catalogue Number • Spare Parts

toolholder	hand	tool number	H	B	L	insert	shim	shim pin	lever	clamp screw	shim pin punch	hex
70.67.3232	L	1	32	32	170	SNMG.19.06.12	214.85.615	214.85.610	214.85.603	214.85.628	73.398.941	214.80.413
70.67.4040	L	1	40	40	250	SNMG.25.07.16	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.391.958.20	L	2	25	25	150	TNMG.22.08-26	214.85.620	214.85.608	214.85.601	214.85.626	73.398.917	214.80.411

NOTE: For tool numbers 2, 3, and 4, use radial adjusting screw 73.085.895 and axial adjusting screw 73.398.585.

NOTE: Products available upon request.

For ICF Coach on TAKISAWA® CNC Lathe — TS 40

Catalogue Number • Spare Parts

		toolholder	insert	shim	shim pin	lever/ clamp	clamp screw	shim pin punch/washer	hex
1(a)	Roughing (to turn from bloom)	**PCLN R 3232 P19**	CNMG.19.06.12	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412
1(b)	Roughing (to turn from forged axle)	**PDJN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
2	Finishing	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
3	Roughing of body	**PDNN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
4	Finishing of body	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
5	Finishing of body	**PTGN L 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
6	External grooving	**69 327 377 10** Shank: 32 x 32 x 170	44.325.340	—	—	73.085.865	73.085.860	73.080.242	214.80.412
7	External threading	**69 327 336 10** Shank: 32 x 32 x 170	44.315.034	—	—	73.085.865	73.085.860	73.080.242	214.80.412

For BEML Coach on TAKISAWA® CNC Lathe — TS 40

Catalogue Number • Spare Parts

		toolholder	insert	shim	shim pin	lever	clamp screw	shim pin punch	hex
1(a)	Roughing (to turn from bloom)	**PCLN R 3232 P19**	CNMG.19.06.12	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412
1(b)	Roughing (to turn from forged axle)	**PDJN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
2	Finishing	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
3	Roughing of body	**PDNN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
4	Finishing of body	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
5	Finishing of body	**PTGN L 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411

For EMU Trailer Coach on TAKISAWA® CNC Lathe — TS 40

Catalogue Number • Spare Parts

		toolholder	insert	shim	shim pin/ screw	lever/ clamp	clamp screw	shim pin punch/washer	hex
1(a)	Roughing (to turn from bloom)	**PCLN R 3232 P19**	CNMG.19.06.12	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412
1(b)	Roughing (to turn from forged axle)	**PDJN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
2	Finishing	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
3	Roughing of body	**PDNN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
4	Finishing of body	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
5	Finishing of body	**PTGN L 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
6	Grooving	**276 STP 3218**	TPUN.22.04.12	73.080.320	73.080.245	73.085.869	73.085.211	73.080.248	214.80.412

NOTE: Grooving tool 276 STP 3218 will use chipbreakers 73.085.804 and 73.085.805.

On TAKISAWA® CNC Lathe — TS 40

Catalogue Number • Spare Parts

		toolholder	insert	shim	shim pin	lever	clamp screw	shim pin punch	hex
1(a)	Roughing (to turn from bloom)	**PCLN R 3232 P19**	CNMG.19.06.12	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412
1(b)	Roughing (to turn from forged axle)	**PDJN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
2	Roughing	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
3	Finishing	**PDNN R 3225 P15**	DNMG.15.06.12	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
4	Finishing	**PTGN R 3232 P22**	TNMG.22.04.08-26	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411

On AJTB Hegenscheidt

Catalogue Number • Spare Parts

toolholder	Sl. No.	H	B	L1	F	I	shim	shim screw	insert screw	hex 1	hex 2
69.395.143	1	32	13	90	11	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.149	1	32	13	90	11	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.154	2	32	13	67	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.144	2	32	13	71	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.153	2	32	13	90	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.150	2	32	13	67	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.151	2	32	13	71	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.152	2	32	13	90	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.178	3	32	13	67	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.179	3	32	13	71	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.180	3	32	13	90	15	VCMT16T312	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.169	3	32	13	67	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.170	3	32	13	71	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.171	3	32	13	90	15	VBMT160412-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709

NOTE: The cassettes are supplied without the inserts, which should be ordered separately.
Products available upon request.

LNUX

ISO catalogue number	L	S	r	d	M	D1	t
LNUX191940	19,05	19,05	4,00	—	—	6,35	10
LNUX301940	30,00	19,05	4,00	—	—	6,35	12
LNUX381240	38,00	22,00	4,00	—	—	6,35	12

LNUX-13

ISO catalogue number	L	S	r	d	M	D1	t
LNUX191940-13	19,05	19,05	4,00	—	—	6,35	10
LNUX301940-13	30,00	19,05	4,00	—	—	6,35	12

LNUX-16

ISO catalogue number	L	S	r	d	M	D1	t
LNUX191940-16	19,05	19,05	4,00	—	—	6,35	10
LNUX301940-16	30,00	19,05	4,00	—	—	6,35	12

4431598

ISO catalogue number	L	S	r	d	M	D1	t
44315983	—	10,00	4,00	19,05	24,56	—	—
44315986	—	6,00	5,00	16,20	19,31	—	—

4441558

ISO catalogue number	L	S	r	d	M	D1	t
44415558	24,00	11,50	1,20	—	—	—	—

44415646

ISO catalogue number	L	S	r	d	M	D1	t
44415646	19,05	6,35	10,00	—	—	—	—

44415690

ISO catalogue number	L	S	r	d	M	D1	t
44415690	28,00	6,35	10,00	—	—	—	—

44415690

ISO catalogue number	L	S	r	d	M	D1	t
44415690	28,00	6,35	10,00	—	—	—	—

L = Overall Length
S = Insert Thickness
r = Radius
d = I.C.D.
M = I.C.
D1 = Diameter of Screw or Pin Hole
t = Thickness of LNUX Inserts
("t" is unique for LNUX inserts)

Products available upon request.

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

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

Grade

Coating		Grade Description		05	10	15	20	25	30	35	40	45
TN2000	HC-P20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated cobalt-enriched substrate has required bulk toughness added with multi-layer MTCVD coating that provides the wear resistance and crater resistance required in steel machining. TN2000 is an optimum grade and the first choice in medium machining of steel. TN2000 provides required chip impact resistance to give longer tool life.	P			■	■	■	■			
TN4000	HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. CVD-coated hard metal substrate with higher cobalt content imparting good toughness required for roughing applications. Substrate has cobalt-enriched top layer to give the cutting edge that extra strength required in roughing applications. TN4000 is the first choice for roughing applications and can take heavy depths of cut and interrupted cuts.	P					■	■	■	■	
			M		■	■						
NEW! TN5120	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Light and medium machining. For cast irons.	K			■	■	■				
NEW! TN7115	HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P		■	■	■					
NEW! TN7125	HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good toughness properties. Medium and heavy machining. For steels.	P				■	■	■			
			M				■	■	■			
ATM	HW-M20	Uncoated carbide. Special substrate with alloying elements to give extra toughness and hardness. Specially suitable for machining of railway wheels.	P			■	■	■				
			M			■	■	■				
TTS	HW-P35	Universal uncoated grade for steel machining. Recommended for rough and finish turning of long chipping materials with large chip cross selection at medium cutting speeds. Also useful for grooving and threading.	P				■	■	■			
TTR	HW-P35	Uncoated carbide. Light and medium machining. For steels and nodular cast iron. To be used at low cutting speeds; also effective in unfavourable conditions.	P						■	■	■	
			M						■	■	■	

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WIDIA Products

Whether your operation is turning, milling, or holemaking, WIDIA™ brands are the high-performance tooling you need. We offer standard and custom solutions for the general engineering market.

WIDIA™ Tools for Heavy-Duty Machining

WIDIA tooling solutions for Heavy-Duty Turning have a proven history of success in these extremely demanding applications around the world. Customers looking for maximum material removal and improved productivity can rely on WIDIA to provide the right tool, inserts, and grades for their workpiece, machine tool, and applications.

WIDIA, your partner for Heavy-Duty Machining delivers:

- Experience
- Confidence
- Reliability
- Chip control
- Results

Let WIDIA put our expertise in Heavy-Duty Machining to work for you.

WIDIA™ offers a vast range of toolholders, mountings, and inserts for the heavy-duty turning industry. These include toolholders and inserts for roughing, facing, profiling, grooving, and finishing. Depth of cut up to 100,0mm.

The combination of new geometries -HD and -SR with new grades such as TN6515 and TN7125 are proven solutions in the heavy-duty turning industry, providing outstanding chip control at large depth of cuts and high feed rates.

CNMM-8

ISO catalogue number	D	L10	S	Rε	D1
CNMM1204088	12,70	12,90	4,76	0,8	5,16
CNMM1204128	12,70	12,90	4,76	1,2	5,16
CNMM1606128	15,88	16,12	6,35	1,2	6,35
CNMM1606168	15,88	16,12	6,35	1,6	6,35
CNMM1906128	19,05	19,34	6,35	1,2	7,93
CNMM1906168	19,05	19,34	6,35	1,6	7,93
CNMM1906248	19,05	19,34	6,35	2,4	7,93
CNMM2509248	25,40	25,79	9,53	2,4	9,12

CNMM-SR

ISO catalogue number	D	L10	S	Rε	D1
CNMM190616SR	19,05	19,34	6,35	1,60	7,93
CNMM190624SR	19,05	19,34	6,35	2,40	7,93
CNMM250916SR	25,40	25,79	9,53	1,60	9,12
CNMM250924SR	25,40	25,79	9,53	2,40	9,12
CNMM250924SRL	25,40	25,79	9,53	2,40	9,12

LNMR...

ISO catalogue number	D	L1	S	Rε	W
LNMR351432	6,35	35,00	14,50	3,20	25,40
LNMR501432	6,35	50,80	14,50	3,20	25,40

LNMR-HD

ISO catalogue number	D	L1	S	Rε	W
LNMR501432HD	6,35	50,80	14,50	3,20	25,40

NOTE: Products available upon request.

LNUX...

ISO catalogue number	D1	L1	S	Rε	W
LNUX400924EN95	9,12	40,00	9,53	2,40	25,40

RNGC...

ISO catalogue number	D	D1	S
RNGC501800	12,70	50,00	18,00
RNGC501800T	12,70	50,00	18,00

RNMC...

ISO catalogue number	D	D1	S
RNMC501800	12,70	50,00	18,00

RNMA...

ISO catalogue number	D	D1	S
RNMA250900	9,12	25,40	9,52
RNMA250900T	9,12	25,40	9,52

RNMG...

ISO catalogue number	D	D1	S
RNMG250900	9,12	25,40	9,52

NOTE: Products available upon request.

RNMH...

ISO catalogue number	D	D1	S
RNMH281000	8,80	28,50	10,50

RNMH-11

ISO catalogue number	D	D1	S
RNMH38120011	12,70	38,10	12,70

RNMH-13

ISO catalogue number	D	D1	S
RNMH38120013	12,70	38,10	12,70

RNMH-M0

ISO catalogue number	D	D1	S
RNMH5018M0	12,70	50,00	18,00

NOTE: Products available upon request.

SNMM-8

	ISO catalogue number	D	L10	S	Rε	D1
8	SNMM1204128	12,70	12,70	4,76	1,20	5,16
	SNMM1506128	15,88	15,88	6,35	1,20	6,35
	SNMM1906128	19,05	19,05	6,35	1,20	7,93
	SNMM1906168	19,05	19,05	6,35	1,60	7,93
	SNMM1906248	19,05	19,05	6,35	2,40	7,93
	SNMM2507248	25,40	25,40	7,94	2,40	9,12
B	SNMM2507248B	25,40	25,40	7,94	2,40	9,12

SNMM-SR

	ISO catalogue number	D	L10	S	Rε	D1
SR	SNMM190616SR	19,05	19,05	6,35	1,60	7,93
	SNMM190624SR	19,05	19,05	6,35	2,40	7,93
	SNMM250916SR	25,40	25,40	9,53	1,60	9,12
	SNMM250924SR	25,40	25,40	9,53	1,60	9,12
	SNMM250724SR	25,40	25,40	7,94	2,40	9,12
SRL	SNMM250724SRL	25,40	25,40	7,94	2,40	9,12
	SNMM250924TSR	25,40	25,40	9,53	2,40	9,12

SNMX...

ISO catalogue number	D	L10	S	Rε	D1
SNMX381224	38,10	38,10	12,10	2,40	9,50

TNMM-8

ISO catalogue number	D	L10	S	Rε	D1
TNMM1604128	9,53	16,50	4,76	1,20	3,81
TNMM2204088	12,70	22,00	4,76	0,80	5,16
TNMM2204128	12,70	22,00	4,76	1,20	5,16
TNMM2204168	12,70	22,00	4,76	1,60	5,16
TNMM2706128	15,88	27,50	6,35	1,20	6,35
TNMM2706248	15,88	27,50	6,35	2,40	6,35

NOTE: Products available upon request.

SVN71/72...RL

ISO catalogue number	L1	W	H1	H2	Rε
SVN71/72…R/L	25,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	30,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	35,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	40,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	50,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	60,00	18,00	15,30	7,20	2,00
SVN71/72…R/L	70,00	18,00	15,30	7,20	2,00

SVN77...RL

ISO catalogue number	L1	W	H1	H2	Rε
SVN77…R/L	25,00	18,00	15,30	7,20	2,00
SVN77…R/L	30,00	18,00	15,30	7,20	2,00
SVN77…R/L	35,00	18,00	15,30	7,20	2,00
SVN77…R/L	40,00	18,00	15,30	7,20	2,00
SVN77…R/L	50,00	18,00	15,30	7,20	2,00
SVN77…R/L	60,00	18,00	15,30	7,20	2,00
SVN77…R/L	70,00	18,00	15,30	7,20	2,00

SVN80...RL

ISO catalogue number	L1	W	H1	H2	Rε
SVN80…R/L	25,00	18,00	15,30	7,20	2,00
SVN80…R/L	30,00	18,00	15,30	7,20	2,00
SVN80…R/L	35,00	18,00	15,30	7,20	2,00
SVN80…R/L	40,00	18,00	15,30	7,20	2,00
SVN80…R/L	50,00	18,00	15,30	7,20	2,00
SVN80…R/L	60,00	18,00	15,30	7,20	2,00
SVN80…R/L	70,00	18,00	15,30	7,20	2,00

SVN...F1

ISO catalogue number	L1	W	H1	H2	Rε
SVN76…F1	20,00	18,00	15,30	7,20	1,20
SVN76…F1	22,00	18,00	15,30	7,20	1,20
SVN76…F1	25,00	18,00	15,30	7,20	1,20
SVN76…F1	30,00	18,00	15,30	7,20	1,20
SVN76…F1	35,00	18,00	15,30	7,20	1,20
SVN76…F1	40,00	18,00	15,30	7,20	1,20
SVN76…F1	45,00	18,00	15,30	7,20	1,20
SVN76…F1	50,00	18,00	15,30	7,20	1,20
SVN76…F1	55,00	18,00	15,30	7,20	1,20
SVN76…F1	60,00	18,00	15,30	7,20	1,20
SVN76…F1	65,00	18,00	15,30	7,20	1,20
SVN76…F1	70,00	18,00	15,30	7,20	1,20

NOTE: Products available upon request.

SVN...F2

ISO catalogue number	L1	W	H1	H2	a
SVN76…F2	20,00	18,00	15,30	7,20	5,00
SVN76…F2	22,00	18,00	15,30	7,20	5,00
SVN76…F2	25,00	18,00	15,30	7,20	5,00
SVN76…F2	30,00	18,00	15,30	7,20	6,00
SVN76…F2	35,00	18,00	15,30	7,20	6,00
SVN76…F2	40,00	18,00	15,30	7,20	6,00
SVN76…F2	45,00	18,00	15,30	7,20	6,00
SVN76…F2	50,00	18,00	15,30	7,20	6,00
SVN76…F2	55,00	18,00	15,30	7,20	6,00
SVN76…F2	60,00	18,00	15,30	7,20	6,00
SVN76…F2	65,00	18,00	15,30	7,20	6,00
SVN76…F2	70,00	18,00	15,30	7,20	6,00

SVN...F3

ISO catalogue number	L1	W	H1	H2	a
SVN76…F3	20,00	18,00	15,30	7,20	5,00
SVN76…F3	22,00	18,00	15,30	7,20	5,00
SVN76…F3	25,00	18,00	15,30	7,20	5,00
SVN76…F3	30,00	18,00	15,30	7,20	6,00
SVN76…F3	35,00	18,00	15,30	7,20	6,00
SVN76…F3	40,00	18,00	15,30	7,20	6,00
SVN76…F3	45,00	18,00	15,30	7,20	6,00
SVN76…F3	50,00	18,00	15,30	7,20	6,00
SVN76…F3	55,00	18,00	15,30	7,20	6,00
SVN76…F3	60,00	18,00	15,30	7,20	6,00
SVN76…F3	65,00	18,00	15,30	7,20	6,00
SVN76…F3	70,00	18,00	15,30	7,20	6,00

SVN...F4

ISO catalogue number	L1	W	H1	H2	a
SVN76…F4	20,00	18,00	15,30	7,20	5,00
SVN76…F4	22,00	18,00	15,30	7,20	5,00
SVN76…F4	25,00	18,00	15,30	7,20	6,00
SVN76…F4	30,00	18,00	15,30	7,20	7,50
SVN76…F4	35,00	18,00	15,30	7,20	8,50
SVN76…F4	40,00	18,00	15,30	7,20	10,00
SVN76…F4	45,00	18,00	15,30	7,20	11,00
SVN76…F4	50,00	18,00	15,30	7,20	12,50

NOTE: Products available upon request.

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

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

Grade

	Coating	Grade Description	05	10	15	20	25	30	35	40	45
NEW! TN5120	HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3. Light and medium machining. For cast irons.	K		K	K	K				
TN6515	HC-P15	Coated carbide. PVD — TiAlN multi-layer. Medium and heavy machining. For steels and nodular cast iron.	P K		P K	P K	P K				
NEW! TN7115	HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P	P	P	P					
NEW! TN7125	HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al_2O_3-TiN. Good toughness properties. Medium and heavy machining. For steels.	P M			P M	P M	P M			
TN8025	HW-P35	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 300 series.	M			M	M	M			
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.	K N S H	K N S H	K N S H	K N S H					
TTM	HW-P25	Uncoated carbide. Medium machining. For steels and nodular cast iron.	P M			P M	P M	P M			
TTR	HW-P35	Uncoated carbide. Light and medium machining. For steels and nodular cast iron. To be used at low cutting speeds. Effective in unfavourable conditions.	P M					P M	P M	P M	

WIN WITH WIDIA™

WIDIA™ Tooling The Best Choice for Any Application

WIDIA offers an extensive line of tools for bar peeling, railways and wheel machining, and heavy-duty machining, providing our customers with everything they need to get the job done right.

WIDIA Tools for Bar Peeling

- Ideal in high feed rate applications, WIDIA Bar Peeling tools enable economical machining operations for the production of cylindrical surfaces on blank bars.
- High surface finishes, dimensional accuracy, and most efficient removal of scales, cracks, sand enclosures, and other errors.

WIDIA Tools for Railways and Wheel Machining

- Complete line of tooling for wheel and axle maintenance in railroad shops.
- Incorporate the latest in tooling technology for maximum metal removal rates and higher productivity.

WIDIA Tools for Heavy-Duty Machining

- With a proven history of success in extremely demanding applications around the world, this line of heavy-duty machining tools provides maximum material removal rates and improved productivity.
- Multiple geometries and grades available, enabling superior performance and outstanding chip control in depths of cut up to 100,0mm.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA

Custom Solutions

Introduction to Custom Solutions H2
Turning Custom Solutions H4
PCD-Tipped Custom Solutions H6
WIDIA-CIRCLE™ Small Hole Tooling H8
Services and Support H10

Fast response and superior performance when you need it.

The WIDIA™ Products Group provides exceptional application and design engineering services. Whether you need tools produced according to a blueprint, a finished part, or a drawing; assistance in process development; or expertise in optimising an application, our world-renowned Advanced Engineering Team is available.

Our engineering departments are fully integrated with specialised production cells located in our focused factories throughout the world. ISO Certified manufacturing facilities with state-of-the-art CNC equipment, simulation capability, CAD/CAM production, and inspection processes ensure that customers receive the highest-quality product with accurate compliance to specifications and repeatability for future production.

Custom Solution Services:

- Blueprint specials
- Complex geometries
- Form tools
- Modified standards
- Application engineering and optimisation
- Tool design
- Project development

Contact your local Authorised Distributor for more information.

THE POWER OF CUSTOM SOLUTIONS

Superabrasive Precision Turning Tools and Inserts

WIDIA-CLAPP DiCO™ brings the power of custom solutions to Indexable Milling, Turning, and Holemaking, further establishing our ability to offer superabrasive cutting tools for all applications.

- Fast Track Custom Solutions Programme (FTCS) provides immediate customised insert solutions to meet your specific needs.
- A wide range of standard CBN and PCD turning inserts also available.
- Local Authorised WIDIA™ Sales Representatives at your fingertips for personal, immediate attention.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA™

Turning and Boring Custom Solutions

We specialise in designing and manufacturing the exact tooling for your needs.

Value-Added Programmes

WIDIA-CLAPP DiCO™ offers a number of value-added programmes that reduce our customers' manufacturing costs on a per-unit basis.

Refurbishment Service

A complete refurbishment service to restore perishable and durable tooling to its original performance at a fraction of the cost of new tooling. Services include regrinding, resetting, or retipping of used perishable tools and refurbishment of used milling cutters.

Refurbishment Delivery Service

A delivery service is provided for both pick-up of used tools and delivery of all refurbished tools for our customers. Our technicians will visit your facility on an as-requested basis to deliver the refurbished products in line with your production requirements with minimal inventory investment.

Just-In-Time Inventory Programmes

Customer- and tool-specific inventory stocking programmes are available and managed effectively with weekly communication of inventory balances and usage information.

Commodity Management

An encompassing PCD and CBN tool supply management program combines our expertise in tool fabrication, inventory management, technical application, and process improvement.

Our complete portfolio.
Your complete satisfaction.

From turning, holemaking, and indexable milling to solid carbide end milling, solid carbide drilling, and tapping, the most powerful tools in the business now proudly wear WIDIA™ brands. When you buy WIDIA products, you're not just purchasing speed, power, and precision, you're investing in quality and complete satisfaction.

Match the most expansive portfolio of precision-engineered products and custom 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 brands. For product information or to schedule an onsite demonstration, visit www.widia.com.

WIDIA™
www.widia.com

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

PCD-Tipped Custom Solutions

Increase tool life up to 300 times parts per tool with PCD solutions!

Our PCD-tipped tools are ideal for machining aluminium and magnesium alloys, copper, and brass, as well as glass-fibre and carbon-fibre reinforced plastics — with cutting speeds between 250–3,000 m/min.

The utilisation of polycrystalline diamond (PCD) tipped tooling has expanded rapidly over the past 10 years within multiple industries. These tools have displaced traditional carbide and high-speed steel (HSS-E) tooling. The economic savings of utilising PCD tooling for machining non-ferrous materials can be categorised in five key areas:

- Longer tool life, enabling increased machine utilisation and overall increased production.
- Strong resistance to abrasive wear, even when cutting speeds are extremely high.
- Higher productivity through increased metal removal rates.
- Superior surface finishes.
- Precise tolerance control.

In most cases where PCD tools have been evaluated against carbide tooling, customers have realised significant increases in tool life, up to 300 times parts per tool. This dramatic increase in tool life significantly decreases machine downtime, thereby increasing production throughput and lowering overall manufacturing costs per unit.

Global Capabilities and Local Service

PCD Tooling Is Making a Big Impact in Technical Markets

Automotive

An industry segment that utilises PCD and CBN tooling in the machining of aluminium, powdered metals, hardened steel, and iron materials.

Telecommunications

A swiftly growing industry that incorporates the usage of PCD in the machining of plastics, fibreboard, bronze, brass, and zinc materials.

Electronics

A growing and competitive industry that incorporates the usage of PCD in the machining of plastics, aluminium, glass, and copper materials.

Aerospace

An industry that has just begun to unlock the economic potential of PCD and CBN tooling in the machining of target materials such as phenolics, graphite composites, and aluminiums.

Contact your local Authorised Distributor for more information.

WIDIA-CIRCLE™ Small Hole Tooling

For more than 50 years, WIDIA-CIRCLE has prided itself on manufacturing the most reliable, highest-quality small hole boring bars available on the indexable tooling market.

Although our extensive standard product line covers most machining applications, we realise that every customer is unique, and occasionally a “special” tool may be required to perform a specific job.

In such cases, we ask you to refer to the Custom Solution Worksheet (pages C130–C131) where you will find detailed special ordering information. Please utilise this form to request modifications to any of our existing product offerings so that they meet your specifications.

If your special requirements do not fall under the categories provided, simply contact us directly to discuss your needs. Our trusted and experienced engineering/technical team is always on hand to work with you to recommend the most viable solution. Once we have discussed your particular machining application in detail, it is possible that one of our many standard tools might help you perform the required job most economically.

Thank you for trusting WIDIA-CIRCLE for all your indexable tooling needs.

Global Capabilities and Local Service

WIDIA CIRCLE

WIN WITH WIDIA™

WIDIA-CIRCLE™ Small Hole Tooling Series

The WIDIA™ line of small hole boring tools is an excellent, economical choice for a wide range of applications. Our solid carbide bars provide exceptional machining versatility and rupture strength. Indexable inserts are available in both steel and carbide shanks.

A/B Series

- Unique locking system enables quick, accurate insert changes.

Quadralock™

- V-slots and limit-stop bolts for increased indexability.

Micro Boring Bars

- Free cutting action, better surface finishes, and greater chip evacuation.

Solid Carbide Bars

- Accurate, quick-change tooling and toolholders are ideal for small parts machining applications.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA™
Win with WIDIA™

Outstanding Service and Support Separates WIDIA™ Products from the Competition

In addition to the outstanding performance we provide with superior tools, the WIDIA Products Group offers the highest-quality support and program services as well.

- Our regional Customer Service teams are considered by our Distributors to be the finest in the industry and are experienced and trained to help with orders, quotations, expediting, processing custom solution requests, and connecting with the correct people.

- Our unique Customer Application Support (CAS) teams are available to many parts of the world on a 24/7 basis, helping to select the correct tool, providing technical information and recommended parameters, and identifying item conversions from the competition to WIDIA products.

- Our Advanced Engineering teams, specialising in specific product groups (end mills, drills, reamers, etc.), work with our customers to optimise application productivity and provide guidance on complex tool designs.

- Our local Field Application Specialists are technical experts who work with our Distributors to assist customers with tool selection, training, tool tests, and productivity gain reporting.

- We offer reconditioning services that provide “like-new” performance unmatched by the competition.

- Our recycling services turn your scrap carbide into cash.

…and that is only the beginning.

The WIDIA Products Group understands that it takes more than great products to earn customer loyalty. We are committed to providing world-class support and programme services that will earn, and keep, your business.

WIN WITH WIDIA™

Best-in-Class Service and Support

With WIDIA™, you get it all — superior products, reliable performance, and unsurpassed support and programme services.

- Highly qualified Customer Service and Customer Application Support (CAS) teams support clients through strong product and market knowledge.
- Advanced Engineering teams specialise in specific product groups to help customers optimise application productivity.
- Field Application Specialists work directly with Distributors to recommend the best tools and provide training and support.

To learn more about our innovations, contact your local Authorised Distributor or visit **www.widia.com**.

WIDIA

Service and Support

WIDIA™ ToolBOSS™ I2–I3
Advanced Tool Management Software I4–I5
WIDIA Tool Recycling I6
WIDIA Tool Reconditioning I7
Customer Application Support I8–I9

"Our Application Engineers assist more than 5,000 manufacturing professionals each month on tooling selection, part processing, and application troubleshooting."

WIDIA™ ToolBOSS™ Secure, high-capacity solutions.

The 28 LEVEL cabinet provides higher capacity within the same footprint as the current 20 LEVEL WIDIA ToolBOSS cabinet. Incorporating many unique features, the 28 LEVEL WIDIA ToolBOSS cabinet is the latest development in secure inventory management.

Combined with our powerful WIDIA ToolBOSS Management Software, the 28 LEVEL cabinet provides a versatile, high-capacity solution to meet the unpredictable challenges of logistics and supply chain management.

Drawer options
There are currently 19 different drawer sizes available to accommodate a large variety of items.

Compatibility
Fully compatible with all existing WIDIA ToolBOSS units.

Diagnostics
Built-in tray diagnostic port, facilitating improved remote system support, diagnosis, and repair.

Efficiency
Multiple drawers can be selected in one transaction, minimising the time required to manage large volumes of stock.

- Cut tooling inventory.
- 24/7 stock availability.
- Unique reconfiguring.
- Decrease tooling spend.
- Reduce administrative costs.
- Accountability.
- Reduced cost per location.

Future-port
USB interface, as well as a DCS expansion port, for use with RFID and other ancillary equipment.

High-speed access
Rapid search and selection of items via the software is further enhanced with a complete LED identification system that guides users directly to the correct drawer.

Traceability
Software provides a complete audit trail, enabling you to track who used a component stored in the system, as well as when, where, and why.

Expandability
Expandable up to 10 units per system, providing up to 1,121 secure locations.

Maximise uptime. Increase output.

ATMS is a powerful, cost effective software solution for the management and control of all tool types. It's an all-inclusive package, providing full tool management with inventory control, purchasing, and full audit trail.

atms

ADVANCED TOOL MANAGEMENT SOFTWARE

Standard and custom reporting
An extensive suite of user-friendly standard and customisable reports.

Requesting and purchasing
The purchasing facility allows internal requisitions to be raised and passed electronically to a business system.

Rework control
Controls the full rework cycle, including internal and external rework departments.

Inspection management
Tracks and trends data to identify tool and calibration maintenance needs.

Increase your productivity:

- Eliminate downtime from stock-outs.
- Achieve up to 66% setup time reduction.

Improve your bottom line:

- Reduce on-hand inventory up to 55% in six months.
- Slash tool consumption up to 30%.
- Reduce acquisition costs up to 90%.

Unlimited points of issue
Access to full reporting, ordering, and data management by location and point of issue.

Vending machine consolidation and order control
Streamlines data entry process consolidation for an unlimited amount of linked vending machines.

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

Get Cash or Credit for Your Used Carbide

**Actual returns may vary based on current market value for recycled carbide materials.*

Why recycle?

It's the right thing to do!

It's easy for your company to be environmentally conscious with our Carbide Recycling Program.

By sending us your used carbide tools, you help preserve and protect the environment and ensure that these products are recycled responsibly.

It's profitable!

Not only does WIDIA™ make it easy for your company to be environmentally conscious, we offer an added incentive — it's profitable.

Through our Carbide Recycling Program, get the full value of your investment in metalcutting tools, improve profitability, and reduce your overall tooling spend. When you send us your used carbide, we will reward you with cash or credit. *(Credit offer valid in U.S.A. only.)*

It's EASY!

Our Carbide Recycling Program is available on the web and is easy to use. You can request a quote, arrange to send us your used carbide, and check the status of your shipment.

To find out more, please contact your Authorised Distributor.

Green Boxes for green companies

The Green Box™ program is a safe and efficient way for you to package and ship your spent carbide tools to an authorised recycling location.

Qualified used carbide includes mixed coated and uncoated metalcutting tools free of chips, oil, and steel contamination. Material must be free of braze.

Anyone Can Regrind Your Tools — Only We Can Truly Recondition Them

Why recondition?

Our Reconditioning Services help optimise the total value of your metalcutting tools throughout their entire life cycle by giving them "like-new" performance characteristics — with rapid turnaround time — so the tools you need are always on-hand and perform just like new.

We recondition:

- Solid carbide drills
- Reamers
- Solid carbide taps
- Solid carbide endmills
- PCD/CBN tools

Reconditioning is an affordable way to make your tooling investment last longer and to achieve continued top performance of your drills and end mills.

By sending your worn drills and end mills for reconditioning, you will get:

- Proprietary geometry.
- Certified coatings.
- Superior quality.
- Like-new performance.
- Fast turnaround time.
- Application support throughout the entire tool life cycle.

Tools can often be reconditioned up to five times.

To use the WIDIA™ tool Reconditioning Services, follow these simple steps:

1. Contact the Customer Service center nearest you for instructions.
2. Package the tools in a sturdy box.
3. Find the reconditioning center nearest you:
   - North America
   - South America
   - Europe
   - Asia

   Ship the tools with the instructions from Customer Service.
4. Reconditioned tools will be returned to you from the reconditioning center.

Contact your local Authorised WIDIA Distributor to get started.

Customer Application Support

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!

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

Service Level Excellence:

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

Services Provided:

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

Best-in-Class Support Tools and Technology:

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

Customer Application Support

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.

Convenient Access Options:

Originating Country	Language	Phone	Fax	E-mail
Australia	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Austria	German	0800 291630*	0800 291631*	eu.techsupport@widia.com
Belgium	English/French	0800 80410*	0800 80411*	eu.techsupport@widia.com
China	English	400 889 2136	001-724-539-6830	ap.techsupport@widia.com
Denmark	English	808 89295*	808 89297*	na.techsupport@widia.com
Finland	English	0800 919413*	0800 919415*	na.techsupport@widia.com
France	French	080 5540 379*	080 5540 029*	eu.techsupport@widia.com
Germany	German	0800 1015774*	0800 0007531*	eu.techsupport@widia.com
India	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Israel	English	1809 449907	1809 439845	na.techsupport@widia.com
Italy	Italian	800 916568*	800 917749*	eu.techsupport@widia.com
Japan	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Korea (South)	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Malaysia	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Netherlands	English	0800 0201131*	0800 0201135*	na.techsupport@widia.com
New Zealand	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Norway	English	800 10081	800 10001	na.techsupport@widia.com
Poland	Polish	00800 4411943	00800 4411940	eu.techsupport@widia.com
Singapore	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
South Africa	English	0800 981644*	0800 981645*	na.techsupport@widia.com
Sweden	English	020798794	020790477	na.techsupport@widia.com
Taiwan	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Thailand	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
United Kingdom	English	0800 028 2996*	0800 028 5721*	na.techsupport@widia.com
USA	English	888-539-5145*	724-539-6830*	na.techsupport@widia.com

** Toll-free number.*

WIDIA

Technical Information

Toolholder Application Data J2
Approach Angles J3
Selection of Toolholder J4–J5
Insert Selection J6–J7
Surface Roughness J8–J10
Dimensions and Tolerances J12, J17
Mounting Dimensions for Cartridges J13
Troubleshooting J14–J15
Hardness Cross Reference J16–J17
Equations J18
Cross Reference J18
Decimal Equivalent Chart J19
Material Technical Information J20–J25
Material Overview J26

Nomenclature with Respect to Workpiece

Insert Orientation with Respect to Workpiece

d =	Depth of Cut	Xr=	Approach Angle
le =	Diameter	f =	Feed
		l =	Insert Cutting Edge Length

90° approach angle toolholders are generally preferred for machining slender jobs for workpieces held between centers.

75° approach angle toolholders are preferred for machining barrel-type components and operations with slight interruptions.

95° approach angle toolholders are preferred for versatile operations like OD turning and facing.

45° approach angle toolholders are preferred for rough machining and for chamfering operations with heavy interruptions.

feature	negative rake	positive rake
back rake	• Moves chips towards the machined surface. 	• Moves chips away from the machined surface.
side rake	• Moves chips towards the job shoulder. 	• Moves chips away from the job shoulder.
advantages	• Cutting edge is stronger. • Can sustain higher cutting forces. • Ideal for machining interrupted cuts. • Has higher number of cutting edges.	• Free cutting action. • Generates less heat. • Consumes less horsepower. • Directs chips away from the job.
disadvantages	• Compresses the metal. • Consumes more horsepower. • Directs chips towards the job. • Generates more heat while cutting.	• Has fewer cutting edges. • Cutting edge is not strong.

80° Diamond Insert Versatility

SNMG

TNMG

CNMG

Advantages of the 80° Diamond:

- CNMG has greater strength for maximum material removal.
- CNMG is available in all types of geometries.
- One insert covers a wide variety of jobs.
- CNMG is versatile in application.

Insert selection is mainly based on the characteristics of the insert and the requirements of the application. Performance aspects and cost considerations should be taken into account in the selection process together with the cutting material grade.

Insert Shape

In general, inserts with larger corner angles should be preferred to those with smaller angles in the following order:
S (90°) – C and W (80°) – T (60°) – D (55°) – V (35°).

Where applicable, the trigon shape W (80°) should be preferred to the C insert, as more cutting edges are available. Round inserts of shape R are an alternative to S inserts, and may also be suitable for use in form turning.

Negative-rake inserts, which are usable on both sides, are more cost effective than one-sided negative-rake inserts. Positive-rake inserts offer advantages in ID turning operations and for thin-walled parts and soft work materials.

Cutting Edge Length

The size of an indexable insert is governed by maximum depth of cut (ap), the cutting edge angle χr, and by insert shape and geometry.

With cutting edge angles from 75–105°, the effective cutting edge length is roughly equal to the maximum depth of cut. In outward facing, particularly form turning (copying), the effective cutting edge angle is reduced. Because of the lower thickness of cut, it is possible to use greater cutting edge lengths than stated.

$$le = \frac{ap}{\sin \chi r}$$

ap = Depth of cut

le = Effective cutting edge length (width of cut)

l = Insert cutting edge length

χr = Cutting edge angle

Maximum Effective Lengths le of Cutting Edges:

geometry	S	C	T	D	V	W	R
-2, -22	0,3 l	0,3 l	0,2 l	0,2 l	—	—	—
-4, -41, -48, -AP	0,5 l	0,5 l	0,3 l	0,3 l	—	0,4 l	—
-MT..., -49, -5, -65, -8	0,7 l	0,7 l	0,5 l	0,5 l	0,2 l	0,5 l	0,4 d

Cutting edge length/effective length

Corner radius
The insert corner determines the strength of the cutting point, the maximum admissible feed, and the surface finish of the workpiece. Select the largest possible corner radius.

Roughing
The following minimum radii, depending on feed, are recommended for rough turning.

Radius r ≥ 1,6 x feed f for insert shapes C and S
Radius r ≥ 2,5 x feed f for insert shapes D and T

Cutting edge length l (mm)

Cutting edge length l (mm)

Recommended Maximum Feeds

The recommended maximum feeds are based on cutting edge angles 75–105°. Higher feed values are possible under favourable conditions. Under non-rigid conditions, lower values should be applied or smaller radii selected, especially if vibration occurs. Larger radii are generally recommended for cast iron, cast steel, and interrupted cuts.

Finishing

In finishing, exacting demands are placed on surface finish and part accuracy. To determine approximately the surface finish to be expected in turning with feeds > 0,1mm, the following formula for theoretical roughness height Rth can be used.

If the theoretical roughness height Rth is assumed to be roughly equal to Rz, the roughness average Ra can be inferred, which does not show a fixed relationship to Rz. A conversion ratio of Rz:Ra = 4:1 is generally appropriate.

$$Rth\ [\mu m] = \frac{125 \times f^2}{r}$$

Maximum Feed (mm) for Radius r

insert shape	0,4	0,8	1,2	1,6	2,4
C S	0,25	0,5	0,8	1,0	1,6
D T	0,16	0,32	0,5	0,63	1,0

Theoretical Roughness Height Rth [μm] for Feed f

radius	0,10	0,12	0,16	0,20	0,25	0,32
0,4	3,2	4,5	8,0	12,5	20,0	—
0,8	1,6	2,2	4,0	6,3	10,0	16,0
1,2	—	1,5	2,8	4,2	6,3	10,7
1,6	—	—	2,0	3,2	5,0	8,0

Approximate Reference Values for the Ratio Rz to Ra

Rz [μm]	1,6	2,5	4,0	6,3	10,0	16,0	16,0
Ra [μm]	0,4	0,6	1,0	1,6	2,5	4,0	6,3

Good surfaces are achieved with:
- Higher cutting speeds.
- Inserts with sharp cutting edges.
- Positive rake angles and positive chipbreaker geometries.
- Use of cermets.
- Rigid machining setups.
- Use of easily machinable work materials.
- Use of cutting fluid.

Surface characteristics:

AA ≙ arithmetic average Ra

CLA ≙ centerline average Ra

RMS ≙ root mean square 1,1 x AA

1 μin = 0,025mm

1 mm = 40 μin

Irregularities that form surface relief and that are conventionally defined within the area where deviations of form and waviness are eliminated. The irregularities in the surface roughness, such as traverse feed marks and irregularities within them, result from the inherent action of the production process.

Primary Texture (Roughness)

Secondary Texture (Waviness)

The component of surface roughness upon which roughness is superimposed. Waviness may result from such factors as machine or work deflections, vibrations, chatter, or heat treatment of warping strains.

Rmax = Distance between two lines parallel to the mean line and touching the profile at the highest and lowest points within the sampling length.

Rz = Average difference between the 5 highest peaks and 5 deepest valleys within the sampling length measured from a line parallel to the mean line and not crossing the profile.

Rz = (R1 + R3 + R5 + R7 + R9) – (R2 + R4 + R6 + R8 + R10) / 5

Machining Symbol

any production method | machining | without removal of material

Symbols to Denote Surface Roughness

old method													
present method (in µm and grades)	0,012	0,025	0,05	0,10	0,20	0,40	0,80	1,6	3,2	6,3	12,5	25	50
		N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12

Ra = Average value of ordinates (Y1, Y2…Yn) from their mean line.

$Ra = 1/l \int_0^l |y| \, dx$

$Ra = \frac{\sum_1^n |yi|}{n}$

Table gives approximate values only.

1µm = 0,001mm = 39µ²
1µ² = 0,0000254mm

Surface FOMOSJ grade (OS 3073)

Surface Roughness

Rt/max µm	CLA µm	CLA µ²	RMS µm	RMS µ²	UDSSR class	CCCP µm Rt
0,06	0,02	0,75	0,02	0,08	14	0,06–0,12
0,10	0,03	1,20	0,04	1,30	13	0,06–0,12
0,20	0,06	2,50	0,08	2,80	12	0,12–0,25
0,30	0,09	3,70	0,10	4,20	11	0,25–0,50
0,40	0,13	5,00	0,14	5,60	—	—
0,50	0,16	6,70	0,18	6,90	—	—
0,60	0,19	7,50	0,21	8,30	10	0,50–0,80
0,70	0,20	8,70	0,25	9,70	—	—
0,80	0,25	10,00	0,28	11,10	—	—
0,90	0,28	11,20	0,32	12,50	—	—
1,00	0,31	12,50	0,35	14,00	—	—
1,20	0,38	15,80	0,42	16,70	9	0,80–1,60
1,50	0,47	18,80	0,53	20,90	—	—
1,80	0,57	22,60	0,64	25,50	—	—
2,00	0,64	25,10	0,78	27,90	8	1,60–3,20
2,40	0,73	30,10	0,85	33,40	—	—
2,80	0,89	35,20	0,99	39,00	—	—
3,00	0,95	37,60	1,06	41,90	—	—
3,50	1,11	43,90	1,24	48,80	—	—
4,00	1,27	50,20	1,41	55,80	7	3,20–6,30
5,00	1,59	62,70	1,77	69,70	—	—
6,00	1,91	75,50	2,12	83,60	—	—
7,00	2,22	87,50	2,48	92,60	—	—
8,00	2,54	100,00	2,83	111,70	6	6,30–10,00
10,00	3,16	125,50	3,54	140,00	—	—
20,00	6,40	251,00	7,60	279,00	5	10,00–20,00
40,00	12,70	205,00	14,10	558,00	4	20,00–40,00
60,00	19,10	755,00	21,20	836,00	3	40,00–63,00
125,00	39,50	1560,00	43,50	750,00	2	63,00–125,00
200,00	64,00	2510,00	78,00	2790,00	1	125,00–200,00

Sl. No.	Manufacturing Process	Values in Ra and µm (0,012 0,025 0,050 0,10 0,20 0,40 0,80 1,6 3,2 6,3 12,5 25 50 100 200)
1	sand casting	5–50
2	permanent mould casting	0,80–6,30
3	die casting	0,80–3,20
4	high-pressure casting	0,32–2
5	hot rolling	2,50–50
6	forging	1,60–25
7	extrusion	0,16–5
8	flame cutting, sawing, and chipping	6,30–100
9	radial cut-off sawing	1–6,30
10	hand grinding	6,30–25
11	disc grinding	1,60–25
12	filing	0,25–25
13	planing	1,60–50
14	shaping	1,60–25
15	drilling	1,60–20
16	turning and milling	0,32–25
17	boring	0,40–6,30
18	reaming	0,40–3,20
19	broaching	0,40–3,20
20	hobbing	0,40–3,20
21	surface grinding	0,063–5
22	cylindrical grinding	0,063–5
23	honing	0,025–0,40
24	lapping	0,012–0,16
25	polishing	0,040–0,16
26	burnishing	0,040–0,80
27	superfinishing	0,016–0,32

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External Turning, Internal Turning

In shape, dimensions, and designations, WIDIA™ toolholders for indexable inserts conform with international standards. The dimensions f and l1 relate to the cutting points of gage inserts of inscribed circle d and corner radius r.

When inserts with smaller or larger corner radii are selected, the dimensions determined by the corner radius will change. For correction values for external turning, see DIN 4984, Part 1; for internal turning, DIN 8025, Part 1.

inscribed circle	4,76–7,94	9,52–12,7	15,88–19,05	25,4
circle radius r	0,4	0,8	1,2	2,4

Standard Tolerances, External Turning

Cutting edge height h = js 13
Shank height h = h 13
Shank width b = h 13
Holder length l1 = k 16
Dimension f = + 0,5mm
(± 0,25 for symmetrical holders)
Approach angle χ = ± 1°
for χ = 90° + 2°

Standard Tolerances, Internal Turning

Shank diameter d1 = g 7
Holder length l1 = k 16
Dimension f = -0,25mm
Approach angle χ = ± 1°
for χ = 90° + 2°

Mounting Dimensions for Cartridges
DIN 4985 and ISO 5611

Fastening Screw and Spring Washer

cartridge size	h1	D min	d	e	l'	g	s	t min	Zmax	fastening screw	spring washer
06	6	20	17	12	23	M 3,5 x 0,60	3,5	10	0,3	MS2173	CSW 035 040
08	8	25	22	17	30	M 4,0 x 0,70	4,5	10	0,3	MS2175	CSW 040 050
10	10	40	37	20	47	M 6,0 x 1,00	5,0	14	0,4	191.405	CSW 060 050
12	12	50	47	20	52	M 6,0 x 1,00	6,0	14	0,4	191.406	CSW 060 050
16	16	60	57	25	59	M 8,0 x 1,25	—	15	0,6	191.407	CSW 060 080
20	20	70	67	30	66	M 8,0 x 1,25	—	15	0,6	191.407	CSW 060 080

[1] for holder shape K, S, and W I.

Holder Sizes

06,08 CA
Adjustment range
± 0,80mm

10,12 CA
Adjustment range
± 1,00mm

$$b = \frac{D}{2} - f$$

16,20 CA
Adjustment range
± 1,00mm

$$b = \frac{D}{2} - f$$

Introduction

Troubleshooting should be performed in a sequential method to identify and solve your machining problems. These problems can be recognised as premature insert edge failure, part appearance, machine noise or vibration, and tool appearance. Successful troubleshooting requires that we correctly identify the problem, then take the necessary corrective action one step at a time. The four key areas of concern are:

1. cutting tool material (grade)
2. machine
3. workpiece
4. set-up

This section discusses possible causes and recommends corrective actions for each of the four areas listed. Remember, if more than one step is taken concurrently, the real cause of the problem may never be discovered. Always perform one corrective measure at a time.

1. Chipping: Appears like normal flank wear to the untrained eye. Actually, normal flank wear lands have a fine, smooth wear pattern, while a land formed by chipping has a saw-toothed, uneven surface. If chipping is not detected soon enough, it may be perceived as depth-of-cut notching.

cause	solution
grade	Use a tougher grade.
edge prep	Use larger hone or T-land possible.
built-up edge	Increase speed.
chatter	Check system rigidity for proper part clamping. Correct worn gibs/bearings. Check for improper tool mounting.
feed	Reduce feed.
recutting chips	Use air blast or coolant to remove chips.

2. Depth-of-cut notching: Appears when chipping or localised wear at the depth-of-cut line on the rake face and flank of the insert occurs. Notching is primarily caused by the condition of the workpiece material. Material conditions prone to depth-of-cut notch include an abrasive workpiece skin of scale, abrasive properties of high-temperature alloys like INCONEL®, a work-hardened outer layer resulting from a previous machining operation, or heat-treated material above 55 HRC.

cause	solution
grade	Use a more wear-resistant grade of carbide.
feed	Reduce feed.
speed	Reduce speed.
edge-prep	Use honed or T-land inserts.
programming	Vary depth of cut on very abrasive materials.

3. Thermal cracks: These cracks run perpendicular to the insert's cutting edge and are caused by the extreme temperature variations.

These temperature variations create heat stresses in the insert, which can result in thermal cracks. To the untrained eye, advanced thermal cracking could appear as chipping.

cause	solution
speed and feed	Reduce speed and possibly the feed.
coolant	Shut off coolant.
grade	Use coated grade.

4. Built-up edge: This condition involves the adhesion of layers of workpiece material to the top surface of the insert. Hardened pieces of the adhered material periodically break free, leaving an irregularly shaped depression along the cutting edge. This causes damage to the part and insert. Cutting forces also will be increased due to built-up edge.

cause	solution
speed	Increase cutting speed.
feed	Increase feed.
coolant	Use mist or flood coolant to avoid chips sticking to the insert when machining stainless steel and aluminium alloys.
edge-prep	Use sharper edge, positive rake PVD inserts; use polished inserts for non-ferrous materials.

5. Crater wear: A relatively smooth, regular depression is produced on the insert's rake face. Crater wear occurs in two ways:

1. Material adhering to the insert's top surface is dislodged, carrying away minute fragments of the top surface of the insert.
2. Frictional heat builds up from the flow of chips over the top surface of the insert. Eventually, this heat buildup softens the insert behind the cutting edge and removes minute particles of the insert until a crater forms.

cause	solution
grade	Use a more wear-resistant grade.
speed	Reduce cutting speed.
edge-prep	Use smaller T-land or increase feed to proper range for T-land.

6. Flank wear: Uniform flank wear is the preferred method of insert failure because it can be predicted. Excessive flank wear increases cutting forces and contributes to poor surface finish.

NOTE: Inserts should be indexed when roughing (0,38mm–0,50mm flank wear is reached) and finishing (0,25mm–0,38mm flank wear or sooner).

cause	cause
speed	Speed should be reduced without changing feed.
feed	Increase feed.
grade	Use more wear-resistant grade. Change to a coated grade if you are now using an uncoated grade.
grade	Inspect insert to determine if proper style is being used.

7. Multiple factors: When wear, chipping, thermal cracking, and breakage occur at once, the machine operator must look beyond the normal feed, speed, and depth-of-cut adjustments to find the root cause of the problem.

cause	cause
feed	Reduce feed rate to relieve cutting forces.
insert/grade	If possible, use a larger nose radius. Use T-land insert. Use a tougher grade of carbide.

Hardness Cross Reference

Brinell		Vickers	Rockwell			Shore	tensile strength
steel ball	hard metal ball		60 kg	100 kg	150 kg		
HB	HB	HV	HRA	HRB	HRC	Sh	N/mm²
—	—	940	85,6	—	68,0	97	—
—	—	920	85,3	—	67,5	96	—
—	—	900	85,0	—	67,0	95	—
—	(767)	880	84,7	—	66,4	93	—
—	(757)	860	84,4	—	65,9	92	—
—	(745)	840	84,1	—	65,3	91	—
—	(733)	820	83,8	—	64,7	90	—
—	(722)	800	83,4	—	64,0	88	—
—	(712)	—	—	—	—	—	—
—	(710)	780	83,0	—	63,3	87	—
—	(698)	760	82,6	—	62,5	86	—
—	(684)	740	82,2	—	61,8	—	—
—	(682)	737	82,2	—	61,7	84	—
—	(670)	720	81,8	—	61,0	83	—
—	(656)	700	81,3	—	60,1	—	—
—	(653)	697	81,2	—	60,0	81	—
—	(647)	690	81,1	—	59,7	—	—
—	(638)	680	80,8	—	59,2	80	—
—	630	670	80,6	—	58,8	—	—
—	627	667	80,5	—	58,7	79	—
—	—	677	80,7	—	59,1	—	—
—	601	640	79,8	—	57,3	77	—
—	—	640	79,8	—	57,3	—	—
—	578	615	79,1	—	56	75	—
—	—	607	78,8	—	55,6	—	—
—	555	591	78,4	—	54,7	73	2095
—	—	579	78	—	54	—	2010
—	534	569	77,8	—	53,5	71	1981
—	—	553	77,1	—	52,5	—	1912
—	514	547	76,9	—	52,1	70	1893
(495)	—	539	76,7	—	51,6	—	1854
—	—	530	76,4	—	51,1	—	1824
—	495	528	76,3	—	51,0	68	1824
(477)	—	516	75,9	—	50,3	—	1775
—	—	508	75,6	—	49,6	—	1736
—	477	508	75,6	—	49,6	66	1736
(461)	—	495	75,1	—	48,8	—	1687
—	—	491	74,9	—	48,5	—	1667
—	461	491	74,9	—	48,5	65	1667
444	—	474	74,3	—	47,2	—	1589
—	—	472	74,2	—	47,1	—	1589
—	444	472	74,2	—	47,1	63	1589
429	429	455	73,4	—	45,7	61	1510
415	415	440	72,8	—	44,5	59	1461
401	401	425	72,0	—	43,1	58	1392
388	388	410	71,4	—	41,8	56	1334
375	375	396	70,6	—	40,4	54	1265
363	363	383	70,0	—	39,1	52	1216
352	352	372	69,3	(110,0)	37,9	51	1177
341	341	360	68,7	(109,0)	36,6	50	1128
331	331	350	68,1	(108,5)	35,5	48	1098
321	321	339	67,5	(108,0)	34,3	47	1059
311	311	328	66,9	(107,5)	33,1	46	1030
302	302	319	66,3	(107,0)	32,1	45	1010
293	293	309	65,7	(106,0)	30,9	43	971
285	285	301	65,3	(105,5)	29,9	—	951
277	277	292	64,6	(104,5)	28,8	41	922
269	269	284	64,1	(104,0)	27,6	40	892
262	262	276	63,6	(103,0)	26,6	39	873
255	255	269	63,0	(102,0)	25,4	38	843
248	248	261	62,5	(101,0)	24,2	37	824
241	241	253	61,8	100,0	22,8	36	804

NOTE: Values in ( ) are not common

(continued)

Hardness Cross Reference *(continued)*

Brinell		Vickers	Rockwell			Shore	tensile strength
steel ball	hard metal ball		60 kg	100 kg	150 kg		
HB	HB	HV	HRA	HRB	HRC	Sh	N/mm²
235	235	247	61,4	99,0	21,7	35	785
229	229	241	60,8	98,2	20,5	34	765
223	223	234	—	97,3	(18,8)	—	—
217	217	228	—	96,4	(17,5)	33	726
212	212	222	—	95,5	(16,0)	—	706
207	207	218	—	94,6	(15,2)	32	686
201	201	212	—	93,8	(13,8)	31	677
197	197	207	—	92,8	(12,7)	30	657
192	192	202	—	91,9	(11,5)	29	637
187	187	196	—	90,7	(10,0)	—	618
183	183	192	—	90,0	(9,0)	28	618
179	179	188	—	89,0	(8,0)	27	598
174	174	182	—	87,8	(6,4)	—	588
170	170	178	—	86,8	(5,4)	26	569
167	167	175	—	86,0	(4,4)	—	559
163	163	171	—	85,0	3,3	25	549
156	156	163	—	82,9	(0,9)	—	520
149	149	156	—	80,8	—	23	500
143	143	150	—	78,7	—	22	490
137	137	143	—	76,4	—	21	461
131	131	137	—	74	—	—	451
126	126	132	—	72	—	20	431
121	121	127	—	69,8	—	19	412
116	116	122	—	67,6	—	18	402
111	111	117	—	65,7	—	15	382

NOTE: Values in ( ) are not common

Dimensions and Tolerances

problem	cause	possible solution
surface roughness	It is affected by the configuration and condition of the cutting point, the cutting conditions, and the rigidity of the machining setup.	• Increase cutting speed. • Reduce feed. • Increase radius. • Use cermets where possible when cutting steel. • Avoid vibrations. • Use cutting fluid.
chatter	Chatter marks or surface damage due to unfavourable chip flow call for special measures.	• Vary feed slightly. • Change approach angle. • Select different chipbreaker geometry. • Check rigidity of tool and holding system.
deformation	Shape and dimensional accuracy are affected by the conditon of the overall machine-part-tool setup.	• Select grade with adequate wear resistance. • Check cutting parameters, including machining allowance. • Check rigidity of tool and work holding. • Keep cutting forces low. • Avoid unbalance.
vibrations, instability	Vibrations in the workpiece usually occur with thin-walled parts and non-rigid setups. Unbalance and excessive cutting forces also cause problems.	• Select larger approach angle for the tool. • Use positive geometries. • Use smaller radii. • Change turning frequency (RPM). • Reduce chip section.
burring	Burring cannot always be avoided when cutting steel workpieces. Chamfering operations should therefore be planned where possible.	• Select inserts with positive geometry. • Use sharpest possible cutting edges (e.g., cermets). • Reduce approach angle. • Check sequence of operations.

Equations

symbol	unit	equations	remarks	validity
n	1/min	$n = (vc \times 1000) / (D \times \pi)$		D, F, B1
vc	m/min	$vc = (D \times \pi \times n) / 1000$	cylindrical turning	D, B
		$vc = (d1 \times \pi \times n) / 1000$		F
tc	min	$tc = \pi \times (Da^2 - Di^2) / (4 \times f \times vc \times 1000)$	face turning vc = constant	D
		$tc = (Da - Di) / (f \times n)$	face turning	D
		$tc = lc / vf$		D, F, B
		$tc = lc / (f \times n)$	cylindrical turning	D, B
		$tc = lc / (fZ \times Z \times n)$		F
vf	mm/min	$vf = f \times n$		D, B
		$vf = fZ \times Z \times n$		F
Q	cm^3/min	$Q = ap \times f \times vc$		D
		$Q = (ap \times ae \times vf) / 1000 = (ap \times ae \times fZ \times Z \times n) / 1000$		F
		$Q = (D \times f \times vc) / 4$		B
P	kW	$P = X1 \times X2 \times (ap \times f \times vc \times kc) / (6 \times 10^4 \times \eta)$		D
		$P = X1 \times X2 \times (ap \times ae \times vf \times kc) / (6 \times 10^7 \times \eta) = X1 \times X2 \times (Q \times kc) / (6 \times 10^4 \times \eta)$		F
		$P = X1 \times X2 \times (D \times f \times vc \times kc) / (24 \times 10^4 \times \eta)$		B
Mc	Nm	$Mc = X1 \times X2 \times (D \times ap \times f \times kc) / 2000$		D
		$Mc = X2 \times (D2 \times f \times kc) / 8000$		B
Fc	N	$Fc = X1 \times X2 \times ap \times f \times kc = X1 \times X2 \times b \times h^{1-mc} \times kc1.1$		D
		$Fc = X1 \times X2 \times ap \times fZ \times kc \times ZiE = X1 \times X2 \times b \times hm^{1-mc} \times kc1.1 \times ZiE$		F
Ff	N	$Ff = X1 \times X2 \times 0{,}35 \times D \times f \times kc = X1 \times X2 \times 0{,}35 \times D \times f^{1-mc} \times kc1.1$		B
ZiE		$ZiE = (\phi C \times Z) / 360$		F
ϕC	grade	$\gamma C = \phi 1 + \phi 2 = \phi A - \phi E$		F
$\phi 1$	grade	$\sin \phi 1 = (2 \times ae1) / d1$		F
$\phi 2$	grade	$\sin \phi 2 = (2 \times ae2) / d1$		F
hm	mm	$hm = (\sin \chi e \times fZ \times ae \times 360) / (\pi \times \phi C \times d1)$		F
		$hm \approx \sin \chi e \times fZ \times \sqrt{(ae / d1)}$	if $ae \leq (d1 / 3)$	F
Rth	µm	$Rth \approx (f2 \times 1000) / (8 \times r\varepsilon)$		D

D = Turning F = Milling B = Drilling

Cross Reference Metric • Inch Units

symbol	unit	
	metric	inch
ae (WOC)	mm = 25,4 x in	in = 0,0394 x mm
ap (DOC)	mm = 25,4 x in	in = 0,0394 x mm
b	mm = 25,4 x in	in = 0,0394 x mm
d, d1 etc	mm = 25,4 x in	in = 0,0394 x mm
f	mm = 25,4 x in	in = (ipr)= 0,0394 x mm
Fc, Ff, Fp	N = 4,448 x lbs	lbs = 0,225 x N
fZ	mm = 25,4 x in	in = (ipt) = 0,0394 x mm
h, hm	mm = 25,4 x in	in = 0,0394 x mm
kc, kc1.1 etc	N/mm^2 = 145 x psi	psi = 0,0069 x N/mm^2
KT	µm = 25,4 x µin	µin = 0,0394 x µm
l, l1 etc	mm = 25,4 x in	in = 0,0394 x mm
P, Pc, Pe	kW = 0,7457 x hp	hp = 1,341 x kW
Ra, Rt, Rz	µm = 25,4 x µin	µin = 0,0394 x µm
Rm	N/mm^2 = 2865 x psi	psi = 0,000349 x N/mm^2
VB	mm = 25,4 x in	in = 0,0394 x mm
vc	m/min = 0,305 x SFM	sfm = 3,281 x m/min
vf	mm/min = 25,4 x IPM	ipm = 0,0394 x mm/min

Decimal Equivalent Chart

size	decimal inches	size	decimal inches	size	decimal inches	size	decimal inches	size	decimal inches
107	0.0019	57	0.0430	9/64	0.1406	6,60mm	0.2598	7/16	0.4375
106	0.0023	1,10mm	0.0433	3,60mm	0.1417	G	0.2610	11,20mm	0.4409
105	0.0027	1,15mm	0.0453	27	0.1440	6,70mm	0.2638	11,50mm	0.4528
104	0.0031	56	0.0465	3,70mm	0.1457	17/64	0.2656	29/64	0.4531
103	0.0035	3/64	0.0469	26	0.1470	6,75mm	0.2657	11,80mm	0.4646
102	0.0039	1,20mm	0.0472	3,75mm	0.1476	H	0.2660	15/32	0.4688
101	0.0043	1,25mm	0.0492	25	0.1495	6,80mm	0.2677	12,00mm	0.4724
100	0.0047	1,30mm	0.0512	3,80mm	0.1496	6,90mm	0.2717	12,20mm	0.4803
99	0.0051	55	0.0520	24	0.1520	I	0.2720	31/64	0.4844
98	0.0055	1,35mm	0.0531	3,90mm	0.1535	7,00mm	0.2756	12,50mm	0.4921
97	0.0059	54	0.0550	23	0.1540	J	0.2770	1/2	0.5000
96	0.0063	1,40mm	0.0551	5/32	0.1562	7,10mm	0.2795	12,80mm	0.5039
95	0.0067	1,45mm	0.0571	22	0.1570	K	0.2810	13,00mm	0.5118
94	0.0071	1,50mm	0.0591	4,00mm	0.1575	9/32	0.2812	33/64	0.5156
93	0.0075	53	0.0595	21	0.1590	7,20mm	0.2835	13,20mm	0.5197
92	0.0079	1,55mm	0.0610	20	0.1610	7,25mm	0.2854	17/32	0.5312
0,20mm	0.0079	1/16	0.0625	4,10mm	0.1614	7,30mm	0.2874	13,50mm	0.5315
91	0.0083	1,60mm	0.0630	4,20mm	0.1654	L	0.2900	13,80mm	0.5433
90	0.0087	52	0.0635	19	0.1660	7,40mm	0.2913	35/64	0.5469
0,22mm	0.0087	1,65mm	0.0650	4,25mm	0.1673	M	0.2950	14,00mm	0.5512
89	0.0091	1,70mm	0.0669	4,30mm	0.1693	7,50mm	0.2953	14,25mm	0.5610
88	0.0095	51	0.0670	18	0.1695	19/64	0.2969	9/16	0.5625
0,25mm	0.0098	1,75mm	0.0689	11/64	0.1719	7,60mm	0.2992	14,50mm	0.5709
87	0.0100	50	0.0700	17	0.1730	N	0.3020	37/64	0.5781
86	0.0105	1,80mm	0.0709	4,40mm	0.1732	7,70mm	0.3031	14,75mm	0.5807
85	0.0110	1,85mm	0.0728	16	0.1770	7,75mm	0.3051	15,00mm	0.5906
0,28mm	0.0110	49	0.0730	4,50mm	0.1772	7,80mm	0.3071	19/32	0.5938
84	0.0115	1,90mm	0.0748	15	0.1800	7,90mm	0.3110	15,25mm	0.6004
0,30mm	0.0118	48	0.0760	4,60mm	0.1811	5/16	0.3125	39/64	0.6094
83	0.0120	1,95mm	0.0768	14	0.1820	8,00mm	0.3150	15,50mm	0.6102
82	0.0125	5/64	0.0781	13	0.1850	O	0.3160	15,75mm	0.6201
0,32mm	0.0126	47	0.0785	4,7mm	0.1850	8,10mm	0.3189	5/8	0.6250
81	0.0130	2,00mm	0.0787	4,75mm	0.1870	8,20mm	0.3228	16,00mm	0.6299
80	0.0135	2,05mm	0.0807	3/16	0.1875	P	0.3230	16,25mm	0.6398
0,35mm	0.0138	46	0.0810	4,8mm	0.1890	8,25mm	0.3248	41/64	0.6406
79	0.0145	45	0.0820	12	0.1890	8,30mm	0.3268	16,50mm	0.6496
0,38mm	0.0150	2,10mm	0.0827	11	0.1910	21/64	0.3281	21/32	0.6562
1/64	0.0156	2,15mm	0.0846	4,90mm	0.1929	8,40mm	0.3307	16,75mm	0.6594
0,40mm	0.0157	44	0.0860	10	0.1935	Q	0.3320	17,00mm	0.6693
78	0.0160	2,20mm	0.0866	9	0.1960	8,50mm	0.3346	43/64	0.6719
0,42mm	0.0165	2,25mm	0.0886	5,00mm	0.1969	8,60mm	0.3386	17,25mm	0.6791
0,45mm	0.0177	43	0.0890	8	0.1990	R	0.3390	11/16	0.6875
77	0.0180	2,30mm	0.0906	5,10mm	0.2008	8,70mm	0.3425	17,50mm	0.6890
0,48mm	0.0189	2,35mm	0.0925	7	0.2010	11/32	0.3438	45/64	0.7031
0,50mm	0.0197	42	0.0935	13/64	0.2031	8,75mm	0.3445	18,00mm	0.7087
76	0.0200	3/32	0.0938	6	0.2040	8,80mm	0.3465	23/32	0.7188
75	0.0210	2,40mm	0.0945	5,20mm	0.2047	S	0.3480	18,50mm	0.7283
0,55mm	0.0217	41	0.0960	5	0.2055	8,90mm	0.3504	47/64	0.7344
74	0.0225	2,45mm	0.0965	5,25mm	0.2067	9,00mm	0.3543	19,00mm	0.7480
0,60mm	0.0236	40	0.0980	5,30mm	0.2087	T	0.3580	3/4	0.7500
73	0.0240	2,50mm	0.0984	4	0.2090	9,10mm	0.3583	49/ 64	0.7656
0,62mm	0.0244	39	0.0995	5,40mm	0.2126	23/64	0.3594	19,50mm	0.7677
72	0.0250	38	0.1015	3	0.2130	9,20mm	0.3622	25/32	0.7812
0,65mm	0.0256	2,60mm	0.1024	5,50mm	0.2165	9,25mm	0.3642	20,00mm	0.7874
71	0.0260	37	0.1040	7/32	0.2188	9,30mm	0.3661	51/64	0.7969
0,70mm	0.0276	2,70mm	0.1063	5,60mm	0.2205	U	0.3680	20,50mm	0.8071
70	0.0280	36	0.1065	2	0.2211	9,40mm	0.3701	13/16	0.8125
69	0.0292	2,75mm	0.1083	5,70mm	0.2244	9,50mm	0.3740	21,00mm	0.8268
0,75mm	0.0295	7/64	0.1094	5,75mm	0.2264	3/8	0.3750	53/64	0.8281
68	0.0310	35	0.1100	1	0.2280	V	0.3770	27/32	0.8438
1/32	0.0312	2,80mm	0.1102	5,80mm	0.2283	9,60mm	0.3780	21,50mm	0.8465
0,80mm	0.0315	34	0.1110	5,90mm	0.2323	9,70mm	0.3819	55/64	0.8594
67	0.0320	33	0.1130	A	0.2340	9,75mm	0.3839	22,00mm	0.8661
66	0.0330	2,90mm	0.1142	15/64	0.2344	9,80mm	0.3858	7/8	0.8750
0,85mm	0.0335	32	0.1160	6,00mm	0.2362	W	0.3860	22,50mm	0.8858
65	0.0350	3,00mm	0.1181	B	0.2380	9,90mm	0.3898	57/64	0.8906
0,90mm	0.0354	31	0.1200	6,10mm	0.2402	25/64	0.3906	23,00mm	0.9055
64	0.0360	3,10mm	0.1220	C	0.2420	10,00mm	0.3937	29/32	0.9062
63	0.0370	1/8	0.1250	6,20mm	0.2441	X	0.3970	59/64	0.9219
0,95mm	0.0374	3,20mm	0.1260	D	0.2460	10,20mm	0.4016	23,50mm	0.9252
62	0.0380	3,25mm	0.1280	6,25mm	0.2461	Y	0.4040	15/16	0.9375
61	0.0390	30	0.1285	6,30mm	0.2480	13/32	0.4062	24,00mm	0.9449
1,00mm	0.0394	3,30mm	0.1299	E	0.2500	Z	0.4130	61/64	0.9531
60	0.0400	3,40mm	0.1339	1/4	0.2500	10,50mm	0.4134	24,50mm	0.9646
59	0.0410	29	0.1360	6,40mm	0.2520	27/64	0.4219	31/32	0.9688
1,05mm	0.0413	3,50mm	0.1378	6,50mm	0.2559	10,80mm	0.4252	25,00mm	0.9843
58	0.0420	28	0.1405	F	0.2570	11,00mm	0.4331	63/64	0.9844
—	—	—	—	—	—	—	—	1"	1.0000

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	G-X 260 NiCr 4-2	—	Grade 2 A	—
0.9625	G-X 330 NiCr 4-2	—	Grade 2 B	—
0.9630	G-X 300 CrNiSi 9-5-2	—	Grade 2 C, D, E	—
0.9635	G-X 300 CrMo 15-3	—	Grade 3 A, B	—
0.9640	G-X 300 CrMoNi 15-2-1	—	Grade 3 A, B	—
0.9645	G-X 260 CrMoNi 20-2-1	—	Grade 3 C	—
0.9650	G-X 260 Cr 27	—	Grade 3 D	—
0.9655	G-X 300 CrMo 27-1	—	Grade 3 E	—
0.xxx	GGV - 30	—	—	FCV 300
0.xxx	GGV - 40	—	—	FCV 400
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	1 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	—	Grade120-90-02	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
—	—	—	GO	17
—	—	—	GO	18
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.A	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.G	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 k	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)	Z 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	Z 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	304S11	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	Z 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 6	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
—	—	—	var[1]	6–9
60 SiCr 8	F.1442	9260	var[1]	6–9
—	F.1581	4320	var[1]	6–9
16 NiCrMo 12	F.1525	—	var[1]	6–9
36 CrNiMo 4, 39 NiCrMo 3 1	36 CrNiMo 4, 40 NiCrMo 4	—	var[1]	6–9
SNCM 630	30 CrNiMo 8, 32 NiCrMo 16	—	var[1]	6–9
34 CrNiMo 6	34 CrNiMo 6	4340	var[1]	6–9
18 NiCrMo 12	F.1560	—	var[1]	6–9
38 Cr 2	38 Cr 2, 38 Cr 3	—	var[1]	6–9
46 Cr 2	46 Cr 2	—	var[1]	6–9
—	—	—	var[1]	6–9
34 Cr 4	34 Cr 4	5132	var[1]	6–9
37 Cr 4	37 Cr 4, 38 Cr 4	5135	var[1]	6–9
41 Cr 4	41 Cr 4, 42 Cr 4	5140	var[1]	6–9
34 CrS 4	34 CrS 4	—	var[1]	6–9
37 CrS 4	37 Cr 4, 38 Cr 4-1	—	var[1]	6–9
41 CrS 4	41 CrS 4, 42 Cr 4-1	—	var[1]	6–9
48 Si 7	F.1450	9260	var[1]	6–9
16 MnCr 5	F.1516	—	var[1]	6–9
20 MnCr 5	F.1523	—	var[1]	6–9
55 Cr 3	—	5155	var[1]	6–9
25 CrMoS 4, 25 CrMo 4	25 CrMoS 4, 30 CrMo 4-1	—	var[1]	6–9
25 CrMo 4	25 CrMo 4, 30 CrMo 4	4130	var[1]	6–9
34 CrMo 4, 35 CrMo 4	34 CrMo 4, 35 CrMo 4	4137	var[1]	6–9
42 CrMo 4	42 CrMo 4	—	var[1]	6–9
34 CrMoS 4, 35 CrMo 4	34 CrMoS 4, 35 CrMo 4	—	var[1]	6–9
42 CrMoS 4, 42 CrMo 4	42 CrMoS 4, 40 CrMo 4-1	—	var[1]	6–9
50 CrMo 4	50 CrMo 4	4150	var[1]	6–9
16 NiCrMo 2	F.1523	8620	var[1]	6–9
20 NiCrMo 2	—	8625	var[1]	6–9
—	—	—	var[1]	6–9
51 CrMoV 4	—	—	var[1]	6–9
51 CrV 4, 50 CrV 4	51 CrV 4	6150	var[1]	6–9
—	35 CrAlMo 5	A 355/D	var[1]	6–9
41 CrAlMo 7	41 CrAlMo 7	A 355/A	var[1]	6–9
31 CrMo 12	31 CrMo 12	—	var[1]	6–9
36 CrMoV 12	—	—	var[1]	6–9
—	—	A 355/C	var[1]	6–9

DIN ISO 513	VDI 3323	Material		Condition	Rm N/mm²	Hardness HB 30	Examples
P	1	Unalloyed steel/cast steel	C < 0,25%	G	420	125	9 SMn 28, St 37.3, C 10, Ck 22, GS-16 Mn 5
	2		0,25 ≤ C < 0,55%	G	650	190	35 S 20, GS-45, GS-52, St 52.3, C 25, C 45, Ck 45, Cf 53
	3	Free cutting steel		V	850	250	35 S 20, GS-45, GS-52, St 52.3, C 25, C 45, Ck 45, Cf 53
	4		0,55% ≤ C	G	750	220	GS-60, 60 S 20, C 60, Ck 67, C 60 W, Ck 75, C 105 W 1, C 110 W
	5			V	1000	300	GS-60, 60 S 20, C 60, Ck 67, C 60 W, Ck 75, C 105 W 1, C 110 W
	6	Low-alloyed steel/cast steel		G	600	180	15 Cr 3, 16 MnCr 5, 17 CrNiMo 6, 25 CrMo 4, 29 CrMoV 9, 30 CrNiMo8
	7			V	930	275	31 CrV 3, 42 CrMo 4, 51 CrV 4, 62 SiMnCr 4, 100 Cr 6, G-105 W 1
	8			V	1000	300	105 WCr 6
	9			V	1200	350	105 WCr 6
	10	High-alloyed steel/cast steel		G	680	200	X 210 Cr 12, X 40 CrMoV 5 1, X 30 WCrV 9 3, X 85 CrMoV 18 2
	11	Tool steel		V	1100	325	X 38 CrMoV 5 3, X 23 CrNi 17, X 155 CrVMo 12 1, S 6-5-2-5
	12	Stainless steel/cast steel		FE/MA	680	200	1.4000, 1.4005, 1.4021, 1.4109, 1.4119, 1.4120, 1.4313, 1.4510, 1.4512, 1.4523
	13.1			MA	820	240	1.4000, 1.4002, 1.4005, 1.4006, 1.4024, 1.4119, 1.4120, 1.4313, 1.4510, 1.4512, 1.4523
	13.2			MA-PH	1060	330	1.4542, 1.4548, 1.4923
M	14.1	Stainless steel/cast steel		AU	600	180	1.4301, 1.4401, 1.4436, 1.4541, 1.4550, 1.4568, 1.4571, 1.4573, 1.4580
	14.2			DU	740	230	1.4362, 1.4417, 1.4410, 1.4460, 1.4462, 1.4575, 1.4582
	14.3			S-AU	680	200	1.4465, 1.4505, 1.4506, 1.4529 (254SMO), 1.4539, 1.4563, 1.4577, 1.4586, 654SMO
	14.4			AU-PH	1060	330	1.4504, 1.4568
K	15	Grey iron GG		FE/PE		180	GG-10, GG-15, GG-170 HB
	16			PE		260	GG20, GG-25, GG-30, GG-25Cr
	17	Nodular iron GGG		FE		160	GGG-35.3, GGG-40, GGG-50, GGV-30
	18			PE		250	≥GGG-60, GGV-40
	19	Malleable iron GTS/GTW		FE		130	GTS-35-10, GTS-45-06, GTW-S-38-12
	20			PE		230	GTW-35-04, GTS-55-04, GTS-65-02
N	21	Wrought aluminium alloys		NAG		60	Al 99,5, AlMg 1
	22			AG		100	AlCuMg 1, AlMgSiPb, AlMgSi 1
	23	Cast aluminium alloys	Si < 12%	NAG		75	G-AlSi 10 Mg, G-AlSi12
	24			AG		90	G-AlCu 5 Si 3
	25		Si > 12%			130	G-AlSi 17, G-AlSi 23
	26	Copper/copper alloys	Pb > 1%			110	Free cutting brass, CuNi 18 Zn 19 Pb
	27					90	Brass, red brass, CuZn33, CuZn-/CuSnZn-alloys
	28					100	Bronze, electrolytic copper, CuNi 3 Si, CuSn-alloys
	29	Non-metals					Thermosetting plastics, FVK, Fibre-reinforced plastics, Bakelit
	30						Hard rubber
S	31	High-temperature alloys	Fe-based	G		200	1.4864, 1.4865, 1.4876
	32			AG		280	1.4864, 1.4865, 1.4876
	33		Ni-/Co-based	G		250	INCONEL® 718, Nimonic 80 A, Hasteloy, Udimet
	34			AG		350	INCONEL 718, Nimonic 80 A, Hasteloy, Udimet
	35			GO		320	INCONEL 718, Nimonic 80 A, Hasteloy, Udimet
	36	Titanium/titanium alloys, Alpha-/Beta-alloys			400		Titanium
	37			AG	1050		TiAl 6 V 4
H	38.1	Steel		H		45 HRC	90 MnV 8, Hardox 400
	38.2			H		55 HRC	Hardox 500
	39.1			H		60 HRC	HSS, 90 MnV 8
	39.2			H		> 62 HRC	HSS, 90 MnV 8
	40.1	Chilled cast iron		GO		400	G-X 260 Cr 27, G-X 260 NiCr 42, G-X 300 CrNiSi 9 5 2, G-X 330 NiCr 42
	40.2			GO		> 440	G-X 260 Cr 27, G-X 260 NiCr 42, G-X 300 CrNiSi 9 5 2, G-X 330 NiCr 42
	41.1	Cast iron		H		55 HRC	G-X 300 NiMo 3 Mg
	41.2			H		> 57 HRC	G-X 300 NiMo 3 Mg

Material Groups and Condition

Many materials — mostly steels — can be available in various microstructures that differ in their machinability significantly.
Those materials are part of several material groups depending on their actual conditions.

AG — Aged
AU — Austenitic, AISI 300
BF — Heat treated to specified strength
BG — Heat treated to specified microstructure
BY — Heat treated to improved machinability
DU — Stainless steel duplex (austenitic-ferritic)
FE — Ferritic
G — Annealed
GG — Grey cast iron
GGG — Nodular cast iron
GO — Cast
H — Hardened
MA — Martensitic
N — Normalised
NAG — Non-aged (non-aging)
PH — Precipitation hardened
S-AU — Superaustenitic
U — Untreated
V — Heat treated
var[1] — Variable

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1016538	SM820	A26
1016544	SM837	A27-28, A83
1016546	SM840	A25-26, A83
1016548	SM841	A27-28, A47, A83
1016602	SKTP343	A34
1016624	SKCP343	A31
1016626	SKDP343	A31-32
1016628	SKCP453	A31, A50
1016644	IWSN433	A43
1016674	ISSN433	A13
1017174	SMYE3	E41, E44
1017176	SMYI3	E41, E44
1017178	SMYE4	E41, E44
1017180	SMYI4	E41, E44
1017220	ITSN322	A11, A43, A77
1017226	IVSN322	A11-12, A44
1017228	SKVN343	A35
1017230	IDSN432	A9, A42, A69, A71
1017246	IRSN43	A14
1017252	ICSN432	A8-9, A42, A67, A69
1017276	ITSN433	A11, A43, A77
1017278	ISSN432	A10, A71, A73, A75
1017282	IVSN432	A11
1017294	ITSN534	A77
1017296	ISSN533	A10, A13
1017298	ICSN533	A8-9, A42
1017300	ISSN633	A10, A13, A71, A75
1017334	ICSN633	A42, A69
1018413	CM109	D41, E19
1018569	CM80	D38, D40, E14-15
1018571	CM81	D38, D40, E14-15
1019661	MS1495	D86
1020575	CKM6	A12-13, A43
1020577	CKM7	A9, A26-27, A42
1020581	CKM9	A11, A26-28, A43
1020583	CKM10	A25-26, A28, A47
1020595	CKM12	A8-10, A13, A42
1020597	CKM13	A27
1020601	CKM19	A27-28, A47
1020603	CKM20	A43, A83
1020605	CKM21	A8-11, A13-14, A42-43
1020607	CKM22	A9, A42
1020645	CKM26	A11
1020653	CKM31	A11-12, A44
1020657	CKM41	A69
1020787	KUAM20	A85, A87, A89, A91, A97-99
1020789	KUAM22	A67, A69, A71, A73, A75, A77, A81, A83
1020791	KUAM23	A79, A85, A91-93, A95, A97-99
1020793	KUAM24	A83
1020805	KUAM26	A77, A83
1020807	KUAM27	A69, A71, A75
1020809	KUAM28	A67, A71, A73, A75, A79, A81, A83, A85, A87, A91-93, A95, A97-99
1020811	KUAM30	A67, A71, A73, A75, A81, A83, A85, A87, A91-93, A95, A97-99
1020813	KUAM31	A67, A69, A71, A73, A75, A77, A79, A81, A83, A85, A91-93, A95, A97-99
1020835	KUAM32	A67, A69, A71, A73, A75, A77, A79, A83, A85, A91, A95, A97
1020839	KUAM34	A85, A87, A89, A91, A97-99
1020841	KUAM35	A85, A87, A89
1020843	KUAM25	A67, A69, A71, A73, A75, A77, A83, A85, A91, A95, A97
1020857	CKM38	A77
1020917	SRS3	A31-35
1020919	SRS4	A31-34, A50, A53
1020923	SSY3T	E41, E44
1020935	SSY4T	E41, E44
1020941	SSN2T	E41, E44
1020943	SSA3T	E41, E44
1020965	SSA4T	E41, E44
1020967	MS109	A83
1020969	MS110	A47
1020971	MS111	A25-28, A83
1020973	MS412	D85
1020975	MS125	A27-28, A83
1021007	MS1321	A30
1021049	MS318	D85
1021053	MS1071	D87
1021085	MS1073	D87
1021095	MS518	D88
1021097	MS352	D38, D40, E14-15
1021135	MS959	A26
1021137	MS960	A27-28
1021143	MS364	A68-71, A74-77
1021337	MS1152	A97-99
1021339	MS1153	A31-34, A50, A52-56, A85, A87, A89, A91, A97-99
1021341	MS1155	A31-32, A50, A52-53, A56, A85, A87, A91-93, A95, A97-99
1021343	MS1156	A31-35
1021375	MS1158	A31-34, A50, A53
1021421	STCM9	A26-28, A47, A67, A69, A71, A73, A75, A77
1021423	STCM11	A42-43, A83
1021451	STCM4	A8-11, A13, A26-28, A42-43
1021453	STCM5	A9, A12-13, A27, A42-43
1021455	STCM8	A25-26, A28, A47, A69, A71, A75, A83
1021463	STCM20	A8-14, A42-44
1021505	STCM37	A77
1021507	STCM38	A67, A69, A71, A73, A75, A77, A81, A83
1021509	STCM39	A77
1021511	STCM40	A69, A71, A73
1021535	KLM43	A42-43, A67, A69, A71, A73, A75
1021537	KLM46	A8-11, A13-14, A42-43, A67, A69, A71, A77
1021539	KLM58	A8-10, A13, A42, A77
1021541	KLM68	A8-10, A13, A42, A69, A71, A75
1021543	KLM33L	A42-43, A77
1021565	KLM34L	A9, A11-13, A43-44, A77
1021567	KLM46L	A9
1021569	KLM46S	A67, A69, A71, A73, A75
1022436	CKM37	A71, A73
1056234	SKSP453	A33-34
1059844	MS326	D14
1067613	CM74	D38, D40-41, E14-15, E19
1067614	CM75	D38, D40-41, E14-15, E19
1067630	CM146	D41, E19
1067631	CM147	D41, E19
1099381	CM182	D39, E15
1099382	CM183	D39, E15
1099429	SM819	A27-28
1099440	SKSP343	A33-34
1099444	SKDP453	A31-32, A53
1099445	SKSN566K	A71, A73
1099446	SKRN100300	A33
1099447	SKRN160400	A33
1099452	IDSN322	A42
1099614	MS1933	A85, A87, A89
1099615	MS1939	A50
1099631	SRS5	A33
1099640	MS1034	D41, E19
1099643	MS1154	A33, A91
1099644	MS1157	A50, A85, A91, A93, A95
1099645	MS1160	A33
1099646	MS1200	D38-41, E14-15, E19
1099649	KLM33	A67, A71, A73, A75
1099650	KLM54	A71, A73
1108062	515.018	A15-21, A45-46
1108063	513.023	A15-21, A45-46, A79
1108065	511.023	A15-16, A18-21, A45-46, A79
1108068	512.112	A15-16, A45, A79
1116889	CKM34	A67, A69, A71, A73, A75, A77, A81, A83
1120807	552.24	A23-24
1121055	551.316	A22, A47, A49
1121063	551.332	A23
1121078	551.333	A24-25
1121086	551.317	A22-24, A49
1121094	557.111	A23-25, A48-49
1121102	557.125	A23
1121205	552.232	A49
1121232	552.221	A22, A47-48
1121239	552.22	A22, A48
1121265	552.225	A48
1121273	552.228	A23
1121302	552.23	A24-25
1121313	552.229	A24-25
1121346	554.252	A22-25, A47-49
1121353	554.253	A48
1121362	554.254	A48
1122009	512.111	A16
1131545	512.135	A21, A46
1131646	191.405	A66-67, A71-73, A75, A81-85, A87, A90-95, A97-99
1131653	191.406	A67, A69-71, A73-75, A77, A79-83, A85, A90-93, A95-99
1131658	191.407	A67, A69-71, A73-75, A77, A79, A82-83, A85, A91, A95-97
1135392	512.134	A21
1137321	511.018	A16, A18-21, A46
1137331	511.024	A17
1137339	511.025	A15-16, A18-20, A45, A79
1137346	511.028	A21
1137353	511.03	A46
1137382	511.033	A15-16, A18-20
1137396	511.038	A18, A20
1137452	511.06	A17
1137509	512.013	A20-21, A46
1137533	512.023	A20-21, A46
1137541	512.025	A18-20, A79
1137585	512.031	A21
1137600	512.053	A18-20
1137610	512.06	A17
1137616	512.063	A18-20, A79
1137650	512.083	A18-20
1137670	512.092	A18, A20
1137678	512.1	A24
1137686	512.101	A24
1137710	512.117	A15-16, A45, A79
1137736	512.123	A15-16
1137789	512.153	A17
1137987	513.018	A20-21, A46
1137996	513.019	A16, A18-20
1138003	513.02	A24
1138029	513.025	A15-16, A18-21, A45, A79
1138057	513.033	A15-16, A18-20
1138064	513.038	A18, A20
1138071	513.06	A17
1138195	514.018	A16
1138315	170.004	A24
1138319	515.022	A15-16, A18-21, A45
1138328	515.028	A18, A20
1139302	554.201	A48
1146699	CKM35	A69, A71, A75, A77, A83
1147828	511.022	A45, A79
1230373	CKM36	A67, A69, A71, A73, A75
1243898	513.123	A24
1243928	551.129	A24
1243929	551.13	A24
1260086	CC09	C10
1274022	ICSN643	A8-9
1274029	IDSN332	A9
1319470	IWSN322	A13
1546392	SMYE5	E41, E44
1744444	KUAM33	A75
1775478	CM72LP	D38, D40-41, E14-16, E19
1775479	CM73LP	D38, D40-41, E14-16, E19
1852181	CS412	A30
1863407	552.21	A49
2001174	CNMG12040849	F11
2002450	CCGT060202AL1	B46
2002452	CCGT060204AL1	B46
2002455	CCGT09T304AL1	B46
2002457	CCGT09T308AL1	B46
2002459	CCGT120404AL1	B46
2002461	CCGT120408AL1	B46
2002463	DCGT070202AL1	B47
2002465	DCGT070204AL1	B47
2002467	DCGT11T302AL1	B47
2002469	DCGT11T304AL1	B47
2002471	DCGT11T308AL1	B47
2002473	RCGT0803M0AL1	B47
2002474	RCGT0803M0AL1	B47
2002475	VCGT110302AL1	B49
2002476	VCGT110302AL1	B49
2002477	VCGT160404AL1	B49
2002479	VCGT160408AL1	B49
2002503	VCGT160412AL3	B49
2002505	VCGT220530AL3	B49
2002506	VCGT220530AL3	B49
2005290	CCGT09T302AL1	B46
2005305	CCGT120402AL1	B46
2005585	CNGM190612AL1	B46
2006728	RCGT1003M0AL1	B47
2006791	SCGT09T304AL1	B48
2006792	SCGT09T308AL1	B48
2006803	SCGT120408AL1	B48
2006990	TCGT110202AL1	B48
2006991	TCGT110204AL1	B48
2006992	TCGT16T302AL1	B48
2007003	TCGT16T304AL1	B48
2007004	TCGT16T308AL1	B48
2007105	12251762000	D72
2007108	12251762100	D72
2007111	12251763200	D72
2007124	12251763300	D72
2007127	12251763400	D72
2007130	12251764200	D72
2007133	12251764300	D72
2007136	12251782000	D71
2007139	12251782100	D71
2007142	12251783200	D71
2007145	12251783300	D71
2007148	12251784200	D71
2007151	12251784300	D71
2007404	2ERA60	E47
2007410	4ELN60	E47
2007414	12191062086	D75
2007419	3ILG60	E48
2007542	2ER15ISO	E49
2007585	2IR075ISO	E50
2007591	2IR08ISO	E50
2007613	2IR10ISO	E50
2007622	2IR125ISO	E50
2007705	VCGT110308AL1	B49
2007826	12251222000	D73
2007832	12251762200	D72
2007863	12251768300	D72
2008113	12251352000	D73
2008116	12251353000	D73
2008119	12251354000	D73
2008122	12251355000	D73
2008135	12251356000	D73
2008138	12251358000	D73
2008141	12251213200	D73
2008144	12250110400	D74
2008147	12250110300	D74
2008150	12251783700	D71
2008153	12251783600	D71
2008156	12251223200	D73
2008159	12251233200	D73
2008187	3EL10ISO	E49
2008256	3ER30ISO	E49
2008275	3ILAG60	E48
2008521	12250110900	D74
2008876	123567320	D80
2008931	123567330	D80
2009080	123567340	D80
2009385	123567360	D80
2009482	123567380	D80
2009504	123567380	D80
2009562	123568080	D82
2009587	AL163R	E41
2009591	AL203R	E41
2009594	AL253R	E41
2009597	AL254R	E41
2009600	AL323R	E41
2009603	AL324R	E41
2009609	AVR203R	E44
2009612	AVR253R	E44
2009625	AVR254R	E44
2009628	AVR25D3R	E44
2009631	AVR25D4R	E44
2009634	AVR324R	E44
2009637	AVR325R	E44
2009640	AVR32D3R	E44
2009643	AVR403R	E44
2009646	AVR405R	E44
2009649	AVR505R	E44
2010027	CCMT12040441	B15
2010047	E06JSCFPR04	A51
2010061	CCMT12040841	B15
2010068	E08KSCLCR06	A50
2010089	CCMX060202L10	B16
2010090	E10MSTFCL11	A54
2010111	E12QSDQCR07	A52
2010120	E12QSTFCL11	A54
2010139	E16RSCLCR09	A50
2010148	E16RSDQCL07	A52
2010150	CNMG12040422	B16
2010157	E16RSDUCR07	A53
2010174	E16RSTFCR16	A54
2010175	CNMG12040422	B16
2010184	E20SSCLCR09T3	A50
2010193	E20SSDUCL11	A53
2010215	E25TSCLCL09	A50

Index

Order No.	Catalogue No.	Page(s)
2010224	E25TSCLCR09T3	A50
2010233	E25TSTFCL16	A54
2010329	CNMG1204085	B17
2010357	CNMG12041222	B16
2010370	CNMG12041222	B16
2010393	CNMG12041248	B17
2010407	CNMG12041249	B17
2010440	CNMG1204125	B17
2010484	CNMG1204165	B17
2010502	CNMG1606085	B17
2010530	CNMG1606125	B17
2010558	CNMG1606165	B17
2010583	CNMG1906085	B17
2010605	CNMG1906125	B17
2010636	CNMG1906165	B17
2010654	CNMG1906245	B17
2010768	CNMM16060865	B19
2010796	CNMM16061265	B19
2010851	CNMM19061265	B19
2010882	CNMM19061665	B19
2010928	CNMM19062465	B19
2011285	DCGT0702022	B20
2011317	DCGT11T3022	B20
2011421	DCMT11T30841	B21
2011507	DCMX11T302R18	B21
2011526	DCMX11T304L18	B21
2011538	DCMX11T304R18	B21
2011717	DNMG15060422	B22
2011742	DNMG15060422	B22
2011754	DNMG1506044	B22
2011774	DNMG15060822	B22
2011786	DNMG15060822	B22
2011801	DNMG1506084	B22
2011823	DNMG15060848	B23
2011832	DNMG15060849	B23
2011860	DNMG1506085	B23
2011883	DNMG15061222	B22
2011921	DNMG15061248	B23
2011943	DNMG15061249	B23
2012004	DNMG1506165	B23
2012010	12157210700	A57
2012019	DNMM15060865	B25
2012035	S10BSCMCN06	A58
2012111	12157211100	A57
2012113	12157210900	A57
2012133	S12DSCACL06	A59
2012199	12157211500	A57
2012203	12157200800	A57
2012209	S16FSCACL09	A59
2012225	S16FSTCCN16	A59
2012231	LNUX400924EN95	B26
2012307	NVR163R	E44
2012325	OVR122R	E45
2013091	SNMG12040822	B30
2013113	SNMG1204084	B30
2013121	SNMG12040848	B31
2013127	SNMG12040849	B31
2013149	SNMG1204085	B31
2013161	SNMG12041222	B30
2013205	SNMG12041248	B31
2013213	SNMG12041249	B31
2013235	SNMG1204125	B31
2013241	SNMG12041622	B30
2013265	SNMG1204165	B31
2013281	SNMG1506085	B31
2013299	SNMG1506125	B31
2013311	SNMG1506165	B31
2013331	SNMG1506245	B31
2013356	SNMG1906085	B31
2013366	SNMG1906125	B31
2013390	SNMG1906165	B31
2013400	SNMM12040865	B32
2013427	SNMM12041265	B32
2013460	SNMM12041665	B32
2013527	SNMM19061265	B32
2013581	SNMM19061665	B32
2013600	SNMM190616SR	B32
2013616	SNMM19062465	B32
2013630	SNMM190624SR	B32
2013655	SNMM250916SR	B32
2013661	SNMM250924SR	B32
2013779	SPMR120308	B34
2013824	SPUN250620T	B34
2013826	SPUN250620T	B34
2013959	SPGN090308	B34
2014076	TCMT1102042	B35
2014082	TCMT1102042	B35
2014101	TCMT16T3042	B35
2014113	CCGT060202AL1	B46
2014115	CCGT09T304AL1	B46
2014118	CCGT120408AL1	B46
2014119	DCGT070202AL1	B47
2014120	DCGT070204AL1	B47
2014134	TCMT16T30441	B35
2014136	TCMT16T30441	B35
2014232	TNMG16040422	B36
2014242	TNMG16040422	B36
2014262	TNMG16040448	B37
2014268	TNMG16040822	B36
2014288	TNMG16040822	B36
2014316	TNMG16040848	B37
2014322	TNMG16040849	B37
2014345	TNMG1604085	B37
2014355	VCGT160408AL1	B49
2014367	TNMG16041222	B36
2014393	TNMG16041248	B37
2014417	TNMG1604125	B37
2014446	TNMG1604165	B37
2014483	TNMG2204085	B37
2014517	TNMG2204125	B37
2014547	TNMG2204165	B37
2014607	TNMM16040865	B38
2014617	TNMM2204088	B38
2014635	TNMM16041265	B38
2014641	TNMM1604128	B38
2014649	TNMM16041665	B38
2014681	TNMM22040865	B38
2014710	TNMM22041265	B38
2014740	TNMM22041665	B38
2014851	TPMR110304	B41
2014877	TPMR110308	B41
2014890	DCGT11T304AL3	B47
2014913	TPMR160304	B41
2014915	TPMR160304	B41
2014941	TPMR160308	B41
2014947	TPMR160308	B41
2014969	TPMR160312	B41
2014992	WNMG06040448	B44
2015019	WNMG06040848	B44
2015037	WNMG0604085	B44
2015039	WNMG06041248	B44
2015051	WNMG0604125	B44
2015069	WNMG0804044	B43
2015081	TPGA110204	B40
2015094	WNMG0804084	B43
2015100	TPGN110304	B40
2015106	WNMG08040849	B44
2015113	TPGN160304	B40
2015118	WNMG0804085	B44
2015135	TPGN160308	B40
2015139	TPGN160308	B40
2015146	WNMG0804124	B43
2015171	WNMG08041249	B44
2015194	WNMG0804125	B44
2015216	WNMG0804165	B44
2015327	TPUN160308	B41
2015754	12251763000	D72
2015782	12251765500	D72
2015792	12251768400	D72
2015814	12251784400	D71
2015816	12251784500	D71
2015839	12251786500	D71
2015842	12251788500	D71
2016118	AL404R	E41
2016122	AL405R	E41
2017766	TPUR160308R	B41
2017822	123567330	D80
2017854	123567703	D81
2017912	123567730	D81
2017915	123567731	D81
2017973	123568080	D82
2017976	123568100	D82
2017980	123568120	D82
2017993	123568121	D82
2017996	123568141	D82
2018214	3ERA60	E47
2018222	3ERG60	E47
2018236	3ELG60	E47
2018246	3ERAG60	E47
2018252	4ERN60	E47
2018256	5ERQ60	E47
2018262	2IRA60	E48
2018272	3IRA60	E48
2018278	3IRG60	E48
2018281	12148005800	A51
2018284	3IRAG60	E48
2018290	4IRN60	E48
2018294	12148007200	A58
2018295	5IRQ60	E48
2018296	12148007300	A50
2018364	3ER035ISO	E49
2018377	3ER05ISO	E49
2018389	3ER07ISO	E49
2018395	3ER075ISO	E49
2018403	3ER08ISO	E49
2018411	3ER10ISO	E49
2018412	12148021100	D75
2018420	12148021500	A29
2018421	3ER125ISO	E49
2018429	3ER15ISO	E49
2018435	3EL15ISO	E49
2018445	3ER175ISO	E49
2018447	3EL175ISO	E49
2018460	3ER20ISO	E49
2018466	3EL20ISO	E49
2018472	3ER25ISO	E49
2018476	3EL25ISO	E49
2018489	3EL30ISO	E49
2018495	4ER35ISO	E49
2018496	12148032586	D75
2018501	4ER40ISO	E49
2018508	4ER45ISO	E49
2018517	4ER50ISO	E49
2018522	5ER55ISO	E49
2018527	12148036300	A50-51
2018528	5ER60ISO	E49
2018534	2IR05ISO	E50
2018538	2IL10ISO	E50
2018539	12148037700	A57
2018549	12148038800	A50, A52-54, A59
2018550	2IR15ISO	E50
2018557	2IL15ISO	E50
2018564	2IR175ISO	E50
2018582	3IR05ISO	E50
2018596	3IR075ISO	E50
2018598	3IL075ISO	E50
2018604	3IR08ISO	E50
2018612	3IR10ISO	E50
2018616	3IL10ISO	E50
2018626	3IR125ISO	E50
2018636	3IR15ISO	E50
2018642	3IL15ISO	E50
2018652	3IR175ISO	E50
2018663	3IR20ISO	E50
2018667	3IL20ISO	E50
2018674	3IR25ISO	E50
2018678	3IL25ISO	E50
2018679	12148068700	A50, A53-54, A57-59
2018684	3IR30ISO	E50
2018688	3IL30ISO	E50
2018695	4IR35ISO	E50
2018702	4IR40ISO	E50
2018703	12148080000	A52-53
2018708	4IR45ISO	E50
2018714	4IR50ISO	E50
2018720	5IR60ISO	E50
2018736	3ER48UN	E51
2018744	3ER40UN	E51
2018748	3ER36UN	E51
2018752	3ER32UN	E51
2018756	3ER28UN	E51
2018760	3ER27UN	E51
2018766	3ER24UN	E51
2018772	3ER20UN	E51
2018778	3ER18UN	E51
2018782	3ER16UN	E51
2018790	3ER14UN	E51
2018796	3ER13UN	E51
2018802	3ER12UN	E51
2018808	3ER11UN	E51
2018814	3ER10UN	E51
2018817	12148095100	A57-59
2018824	3ER8UN	E51
2018860	2IR32UN	E52
2018864	2IR28UN	E52
2018868	2IR27UN	E52
2018872	2IR24UN	E52
2018876	2IR20UN	E52
2018882	2IR18UN	E52
2018886	2IR16UN	E52
2018914	3IR36UN	E52
2018918	3IR32UN	E52
2018922	3IR28UN	E52
2018932	3IR24UN	E52
2018938	3IR20UN	E52
2018944	3IR18UN	E52
2018950	3IR16UN	E52
2018955	3IR14UN	E52
2018966	3IR12UN	E52
2018972	3IR11UN	E52
2018979	3IR10UN	E52
2018990	3IR8UN	E52
2019084	12148566486	A29
2019086	12148566586	A29
2019183	12148583800	D75
2019202	12148586000	D75
2019217	12148586900	D75
2019251	12148589300	D75
2019273	3ER27NPT	E53
2019278	3ER18NPT	E53
2019287	12148596200	D71-72
2019288	3ER14NPT	E53
2019298	3ER115NPT	E53
2019305	3ER8NPT	E53
2019319	3IR27NPT	E53
2019323	3IR18NPT	E53
2019329	3IR14NPT	E53
2019335	3IR115NPT	E53
2019339	3IR8NPT	E53
2019343	3ER10RD	E58
2019347	3ER8RD	E58
2019359	4ER6RD	E58
2019362	12157200500	A57
2019365	4ER4RD	E58
2019375	3IR10RD	E59
2019381	3IR8RD	E59
2019389	3IR6RD	E59
2019394	4IR6RD	E59
2019400	4IR4RD	E59
2019423	2IR18PG	E58
2019435	3IR18PG	E58
2019441	3IR16PG	E58
2019447	3ER15TR	E59
2019453	3ER2TR	E59
2019455	3EL2TR	E59
2019461	3ER3TR	E59
2019463	3EL3TR	E59
2019469	4ER4TR	E59
2019471	4EL4TR	E59
2019479	4ER5TR	E59
2019487	5ER6TR	E59
2019497	3IR15TR	E60
2019511	3IR3TR	E60
2019520	4IR4TR	E60
2019528	4IR5TR	E60
2019534	5IR6TR	E60
2021531	DCMX11T302L18	B21
2021538	CCGT060204AL1	B46
2021539	CCGT09T308AL1	B46
2021540	CCGT120404AL1	B46
2021625	12251221900	D73
2021626	12251221600	D73
2021627	12251763500	D72
2021629	12251332000	D73
2021631	12251762300	D72
2021634	12251212500	D73
2021635	12251222500	D73
2021636	12251762500	D72
2021637	12251762400	D72
2021638	12251768200	D72
2021639	12251342000	D73
2021640	12251343000	D73
2021641	12251344000	D73
2021644	2ER175ISO	E49
2021656	2ILA60	E48
2021660	2IR20ISO	E50
2021718	12250110600	D74
2021719	12250110500	D74
2021720	12250110800	D74
2021721	12250110700	D74
2021722	12250111000	D74
2021723	12251234000	D73
2021743	12251368000	D73
2021791	123568100	D82

Order No.	Catalogue No.	Page(s)
2021793	123568120	D82
2021795	123568140	D82
2021798	123568160	D82
2021804	123567320	D80
2021869	123567350	D80
2021873	123567350	D80
2021902	123567360	D80
2021936	CCGT0602022	B14
2021937	CCGT0602022	B14
2021943	CCGT09T3022	B14
2021945	CCMT0602042	B14
2021947	CCMT0602042	B14
2021948	CCMT0602042	B14
2021949	CCMT0602082	B14
2021972	CCMT09T3042	B14
2021980	CCMX120408L16	B16
2021986	CNMG1204044	B16
2021988	CNMG12040448	B17
2021991	CNMG12040822	B16
2021994	CNMG12040822	B16
2021999	CNMG1204084	B16
2022002	CNMG12040848	B17
2022007	CNMG12040849	B17
2022013	CNMM12040865	B19
2022019	CNMM12041265	B19
2022025	CNMM12041665	B19
2022038	CNMM16061665	B19
2022056	CNMM190616SR	B19
2022064	CNMM190624SR	B19
2022066	CNMM250916SR	B19
2022070	CNMM250924SR	B19
2022080	CPGT04T1043	B20
2022081	CPGT04T1043	B20
2022082	CPGT04T1043	B20
2022130	DCGT0702022	B20
2022136	DCMT0702042	B20
2022139	DCMT0702082	B20
2022144	DCMT11T3042	B20
2022145	DCMT11T3042	B20
2022150	DCMT11T30441	B21
2022151	DCMT11T30441	B21
2022154	DCMT11T3082	B20
2022159	DCMT11T30841	B21
2022175	DCMT15040441	B21
2022207	DNMG11040422	B22
2022212	DNMG11040422	B22
2022213	DNMG11040448	B23
2022216	DNMG11040822	B22
2022221	DNMG11040822	B22
2022222	DNMG11040848	B23
2022233	DNMG11040849	B23
2022238	DNMG11041248	B23
2022253	DCGT11T302AL1	B47
2022254	DCGT11T304AL1	B47
2022255	DCGT11T308AL1	B47
2022256	VCGT160404AL1	B49
2022257	CCGT060202AL3	B46
2022258	CCGT060202AL3	B46
2022259	CCGT060204AL3	B46
2022260	CCGT060204AL3	B46
2022261	CCGT09T304AL3	B46
2022262	CCGT09T304AL3	B46
2022268	DNMG1506125	B23
2022281	DNMM15061265	B25
2022285	DNMM15061665	B25
2022323	CCGT120404AL3	B46
2022324	CCGT120404AL3	B46
2022325	CCGT120408AL3	B46
2022326	CCGT120408AL3	B46
2022327	DCGT070202AL3	B47
2022328	DCGT070202AL3	B47
2022329	DCGT070204AL3	B47
2022330	DCGT070204AL3	B47
2022331	DCGT11T304AL3	B47
2022332	DCGT11T308AL3	B47
2022340	NL82R	E41
2022342	NVR132R	E44
2022343	NVR204R	E44
2022345	0VR152R	E45
2022397	SNMG12040422	B30
2022402	SNMG12040448	B31
2022446	12250110100	D74
2022447	12250110200	D74
2022483	DCGT11T308AL3	B47
2022484	VCGT160404AL3	B49
2022485	VCGT160404AL3	B49
2022487	VCGT160408AL3	B49
2022488	VCGT160408AL3	B49
2022489	VCGT160412AL3	B49
2022547	12251763100	D72
2022548	12251764000	D72
2022549	12251764100	D72
2022550	12251764400	D72
2022551	12251764500	D72
2022552	12251765200	D72
2022553	12251765300	D72
2022554	12251765400	D72
2022555	12251766200	D72
2022556	12251766300	D72
2022557	12251766400	D72
2022558	12251766500	D72
2022559	12251768500	D72
2022560	12251783000	D71
2022561	12251783100	D71
2022562	12251784000	D71
2022563	12251784100	D71
2022564	12251785200	D71
2022565	12251785300	D71
2022566	12251785400	D71
2022567	12251785500	D71
2022568	12251786400	D71
2022569	12251788400	D71
2022589	AL325R	E41
2022748	TPUR160308L	B41
2022764	123567702	D81
2022766	123567704	D81
2022767	123567720	D81
2022768	123567721	D81
2022781	123567740	D81
2022783	123567741	D81
2022787	123568081	D82
2022788	123568101	D82
2022789	123568140	D82
2022790	123568160	D82
2022791	123568161	D82
2022852	CCGT060202AL2	B46
2022854	CCGT09T302AL3	B46
2022855	CCGT09T304AL2	B46
2022856	CCGT09T308AL2	B46
2022858	CCGT09T308AL3	B46
2022859	CCGT120402AL3	B46
2022860	DCGT070204AL2	B47
2022861	DCGT11T302AL3	B47
2022862	DCGT11T304AL2	B47
2022921	12191061900	D75
2022922	12191062586	D75
2022923	12191063286	D75
2023443	DCGT11T308AL2	B47
2023597	E06JSCLPL04	A51
2023598	E06JSCLPR04	A51
2023600	E08KSCFCR06	A51
2023601	E08KSCLCL06	A50
2023603	E08KSCLCR065	A50
2023607	E12QSCLCL06	A50
2023608	E12QSCLCR06	A50
2023610	E12QSDUCL07	A53
2023611	E12QSDUCR07	A53
2023613	E16RSCLCL09	A50
2023614	E16RSCLCR09T3	A50
2023615	E16RSCLCL09T3	A50
2023617	E16RSDUCL07	A53
2023618	E16RSTFCL16	A54
2023621	E20SSCLCR09	A50
2023622	E20SSDQCL11	A52
2023623	E20SSDQCR11	A52
2023624	E20SSDUCR11	A53
2023625	E20SSTFCL16	A54
2023626	E20SSTFCR16	A54
2023629	E25TSDUCL11	A53
2023630	E25TSDUCR11	A53
2023631	E25TSTFCR16	A54
2023632	E32USCLCR12	A50
2023638	SCGT120408AL3	B48
2024091	S08ASCMCN065	A58
2024102	12157210400	A57
2024105	S10BSCQCL06	A58
2024106	S10BSCQCR06	A58
2024123	S12DSCACR06	A59
2024559	VCGT110302AL3	B49
2024560	VCGT110304AL1	B49
2024561	VCGT110304AL3	B49
2024736	SPGN090304	B34
2024737	SPGN090308	B34
2024742	SPGN120308	B34
2024955	DNMG11041222	B22
2024959	DNMG15060448	B23
2025095	TPGN110304	B40
2025097	TPGN110308	B40
2025824	DNMG15061648	B23
2025828	NVR102R	E44
2025962	SPUN150412T	B34
2026013	SPUN190416T	B34
2026020	TCMT1102082	B35
2026085	TNMG16041648	B37
2026092	TPUN270620T	B41
2026163	WNMG08040448	B44
2026164	WNMG08040848	B44
2026165	WNMG08041248	B44
2026167	WNMG08041648	B44
2026170	TCGT1102022	B35
2026313	VCGT220530AL1	B49
2027339	CCMT090308	B14
2027431	CCMT09T308	B14
2027432	CCMT09T308	B14
2027443	CCMT09T308	B14
2027444	CCMT09T308	B14
2027447	CCMT09T308MU	B15
2027465	CCMT09T312	B14
2027472	CCMT120408	B14
2027484	CCMT120408	B14
2027507	CCMW060204	B15
2027509	CCMW090304	B15
2027510	CCMW090308	B15
2027511	CCMW09T304	B15
2027512	CCMW09T308	B15
2027524	CCMW120404	B15
2027525	CCMW120408	B15
2027528	CNMA120408	B16
2027545	CNMA190616	B16
2027567	CNMG120408	B16
2027569	CNMG120408	B16
2027570	CNMG120408SL	B18
2027589	CNMG120412SL	B18
2027603	CNMG120416SL	B18
2027610	CNMG160608SL	B18
2027626	CNMG160612SL	B18
2027630	CNMG160616SL	B18
2027646	CNMG190612SL	B18
2027652	CNMG190616SL	B18
2027724	CNMP120404SM	B19
2027726	CNMP120408SM	B19
2027728	CNMP120412SM	B19
2027730	CNMP160608SM	B19
2027732	CNMP160612SM	B19
2027744	CNMP190616SM	B19
2027749	DCMT070202	B20
2027768	DCMT070204	B20
2027786	DCMT070208	B20
2027804	DCMT11T304	B20
2027805	DCMT11T304	B20
2027807	DCMT11T304	B20
2027811	DCMT11T304MU	B21
2027832	DCMT11T308	B20
2027843	DCMT11T308	B20
2027845	DCMT11T308	B20
2027848	DCMT11T308MU	B21
2027868	DCMT11T312	B20
2027869	DCMT11T312	B20
2027887	DCMT150404	B20
2027908	DCMT150408	B20
2027909	DCMT150408	B20
2027910	DCMT150408	B20
2027923	DCMT150408MU	B21
2027932	DCMT150412	B20
2027943	DCMT150412	B20
2027946	DCMT150412MU	B21
2027965	DCMT150416	B20
2027966	DCMW070204	B21
2027967	DCMW11T304	B21
2027976	DNMG150604CT	B24
2027985	DNMG150608CT	B24
2027989	DNMG150608SL	B24
2027999	DNMG150612CT	B24
2028003	DNMG150612SL	B24
2028018	DNMP150608SM	B25
2028020	DNMP150612SM	B25
2028064	LNMX181220HP	B26
2028066	LNMX181220SP	B26
2028107	NNGJ281020	B27
2028109	NNGJ2810201D	B27
2028114	RCMT0602M0	B27
2028115	RCMT0602M0	B27
2028117	RCMT0602M0	B27
2028121	RCMT0602M043	B27
2028125	RCMT0602M043	B27
2028129	RCMT0803M0	B27
2028136	RCMT0803M043	B27
2028137	RCMT0803M043	B27
2028143	RCMT10T3M0	B27
2028145	RCMT10T3M0	B27
2028148	RCMT10T3M043	B27
2028151	RCMT10T3M043	B27
2028156	RCMT1204M0	B27
2028157	RCMT1204M0	B27
2028158	RCMT1204M0	B27
2028161	RCMT1204M043	B27
2028163	RCMT1204M043	B27
2028164	RCMT1606M0T	B28
2028166	RCMT1606M0T	B28
2028168	RCMT1606M043	B27
2028170	RCMT1606M043	B27
2028196	RCMX2507M0T	B28
2028218	12157210300	A57
2028224	SCMT090304	B29
2028225	SCMT090304	B29
2028230	SCMT090304MU	B29
2028238	SCMT090308	B29
2028240	SCMT090308	B29
2028243	SCMT090308MU	B29
2028255	SCMT09T304	B29
2028256	SCMT09T304	B29
2028259	SCMT09T304MU	B29
2028270	SCMT09T308	B29
2028271	SCMT09T308	B29
2028272	SCMT09T308	B29
2028275	SCMT09T308MU	B29
2028286	SCMT120408	B29
2028288	SCMT120408	B29
2028289	SCMT120408	B29
2028295	SCMT120412	B29
2028296	SCMT120412	B29
2028297	SCMT120412	B29
2028298	SCMT120412	B29
2028306	SCMT150512	B29
2028307	SCMT150512	B29
2028308	SCMW090304	B29
2028310	SCMW120408	B29
2028311	SCMW120408	B29
2028371	SNMA120408	B30
2028375	SNMA190616	B30
2028387	SNMG120408	B30
2028388	SNMG120408	B30
2028389	SNMG120408SL	B32
2028401	SNMG120412SL	B32
2028406	SNMG120416SL	B32
2028410	SNMG150608SL	B32
2028417	SNMG150612SL	B32
2028421	SNMG150616SL	B32
2028428	SNMG190612	B30
2028429	SNMG190612SL	B32
2028433	SNMG190616SL	B32
2028462	SNMP120408SM	B33
2028464	SNMP120412SM	B33
2028466	SNMP150608SM	B33
2028468	SNMP150612SM	B33
2028469	SNMP150616SM	B33
2028471	SNMP190616SM	B33
2028474	SNUN120408	B33
2028475	SNUN120408	B33
2028477	SNUN120412	B33
2028478	SNUN120412	B33
2028479	SNUN120412	B33
2028494	SPGN090304	B34
2028496	SPGN120304	B34
2028498	SPGN120308	B34
2028500	SPGN120312	B34
2028543	SPUN090308	B34
2028544	SPUN090308	B34
2028547	SPUN120304	B34
2028548	SPUN120304	B34
2028549	SPUN120304	B34
2028555	SPUN120308	B34
2028558	SPUN120308	B34
2028559	SPUN120308	B34

Order No.	Catalogue No.	Page(s)
2028560	SPUN120312	B34
2028561	SPUN120312	B34
2028562	SPUN120412	B34
2028563	SPUN120412	B34
2028565	SPUN150412	B34
2028566	SPUN150412	B34
2028567	SPUN150412	B34
2028568	SPUN190412	B34
2028569	SPUN190412	B34
2028570	SPUN190412	B34
2028579	TCMT110202	B35
2028586	TCMT110204	B35
2028587	TCMT110204	B35
2028589	TCMT110204	B35
2028595	TCMT110208	B35
2028596	TCMT110208	B35
2028607	TCMT16T304	B35
2028609	TCMT16T304	B35
2028610	TCMT16T304	B35
2028612	TCMT16T304MU	B36
2028624	TCMT16T308	B35
2028626	TCMT16T308	B35
2028627	TCMT16T308	B35
2028630	TCMT16T308MU	B36
2028635	CCGT060204AL2	B46
2028636	VCGT160412AL1	B49
2028650	TCMT16T312MU	B36
2028660	TCMT220408	B35
2028661	TCMT220408	B35
2028667	TCMT220412	B35
2028668	TCMW110204	B36
2028669	TCMW110204	B36
2028670	TCMW16T304	B36
2028671	TCMW16T304	B36
2028690	TNMA160408	B36
2028700	TNMG160404	B36
2028705	TNMG160408	B36
2028706	TNMG160408	B36
2028712	TNMG220404	B36
2028718	TNMG220408	B36
2028719	TNMG220408	B36
2028726	TNMP160404SM	B39
2028728	TNMP160408SM	B39
2028730	TNMP160412SM	B39
2028732	TNMP220404SM	B39
2028734	TNMP220408SM	B39
2028736	TNMP220412SM	B39
2028739	TNUN160408	B39
2028740	TNUN160408	B39
2028762	TPGN160304	B40
2028765	TPGN160304	B40
2028766	TPGN160308	B40
2028769	TPGN160312	B40
2028806	TPUN110304	B41
2028808	TPUN110304	B41
2028814	TPUN110308	B41
2028815	TPUN110308	B41
2028821	TPUN160304	B41
2028824	TPUN160304	B41
2028830	TPUN160308	B41
2028832	TPUN160308	B41
2028833	TPUN160312	B41
2028834	TPUN160312	B41
2028835	TPUN160312	B41
2028839	TPUN220408	B41
2028843	TPUN220412	B41
2028846	TPUN220412	B41
2028847	TPUN220412	B41
2028848	TPUN220416	B41
2028859	VBMT160404	B42
2028860	VBMT160404	B42
2028869	VBMT160408	B42
2028870	VBMT160408	B42
2028876	VBMT160412	B42
2028929	WNMG080408SL	B45
2028933	WNMG080412SL	B45
2029211	12146003800	D73
2029220	12146009500	D73
2029222	12146012600	D71-72
2029223	12146012700	D71-72
2029224	12146013400	D73
2029481	12148001100	E45
2029499	12148021900	D75
2029506	12148024100	D75
2029507	12148024200	D75
2029508	12148024500	A29, D75
2029511	12148024800	D75
2029521	12148031686	D75
2029523	12148032086	D75
2029535	12148036000	D73
2029544	12148041100	D71-72, D75
2029545	12148041200	D71-72, D75
2029546	12148041300	D71-73
2029547	12148041400	A29, D73
2029696	12148589800	D75
2029707	12148597100	A29
2029711	12148599900	A29
2030737	12147789100	E45
2030993	12157301500	A59
2030994	12157301800	A58
2030995	12157301400	A59
2030998	12157301700	A59
2030999	12157301600	A59
2031018	E06JSCFPL04	A51
2031019	E08KSCFCL06	A51
2031020	E08KSCLCL065	A50
2031022	E10MSCLCL06	A50
2031023	E12QSDQCL07	A52
2031024	E12QSTFCR11	A54
2031025	E16RSDQCR07	A52
2031026	E20SSCLCL09	A50
2031027	E20SSCLCL09T3	A50
2031028	E25TSCLCL09T3	A50
2031029	E25TSCLCR09	A50
2031094	12157210200	A57
2031095	S08ASCACL069	A59
2031096	S08ASCNCL066	A58
2031097	S08ASCNCR06	A58
2031100	12157210500	A57
2031101	12157210600	A57
2031102	S10BSCACL06	A59
2031103	S10BSCACR06	A59
2031104	S10BSTCCN11	A59
2031107	12157200300	A57
2031108	12157200700	A57
2031109	12157200200	A57
2031110	12157200600	A57
2031111	12157211000	A57
2031112	12157210800	A57
2031113	S12DSCMCN06	A58
2031114	12157200900	A57
2031115	12157211300	A57
2031116	12157211400	A57
2031117	12157211200	A57
2031118	S16FSCACR09	A59
2031119	S16FSCMCN09	A58
2031135	12157201100	A57
2031136	12157201300	A57
2031137	12157201000	A57
2031213	S30MSSDCN12	A58
2031262	12157200400	A57
2031658	CCMT060202	B14
2031660	CCMT060202	B14
2031665	CCMT060204	B14
2031666	CCMT060204	B14
2031667	CCMT060204	B14
2031668	CCMT060204	B14
2031669	CCMT060204	B14
2031693	CCMT090304	B14
2031695	CCMT090304	B14
2031697	CCMT090304MU	B15
2031706	CCMT090308	B14
2031709	CCMT090308MU	B15
2031723	CCMT09T304	B14
2031725	CCMT09T304	B14
2031726	CCMT09T304	B14
2031729	CCMT09T304MU	B15
2031733	CCMW060202	B15
2031734	CCMW090302	B15
2031737	DCMW150408	B21
2031739	DNMP150604SM	B25
2031765	SNUN090308	B33
2031766	SNUN150412	B33
2031767	SNUN190412	B33
2031768	SOUN1904ZZT2	B34
2031769	SOUN1904ZZT3	B34
2031770	SOUN2506ZZT2	B34
2031771	SOUN2506ZZT3	B34
2031774	SPGN190412	B34
2031776	SPUN090304	B34
2031781	TNUN160308	B39
2031782	TNUN160312	B39
2031783	TNUN160412	B39
2031785	TNUN220416	B39
2031786	TPGA110208	B40
2031888	E10MSTFCR11	A54
2031902	TPGN110204	B40
2031913	TPGN110208	B40
2031941	12191824086	A29
2031942	12191814086	A29
2031943	12191825086	A29
2031944	12191815086	A29
2035312	CCMT09T308	F10
2037229	VBMT160408	F19
2039543	TNMG160408	F17
2045826	CNMG1204085	F11
2045827	CNMG1204085	F11
2048347	CCMT090304	F10
2048348	CCMT090308	F10
2050081	MS2111	D38-41, E14-16, E19
2050269	CCMT090304MU	F10
2050270	TCMT16T308	F16
2058066	12191062686	D75
2065128	AL253L	E41
2065134	AVR25D3L	E44
2065135	AVR25D4L	E44
2065295	3EL27NPT	E53
2065296	3EL18NPT	E53
2065297	3IL14NPT	E53
2068169	SCMT150512	B29
2071294	AL163L	E41
2071295	AL203L	E41
2071313	NVR102L	E44
2071317	NVR163L	E44
2071318	AVR203L	E44
2071904	3ELAG60	E47
2071907	3ILA60	E48
2071923	2IL20ISO	E50
2071943	3EL8RD	E58
2076776	4IL50ISO	E50
2076780	3EL115NPT	E53
2079043	4IL35ISO	E50
2100240	3ELA60	E47
2100489	4ILN60	E48
2100962	3EL05ISO	E49
2101037	3EL075ISO	E49
2101186	3EL125ISO	E49
2101506	4EL35ISO	E49
2101539	4EL40ISO	E49
2102322	4IL40ISO	E50
2102627	3EL8UN	E51
2102653	2IL32UN	E52
2102749	3IL12UN	E52
2103958	5EL6TR	E59
2103981	3IL3TR	E60
2104014	4IL5TR	E60
2114772	AL254L	E41
2114832	AVR253L	E44
2157413	3EL16UN	E51
2192607	3EL12UN	E51
2192644	3EL8NPT	E53
2202791	TCMT110204	F16
2203124	DNMG15060422	F13
2207617	CNMG120408AP	B17
2207622	DNMG150608AP	B23
2218150	CNMG120408	F11
2225730	TNMG16040849	F17
2225731	TNMG1604085	F18
2228436	CCMT060208MU	B15
2233178	CCMT120408MU	B15
2236077	SNMG250716	F15
2237832	TPUN160308	F19
2260899	CNMG1906125	F11
2261654	RCMX2006M0	F14
2271535	TNMG2204085	F18
2370861	SCMT120408	B29
2388660	SKRN1203M0	A33
2391688	CCMT12040441	B15
2391743	CCMT12040841	B15
2393014	DNMG150608	F13
2398837	RCMX2006M0	F14
2405630	SCMT120408	F14
2409372	CNMG1204125	F11
2415792	CCMT060204	F10
2421384	SSY5T	E41, E44
2421386	SSA5T	E41, E44
2422429	CNMG12040822	F11
2422430	DNMG15060849	F13
2429601	514.112	A46
2429602	514.118	A17-21, A46
2429633	514.122	A45, A79
2429634	514.123	A15-16, A18-21, A45-46, A79
2429636	514.125	A15-16, A18-20, A45, A79
2429637	514.128	A17, A21
2429638	514.133	A15-16, A18-20
2429639	514.138	A18, A20
2434317	TNMG2204125	F18
2454398	SCMT120416	B29
2494096	CCGT060202MU	B14
2494099	CCMT060204MU	B15
2494108	CCMT090312MU	B15
2494113	CCMT09T312MU	B15
2494118	CCMT120404MU	B15
2494126	CCMT120412MU	B15
2496756	TCGT110202MU	B35
2496757	TCMT110204MU	B36
2496762	TCMT110208MU	B36
2496767	TCMT220408MU	B36
2496772	TCMT220412MU	B36
2497057	CNMG120412AP	B17
2497062	DNMG150612AP	B23
2497065	SNMG120408AP	B31
2497067	SNMG120412AP	B31
2497069	TNMG160408AP	B37
2497072	TNMG160412AP	B37
2497074	WNMG080408AP	B44
2497077	WNMG080412AP	B44
2497081	DCGT070202MU	B20
2497082	DCMT070204MU	B21
2497097	DCMT070208MU	B21
2497101	DCMT11T312MU	B21
2497106	DCMT150404MU	B21
2497111	SCMT120408MU	B29
2497116	SCMT120412MU	B29
2497120	SCMT120416MU	B29
2498713	123567320	D80
2498714	123567330	D80
2498715	123567340	D80
2498716	123567350	D80
2498717	123567230	D80
2498718	123567231	D80
2498719	123567240	D80
2498720	123567241	D80
2498721	123567420	D80
2498722	123567430	D80
2498723	123567440	D80
2498724	123567450	D80
2498725	123567320	D80
2498726	123567330	D80
2498727	123567340	D80
2498728	123567350	D80
2498729	123567230	D80
2498730	123567231	D80
2498731	123567240	D80
2498732	123567241	D80
2498733	123567420	D80
2498734	123567430	D80
2498735	123567440	D80
2498736	123567450	D80
2539334	CM184LP	D39, E15
2539335	CM185LP	D39, E15
2556713	VNMG12T308	F20
2556722	VNMG12T308	F20
2556737	VNMG12T304	F20
2556742	VNMG12T304	F20
2556756	VBMT160408	F19
2556760	VBMT160408	F19
2556764	VBMT160408	F19
2556787	VBMT160404	F19
2556792	VBMT160404	F19
2556832	KNUX160410L12	F13
2556856	KNUX160410L11	F13
2556873	KNUX160405L11	F13
2556877	KNUX160405L11	F13
2556885	KNUX160405L11	F13
2556892	KNUX160415R12	F13
2556908	KNUX160410R12	F13
2556928	KNUX160410R11	F13
2556944	KNUX160405R11	F13
2556948	KNUX160405R11	F13
2556960	KNUX160405R11	F13
2558131	CGGN120304	F10
2558222	TEGN110304	F17
2558227	TEGN160304	F17

Order No.	Catalogue No.	Page(s)
2558237	TEGN160308	F17
2558739	44315901	E48
2558745	44315901	E48
2558754	44315900	E48
2558759	44315900	E48
2559116	SNMG250724	F15
2559131	SNMG250716	F15
2559156	SNMG190616	F15
2559186	SNMG190612	F15
2559191	SNMG190612	F15
2559201	SNMG190612	F15
2559206	SNMG190612	F15
2559211	SNMG120412	F15
2559237	SNMG120408	F15
2559242	SNMG120408	F15
2559247	SNMG120408	F15
2559262	SNMG120408	F15
2559272	SNMG120404	F15
2559301	CNMG190616	F11
2559307	CNMG190616	F11
2559311	CNMG190616	F11
2559317	CNMG190616	F11
2559326	CNMG190616	F11
2559352	CNMG190612	F11
2559372	CNMG190612	F11
2559377	CNMG190612	F11
2559382	CNMG190612	F11
2559397	CNMG190612	F11
2559443	CNMG120412	F11
2559448	CNMG120412	F11
2559474	CNMG120408	F11
2559490	CNMG120408	F11
2559504	CNMG120408	F11
2559520	CNMG120408	F11
2559538	CNMG120404	F11
2559543	CNMG120404	F11
2559548	CNMG120404	F11
2559561	CNMG120404	F11
2559576	CNMG120404	F11
2559591	TNMG220416	F17
2559601	TNMG220412	F17
2559606	TNMG220412	F17
2559611	TNMG220412	F17
2559616	TNMG220412	F17
2559635	TNMG220408	F17
2559640	TNMG220408	F17
2559650	TNMG160412	F17
2559655	TNMG160412	F17
2559680	TNMG160408	F17
2559685	TNMG160408	F17
2559690	TNMG160408	F17
2559720	TNMG160408	F17
2559739	TNMG160404	F17
2559750	TNMG160404	F17
2559805	CNMA120412	F11
2559810	CNMA120412	F11
2559834	CNMA120408	F11
2559840	CNMA120408	F11
2559845	CNMA120408	F11
2559864	CNMA120404	F11
2559874	CNMA120404	F11
2559884	SNMM250724	F15
2559904	SNMM250724	F15
2559914	SNMM190616	F15
2559949	SNMA250724	F15
2559959	SNMA250724	F15
2559989	SNMA120412	F15
2559994	SNMA120412	F15
2560009	SNMA120408	F15
2560025	SNMA120408	F15
2560030	SNMA120408	F15
2560121	TNMA160408	F17
2560131	TNMA160408	F17
2560136	TNMA160408	F17
2560185	DNMG150612	F13
2560190	DNMG150612	F13
2560230	DNMG150608	F13
2560235	DNMG150608	F13
2560240	DNMG150608	F13
2560293	DNMG150604	F13
2560308	DNMG150604	F13
2560872	WNMG08040849	F21
2560901	TNMG16040849	F17
2560926	CNMG12040422	F11
2560969	TNMG16040822	F17
2560986	TNMG16040422	F17
2560991	TNMG16040422	F17
2561091	CNMG12040849	F11
2561209	DNMG1506165	F13
2561248	DNMG1506125	F13
2561288	DNMG1506085	F13
2561293	DNMG1506085	F13
2561297	TNMG2204165	F18
2561303	TNMG2204125	F18
2561307	TNMG2204125	F18
2561329	TNMG2204085	F18
2561344	TNMG1604125	F18
2561349	TNMG1604125	F18
2561374	TNMG1604085	F18
2561379	TNMG1604085	F18
2561389	TNMG1604085	F18
2561398	SNMG1906165	F15
2561421	SNMG1906125	F15
2561427	SNMG1906125	F15
2561450	SNMG1204125	F15
2561455	SNMG1204125	F15
2561480	SNMG1204085	F15
2561515	CNMG1906165	F11
2561520	CNMG1906165	F11
2561550	CNMG1906125	F11
2561590	CNMG1204125	F11
2561596	CNMG1204125	F11
2561634	CNMG1204085	F11
2561661	WNMG0804125	F21
2561686	WNMG0804125	F21
2561712	WNMG0804085	F21
2561717	WNMG0804085	F21
2561722	WNMG0804085	F21
2561753	TNMM2204168	F18
2561774	CNMM1906168	F12
2561794	SNMM2507248	F15
2561811	SNMM1906168	F15
2561825	SNMM1204088	F15
2561892	SPUN190416	F16
2561907	SPUN190416	F16
2561927	SPUN120312	F16
2561932	SPUN120312	F16
2561937	SPUN120308	F16
2561947	SPUN120308	F16
2561952	SPUN120308	F16
2561957	SPUN120308	F16
2561967	SPUN120308	F16
2562002	SPUN090308	F16
2562359	CCMT09T304	F10
2562379	CCMT09T304	F10
2562385	CCMT09T304	F10
2562390	CCMT09T304	F10
2562395	CCMT09T304	F10
2562415	SNUN190416	F16
2562489	SNUN120408	F16
2562494	SNUN120408	F16
2562499	DCMT11T308MU	F12
2562525	CCMT09T308MU	F10
2562545	CCMT09T304MU	F10
2562552	CCMT09T304MU	F10
2562700	TPUN220412	F19
2562705	TPUN220412	F19
2562710	TPUN220412	F19
2562725	TPUN160312	F19
2562730	TPUN160312	F19
2562745	TPUN160312	F19
2562755	TPUN160308	F19
2562765	TPUN160308	F19
2562776	TPUN160308	F19
2562781	TPUN160308	F19
2562796	TPUN160308	F19
2562802	TPUN160308	F19
2562816	TPUN160304	F19
2562822	TPUN160304	F19
2562827	TPUN160304	F19
2562831	TPUN160304	F19
2562837	TPUN160304	F19
2562846	TPUN160304	F19
2562861	TPUN110308	F19
2562866	TPUN110308	F19
2562887	TPUN110308	F19
2562901	TPUN110304	F19
2562911	TPUN110304	F19
2562952	TNUN220412	F18
2562982	TNUN160408	F18
2563017	TNUN160308	F18
2563037	WNMG0604085	F21
2563047	WNMG0604085	F21
2563052	WNMG0604085	F21
2563318	DCMW11T304	F12
2563403	DNMG1104085	F13
2563408	DNMG1104085	F13
2563431	DNMG11T3085	F13
2563459	DCMT11T308	F12
2563474	DCMT11T308	F12
2563479	DCMT11T308	F12
2563491	TCMT16T304	F16
2563516	TPMR110304	F19
2563522	TPMR110304	F19
2563526	TPMR110304	F19
2563537	TPMR160304	F19
2563553	TPMR160304	F19
2563563	DCMT11T304	F12
2563573	DCMT11T304	F12
2563606	RCMX3209M0	F14
2563635	RCMX2507M0	F14
2563657	RCMX2006M0	F14
2563689	RCMX1204M0	F14
2563694	RCMX1204M0	F14
2563713	RCMX1003M0	F14
2563735	SCMX190412	F14
2563773	VCMT16T308	F20
2563780	VCMT16T308	F20
2563785	VCMT16T308	F20
2563826	VCMT16T304	F20
2563847	TPMR110308	F19
2563851	TPMR110308	F19
2563933	TPMR160308	F19
2563965	CCMT120408	F10
2563990	CCMT09T308	F10
2564000	CCMT09T308	F10
2564010	CCMT090308	F10
2564015	CCMT090308	F10
2564020	CCMT090308	F10
2564044	CCMT090304	F10
2564058	CCMT090304	F10
2564068	CCMT090304	F10
2564082	CCMT090304	F10
2564132	CCMT060204	F10
2564157	CCMT060204	F10
2564167	CCMT060204	F10
2564187	CCMT060204	F10
2564195	CCMW120408	F10
2564202	CCMW090308	F10
2564211	CCMW090304	F10
2564221	CCMW060204	F10
2564248	TCMT16T308	F16
2564259	TCMT16T308	F16
2564280	TCMT110204	F16
2564295	TCMT110204	F16
2564312	TCMT110204	F16
2564432	TCMT110208R	F16
2564437	TCMT110208R	F16
2564447	RCMT0602M0	F14
2564457	RCMT0602M0	F14
2575813	TPGN110304	F19
2576282	SNMG250724	F15
2576283	SNMG190612	F15
2576284	SNMG120408	F15
2576285	CNMG120408	F11
2576286	TNMG160408	F17
2576287	TNMG160404	F17
2576288	DNMG150604	F13
2576289	SNMG1204085	F15
2576314	CCMT09T308MU	F10
2576427	DCMT11T304	F12
2576428	RCMX1204M0	F14
2576429	VCMT16T304	F20
2580611	TNMG160408FL	F18
2581319	CNMG120412FR	F12
2581320	WNMG060408FR	F21
2581322	WNMG060412FR	F21
2581324	CNMG120408FR	F12
2581348	CCMT120408	F10
2581349	CCMT09T308	F10
2584105	TNMG160408FR	F18
2599478	CCMT09T308	F10
2600454	TNMG160412FR	F18
2604466	TNMG160404FL	F18
2611228	WNMG060404FL	F21
2633861	DNMG1506125	F13
2642318	5IL55ISO	E50
2642319	5IL60ISO	E50
2820981	LTM16	C69
2821023	WPMT06T308LF	C44
2821036	WPMT06T304LF	C44
2821067	TPHH160308LF	C43
2821070	TPHH160304LF	C43
2821090	TPHH160308L	C42
2821104	TPHH160308L	C42
2821115	TPHH160308L	C42
2821121	TPHH160308R	C42
2821128	TPHH160304L	C42
2821137	TPHH160304L	C42
2821150	TPHH160304L	C42
2821158	TPHH160304R	C42
2821162	TPHH160304L	C42
2821168	TPHH160304R	C42
2821174	TPHH160302L	C42
2821186	TPHH160302L	C42
2821191	TPHH160302R	C42
2821197	TPHH160302L	C42
2821208	TPHH160302L	C42
2821213	TPHH160302R	C42
2821290	TPHB160308M	C42
2821296	TPHB160304M	C42
2821319	TPHH17T309LF	C43
2821325	TPHB160316	C42
2821331	TPHB160308	C42
2821349	TPHB160308	C42
2821371	TPHB160308	C42
2821377	TPHB160308	C42
2821381	TPHB160308	C42
2821392	TPHB160304	C42
2821397	TPHB160302	C42
2821402	TPHB1603X0	C42
2821457	CPGT09T304LF	C39
2821484	CPMT09T308LF	C39
2821494	CPMT09T304LF	C39
2821499	CPMT09T304LF	C39
2821519	CPMT09T302LF	C39
2821536	TPGT16T304HP	C43
2821539	TPGT16T304HP	C43
2821553	TPMT160312LF	C44
2821559	TPMT160308LF	C44
2821566	TPMT160308LF	C44
2821571	TPMT160304LF	C44
2821577	TPMT160304LF	C44
2821602	TPHH17T309LF	C43
2821635	TPHH17T305LF	C43
2821660	TPHH160308LF	C43
2821664	TPHH160308LF	C43
2821670	TPHH160308LF	C43
2821682	TPHH160308LF	C43
2821688	TPHH160308LF	C43
2821700	TPHH160304LF	C43
2821705	TPHH160304LF	C43
2821718	TPHH160304LF	C43
2821725	TPHH160304LF	C43
2821749	TPHB160304	C42
2821772	TPHB160304	C42
2821778	TPHB160304	C42
2821799	TPHB160304	C42
2821806	TPHB160304	C42
2821812	TPHB160302	C42
2821816	TPHB160302	C42
2821822	TPHB160302	C42
2821834	TPHB160302	C42
2821840	TPHB1603X0	C42
2821844	TPHB1603X0	C42
2821849	TPHB1603X0	C42
2821858	TPHB1603X0	C42
2821865	TPHB1603X0	C42
2822085	SDBM162545R	C19
2823182	SKEY	C69
2823189	STKEY	C69
2823196	STBIT	C69
2823203	STM31	C69
2823227	SC30	C15, C19, C23, C69
2823236	SBIT	C69
2823592	TPGT110204HP	C43
2823595	TPGT110204HP	C43
2823605	TPGT110202HP	C43
2823612	TPGT110202HP	C43
2823619	TPMT110204LF	C44
2823625	TPMT110204LF	C44
2823638	TPMT110202LF	C44
2823646	TPMT110202LF	C44
2823673	TPHH110208R	C42

Order No.	Catalogue No.	Page(s)
2823681	TPHH110208L	C42
2823697	TPHH110208L	C42
2823704	TPHH110208R	C42
2823710	TPHH110204L	C42
2823724	TPHH110204L	C42
2823739	TPHH110204L	C42
2823746	TPHH110204R	C42
2823753	TPHH110204L	C42
2823760	TPHH110204R	C42
2823767	TPHH110202L	C42
2823780	TPHH110202L	C42
2823792	TPHH110202L	C42
2823805	TPHH110202L	C42
2823812	TPHH110202R	C42
2823819	TPHH110204	C43
2823826	TPHH110204	C43
2823846	TPHH110204	C43
2823851	TPHH110204	C43
2823858	TPHH110204	C43
2823870	TPHH110202	C43
2823877	TPHH110202	C43
2823908	TPHH110202	C43
2823914	TPHH110202	C43
2823942	TPHB110204M	C42
2823949	TPHB110202M	C42
2823954	TPHB1102X0M	C42
2824008	TPHB110208M	C42
2824015	TPHB110204M	C42
2824022	TPHB110202M	C42
2824030	TPHB1102X0M	C42
2824037	TPHB110208	C42
2824044	TPHB110208	C42
2824065	TPHB110208	C42
2824071	TPHB110208	C42
2824077	TPHB110208	C42
2824090	TPHB110204	C42
2824104	TPHB110204	C42
2824122	TPHB110204	C42
2824129	TPHB110204	C42
2824136	TPHB110204	C42
2824143	TPHB110204	C42
2824148	TPHB110202	C42
2824168	TPHB110202	C42
2824191	TPHB110202	C42
2824195	TPHB110202	C42
2824200	TPHB110202	C42
2824213	TPHB1102X0	C42
2824220	TPHB1102X0	C42
2824236	TPHB1102X0	C42
2824243	TPHB1102X0	C42
2824251	TPHB1102X0	C42
2824316	WPHT040204	C44
2824324	WPHT040204	C44
2824331	WPHT040202	C44
2824338	WPHT040202	C44
2824344	WPHT040201	C44
2824350	WPHT040201	C44
2824362	WPMT040204LF	C44
2824433	CPHH06T104	C39
2824441	CPHH06T104	C39
2824447	CPHH06T104	C39
2824454	CPHH06T102	C39
2824461	CPHH06T102	C39
2824468	CPHH06T102	C39
2824562	CPHB06T104	C39
2824583	CPHB06T102	C39
2824590	CPHB06T102	C39
2824737	QCBM122540R	C18
2824747	QCBM122545R	C18
2824769	QCBM102545L	C18
2824776	QCBM102545R	C18
2824815	QSOM9516380R	C23
2824819	QSOM9516385R	C23
2824886	QSBM121520R	C14
2824898	QSBM121525R	C14
2824945	QSBM9920385L	C17
2824950	QSBM9920385R	C17
2824993	QSBM9916485R	C17
2825013	QSBM9912480R	C17
2825019	QSBM9912485L	C17
2825024	QSBM9912485R	C17
2825052	QSBM9912295R	C17
2825941	QTM20	C21-22, C69
2825948	QTM26	C21-22, C69
2825952	QTKEY	C69
2825963	QTBIT	C69
2825964	Q8BIT	C69
2825973	Q8KEY	C69
2825982	QKEY	C69
2826005	QC15	C69
2826031	QC26	C14, C17-18, C23, C69
2826038	QC21	C14, C17-18, C69
2826045	QBIT	C69
2827471	WPHTS30104	C44
2827477	WPHTS30104	C44
2827483	WPHTS30102	C44
2827490	WPHTS30102	C44
2827496	WPHTS30101	C44
2827506	WPHTS30101	C44
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2828134	GSBMW51003R	C21
2828318	GTKEY	C69
2828324	GTBIT	C69
2828337	GT21	C24-25, C69
2828386	TDHH07S104	C41
2828398	TDHH07S102	C41
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2828460	TDHH07S104L	C41
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2828508	TDHH07S102L	C41
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2828523	TDHH07S102R	C41
2828529	TDHH07S102L	C41
2828541	TDHH07S102L	C41
2828547	TDHH07S102R	C41
2828562	TDHB07S108M	C41
2828579	TDHB07S102M	C41
2828591	TDHB07S1X0M	C41
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2829390	FCBM61525R	C18
2829408	FSBM8216380R	C16
2829429	FSBM6616195R	C16
2829442	FSBM8212380L	C16
2829448	FSBM8212380R	C16
2829459	FSBM8212385R	C16
2829472	FSBM8212250R	C16
2829496	FSBM6612190R	C16
2829501	FSBM6612195L	C16
2829508	FSBM6612195R	C16
2829533	FSBM5212125R	C16
2829539	FSBM81000R	C14
2829545	FSBM81005L	C14
2829548	FSBM81005R	C14
2829554	FSBM61000R	C14
2829566	FSBM61005R	C14
2830471	FC14	C16, C20, C69
2830477	FC11	C14, C16, C18, C20, C69
2830492	FKEY	C69
2830497	FBIT	C69
2830529	CDG50302R	C45
2830535	CDG50302R	C45
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2830572	CDT50022R	C45
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2830769	CDHBS4T004M	C38
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2830836	CDHBS4T004	C38
2830843	CDHBS4T002	C38
2830848	CDHBS4T002	C38
2830853	CDHBS4T002	C38
2830864	CDHBS4T002	C38
2830870	CDHBS4T002	C38
2830876	CDHBS4T0X0	C38
2830881	CDHBS4T0X0	C38
2830888	CDHBS4T0X0	C38
2830897	CDHBS4T0X0	C38
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2831031	CCBM51525R	C12
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2831042	CCMM51020R	C26
2831048	CSMM6760R	C26
2831054	CSMM5640R	C26
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2831132	CCBM5316515L	C13
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2831211	CCBM5312510R	C13
2831221	CCBM5312515R	C13
2831232	CCBM5312250R	C13
2831238	CCBM5312255L	C13
2831244	CCBM5312255R	C13
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2831399	CSPM71225225R	C24
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2831468	CSBM6412325R	C11
2831477	CSBM6412190R	C11
2831483	CSBM6412195L	C11
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2831548	CSBM4512125R	C11
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2831588	CSBM6410195L	C11
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2831615	CSBM5210255R	C11
2831628	CSBM5210120R	C11
2831639	CSBM5210125R	C11
2831651	CSBM4510255R	C11
2831656	CSBM4510125L	C11
2831661	CSBM4510125R	C11
2831666	CSBM8765R	C10
2831676	CSBM6650R	C10
2831687	CSBM6655R	C10
2831695	CSBM4657L	C10
2831701	CSBM4657R	C10
2831791	CCBM61005L	C12
2831801	CCBM51000R	C12
2831807	CCBM51005L	C12
2831813	CCBM41007L	C12
2831821	CCBM61005R	C12
2831826	CCBM51005R	C12
2831832	CCBM41007R	C12
2832628	CKEY	C69
2832635	CT11	C21-22, C69
2832641	CT15	C21-22, C24-25, C69
2832647	CC11	C10-13, C26, C69
2832655	CC09	C11-13, C69
2832661	CBIT	C69
2832672	BP3121000R	C58
2832676	BP3121000R	C58
2832683	BP250825R	C58
2832689	BP250825R	C58
2832702	BP187600R	C58
2832719	BB3121250R	C58
2832724	BB3121250R	C58

Order No.	Catalogue No.	Page(s)
2832730	BB2501750R	C58
2832737	BB2501750R	C58
2832742	BB2501000R	C58
2832747	BB2501000R	C58
2832758	BB1871250R	C58
2832763	BB187750R	C58
2832769	BB187750R	C58
2832809	CSM22500	C27
2832813	CSM22375	C27
2832820	CSM22312	C27
2832827	CSM22250	C27
2832832	CSM22187	C27
2832838	CSM22156	C27
2836024	BW312	C51, C69
2836069	MB030187R	C67
2836080	MB030187R	C67
2836085	MB010062R	C67
2836098	MB010062R	C67
2836168	MT15660F2R	C68
2836180	MT09560F2R	C68
2836184	MP156500R	C68
2836190	MP125375R	C68
2836200	MP062187R	C68
2836210	MG156050R	C68
2836216	MG125040R	C68
2836223	MG095030R	C68
2836229	MB156875R	C67
2836240	MB125625R	C67
2836245	MB125375R	C67
2836251	MB094500R	C67
2836263	MB062312R	C67
2836322	MT15660F2R	C68
2836328	MT12560F2R	C68
2836334	MT09560F2R	C68
2836339	MP156500R	C68
2836345	MP125375R	C68
2836351	MP094281R	C68
2836357	MP062187R	C68
2836363	MG156050R	C68
2836375	MG095030R	C68
2836380	MB156875R	C67
2836388	MB156500R	C67
2836394	MB125625R	C67
2836398	MB125375R	C67
2836405	MB094500R	C67
2836412	MB094281R	C67
2836418	MB062312R	C67
2836423	MB062187R	C67
2836436	ATD15660F2	C57
2836443	ATD15660F2	C57
2836450	ATD12560F2	C57
2836458	ATD12560F2	C57
2836462	ATD09560F2	C57
2836468	ATD09560F2	C57
2836473	APD156500R	C57
2836479	APD156500R	C57
2836483	APD125375R	C57
2836489	APD125375R	C57
2836495	APD09281R	C57
2836499	APD09281R	C57
2836511	APD06187R	C57
2836517	AGD15605	C56
2836524	AGD15605	C56
2836531	AGD12504	C56
2836537	AGD12504	C56
2836545	AGD09503	C56
2836550	AGD09503	C56
2836554	ABD156875R	C56
2836561	ABD156875R	C56
2836567	ABD156500R	C56
2836573	ABD156500R	C56
2836579	ABD125625R	C56
2836582	ABD125625R	C56
2836588	ABD125375R	C56
2836593	ABD125375R	C56
2836599	ABD09500R	C56
2836604	ABD09500R	C56
2836608	ABD09281R	C56
2836614	ABD09281R	C56
2836621	ABD06312R	C56
2836627	ABD06312R	C56
2836632	ABD06187R	C56
2836639	ABD06187R	C56
2836679	ABD156875RM	C56
2836694	ABD125625RM	C56
2836700	ABD09500RM	C56
2836705	ABD09500RM	C56
2839192	ATBM1638	C51
2839222	ATBM838	C51
2840089	MBIT	C69
2840094	MKEY	C69
2840098	MSM46	C63, C69
2840174	AKEY	C69
2840186	AS832	C51, C69
2840192	AW250	C51, C69
2892513	BS832	C51, C69
2904944	DNMG150408AP	B23
2904950	DNMG150412AP	B23
2904955	DNMP150404SM	B25
2904956	DNMP150408SM	B25
2904957	DNMP150412SM	B25
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2951905	CCMT09T3042	B14
2951906	CCMT09T308	B14
2951907	CCMT120408	B14
2951908	CCMT120412	B14
2951909	DCMT11T304	B20
2951910	DCMT11T3042	B20
2951911	DCMT11T30441	B21
2951912	DCMT11T308	B20
2951943	DCMT11T3082	B20
2951944	DCMT11T30841	B21
2951945	DCMT11T31241	B21
2951946	DCMT150404	B20
2951947	DCMT150408	B20
2951948	SCMT120412	B29
2952067	SNMN120412T02020	B56
2952068	SNMN120416T02020	B56
2952069	SNMX120712T02020	B57
2952070	SNMX120716T02020	B57
2952071	SNMX150716T02020	B57
2952072	TNGN160408T02020	B58
2952082	CNGN120408T02020	B50
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2952114	CNGN120416T02020	B50
2952115	CNGN120712T02020	B50
2952116	CNGN120716T02020	B50
2952117	CNGX120708T02020	B50
2952118	CNGX120712T01020FW	B51
2952119	CNGX120712T02020	B50
2952120	CNGX120716T02020	B50
2952121	CNGX160716T02020	B50
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2952123	CNMX120716T02020	B51
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2952125	DNGX120716T02020	B52
2952126	DNGX150708T02020	B52
2952127	DNGX150712T02020	B52
2952128	DNGX150716T02020	B52
2952129	DNMX150716T02020	B52
2952130	ENGX130716T02020	B53
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2952133	RNGN150700T02020	B54
2952134	RNMN120700T02020	B54
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2952139	SNGN120716T02020	B55
2952140	SNGX120708T02020	B56
2952141	SNGX120712T01020FW	B56
2952142	SNGX120712T02020	B56
2952143	SNGX120716T02020	B56
2952144	SNGX150716T02020	B56
2952146	SCGN090408EFW	B54
2952147	SCGN090412T00520	B54
2952153	TNGN160412T02020	B58
2952154	TNGN220416T02020	B58
2952155	TPGN160308T02020	B58
2952156	TPGN160312T02020	B58
2952157	WNGX080712T02020	B59
2952158	CNGA120408T01020FW	B50
2952159	CNGA120408T02020	B50
2952160	CNGA120412T01020FW	B50
2952161	CNGA120412T02020	B50
2952162	CNGA120416T01020FW	B50
2952173	CNGA120416T02020	B50
2952174	CNGA160612T02020	B50
2952175	CNGA160616T02020	B50
2952176	CNGA190612T02020	B50
2952177	CNGA190616T02020	B50
2952178	CNMA120408T02020	B51
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2952181	CNMA160612T02020	B51
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2952184	DNGA150412T02020	B52
2952185	DNGA150612T02020	B52
2952186	DNMA150412T02020	B52
2952187	SNGA120408T02020	B55
2952188	SNGA120412T02020	B55
2952189	SNGA120416T02020	B55
2952190	SNGA150612T02020	B55
2952191	SNGA150616T02020	B55
2952192	SNMA120412T02020	B56
2952193	SNMA120416T02020	B56
2952194	SNMA150616T02020	B56
2952195	TNGA160408T02020	B58
2952196	TNGA160412T02020	B58
2952197	TNGA160416T02020	B58
2952198	VNGA160408T02020	B59
2952199	WNGA080408T02020	B59
2952200	WNGA080412T02020	B59
2952201	WNGA080416T02020	B59
2952333	123567360	D80
2952334	123567380	D80
2952335	123567460	D80
2952336	123567480	D80
2952337	123567803	D81
2952338	123567804	D81
2952339	123567805	D81
2952340	123567806	D81
2952341	123568080	D82
2952342	123568100	D82
2952343	123568120	D82
2952344	123568140	D82
2952345	123568160	D82
2952350	123567360	D80
2952351	123567380	D80
2952352	123567460	D80
2952353	123567480	D80
2952354	123567702	D81
2952355	123567703	D81
2952356	123567704	D81
2952357	123567720	D81
2952358	123567721	D81
2952359	123567730	D81
2952360	123567731	D81
2952361	123567740	D81
2952362	123567741	D81
2952363	123568080	D82
2952364	123568100	D82
2952365	123568120	D82
2952366	123568140	D82
2952367	123568160	D82
2952526	CNGA120404T02020	B50
2952527	CNGA120408T02020	B50
2952528	CNGA120412T02020	B50
2952529	CNGA160612T02020	B50
2952530	CNGA190612T02020	B50
2952531	CNGA190616T02020	B50
2952532	DNGA150404T02020	B52
2952533	DNGA150408T02020	B52
2952534	DNGA150412T02020	B52
2952535	DNGA150604T02020	B52
2952536	DNGA150608T02020	B52
2952537	DNGA150612T02020	B52
2952538	SNGA120408T02020	B55
2952539	SNGA120412T02020	B55
2952540	SNGA120416T02020	B55
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2952542	TNGA160412T02020	B58
2952543	TNGA160416T02020	B58
2952544	TNGA220408T02020	B58
2952545	VNGA160404T02020	B59
2952546	VNGA160408T02020	B59
2952547	VNGA160412T02020	B59
2952548	VNGA220408T02020	B59
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2952610	DNGN150716T02020	B52
2952611	ENGN130704T02020	B53
2952612	ENGN130708T02020	B53
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2952614	ENGN130716T02020	B53
2952615	RNGN090400T02020	B54
2952616	RNGN120400T02020	B54
2952617	RNGN120700T02020	B54
2952618	RNGN120700T10015	B54
2952619	RNGN120700T20015	B54
2952620	RNGN150700T02020	B54
2952693	RCGX090700T01020	B53
2952694	RCGX090700T02020	B53
2952695	RCGX090700T07015	B53
2952696	RCGX090700T20015	B53
2952697	RCGX120700T02020	B53
2952698	RCGX120700T20015	B53
2952699	SCUN120412T00520	B54
2952700	SPGN090308T01020	B57
2952701	SPGN120304T01020	B57
2952702	SPGN120308T01020	B57
2952703	SPUN120304T00520	B57
2952704	SPUN120308T00520	B57
2952705	SPUN120312T00520	B57
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2952707	TPGN110308T01020	B58
2952708	TPGN110312T01020	B58
2952709	TPGN160304T00520	B58
2952710	TPGN160304T01020	B58
2952711	TPGN160308T00520	B58
2952712	TPGN160308T01020	B58
2952713	TPGN160312T01020	B58
2952748	SNGN090308T02020	B55
2952749	SNGN090412T00515	B55
2952750	SNGN120408T00520	B55
2952751	SNGN120408T02020	B55
2952752	SNGN120412T02020	B55
2952823	SNGN120416T02020	B55
2952824	SNGN120704T02020	B55
2952825	SNGN120708T02020	B55
2952826	SNGN120712T02020	B55
2952827	SNGN120716T02020	B55
2952828	SNGN120720T02020	B55
2952829	SNGN120720T10015	B55
2952830	SNGN150712T02020	B55
2952831	SNGN150716T02020	B55
2952832	SNGN190720K20015	B55
2952833	SNGN190720T20015	B55
2952834	TNGN110308T02020	B58
2952835	TNGN160404T02020	B58
2952836	TNGN160408T02020	B58
2952837	TNGN160412T02020	B58
2952838	TNGN160416T02020	B58
2952839	TNGN160708T02020	B58
2952840	TNGN160712T02020	B58
2952841	TNGN220408T02020	B58
2953284	123567330	D80
2953286	123567340	D80
2953289	123567320	D80
2953291	123567230	D80
2953339	SNGN120712T00520	B55
2953340	SNGN120716T00520	B55
2953342	CNMG120404FW	B18
2953663	123567440	D80
2953666	123567380	D80
2953667	123567240	D80
2953671	123567450	D80
2953672	123567231	D80
2953673	123567350	D80
2953674	123567360	D80
2953675	123567480	D80
2953676	123567241	D80
2953677	123567460	D80
2953678	123567430	D80
2953679	123567420	D80
2954695	CNMG120408FW	B18
2954698	CNMG120412FW	B18
2954701	CNMG120408MW	B18
2954704	CNMG120412MW	B18
2954707	DNMG150404FW	B24
2954710	DNMG150408FW	B24
2954713	DNMG150604FW	B24
2954716	DNMG150608FW	B24
2954719	DNMG150408MW	B24
2954722	DNMG150412MW	B24

Order No.	Catalogue No.	Page(s)
2954725	DNMG150608MW	B24
2954728	DNMG150612MW	B24
2954731	WNMG080404FW	B45
2954734	WNMG080408FW	B45
2954737	WNMG080412FW	B45
2954740	WNMG080408MW	B45
2954743	WNMG080412MW	B45
2955621	CNMG12040822	B16
2955622	CNMG12041222	B16
2955721	CNMG12040422	B16
2955722	CNMG12040822	B16
2955753	CNMG12041222	B16
2955754	DNMG15060422	B22
2955755	DNMG15060822	B22
2955756	DNMG15061222	B22
2955757	SNMG12040422	B30
2955758	SNMG12040822	B30
2955759	SNMG12041222	B30
2955760	TNMG16040422	B36
2955761	TNMG16040822	B36
2955762	TNMG16041222	B36
2955763	CNMG120408AP	B17
2955764	CNMG120412AP	B17
2955765	DNMG150608AP	B23
2955766	DNMG150612AP	B23
2955767	SNMG120408AP	B31
2955768	SNMG120412AP	B31
2955769	TNMG160408AP	B37
2955770	TNMG160412AP	B37
2955771	WNMG080408AP	B44
2955772	WNMG080412AP	B44
2955773	CCMT09T304MU	B15
2955774	CCMT09T308MU	B15
2955775	CCMT09T312MU	B15
2955776	CCMT120404MU	B15
2955777	CCMT120408MU	B15
2955778	CCMT120412MU	B15
2955779	DCMT11T304MU	B21
2955780	DCMT11T308MU	B21
2955781	DCMT11T312MU	B21
2955782	DCMT150404MU	B21
2955783	DCMT150408MU	B21
2955784	DCMT150412MU	B21
2955785	SCMT09T304MU	B29
2955786	SCMT09T308MU	B29
2955787	SCMT120408MU	B29
2955788	SCMT120412MU	B29
2955789	TCMT16T304MU	B36
2955790	TCMT16T308MU	B36
2955791	TCMT16T312MU	B36
2955792	CNMP120404SM	B19
2955793	CNMP120408SM	B19
2955794	CNMP120412SM	B19
2955795	DNMP150604SM	B25
2955796	DNMP150608SM	B25
2955797	DNMP150612SM	B25
2955798	SNMP120408SM	B33
2955799	SNMP120412SM	B33
2955800	TNMP160404SM	B39
2955801	TNMP160408SM	B39
2955802	TNMP160412SM	B39
2955803	TNMP220404SM	B39
2955804	TNMP220408SM	B39
2955805	TNMP220412SM	B39
2956093	DNMG15060822	B22
2956094	DNMG15061222	B22
2956095	SNMG12040822	B30
2956096	SNMG12041222	B30
2956097	SNMG12041622	B30
2956098	TNMG16040822	B36
2956099	TNMG16041222	B36
2956100	CNMG120408AP	B17
2956101	CNMG120412AP	B17
2956102	DNMG150608AP	B23
2956103	DNMG150612AP	B23
2956104	SNMG120408AP	B31
2956105	SNMG120412AP	B31
2956106	TNMG160408AP	B37
2956107	TNMG160412AP	B37
2956108	WNMG080408AP	B44
2956109	WNMG080412AP	B44
2956110	CCMT09T304MU	B15
2956111	CCMT09T308MU	B15
2956112	CCMT09T312MU	B15
2956113	CCMT120408MU	B15
2956114	CCMT120412MU	B15
2956115	DCMT11T304MU	B21
2956116	DCMT11T308MU	B21
2956117	DCMT11T312MU	B21
2956118	DCMT150408MU	B21
2956119	DCMT150412MU	B21
2956120	SCMT09T304MU	B29
2956121	SCMT09T308MU	B29
2956122	SCMT120408MU	B29
2956123	SCMT120412MU	B29
2956124	SCMT120416MU	B29
2956125	TCMT16T304MU	B36
2956126	TCMT16T308MU	B36
2956127	TCMT16T312MU	B36
2956128	CNMP120408SM	B19
2956129	CNMP120412SM	B19
2956130	DNMP150608SM	B25
2956131	DNMP150612SM	B25
2956132	SNMP120408SM	B33
2956133	SNMP120412SM	B33
2956134	SNMP150608SM	B33
2956135	SNMP150612SM	B33
2956136	SNMP150616SM	B33
2956137	TNMP160408SM	B39
2956138	TNMP160412SM	B39
2956139	TNMP220408SM	B39
2956140	TNMP220412SM	B39
2967794	TNMG160404FM	F18
2967795	TNMG160408FM	F18
2967798	CNMG120408FM	F12
2989026	CNMG120408FR	F12
2992805	DNMG110408FM	F13
3020579	CCMT060204	F10
3025010	GSPM1016385R	C24
3027643	MB156500L	C67
3029009	S40TCCLNR12MX7	A47
3029010	S40TCCLNL12MX7	A47
3029011	S40TCCLNR12MN4	A48
3029012	S40TCCLNL12MN4	A48
3029143	S40TCCLNR12MN7	A48
3029144	S40TCCLNL12MN7	A48
3029151	S40TCSSNR12MX7	A49
3029152	S40TCSSNL12MX7	A49
3029153	S40TCWLNR08MX7	A49
3029154	S40TCWLNL08MX7	A49
3032544	CDJNL2525M15MN7	A23
3032545	CDJNR3225P15MN7	A23
3032546	CDJNL3225P15MN7	A23
3032549	CRDNN2525M12MN4	A24
3032550	CRDNN3225P12MN4	A24
3032551	CRDNN2525M12MN7	A24
3032552	CRDNN3225P12MN7	A24
3032675	CRSNR3225P12MN4	A25
3032676	CRSNL3225P12MN4	A25
3032677	CRSNR2525M12MN7	A25
3032678	CRSNL2525M12MN7	A25
3032679	CRSNR3225P12MN7	A25
3032680	CRSNL3225P12MN7	A25
3032691	CCLNR2525M12MX7	A22
3032692	CCLNL2525M12MX7	A22
3032713	CCLNR3225P12MX7	A22
3032715	CCLNR2525M12MN4	A22
3032716	CCLNL2525M12MN4	A22
3032717	CCLNR2525M12MN7	A22
3032718	CCLNL2525M12MN7	A22
3032719	CCLNR3225P12MN7	A22
3032723	CCLNR2525M12MF7	A22
3032726	CDJNR2525M15MX7	A23
3032727	CDJNL2525M15MX7	A23
3032728	CDJNR2525M15MN7	A23
3105217	DNMG150404CT	B24
3105219	DNMG150408CT	B24
3105229	CNMP160612SM	B19
3105230	CNMP190612SM	B19
3118386	2IL05ISO	E50
3118389	2IL075ISO	E50
3122028	3EL10UN	E51
3122422	3IL8RD	E59
3122444	3IL8UN	E52
3123198	2IL125ISO	E50
3124272	3IL05ISO	E50
3176688	MS2173	A85, A87, A89
3176689	MS2175	A85, A87, A89, A91, A97-99
3287987	CSWM 035 040	A85, A87, A89
3287988	CSWM 040 050	A85, A87, A89, A91, A97-99
3287989	CSWM 060 050	A67, A69, A71, A73, A75, A77, A79, A81, A83, A85, A87, A91-93, A95, A97-99
3287990	CSWM 080 050	A67, A69, A71, A73, A75, A77, A79, A83, A85, A91, A95, A97
3287991	CSWM 100 080	A69, A71, A75, A77
3327742	SNMA120404	F15
3348293	DNMP150408SM	B25
3348294	DNMP150404SM	B25
3348297	DNMG1504085	B23
3348299	DNMG15040848	B23
3348301	VNMP160408SM	B43
3348302	VNMP160404SM	B43
3351505	WNMP080412SM	B45
3351521	WNMP080408SM	B45
3393828	QSBMW121523R	C21
3517652	CSBM8765L	C10
3518693	CSBM8760R	C10
3518694	GSPM1316515R	C24
3520653	CCBM81005R	C12
3538703	206262	D87
3538704	206263	D85
3538705	206264	D85
3538706	206265	D85
3538707	206266	D85
3538710	206271	D87
3538711	206272	D85
3538712	206273	D85
3538713	206274	D85
3538714	206275	D85
3538715	206276	D85
3538716	206277	D85
3538717	206278	D85
3538718	206279	D85
3538719	206280	D85
3538720	206281	D85
3538721	206282	D85
3538722	206283	D85
3538723	206284	D85
3538741	206417	D85
3538742	206418	D85
3538743	206419	D85
3538749	206439	D87
3538751	206446	D85
3538752	206447	D85
3538753	206450	D85
3538754	206452	D85
3538755	206454	D85
3538756	206455	D85
3538766	206506	D88
3538767	206507	D88
3538768	206508	D88
3538769	206509	D88
3538770	206510	D88
3538771	206511	D88
3538772	206518	D86
3538773	206519	D86
3538774	206523	D86
3538779	218125	D111
3538780	218126	D111
3538783	218134	D111
3538784	218142	D111
3538785	218143	D111
3538804	235201	D103
3538805	235202	D103
3538806	235203	D103
3538807	235204	D103
3538808	235205	D103
3538809	235206	D103
3538810	235207	D103
3538811	235208	D103
3538812	235209	D103
3539504	331101	D87
3539505	331102	D87
3539508	331109	D87
3539509	331110	D87
3539510	331118	D87
3539515	333101	D86
3539516	333102	D86
3539517	333103	D86
3539518	333104	D86
3539522	333111	D86
3539559	338221	D104
3539560	338222	D104
3539561	338223	D104
3539562	338224	D104
3539563	338225	D105
3539564	338226	D105
3539565	338227	D105
3539566	338228	D105
3539567	338229	D105
3539568	338230	D105
3539569	338231	D104
3539570	338232	D104
3539795	409182	D88
3539796	409183	D88
3539797	409184	D88
3539798	409185	D88
3539799	409187	D88
3539841	435126	D85
3539842	435127	D85
3539843	435128	D87
3539844	435129	D87
3539845	435130	D85
3539846	435131	D85
3539851	435140	D85
3539852	435141	D85
3539853	435142	D87
3539854	435143	D87
3539863	435152	D85
3539864	435153	D85
3539865	435154	D86
3539866	435155	D86
3539867	435156	D86
3539868	435157	D86
3539876	435170	D85
3539877	435171	D85
3539880	435180	D85
3539881	435181	D85
3539884	435194	D86
3539887	435200	D85
3539888	435201	D85
3539889	435202	D85
3539890	435203	D85
3539891	435204	D85
3539892	435205	D85
3539916	440202	D104
3539917	440203	D104
3539918	440204	D104
3539919	440205	D105
3539920	440206	D105
3539921	440207	D105
3539922	440208	D105
3539923	440209	D105
3539924	440211	D104
3539925	4402122	D104
3539955	446101	D13
3539956	446102	D13
3539957	446103	D13-14
3539958	446104	D13-14
3539981	606190	D111
3539983	606193	D111
3539998	606218	D103
3539999	606219	D104-105
3540016	606243	D88
3540017	606244	D88
3540019	606247	D86
3540021	606249	D10-12
3540026	606255	D16
3540027	606256	D20
3540036	613135	D103
3540038	613137	D103
3540039	613139	D88
3540042	614125	D20
3540043	614126	D20
3540081	619151	D20
3540084	619155	D103
3540093	619168	D10-11, D13-14, D16, D20, D85
3540117	619205	D10-11, D13
3540176	619419	D16
3540396	506101	D108
3540398	506101	D108
3540399	506101	D108
3540400	506101	D108
3540407	506102	D108
3540408	506102	D108
3540409	506102	D108
3540412	506103	D108
3540414	506103	D108
3540415	506103	D108

Order No.	Catalogue No.	Page(s)
3540421	506104	D108
3540423	506104	D108
3540429	506105	D108
3540430	506105	D108
3540435	506106	D108
3540440	506107	D108
3540444	506108	D108
3540857	507295	D97
3540858	507295	D97
3540859	507295	D97
3540860	507296	D97
3540861	507296	D97
3540862	507296	D97
3540863	507297	D97
3540864	507297	D97
3540865	507297	D97
3540920	507348	D97
3540921	507349	D97
3540922	507350	D97
3540923	507351	D97
3540924	507352	D97
3540925	507353	D97
3540932	507363	D96
3540933	507363	D96
3540934	507364	D96
3540935	507364	D96
3540936	507365	D96
3540937	507365	D96
3540938	507366	D96
3540939	507367	D96
3540940	507368	D96
3540941	507369	D96
3540942	507370	D96
3540943	507371	D96
3540944	507372	D96
3540945	507372	D96
3540946	507372	D96
3540947	507373	D96
3540948	507373	D96
3540949	507374	D96
3540950	507374	D96
3540951	507378	D97
3540952	507378	D97
3540953	507378	D97
3540954	507379	D97
3540955	507379	D97
3540956	507379	D97
3540957	507380	D97
3540958	507380	D97
3540959	507380	D97
3540963	507383	D96
3541618	510101	D114
3541622	510102	D114
3541624	510103	D115
3541625	510103	D115
3541626	510103	D115
3541627	510103	D115
3541630	510104	D114
3541636	510106	D115
3541638	510106	D115
3541642	510107	D115
3541644	510108	D115
3541646	510108	D115
3541648	510113	D114
3541649	510114	D114
3541650	510115	D114
3541651	510116	D114
3541652	510117	D114
3541653	510118	D114
3541654	510119	D114
3541655	510120	D114
3541656	510121	D114
3541657	510122	D114
3541658	510123	D114
3541659	510124	D114
3541663	510128	D114
3541667	510132	D114
3541669	510134	D114
3541672	510135	D115
3541673	510135	D115
3541674	510136	D115
3541675	510136	D115
3541676	510136	D115
3541677	510136	D115
3541680	510137	D115
3541683	510138	D115
3548058	CCMT09T308MU	B15
3548059	DCMT11T308MU	B21
3548062	SCMT09T308MU	B29
3548164	CNMA120408	B16
3548165	CNMA120412	B16
3548168	SNMA120408	B30
3548169	SNMA120412	B30
3548172	CNMG1204085	B17
3548183	CNMG120412	B16
3548184	DNMG11040822	B22
3548185	DNMG15060822	B22
3548186	DNMG1506125	B23
3548187	WNMG0804085	B44
3548188	WNMG0804125	B44
3558218	CCGT060202MU	B14
3558219	CCMT060204MU	B15
3558220	CCMT060208MU	B15
3558221	CCMT090304MU	B15
3558222	CCMT090308MU	B15
3558293	CCMT090312MU	B15
3558294	CCMT09T304MU	B15
3558295	CCMT09T312MU	B15
3558296	CCMT120404MU	B15
3558297	CCMT120408MU	B15
3558298	CCMT120412MU	B15
3558299	DCMT070204MU	B21
3558300	DCMT070208MU	B21
3558301	DCMT11T304MU	B21
3558302	DCMT11T312MU	B21
3558303	DCMT150408MU	B21
3558304	DCMT150412MU	B21
3558305	SCMT090304MU	B29
3558306	SCMT090308MU	B29
3558308	SCMT09T304MU	B29
3558309	SCMT120408MU	B29
3558310	SCMT120412MU	B29
3558311	SCMT120416MU	B29
3558312	TCGT110202MU	B35
3558313	TCMT110204MU	B36
3558314	TCMT110208MU	B36
3558315	TCMT16T304MU	B36
3558316	TCMT16T308MU	B36
3558317	TCMT220408MU	B36
3558318	TCMT220412MU	B36
3558325	CCMT060202	B14
3558326	CCMT060204	B14
3558327	CCMT060208	B14
3558329	CCMT090304	B14
3558330	CCMT090308	B14
3558331	CCMT09T304	B14
3558332	CCMT09T308	B14
3558403	CCMT09T312	B14
3558404	CCMT120408	B14
3558405	CCMT120412	B14
3558406	DCMT070202	B20
3558407	DCMT070204	B20
3558408	DCMT070208	B20
3558409	DCMT11T304	B20
3558410	DCMT11T308	B20
3558411	DCMT11T312	B20
3558412	DCMT150404	B20
3558413	DCMT150408	B20
3558414	DCMT150412	B20
3558415	DCMT150416	B20
3558416	RCMT0602M0	B27
3558417	RCMT0602M043	B27
3558418	RCMT0803M0	B27
3558419	RCMT0803M043	B27
3558420	RCMT10T3M0	B27
3558421	RCMT10T3M043	B27
3558422	RCMT1204M0	B27
3558423	RCMT1204M043	B27
3558424	RCMT1606M0	B27
3558425	RCMT1606M043	B27
3558426	RCMX2006M0T	B28
3558427	RCMX2507M0T	B28
3558428	SCMT09T304	B29
3558429	SCMT09T308	B29
3558430	SCMT120408	B29
3558431	SCMT120412	B29
3558432	SCMT120416	B29
3558433	TCMT110204	B35
3558434	TCMT110208	B35
3558435	TCMT16T304	B35
3558436	TCMT16T308	B35
3558437	TCMT16T312	B35
3558438	TCMT220412	B35
3558439	VBMT160404	B42
3558440	VBMT160408	B42
3558441	VBMT160412	B42
3558442	VCMT16T308	B42
3558450	CNMA120404	B16
3558451	CNMA160612	B16
3558452	CNMA190612	B16
3558533	CNMA190616	B16
3558534	DNMA150608	B22
3558535	DNMA150612	B22
3558536	SNMA190612	B30
3558537	SNMA190616	B30
3558538	TNMA160408	B36
3558539	TNMA160412	B36
3558540	TNMA220408	B36
3558541	TNMA220412	B36
3558542	TNMA220416	B36
3558543	WNMA080408	B43
3558544	WNMA080412	B43
3559523	CNMG120404	B16
3559524	CNMG12040422	B16
3559525	CNMG120408	B16
3559526	CNMG12040822	B16
3559527	CNMG12041222	B16
3559528	CNMG1204125	B17
3559529	CNMG1204165	B17
3559530	CNMG160608	B16
3559531	CNMG1606085	B17
3559532	CNMG160612	B16
3559533	CNMG1606125	B17
3559534	CNMG1606165	B17
3559535	CNMG1906085	B17
3559536	CNMG190612	B16
3559537	CNMG1906125	B17
3559538	CNMG190616	B16
3559539	CNMG1906165	B17
3559540	CNMG1906245	B17
3559541	DNMG11040422	B22
3559542	DNMG1104085	B23
3559544	DNMG150604	B22
3559546	DNMG15060422	B22
3559547	DNMG150608	B22
3559548	DNMG1506085	B23
3559549	DNMG150612	B22
3559550	DNMG15061222	B22
3559551	DNMG1506165	B23
3559552	RNMG120400	B28
3559554	SNMG09030422	B30
3559555	SNMG09030822	B30
3559556	SNMG120404	B30
3559557	SNMG12040422	B30
3559558	SNMG120408	B30
3559559	SNMG12040822	B30
3559560	SNMG1204085	B31
3559561	SNMG120412	B30
3559562	SNMG12041222	B30
3559573	SNMG1204125	B31
3559574	SNMG1204165	B31
3559575	SNMG1506085	B31
3559576	SNMG150612	B30
3559577	SNMG1506125	B31
3559578	SNMG1506165	B31
3559579	SNMG1506245	B31
3559580	SNMG1906085	B31
3559581	SNMG1906125	B31
3559582	SNMG190616	B30
3559583	SNMG1906165	B31
3559584	TNMG11030422	B36
3559585	TNMG11030822	B36
3559586	TNMG160404	B36
3559587	TNMG16040422	B36
3559588	TNMG160408	B36
3559589	TNMG16040822	B36
3559590	TNMG1604085	B37
3559591	TNMG160412	B36
3559592	TNMG16041222	B36
3559593	TNMG1604125	B37
3559594	TNMG220408	B36
3559595	TNMG2204085	B37
3559596	TNMG220412	B36
3559597	TNMG2204125	B37
3559598	TNMG220416	B36
3559599	TNMG2204165	B37
3559600	VNMG12T308	B43
3559601	WNMG06040422	B43
3559602	WNMG06040822	B43
3559603	WNMG0804165	B44
3559605	SNUN120408	B33
3559606	SNUN120412	B33
3559607	SPGN090308	B34
3559608	SPGN120308	B34
3559609	SPGN120312	B34
3559610	SPMR090308	B34
3559611	SPMR120304	B34
3559643	SPMR120312	B34
3559644	SPUN120308	B34
3559645	SPUN120312	B34
3559646	TNUN160408	B39
3559647	TPGN110308	B40
3559648	TPGN160308	B40
3559649	TPMR110308	B41
3559650	TPMR160304	B41
3559651	TPMR160308	B41
3559652	TPMR160312	B41
3559653	TPUN160304	B41
3559654	TPUN160308	B41
3559655	TPUN160312	B41
3559656	TPUN220412	B41
3562029	606266	D12
3563591	331117	D87
3565364	206285	D85
3576565	CCMW060204	B15
3576566	CCMW090304	B15
3576567	CCMW090308	B15
3576568	CCMW09T304	B15
3576569	CCMW09T308	B15
3576570	CCMW120404	B15
3576571	CCMW120408	B15
3576572	DCMW070204	B21
3576603	DCMW11T304	B21
3576604	DCMW150408	B21
3576605	SCMW090304	B29
3576606	SCMW09T308	B29
3576607	SCMW120408	B29
3576609	TCMW16T304	B36
3576679	TCMW110204	B36
3587590	206448	D85
3603744	LNUX19194013	B26
3603745	LNUX191940T	B26
3603746	LNUX30194013	B26
3603747	LNUX301940T	B26
3606522	NG3M300LK	D50
3606660	NG3094RK	D48
3606673	NG2M170RK	D48
3606674	NG3M225RK	D48
3606676	NG2M300RK	D48
3606677	NG3M275RK	D48
3606678	NG3M400RK	D49
3606679	NG2M120RK	D48
3606680	NG2M300LK	D49
3606827	NG2M120LK	D49
3606828	NG2M225RK	D48
3606829	NG2M195RK	D48
3606830	NG4M500RK	D49
3606831	NG3M275LK	D50
3606832	NG4M500LK	D50
3606903	NG2M080RK	D48
3606904	NG2M140LK	D49
3606905	NG2M170LK	D49
3606906	NG3M400LK	D50
3606907	NG2M225LK	D49
3606908	NG4M400RK	D49
3606909	NG3M225LK	D50
3606910	NG2M195LK	D49
3606911	NG2M080LK	D49
3606912	NG4M400LK	D50
3606913	NG2M275LK	D49
3606914	NG3M425RK	D49
3606915	NG3M120RK	D48
3606916	NG2M275RK	D48
3606917	NG3M120LK	D50
3606918	NG3M425LK	D50
3606921	NGD3M400LK	D51
3606922	NGD3M300RK	D51
3606923	NGD4M400LK	D51
3606924	NR2M075L	D55
3606925	NR2M100L	D55
3606926	NR2M125L	D55
3606927	NR2M150L	D55
3606928	NR2M175L	D55
3606929	NR2M075R	D55

Order No.	Catalogue No.	Page(s)
3606930	NR2M100R	D55
3606931	NR2M125R	D55
3606932	NR2M150R	D55
3606933	NR2M175R	D55
3606934	NR3M225L	D55
3606935	NGD2M150LK	D51
3606936	NGD2M200LK	D51
3606937	NGD2M150RK	D51
3606938	NGD2M200RK	D51
3606939	NGD2M250RK	D51
3606940	NGD3M400RK	D51
3606941	NGD3M200LK	D51
3606942	NGD3M250LK	D51
3606943	NGD3M300LK	D51
3606944	NGD3M350LK	D51
3606945	NGD3M200RK	D51
3606946	NGD3M250RK	D51
3606947	NGD3M350RK	D51
3606948	NR2M050L	D55
3606949	NR3M100L	D55
3606950	NR3M125L	D55
3606951	NR3M150L	D55
3606952	NR3M175L	D55
3606953	NR3M200L	D55
3606954	NR4M200L	D55
3606955	NR4M225L	D55
3606956	NR4M250L	D55
3606957	NR2M050R	D55
3606958	NR3M100R	D55
3606959	NR3M125R	D55
3606960	NR3M150R	D55
3606961	NR3M175R	D55
3606962	NR3M200R	D55
3606963	NR3M225R	D55
3606964	NR4M200R	D55
3606965	NR4M225R	D55
3606966	NR4M250R	D55
3606967	NGP2M150L	D52
3606968	NGP2M200L	D52
3606969	NGP2M250L	D52
3606970	NGP2M300L	D52
3606971	NGP3M150L	D52
3606972	NGP3M200L	D52
3606973	NGP3M250L	D52
3606974	NGP3M300L	D52
3606975	NGP2M150R	D52
3606976	NGP2M200R	D52
3606977	NGP2M250R	D52
3606978	NGP2M300R	D52
3606979	NGP3M150R	D52
3606980	NGP3M200R	D52
3606981	NGP3M250R	D52
3606982	NGP3M300R	D52
3606983	NGD4M450LK	D51
3606984	NGD4M500LK	D51
3606985	NGD4M550LK	D51
3606986	NGD4M400RK	D51
3606987	NGD4M450RK	D51
3606988	NGD4M500RK	D51
3606989	NGD4M550RK	D51
3606990	NG2M050LK	D49
3606991	NG2M050RK	D48
3606992	NGD2M250LK	D51
3607014	NG3062R	D47
3607015	NR3031R	D55
3607016	NB2L	D57
3607017	NB3L	D57
3607018	NG3094R	D47
3607019	NB3R	D57
3607020	NG3125R	D47
3607021	NG3047R	D47
3607022	NG3125L	D47
3607025	NG3094L	D47
3607026	NR3062R	D55
3607027	NG2062R	D47
3607028	NR3047L	D55
3607029	NGD3094RK	D51
3607030	NG2031R	D47
3607031	NR3047R	D55
3607032	NR3062L	D55
3607033	NG3062L	D47
3607034	NR3031L	D55
3607035	NGD3094LK	D51
3607036	NG3047L	D47
3607037	NGP2M150L	D52
3607038	NGP2M200L	D52
3607039	NGP2M250L	D52
3607040	NGP2M300L	D52
3607041	NGP3M150L	D52
3607042	NGP3M200L	D52
3607043	NGP3M250L	D52
3607044	NGP3M300L	D52
3607045	NGP2M150R	D52
3607046	NGP2M200R	D52
3607047	NGP2M250R	D52
3607048	NGP2M300R	D52
3607049	NGP3M150R	D52
3607050	NGP3M200R	D52
3607051	NGP3M250R	D52
3607052	NGP3M300R	D52
3607055	NG3062RK	D48
3607056	NR3062RK	D56
3607057	NG3125RK	D48
3607058	NG3094LK	D50
3607061	NG3125LK	D50
3607062	NR3031RK	D56
3607064	NB2R	D57
3607068	NG3125RK	D48
3607069	NG3094RK	D48
3607070	NG3062RK	D48
3607071	NG2M200RK	D48
3607072	NG3M300RK	D48
3607083	NGD3094RK	D51
3607084	NG3047RK	D48
3607085	NRD3031L	D56
3607086	NR3047RK	D56
3607087	NRD3031R	D56
3607088	NGD3125RK	D51
3607089	NG2062RK	D48
3607090	NG2031RK	D48
3607091	NR3062LK	D56
3607092	NG3062LK	D50
3607093	NR3047R	D55
3607094	NR3078RK	D56
3607095	NR3031LK	D56
3607096	NGD3094LK	D51
3607097	NGD3125LK	D51
3607098	NGD3062LK	D51
3607099	NRD3062R	D56
3607100	NG2M200RK	D48
3607101	NR4094RK	D56
3607102	NR3047LK	D56
3607103	NG4189RK	D49
3607104	NGD3062RK	D51
3607105	NG3047LK	D49
3607106	NG3078LK	D50
3607107	NG3189LK	D50
3607108	NG3189RK	D49
3607109	NG3062R	D47
3607110	NG3125R	D47
3607111	NG3078RK	D48
3607112	NG2031LK	D49
3607123	NG2047RK	D48
3607124	NRD3062L	D56
3607125	NR3031R	D55
3607126	NG2062LK	D49
3607127	NG3156RK	D49
3607128	NGP2062R	D52
3607129	NG2M100RK	D48
3607130	NR4125R	D55
3607131	NR3062R	D55
3607132	NGD4125LK	D51
3607133	NGD4125RK	D51
3607134	NGD4250RK	D51
3607135	NR3047L	D55
3607136	NP2002RK	D54
3607137	NG3094R	D47
3607138	NG3M300RK	D48
3607139	NR3031L	D55
3607140	NG4189LK	D50
3607141	NR4125RK	D56
3607142	NG4250LK	D50
3607143	NG4250R	D47
3607144	NG2M200LK	D49
3607145	NG3072RK	D48
3607146	NG2094RK	D48
3607147	NGD4189LK	D51
3607148	NGD3189LK	D51
3607149	NG2094LK	D49
3607150	NR4094LK	D56
3607151	NG2M140RK	D48
3607152	NG3125L	D47
3607153	NG2031R	D47
3607154	NP3002RK	D54
3607155	NG2125RK	D48
3607156	NR4062LK	D56
3607157	NG3047R	D47
3607158	NG3062L	D47
3607159	NG2M100LK	D49
3607160	NG3094L	D47
3607161	NGD4189RK	D51
3607162	NRD4062L	D56
3607163	NG4125RK	D49
3607164	NR4062RK	D56
3607165	NG2125LK	D49
3607166	NR4125LK	D56
3607167	NG2062R	D47
3607168	NG4250RK	D49
3607169	NR3094L	D55
3607170	NGD3189RK	D51
3607171	NR3062L	D55
3607172	NR3078LK	D56
3607173	NRD4062R	D56
3607174	NR2031R	D55
3607175	NG4250L	D47
3607176	NR2031L	D55
3607177	NG3156LK	D50
3607178	NGD4250LK	D51
3607179	NG3047L	D47
3607180	NR3094R	D55
3607181	NR4125L	D55
3607182	NGP2062L	D52
3607183	NG4125LK	D50
3607184	NG3072LK	D50
3607185	NRD4125R	D56
3607186	NRD4125L	D56
3607203	NG3125LK	D50
3607204	NG3094LK	D50
3607205	NGD3094RK	D51
3607206	NR3031RK	D56
3607207	NG2M200LK	D49
3607208	NG3M200RK	D48
3607209	NGD3125LK	D51
3607210	NGD3125RK	D51
3607211	NG3M200LK	D50
3607212	NG3M300LK	D50
3607213	NG3062LK	D50
3607214	NR3047RK	D56
3607215	NG2062RK	D48
3607216	NR3062LK	D56
3607217	NG3M250RK	D48
3607218	NG2M100RK	D48
3607219	NG3M100RK	D48
3607220	NG4189RK	D49
3607221	NG3M150RK	D48
3607222	NR3031LK	D56
3607233	NGD3062RK	D51
3607234	NG2M150RK	D48
3607235	NG3M400RK	D49
3607236	NR3062RK	D56
3607237	NG3M400LK	D50
3607238	NG3047RK	D48
3607239	NG2M100LK	D49
3607240	NGD3094LK	D51
3607241	NF3125RK	D53
3607242	NG2M170RK	D48
3607291	NG2M080RK	D48
3607292	NG2M275LK	D49
3607293	NFD3125LK	D53
3607294	NG2M150LK	D49
3607295	NRD4062L	D56
3607296	NFD3125RK	D53
3607297	NG3M275LK	D50
3607298	NRD4125L	D56
3607299	NG2M120RK	D48
3607300	NG3M250LK	D50
3607301	NR2031R	D55
3607302	NG3M350RK	D49
3607303	NR4125RK	D56
3607304	NG4250RK	D49
3607305	NG3189RK	D49
3607306	NR3078LK	D56
3607307	NG2062LK	D49
3607308	NG3M150LK	D50
3607309	NG3078RK	D48
3607310	NG3M225RK	D48
3607311	NG4250LK	D50
3607312	NGD4125RK	D51
3607313	NG2031RK	D48
3607314	NGD4189LK	D51
3607315	NG3M325LK	D50
3607316	NGD4125LK	D51
3607317	NG2094RK	D48
3607318	NG2M140RK	D48
3607319	NR2031L	D55
3607320	NG3189LK	D50
3607321	NGD4189RK	D51
3607322	NF3125LK	D53
3607323	NG3094L	D47
3607324	NG2M250RK	D48
3607325	NFD4189RK	D53
3607326	NG2M300LK	D49
3607327	NG2M170LK	D49
3607328	NP3012RK	D54
3607329	NG3M225LK	D50
3607330	NG2041R	D47
3607331	NG3M175LK	D50
3607332	NG3072RK	D48
3607333	NF3156LK	D53
3607334	NG2M120LK	D49
3607335	NG3156LK	D50
3607336	NG3M220RK	D48
3607337	NG3M275RK	D48
3607338	NG2M140LK	D49
3607339	NR3094L	D55
3607340	NG2M300RK	D48
3607362	NG3M450RK	D49
3607363	NG4M400LK	D50
3607364	NG4M400RK	D49
3607365	NG3M320RK	D48
3607366	NG4M550LK	D50
3607367	NG2M220LK	D49
3607368	NG2M325LK	D49
3607369	NG3M450LK	D50
3607370	NG4M350RK	D49
3607371	NG4M350LK	D50
3607372	NG3M320LK	D50
3607373	NGD3189RK	D51
3607374	NG3047LK	D49
3607375	NG3125R	D47
3607376	NG2047LK	D49
3607377	NG4189LK	D50
3607378	NFD4250RK	D53
3607379	NG2M175RK	D48
3607380	NG2094LK	D49
3607381	NG2125RK	D48
3607382	NG4250R	D47
3607383	NG4M550RK	D49
3607384	NG3M120LK	D50
3607385	NG4M600RK	D49
3607386	NG4M300LK	D50
3607387	NG4M600LK	D50
3607388	NG4M300RK	D49
3607389	NG4M450LK	D50
3607390	NG4M450RK	D49
3607391	NGD2M250LK	D51
3607393	NR2M050R	D55
3607394	NG2M050RK	D48
3607395	NR3M100L	D55
3607396	NR3M200L	D55
3607397	NR3M100R	D55
3607398	NR3M200R	D55
3607399	NGD2M200LK	D51
3607400	NGD3M300LK	D51
3607401	NR2M050L	D55
3607402	NGD2M150LK	D51
3607403	NG3062R	D47
3607404	NG2047RK	D48
3607405	NR4062LK	D56
3607406	NG3094R	D47
3607407	NR3078RK	D56
3607408	NR3047LK	D56
3607409	NG2M275RK	D48
3607410	NGD3189LK	D51
3607411	NG2M225RK	D48
3607412	NG3M120RK	D48
3607413	NG2M225LK	D49
3607414	NGD4250RK	D51
3607415	NFD4189LK	D53
3607416	NG3047R	D47
3607417	NG2M195RK	D48
3607418	NG3M175RK	D48
3607419	NG3M100LK	D49
3607420	NG2M195LK	D49

Order No.	Catalogue No.	Page(s)
3607421	NG2M175LK	D49
3607422	NGD4250LK	D51
3607423	NGD3M250LK	D51
3607424	NGD3M400LK	D51
3607425	NGD3M250RK	D51
3607426	NGD3M300RK	D51
3607427	NGD3M400RK	D51
3607428	NF3M200LK	D53
3607429	NF3M300LK	D53
3607430	NR2M075L	D55
3607431	NR2M100L	D55
3607432	NR2M125L	D55
3607433	NR2M150L	D55
3607434	NR2M175L	D55
3607435	NR3M125L	D55
3607436	NR3M150L	D55
3607437	NR3M175L	D55
3607438	NR3M225L	D55
3607439	NR3M125R	D55
3607440	NR3M150R	D55
3607441	NR3M175R	D55
3607442	NR3M225R	D55
3607443	NG2031LK	D49
3607444	NG2125LK	D49
3607445	NG3125L	D47
3607446	NR2047L	D55
3607447	NG4M500RK	D49
3607448	NG4125LK	D50
3607449	NG4125RK	D49
3607450	NG2058R	D47
3607451	NGD3062LK	D51
3607452	NR4094LK	D56
3607453	NG2062R	D47
3607454	NG3072LK	D50
3607455	NRD3031L	D56
3607456	NG3156RK	D49
3607457	NRD3031R	D56
3607458	NR4125LK	D56
3607459	NG3062L	D47
3607460	NG3078LK	D50
3607461	NR4062RK	D56
3607462	NRD3062L	D56
3607463	NG2M050LK	D49
3607464	NFD3M300LK	D53
3607465	NGD2M200RK	D51
3607466	NR4M200L	D55
3607467	NR4M225L	D55
3607468	NR4M250L	D55
3607469	NR2M075R	D55
3607470	NR2M100R	D55
3607471	NR2M125R	D55
3607472	NR2M150R	D55
3607473	NR3062R	D55
3607474	NRD3062R	D56
3607475	NR3031R	D55
3607476	NR3094R	D55
3607477	NP2002RK	D54
3607478	NR3031L	D55
3607479	NR3047L	D55
3607480	NR4094RK	D56
3607481	NG2062L	D47
3607482	NG2031L	D47
3607483	NR2M175R	D55
3607484	NR4M200R	D55
3607485	NR4M225R	D55
3607486	NR4M250R	D55
3607487	NGD3M200LK	D51
3607488	NGD3M350LK	D51
3607489	NGD4M400LK	D51
3607490	NGD4M450LK	D51
3607491	NGD4M500LK	D51
3607492	NGD4M550LK	D51
3607493	NP3002RK	D54
3607494	NR2047R	D55
3607495	NG2031R	D47
3607496	NRD4125R	D56
3607497	NR3062L	D55
3607498	NG2058L	D47
3607499	NRD4062R	D56
3607500	NR4125R	D55
3607501	NG3047L	D47
3607502	NR3047R	D55
3607503	NGD2M150RK	D51
3607504	NGD2M250RK	D51
3607505	NGD3M200RK	D51
3607506	NGD3M350RK	D51
3607507	NGD4M400RK	D51
3607508	NGD4M450RK	D51
3607509	NGD4M500RK	D51
3607510	NGD4M550RK	D51
3607511	NF3M200RK	D53
3607512	NF3M300RK	D53
3607513	NG4250L	D47
3607514	NR4125L	D55
3607515	NG3M325RK	D48
3607516	NG3M220LK	D50
3607517	NG3M425RK	D49
3607518	NG2M250LK	D49
3607519	NG3M350LK	D50
3607520	NG3M425LK	D50
3607521	NG2M220RK	D48
3607522	NG4M500LK	D50
3607523	NFD3M300RK	D53
3607528	NTK3R	E24
3607530	NT3R	E22
3607531	NTF3R	E23
3607532	NT3L	E22
3607533	NG2M325RK	D48
3607534	NG2M080LK	D49
3607628	NG3062RK	D48
3607629	NG3189LK	D50
3607630	NG3189RK	D49
3607631	NG3062LK	D50
3607632	NG3M225RK	D48
3607643	NT3RK	E21
3607644	NTP3R	E22
3607645	NT3LK	E21
3607646	NTK2R	E24
3607647	NT2R	E22
3607648	NJK3008R20	E26
3607649	NT3RCK	E23
3607650	NTP3L	E22
3607651	NT2RK	E21
3607652	NTF3L	E23
3607653	NG4M350LK	D50
3607654	NG3M300LK	D50
3607655	NG3M300RK	D48
3607656	NG3M400LK	D50
3607657	NG4M600RK	D49
3607658	NG4M350RK	D49
3607659	NG3M225LK	D50
3607660	NG3M250LK	D50
3607661	NG4M500RK	D49
3607662	NG3M200RK	D48
3607663	NG3M150LK	D50
3607664	NG3M250RK	D48
3607665	NG4M500LK	D50
3607666	NG3M200LK	D50
3607667	NG4M400RK	D49
3607668	NG3M150RK	D48
3607669	NG3M400RK	D49
3607670	NG4M400LK	D50
3607671	NG4M600LK	D50
3607672	NR2M050L	D55
3607673	NTF2R	E23
3607674	NT2LK	E21
3607675	NT2L	E22
3607676	NT4R	E22
3607677	NTP2R	E22
3607678	NTP2L	E22
3607683	NR2M075L	D55
3607684	NR2M100L	D55
3607685	NR2M125L	D55
3607686	NR2M150L	D55
3607687	NR2M175L	D55
3607688	NR3M100L	D55
3607689	NR3M125L	D55
3607690	NR3M150L	D55
3607691	NR3M175L	D55
3607692	NR3M200L	D55
3607693	NR3M225L	D55
3607694	NR4M200L	D55
3607695	NR4M225L	D55
3607696	NR4M250L	D55
3607697	NR2M050R	D55
3607698	NR2M075R	D55
3607699	NR2M100R	D55
3607700	NR2M125R	D55
3607701	NR2M150R	D55
3607702	NR2M175R	D55
3607703	NR3M100R	D55
3607704	NR3M125R	D55
3607705	NR3M150R	D55
3607706	NR3M175R	D55
3607707	NR3M200R	D55
3607708	NR3M225R	D55
3607709	NR4M200R	D55
3607710	NR4M225R	D55
3607711	NR4M250R	D55
3607823	NTP3R	E22
3607824	NT3RK	E21
3607825	NT3R	E22
3607826	NT3L	E22
3607827	NTK3R	E24
3607828	NT3LK	E21
3607829	NAS3L6	E30
3607830	NTF3R	E23
3607831	NTP3L	E22
3607832	NTF3L	E23
3607833	NT2LK	E21
3607834	NT4R	E22
3607835	NT2L	E22
3607836	NTK2R	E24
3607837	NT2RK	E21
3607838	NT3RCK	E23
3607839	NTP4R	E22
3607840	NTP2L	E22
3607841	NTP2R	E22
3607842	NA3L4	E29
3607843	NT2R	E22
3607844	NAS3L12	E30
3607845	NAS3L8	E30
3607846	NT4RK	E21
3607847	NA3L6	E29
3607848	NA3R4	E29
3607849	NT4L	E22
3607850	NJP3014R12	E26
3607851	NA3R6	E29
3607852	NTF2R	E23
3607853	NTK3L	E24
3607854	NA3R8	E29
3607855	NA3L8	E29
3607856	NAS3R8	E30
3613033	DNMA150408	B22
3613034	DNMA150412	B22
3613035	DNMG150408	B22
3613036	DNMG150412	B22
3613037	DNMG1504085	B23
3613038	DNMG1504125	B23
3613039	DNMG15040822	B22
3613040	DNMG15041222	B22
3614290	206445	D85
3614291	206451	D85
3614292	206453	D85
3614344	206522	D86
3615303	206424	D85
3615305	206440	D87
3615308	206449	D85
3615309	206456	D85
3616753	409186	D88
3616754	440201M	D104
3634282	252209M	D14
3634283	252210M	D14
3634284	252211M	D14
3634285	252212M	D14
3634286	252217M	D14
3634287	252218M	D14
3634288	252219M	D14
3634289	252220M	D14
3634290	252225M	D14
3634291	252226M	D14
3634292	252227M	D14
3634293	252228M	D14
3636536	NSR2525M3	D38, E14
3636539	NSL2525M3	D38, E14
3636540	NSR2525M4	D38, E14
3636541	NER2525M3	D40, E15
3636542	NSR1616H2	D38, E14
3636543	NEL2525M3	D40, E15
3636544	NSL2525M4	D38, E14
3636545	NSL1616H2	D38, E14
3636548	NDC88VR75M	E27
3636549	NTC3R12E	E25
3636550	NDC3115VR75	E27
3636551	NT1L	E21
3636552	NDC8115VR75M	E27
3636553	NTC3R16E	E25
3636554	NTC3R14E	E25
3636555	NT1L	E21
3636556	NTC3L12I	E25
3636557	NTC3R16E	E25
3636558	NDC38RDR75	E28
3636559	NDC38RDL75	E28
3636560	NA4L4	E29
3636561	NA6L3	E29
3636562	NTC3R12E	E25
3636563	NTB3LB	E30
3636564	NA6R3	E29
3636565	NDC310RDL75	E28
3636566	NA4R4	E29
3636567	NA6R2	E29
3636568	NA6L2	E29
3636569	NG1062L	D47
3636570	NG1094L	D47
3636571	NG1047L	D47
3636572	NG5M500L	D47
3636904	CCMT09T308MU	B15
3636905	SCMT09T308MU	B29
3636906	RCMT1204M043	B27
3636907	CNMG12040849	B17
3636908	CCMT060204	B14
3636909	CNMM250924SR	B19
3636910	CCMT09T308	B14
3636911	CNMG1204085	B17
3636912	SNMM250924SR	B32
3636913	CNMG12041249	B17
3636914	TCMT16T308	B35
3636915	DNMG15060849	B23
3636916	VBMT160408	B42
3636917	WNMG08040849	B44
3638588	NSR2020K3	D38, E14
3638589	NSR2020K2	D38, E14
3638590	NSR2525M2	D38, E14
3639045	NSL2020K2	D38, E14
3639046	NSL2020K3	D38, E14
3639047	NSL2525M2	D38, E14
3639048	NASR1616K3Q	D39, E15
3639108	DNMG15060422	B22
3639109	SCMT120412	B29
3639110	VBMT160404	B42
3639111	TCMT110204	B35
3639112	TCMT16T304MU	B36
3639135	TPUN160308	B41
3639136	TNMG1604085	B37
3639137	DNMM15060865	B25
3639138	TCMT110208	B35
3639139	CNMG120408AP	B17
3639140	SNMG12041649	B31
3639141	NNUJ22082011	B27
3639142	CCGT060202MU	B14
3639193	WNMG0804125	B44
3639194	LNUX30194016	B26
3639195	DCMT11T312MU	B21
3639196	DNMG150608CT	B24
3639197	CNMG12041248	B17
3639198	CCMT060204MU	B15
3639199	TPMR110304	B41
3639200	DNMG11040849	B23
3639201	CNMG1906165	B17
3639202	CCMT120404MU	B15
3639203	CCMT090308MU	B15
3639204	DNMG11040422	B22
3639205	DCMT070208	B20
3639206	CNMG1204165	B17
3639207	WNMG06040422	B43
3639208	TNMM22040865	B38
3639209	RCMT10T3M0	B27
3639210	RCMT0602M0	B27
3639211	CNMG120408SL	B18
3639230	VBMT160412	B42
3639231	SCMT09T308	B29
3639232	DNMG15061249	B23
3639273	DCMT11T30441	B21
3639274	CCMT09T304	B14
3639275	TPMR160308	B41
3639276	WNMG06040849	B44
3639277	CCMT060208	B14
3639278	CNMG12040822	B16
3639279	WNMG0804085	B44
3639280	LNUX191940RRP	B26
3639281	DNMG1506125	B23
3639282	CNMG12040848	B17
3639283	WNMG080408AP	B44
3639284	DCMT11T308MU	B21

Order No.	Catalogue No.	Page(s)
3639285	DCMT11T30841	B21
3639286	RCMT1606M043	B27
3639287	CCMT090308	B14
3639288	WNMG08041249	B44
3639289	CNMG120408	B16
3639290	CNMG1606125	B17
3639291	SNMM2507248	B32
3639292	DNMG1506085	B23
3639293	SNMM19061665	B32
3639296	SCMT120408	B29
3639297	DCMT11T304MU	B21
3639298	DCMT11T312	B20
3639299	TPMR160304	B41
3639300	CCMT090304	B14
3639301	CNMM12040865	B19
3639302	SNMM190616SR	B32
3639353	DCMT070204	B20
3639354	DNMM15061265	B25
3639355	CCMT09T304MU	B15
3639356	TCGT110202MU	B35
3639357	DCMT11T304	B20
3639358	TCMT16T304	B35
3639359	DCMT070204MU	B21
3639360	CNMM12041265	B19
3639361	DCMT11T308	B20
3639362	TCMT16T308MU	B36
3639363	DNMG15060822	B22
3639364	CCMT060202	B14
3639365	CCMT120408MU	B15
3639366	LNMX181220HP	B26
3639367	CNMG120412MW	B18
3639368	SNMG12040849	B31
3639369	DCMT070202	B20
3639370	RCMX2006M0T	B28
3639371	TNMG16040849	B37
3639373	RCMT1204M0	B27
3639374	CNMG1204125	B17
3639375	CCMT120408	B14
3639831	NNGJ281020	B27
3639832	CNMG09030849	B17
3640153	DNMG15040849	B23
3640154	SNMG120408AP	B31
3640155	TCMT220408	B35
3640156	RCMX3209M0T	B28
3640157	TNMG22040849	B37
3640158	CCMT09T30441	B15
3640159	TNMG16040422	B36
3640160	DNMG150608AP	B23
3640161	SCMT090304	B29
3640162	RCMT10T3M043	B27
3640163	RCMT0803M0	B27
3640164	CCMT0602042	B14
3640165	TNMG1604125	B37
3640166	DNMG150608	B22
3640167	CNMM2509248	B19
3640168	CNMG160612SL	B18
3640169	TNMG2204085	B37
3640170	CNMG1906125	B17
3640171	CNMG1906085	B17
3640172	CNMM190616SR	B19
3640173	SPUN120308	B34
3640174	WNMG0804044	B43
3640175	TNMG220404	B36
3640176	SNMG12040422	B30
3640177	DCMT150408	B20
3640301	TCMT16T30441	B35
3640302	CNMG1606165	B17
3640653	TNMG16040822	B36
3640654	TCMT1102042	B35
3640655	CCMT09T31241	B15
3640656	DCMT150404	B20
3640657	DNMG1506165	B23
3640658	DNMG15060848	B23
3640659	LNUX191940T	B26
3640660	CCMT090304MU	B15
3640661	SCMT090308MU	B29
3640663	CNMG12040448	B17
3640664	SNMG12041249	B31
3640665	NNGJ2810201D	B27
3640666	RCMX2507M0T	B28
3640667	CCMT12040841	B15
3640668	DNMG150608SL	B24
3640669	SNMG1204085	B31
3640670	WNMG0804084	B43
3640671	TPMR110308	B41
3640672	SPUN250620T	B34
3640673	SNMG150612SL	B32
3640674	SNMG1906165	B31
3640675	SNMG1506085	B31
3640676	TCMT110204MU	B36
3641622	A25RNNTOR3	D41, E19
3641643	A16MNNTOR2	D41, E19
3641644	A12MNNTOR2	D41, E19
3641645	A20QNNTOR2	D41, E19
3641646	A32SNNTOR3	D41, E19
3641647	A12MNNTOR1	D41, E19
3641648	A10KNNTOR1	D41, E19
3641649	A16MNNTOL2	D41, E19
3641650	A25RNNTOL3	D41, E19
3641651	A25RNNTOR2	D41, E19
3641652	A20QNNTOL2	D41, E19
3641653	A40TNNTOR3	D41, E19
3641654	A40TNNTOR4	D41, E19
3641655	A12MNNTOL2	D41, E19
3641656	A32SNNTOL3	D41, E19
3641657	A25RNNTOL2	D41, E19
3641658	NER2020K2	D40, E15
3641659	A40TNNTOL3	D41, E19
3641660	NSR1212F2	D38, E14
3641661	A50UNNTOR4	D41, E19
3641662	NASR1212M2Q	D39, E15
3641663	A40TNNTOL4	D41, E19
3641664	NSR3225P3	D38, E14
3641665	NER2525M2	D40, E15
3641666	NSR3232P3	D38, E14
3641667	NASR1010M2Q	D39, E15
3641668	NEL2525M4	D40, E15
3641669	NSR3232P4	D38, E14
3641670	NSL3225P3	D38, E14
3641671	NSL3232P3	D38, E14
3641672	NER2525M4	D40, E15
3641673	NSR3232P5	D38, E14
3641674	NER1616H2	D40, E15
3641675	NSR3225P4	D38, E14
3641676	NEL2525M2	D40, E15
3641677	NEL2020K2	D40, E15
3641678	NSL3225P4	D38, E14
3641679	NSL3232P4	D38, E14
3641680	NER3225P3	D40, E15
3641681	NSL1212F2	D38, E14
3641682	NSR1010E2	D38, E14
3641683	NSL1010E2	D38, E14
3641684	NEL1616H2	D40, E15
3641685	NEL3225P3	D40, E15
3641686	NASL1212M2Q	D39, E15
3641687	NASL1616K3Q	D39, E15
3641688	NSL3232P5	D38, E14
3641689	NER3225P4	D40, E15
3641690	A50UNNTOL4	D41, E19
3641691	NASL1010M2Q	D39, E15
3641692	NER3232P5	D40, E15
3641693	NER3232P4	D40, E15
3641694	NEL3225P4	D40, E15
3641695	NEL3232P5	D40, E15
3641696	NEL3232P4	D40, E15
3641795	CNMG1606085	B17
3641796	SPMR120304	B34
3641797	DCMT11T3082	B20
3641798	SNMG1204084	B30
3641799	TCMT16T30841	B35
3641800	CCMT09030841	B15
3641801	DCMT0702042	B20
3641802	TCMT220412	B35
3642373	TPMR160312	B41
3642374	DNMG11040822	B22
3642375	SCMT090308	B29
3642376	SNMG1204125	B31
3642377	CNMG120404	B16
3642378	WNMG06040822	B43
3642379	TNMG16041249	B37
3642380	CNMG190612SL	B18
3642381	CCMT09T30841	B15
3642382	TNMG160404	B36
3642383	TPUN160304	B41
3642384	DCMT070208MU	B21
3642385	CCMT060208MU	B15
3642386	WNMG0804124	B43
3642387	DCMT15040441	B21
3642388	RCMT0803M043	B27
3642389	WNMG080408SL	B45
3642390	SNMG09030822	B30
3642391	TNMG220408	B36
3642392	TNMG2204125	B37
3642393	RCMT1606M0	B27
3642394	DCMT150416	B20
3644074	MP094281L	C68
3646858	507363	D96
3649193	WNMG0804165	B44
3649194	CNMG12040849	B17
3649195	DNMG150608CT	B24
3649196	CCMT09T308MU	B15
3649197	TCMT16T312	B35
3649198	VBMT160412	B42
3649199	CCMT060204	B14
3649200	VBMT160408	B42
3649201	DCMT070204	B20
3649202	DCMT11T304	B20
3649203	DCMT11T308MU	B21
3649204	CNMG1204085	B17
3649205	TNMG16040849	B37
3649206	CNMG1204125	B17
3649207	CCMT090304	B14
3649208	CCMT090308	B14
3649209	VBMT160404	B42
3649210	CCMT060202	B14
3649211	CNMG1606125	B17
3649212	DCMT11T30841	B21
3649233	CCMT120408	B14
3649234	CNMG12041222	B16
3649235	WNMG08040849	B44
3649236	CNMG12040822	B16
3649237	DCMT11T308	B20
3649238	CCMT060208	B14
3649239	RCMX2006M0T	B28
3649240	TPMR160308	B41
3649241	DCMT11T304MU	B21
3649242	DNMG1506125	B23
3649243	RCMT1204M0	B27
3649244	DCMT11T30441	B21
3649245	RCMT1204M043	B27
3649246	DNMG11040822	B22
3649247	SCMT090308	B29
3649248	DCMT070208	B20
3649249	TNMG16041249	B37
3649250	TPUN160308	B41
3649251	SCMT120408	B29
3649252	TPUN160304	B41
3649253	TCMT16T304	B35
3649254	DNMG1506084	B22
3649255	CCMT120412	B14
3649256	DNMG15060849	B23
3649257	DNMG15061249	B23
3649258	DCMT150404	B20
3649259	WNMG08041249	B44
3649260	TCMT110204	B35
3649261	CNMG120412AP	B17
3649262	CNMG12040422	B16
3649263	WNMG0804125	B44
3649264	RCMT10T3M0	B27
3649265	SNGN120412	B30
3649266	RCMT1606M043	B27
3649267	CNMG160612SL	B18
3649268	TCMT16T308	B35
3649269	DCMT150416	B20
3649270	DCMT150408	B20
3649271	TNMG220404	B36
3649272	SCMT090304MU	B29
3649786	581107	D27
3649787	581108	D27
3649788	581109	D27
3649789	581110	D27
3649790	581111	D27
3649791	582113	D27
3649792	582114	D27
3649793	582115	D27
3649794	582116	D27
3649795	582117	D27
3649796	582118	D27
3649797	5821197	D27
3649798	582120	D27
3649799	582122	D27
3649800	582129	D27
3649801	582130	D27
3649802	582131	D27
3649803	582149	D27
3649804	583125	D25
3649805	583126	D25
3649806	583127	D25
3649807	583128	D25
3649808	583129	D25
3649809	583135	D25
3649810	583136	D25
3649811	582115	D27
3649812	583137	D25
3649813	583138	D25
3649814	583139	D25
3649815	583160	D25
3649816	583161	D25
3649817	583162	D25
3649818	583163	D25
3649819	582116	D27
3649820	583164	D25
3649821	583175	D25
3649822	583176	D25
3649823	583177	D25
3649824	583178	D25
3649825	582117	D27
3649826	583179	D25
3649827	581107	D27
3649828	581108	D27
3649829	581109	D27
3649830	581110	D27
3649831	581111	D27
3649832	582113	D27
3649833	582114	D27
3649834	582118	D27
3649835	582119	D27
3649836	582120	D27
3649837	582122	D27
3649838	582129	D27
3649839	582130	D27
3649840	582131	D27
3649841	582149	D27
3649842	583125	D25
3649843	583126	D25
3649844	583127	D25
3649845	583135	D25
3649846	583136	D25
3649847	583137	D25
3649848	583175	D25
3649849	583176	D25
3649850	583177	D25
3649851	583155	D26
3649852	583156	D26
3649853	583157	D26
3649854	583158	D26
3649855	583159	D26
3649856	583165	D26
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Order No.	Catalogue No.	Page(s)
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Order No.	Catalogue No.	Page(s)
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Order No.	Catalogue No.	Page(s)
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Order No.	Catalogue No.	Page(s)
3795340	CNMG12040422	B16
3795341	CNMG120404FW	B18
3795342	CNMG12040822	B16
3795473	CNMG120408FW	B18
3795474	CNMG120408MW	B18
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3795476	CNMG120412FW	B18
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3852652	A50UMCLNL12	A42
3852663	A50UMCLNR16	A42
3852664	A50UMCLNR19	A42
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3870042	CKJNL2525M16	A24
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3870065	CKJNR3225P16	A24
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3870067	CSBPL2525M12	A25
3870068	CSBPR2020K12	A25
3870069	CSBPR2525M12	A25
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3870072	CSDPN2525M12	A26
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3870074	CSSPR2020K12	A26
3870075	CSSPR2525M12	A26
3870076	CTCPN2510M11	A27
3870077	CTCPN2514M16	A27
3870078	CTCPN2518M22	A27
3870079	CTCPN2520M22	A27
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3870081	CTCPN4020R22	A27
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3870083	CTDPR1212F11	A27
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3870088	CTFPR2525M16	A28
3870089	CTGPL1212F11	A28
3870090	CTGPL2020K16	A28
3870091	CTGPL2525M16	A28

Order No.	Catalogue No.	Page(s)
3870092	CTGPR1212F11	A28
3870103	CTGPR1616H11	A28
3870104	CTGPR2020K11	A28
3870105	CTGPR2020K16	A28
3870106	CTGPR2525M16	A28
3870107	CTGPR2525M22	A28
3870252	STWPR12CA16	A98-99
3870305	MSYNR25CA19	A74-75
3870306	MSYNR16CA12	A74-75
3870307	MSYNR12CA12	A74-75
3870308	MSYNR10CA09	A74-75
3870309	MSYNL10CA09	A74-75
3870310	MSTNR16CA12	A74-75
3870311	MSTNR12CA12	A74-75
3870312	MSTNR10CA09	A74-75
3870333	MSSNR20CA15	A72-73
3870334	MSSNR16CA12	A72-73
3870335	MSSNR12CA12	A72-73
3870336	MSSNR10CA09	A72-73
3870337	MSSNL20CA15	A72-73
3870338	MSSNL16CA12	A72-73
3870339	MSSNL12CA12	A72-73
3870340	MSSNL10CA09	A72-73
3870341	MSRNR20CA15	A72-73
3870342	MSRNR16CA12	A72-73
3870343	MSRNR12CA12	A72-73
3870344	MSRNR10CA09	A72-73
3870345	MSRNL20CA15	A72-73
3870346	MSRNL16CA12	A72-73
3870347	MSRNL12CA12	A72-73
3870348	MSKNR25CA19	A70-71
3870349	MSKNR20CA15	A70-71
3870350	MSKNR16CA12	A70-71
3870351	MSKNR12CA12	A70-71
3870352	MSKNR10CA09	A70-71
3870353	MSKNL20CA15	A70-71
3870354	MSKNL16CA12	A70-71
3870355	MSKNL12CA12	A70-71
3870356	MSKNL10CA09	A70-71
3870360	MDQNR20CA15	A70-71
3870361	MDQNR16CA15	A70-71
3870362	MDQNL20CA15	A70-71
3870363	STWPR10CA11	A98-99
3870364	STWPR08CA09	A98-99
3870365	STWPL12CA16	A98-99
3870366	STWPL10CA11	A98-99
3870367	STTPR12CA16	A98-99
3870368	STTPR10CA11	A98-99
3870369	STTPR08CA09	A98-99
3870370	STGPR12CA16	A96-97
3870371	STGPR10CA11	A96-97
3870372	STGPR08CA09	A96-97
3870373	STGPL10CA11	A96-97
3870374	STGPL08CA09	A96-97
3870375	STFPR16CA16	A96-97
3870376	STFPR12CA16	A96-97
3870377	STFPR10CA11	A96-97
3870378	STFPR08CA09	A96-97
3870379	STFPL12CA16	A96-97
3870380	STFPL10CA11	A96-97
3870381	STFPL08CA09	A96-97
3870382	SSSPR10CA09	A94-95
3870383	SSSPL10CA09	A94-95
3870384	SSSCR16CA12	A94-95
3870385	SSSCR12CA12	A94-95
3870386	SSSCR10CA09	A94-95
3870387	SSSCL12CA12	A94-95
3870388	SSRPR10CA09	A92-93
3870389	SSRPL10CA09	A92-93
3870390	SSRCR12CA12	A92-93
3870391	SSRCL12CA12	A92-93
3870392	SSKPR12CA09	A92-93
3870393	SSKPR10CA09	A92-93
3870394	SSKPL10CA09	A92-93
3870403	MDQNL16CA15	A70-71
3870404	MDJNR20CA15	A68-69
3870405	MDJNR16CA15	A68-69
3870406	MDJNL16CA15	A68-69
3870407	MCLNR25CA19	A68-69
3870408	MCLNR20CA12	A68-69
3870409	MCLNR16CA12	A68-69
3870410	MCLNR12CA12	A68-69
3870411	MCLNL25CA19	A68-69
3870412	MCLNL20CA12	A68-69
3870413	MCLNL16CA12	A68-69
3870414	MCLNL12CA12	A68-69
3870415	MCKNR16CA12	A66-67
3870416	MCKNR12CA12	A66-67
3870417	MCKNL12CA12	A66-67
3870418	MCFNR20CA12	A66-67
3870419	MCFNR16CA12	A66-67
3870420	MCFNR12CA12	A66-67
3870421	MCFNR10CA09	A66-67
3870422	MCFNL16CA12	A66-67
3870423	MCFNL12CA12	A66-67
3870424	CTFPR20CA22	A82-83
3870425	CTFPR16CA16	A82-83
3870426	CTFPR12CA16	A82-83
3870427	CTFPR10CA11	A82-83
3870428	CTFPL12CA16	A82-83
3870429	CSSPR12CA12	A82-83
3870430	CSSPR10CA09	A82-83
3870431	CSSPL20CA12	A82-83
3870432	CSSPL12CA12	A82-83
3870433	CSSPL10CA09	A82-83
3870434	CSRPR12CA12	A80-81
3870435	CSRPR10CA09	A80-81
3870436	CSKPR12CA12	A80-81
3870437	CSKPR10CA09	A80-81
3871190	SSKCR16CA12	A90-91
3871191	SSKCR12CA12	A90-91
3871192	SSKCR10CA09	A90-91
3871243	SSKCL12CA12	A90-91
3871244	SRGCR10CA08	A90-91
3871245	SRGCR08CA06	A90-91
3871246	SRGCL12CA10	A90-91
3871247	SDJPR10CA07	A90-91
3871248	SDJPL10CA07	A90-91
3871249	SCWPR08CA06	A88-89
3871250	SCWPL08CA06	A88-89
3871251	SCTPR08CA06	A88-89
3871252	SCTPR06CA05	A88-89
3871253	SCTPL08CA06	A88-89
3871254	SCSPR08CA06	A88-89
3871255	SCSPR06CA05	A88-89
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3871257	SCRPR08CA06	A86-87
3871258	SCRPL08CA06	A86-87
3871259	SCLPR10CA09	A86-87
3871260	SCLPR08CA06	A86-87
3871261	SCLPR06CA05	A86-87
3871262	SCLPL10CA09	A86-87
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3871264	SCLPL06CA05	A86-87
3871265	SCLCR12CA12	A84-85
3871266	SCLCL16CA12	A84-85
3871267	SCLCL12CA12	A84-85
3871268	SCLCR10CA09	A84-85
3871270	SCGPR08CA06	A84-85
3871271	SCGPL08CA06	A84-85
3871272	SCFPR10CA09	A84-85
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3871284	SCFPR06CA05	A84-85
3871285	SCFPL08CA06	A84-85
3871286	PSKNR16CA12	A78-79
3871287	PSKNR12CA12	A78-79
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3871289	PSKNR20CA15	A78-79
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3871291	PCLNR12CA12	A78-79
3871292	PCLNL20CA16	A78-79
3871293	PCLNL16CA12	A78-79
3871294	MTGNR20CA22	A76-77
3871295	MTGNR16CA16	A76-77
3871296	MTGNR12CA16	A76-77
3871297	MTGNL20CA22	A76-77
3871298	MTGNL16CA16	A76-77
3871299	MTGNL12CA16	A76-77
3871300	MTFNR25CA27	A76-77
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3871306	MTFNL12CA16	A76-77
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3873547	CNMG120408SL	B18
3873548	DCMT070204MU	B21
3873549	DNMG15040849	B23
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3873553	TPUN160312	B41
3873554	TNMM2204128	B38
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3873557	DCMT15040441	B21
3873558	DNMG1506165	B23
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3873561	RCMT10T3M043	B27
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3873563	DCMT150416	B20
3873564	TCMT16T30441	B35
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3873567	TNMG22040448	B37
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3873570	DNMG150604	B22
3875105	DNMG15061649	B23
3875106	TNMG22041249	B37
3875107	SNMM15061665	B32
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3875109	RCMT1204M043	B27
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3875134	TNMG1604044	B37
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3875145	SNMG1906125	B31
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3875148	CNMM19061665	B19
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3875151	TNMG160408	B36
3875152	TNMM2204088	B38
3875153	SNMG1204084	B30
3875154	SNMG1506165	B31
3875155	RCMT0602M043	B27
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3875157	TNMM22040865	B38
3875158	TCMT110208MU	B36
3875159	DNMM15061665	B25
3875160	SNMG120408AP	B31
3875161	DNMG11041249	B23
3875162	TNMG16041249	B37
3875163	TPUN160304	B41
3875164	SNMG1906165	B31
3875165	DCMT11T31241	B21
3878354	PCBNL2525M12	A15
3878355	PCBNL3232P16	A15
3878356	PCBNR2525M12	A15
3878357	PCBNL3232P19	A15
3878358	PCBNR3232P19	A15
3878359	PCBNL3225P16	A15
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3878361	PCBNR2020K12	A15
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3878363	PCBNR3232P16	A15
3878364	PCBNR4040S19	A15
3878365	PCBNL2525M16	A15
3878366	PCBNR2525M16	A15
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3878376	PCKNL3225P16	A15
3878377	PCKNL2525M16	A15
3878378	PCKNL4040S19	A15
3878379	PCLNL1616H12	A16
3878380	PCLNL2525M16	A16
3878381	PCLNL3225P19	A16
3878393	PCLNL3232P19	A16
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3878400	PCLNR1616H12	A16
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3878402	PCLNR3225P12	A16
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3878414	PCLNR3232P19	A16
3878415	PCLNL3232P16	A16
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3878417	PCLNR4040S19	A16
3878418	PCLNL2020K12	A16
3878419	PCLNR2525M12	A16
3878421	PCLNR3225P16	A16
3878422	PCLNR2020K12	A16
3878423	PDJNL3225P15	A17
3878424	PDJNR1616H11	A17
3878425	PDJNR3225P15	A17
3878426	PDJNR4025R15	A17
3878427	PDJNL2020K11	A17
3878428	PDJNL2525M11	A17
3878429	PDJNR2020K11	A17
3879151	PDJNR2525M11	A17
3879152	PDJNR3232P15	A17
3879313	PDJNL1616H11	A17
3879314	PDJNL2525M15	A17
3879315	PDJNL3232P15	A17
3879316	PDJNL4025R15	A17
3879317	PDJNL2020K15	A17
3879318	PDJNR2020K15	A17
3879319	PDNNR2525M15	A17
3879320	PDNNL2525M15	A17
3879321	PDNNL4025M15	A17
3879322	PDNNR4025M15	A17
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3879326	PSBNL4040S25	A18
3879327	PSBNR3232P19	A18
3879328	PSBNL3232P19	A18
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3879330	PSBNR3232P15	A18
3879331	PSBNR4040S25	A18
3879332	PSBNL3232P15	A18
3879333	PSBNR2525M15	A18
3879334	PSBNR4040S19	A18
3879335	PSDNN2020K12	A18
3879336	PSDNN1616H09	A18
3879337	PSDNN2525M12	A18
3879338	PSDNN4040S25	A18
3879339	PSKNL2525M12	A19
3879340	PSKNR2020K12	A19
3879341	PSKNR2525M12	A19

Order No.	Catalogue No.	Page(s)
3879342	PSKNR3232P19	A19
3879343	PSKNL2020K12	A19
3879344	PSKNL3232P19	A19
3879345	PSKNL4040S19	A19
3879346	PSKNR1616H09	A19
3879347	PSSNL2020K12	A20
3879348	PSSNR2020K12	A20
3879349	PSSNR2525M15	A20
3879350	PSSNR3232P19	A20
3879351	PSSNR1616H09	A20
3879352	PSSNR2525M12	A20
3879353	PSSNL2525M12	A20
3879354	PSSNR3232P15	A20
3879355	PSSNL2525M15	A20
3879356	PSSNL3232P19	A20
3879357	PSSNL4040S19	A20
3879358	PSSNL3225P12	A20
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3879362	PSSNR3225P15	A20
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3879367	PTFNR2020K16	A20
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3879369	PTFNR1616H16	A20
3879370	PTFNR3225P22	A20
3879371	PTFNL2525M22	A20
3879372	PTFNR2525M22	A20
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3879384	PTGNL2020K16	A21
3879385	PTGNR1616H16	A21
3879386	PTGNL2525M22	A21
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3879405	PWLNR1616H06	A21
3879406	PWLNL2020K06	A21
3879407	PWLNR2020K06	A21
3879408	PWLNR2020K08	A21
3879409	PWLNR2525M08	A21
3879410	PWLNL1616H06	A21
3879411	SCLCL1616H09	A31
3879412	SCLCL2020K09	A31
3879413	SCLCL2525M12	A31
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3879415	SCLCL2020K12	A31
3879416	SCLCR1616H09	A31
3879417	SCLCR2020K09	A31
3879418	SCLCR2525M12	A31
3879433	SDHCL1616H11	A31
3879434	SDHCL2525M15	A31
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3883323	SNMN120316S02020	B81
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3883404	TPMR160308	B41
3883405	VBMT160404	B42
3883406	VBMT160408	B42
3883407	VBMT160412	B42

Order No.	Catalogue No.	Page(s)
3883408	WNMG06040822	B43
3883409	WNMG06040849	B44
3883410	WNMG0804085	B44
3883434	A25TSVQBR16	A56
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3883445	A16RSTFPL11	A55
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3883448	A10KSTWPR11	A55
3883449	A10KSTWPL11	A55
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3883452	A25RCTFPL16	A47
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3883458	A25RPWLNR08	A46
3883459	A16RPWLNR06	A46
3883460	A25RPWLNL08	A46
3883461	A16RPWLNL06	A46
3883462	A25TSDQCR11	A52
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3883525	CPGW060204S01015C	B74
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3884732	CDHBS4T002	C38
3884960	CHB20200621500R	C100
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3884962	CHB20251251500R	C100
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3885003	CFR80947503000R	C108
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3885013	CFR815712503000R	C108
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3885083	CHB20301251500R	C100
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3885093	CHB20704371500R	C100
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3885120	CHB636022504000R	C100
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3885122	CHB636025004000R	C100
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3885124	CHB848020003000R	C100
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3885126	CHB848030004000R	C100
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3885959	MB010062L	C67
3885960	MB010062L	C67
3885961	MB030187L	C67
3885962	MB030187L	C67
3885983	MB062187L	C67
3885984	MB062187L	C67
3885985	MB062187R	C67
3885986	MB062312L	C67
3885987	MB062312L	C67
3885988	MB094281L	C67
3885989	MB094281L	C67
3885990	MB094500L	C67
3885991	MB094500L	C67
3885992	MB125375L	C67
3885993	MB125375L	C67
3885994	MB125625L	C67
3885995	MB125625L	C67
3885996	MB156500L	C67
3885997	MB156500R	C67
3885998	MB156875L	C67

Order No.	Catalogue No.	Page(s)
3885999	MB156875L	C67
3886000	MG095030L	C68
3886001	MG095030L	C68
3886002	MG125040L	C68
3886003	MG125040L	C68
3886255	CFG100620753500R	C105
3886256	CFG100620753500R	C105
3886257	CFG100931003500R	C105
3886258	CFG101251003500R	C105
3886259	CFG101251003500R	C105
3886260	CFG101561003500R	C105
3886261	CFG101561003500R	C105
3886262	CFG120620754000R	C105
3886273	CFG120620754000R	C105
3886274	CFG120931004000R	C105
3886275	CFG120931004000R	C105
3886276	CFG121251004000R	C105
3886277	CFG121251004000R	C105
3886278	CFG121561004000R	C105
3886279	CFG121561004000R	C105
3886280	CFG121871504000R	C105
3886281	CFG122502504000R	C105
3886282	CFG122502504000R	C105
3886283	CFG40300502500R	C105
3886284	CFG40400502500R	C105
3886285	CFG40500502500R	C105
3886286	CFG50400502500R	C105
3886287	CFG50400502500R	C105
3886288	CFG50500502500R	C105
3886289	CFG50500502500R	C105
3886290	CFG60300502500R	C105
3886291	CFG60931002500R	C105
3886292	CFG80620753000R	C105
3886293	CFG80620753000R	C105
3886294	CFG80931003000R	C105
3886295	CFG81251003000R	C105
3886296	CFG81251003000R	C105
3886297	CFG81561003000R	C105
3886298	CFG81561003000R	C105
3886299	CFR40172502500R	C106
3886300	CFR40173752500R	C106
3886301	CFR40173752500R	C106
3886302	CFR40175002500R	C106
3886303	CFR40176252500R	C106
3886304	CFR40252502500R	C106
3886305	CFR40253752500R	C106
3886306	CFR40255002500R	C106
3886307	CFR40256252500R	C106
3886308	CFR40302502500R	C106
3886309	CFR40303752500R	C106
3886310	CFR40305002500R	C106
3886311	CFR40306252500R	C106
3886312	CFR50333752500R	C106
3886313	CFR50333752500R	C106
3886314	CFR50335002500R	C106
3886315	CFR50382502500R	C106
3886316	CFR50382502500R	C106
3886317	CFR50383752500R	C106
3886318	CFR50385002500R	C106
3886319	CFR50387502500R	C106
3886320	CFR604010002500R	C107
3886321	CFR604012502500R	C107
3886322	CFR604012502500R	C107
3886548	GSBMW81003L	C21
3886549	GSBMW81003R	C21
3886550	QSBM101270L	C14
3886551	QSBM101275L	C14
3886552	QSBM101275R	C14
3886856	CATR63601000250012R	C118
3886857	CATR42001000250016R	C118
3886858	CATR4200400250016R	C118
3886859	CATR4200600250016R	C118
3886860	CATR4200750250016R	C118
3886861	CATR52351000250014R	C118
3886862	CATR52351000250014R	C118
3886868	CUG505010002500R	C113
3886869	CUG50505002500R	C113
3886870	CUG50505002500R	C113
3886871	CUG506210002500R	C113
3886872	CUG506210002500R	C113
3886883	CATR52351250250014R	C118
3886884	CATR52351750250014R	C118
3886885	CATR52351750250014R	C118
3886886	CATR5235500250014R	C118
3886887	CATR5235500250014R	C118
3886888	CATR5235750250014R	C118
3886889	CATR5235750250014R	C118
3886890	CATR63601250250012R	C118
3886891	CATR63601250250012R	C118
3886892	CATR63601800250012R	C118
3886893	CATR63601800250012R	C118
3886894	CATR6360500250012R	C118
3886895	CATR8490150030010R	C118
3886896	CATR8490150030005R	C118
3886897	CATR8490150030006R	C118
3886898	CATR8490150030006R	C118
3886899	CATR8490150030008R	C118
3886900	CATR8490200030010R	C118
3886901	CATR8490200030005R	C118
3886902	CATR8490200030006R	C118
3886903	CATR8490750300010R	C118
3886904	CATR8490750300010R	C118
3886905	CATR849075030005R	C118
3886906	CATR849075030006R	C118
3886907	CATR849075030006R	C118
3886908	CATR849075030008R	C118
3886909	CATS4200400250016R	C119
3886910	CATS4200600250016R	C119
3886911	CATS4200750250016R	C119
3886912	CATS52351000250014R	C119
3886913	CATS5235100025014R	C119
3886914	CATS52351250250014R	C119
3886915	CATS52351250250014R	C119
3886916	CATS52351750250014R	C119
3886917	CATS5235500250014R	C119
3886918	CATS5235500250014R	C119
3886919	CATS5235750250014R	C119
3886920	CATS5290750250014R	C119
3886921	CATS63601000250012R	C119
3886922	CATS63601000250012R	C119
3886923	CATS63601250250012R	C119
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3886935	CATS8490150030007R	C119
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3886938	CATS8490150030009R	C119
3886939	CATS8490150030009R	C119
3886940	CATS8490200030010R	C119
3886941	CATS8490200030010R	C119
3886943	QSBM121520L	C14
3886944	QSBM1316385L	C17
3886945	QSBM1316385R	C17
3886946	QSBM1316630R	C17
3886947	QSBM1316635L	C17
3886948	QSBM1316635R	C17
3886949	QSBM15920630R	C17
3886950	QSBM15920635R	C17
3886951	QSBMW101273R	C21
3886952	QSBMW101273L	C21
3886963	QSBMW121523L	C21
3886964	SSBM161780L	C15
3886965	SSBM161780R	C15
3886966	SSBM161785L	C15
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3886968	SSBM202030R	C15
3886969	SSBM202035L	C15
3886973	CUG506212502500R	C113
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3887023	CUPG809310003000R	C114
3887024	CUPG809310003000R	C114
3887025	CUPG809315003000R	C114
3887026	CUPG809315003000R	C114
3887027	CUPG812510003000R	C114
3887028	CUPG812510003000R	C114
3887029	CUPG812515003000R	C114
3887030	CUPG812515003000R	C114
3887036	CB210015015004RM	C97
3887037	CB210020015004RM	C97
3887038	CB210030015004RM	C97
3887039	CB210040015004RM	C97
3887040	CB210060015004RM	C97
3887041	CB210070015004RM	C97
3887042	CB211015015004RM	C97
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3887044	CB211030015004RM	C97
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3887046	CB211050015004RM	C97
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3887048	CB211070015004RM	C97
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3887053	CB312070020006RM	C97
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3887055	CB314025020006RM	C97
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3887069	CB418011002500 6RM	C98
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3887079	CB4200130025006RM	C98
3887080	CB420040025006RM	C98
3887081	CB420050025006RM	C98
3887082	CB420060025006RM	C98
3887091	CFR818812503000R	C108
3887092	CFR818815003000R	C108
3887093	CB420070025006RM	C98
3887094	CB420080025006RM	C98
3887095	CB420090025006RM	C98
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3887102	CB5230160025006RM	C98
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3887107	CB523080025006RM	C98
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3887112	CB5290135025006RM	C98
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3887143	CB636060025006RM	C99
3887144	CB636075025006RM	C99
3887145	CB636090025006RM	C99
3887146	CB8490100030006RM	C99
3887147	CB8490125030006RM	C99
3887148	CB8490150030006RM	C99
3887149	CB8490200040006RM	C99
3887150	CB8490250040006RM	C99
3887151	CB8490260040006RM	C99
3887152	CB8490275040006RM	C99
3887153	CB8490300060006RM	C99
3887154	CB8490350060006RM	C99
3887155	CB8490400060006RM	C99
3887156	CB8490450060006RM	C99
3887157	CB849075030006RM	C99
3887183	CFR81885003000R	C108
3887184	CFR825010003000R	C108
3887185	CFR825010003000R	C108
3887186	CFR825012503000R	C108
3887187	CFR825015003000R	C108
3887188	CFR82505003000R	C108
3887189	CFR82505003000R	C108
3887190	CFR82507503000R	C108
3887191	CFR82507503000R	C108
3887192	COR4142563250040R	C109
3887193	COR4145625250040R	C109
3887194	COR6175750250015R	C109
3887195	COR6209813250040R	C109
3887196	COR6209813250040R	C109
3887197	COR6242938250040R	C109
3887198	CRR40172502500R	C110
3887199	CRR40173752500R	C110

Index

Order No.	Catalogue No.	Page(s)
3887200	CRR40175002500R	C110
3887201	CRR40176252500R	C110
3887202	CRR40253752500R	C110
3887203	CRR40302502500R	C110
3887204	CRR40303752500R	C110
3887205	CRR40305002500R	C110
3887206	CRR50332502500R	C110
3887207	CRR50333752500R	C110
3887208	CRR50335002500R	C110
3887209	CRR50337502500R	C110
3887210	CRR50382502500R	C110
3887211	CRR50383752500R	C110
3887212	CRR50387502500R	C110
3887213	CRR604010002500R	C111
3887214	CRR604012502500R	C111
3887215	CRR604012502500R	C111
3887216	CRR60402502500R	C111
3887217	CRR60403752500R	C111
3887218	CRR60407502500R	C111
3887219	CRR604710002500R	C111
3887220	CRR604712502500R	C111
3887221	CRR60473752500R	C111
3887222	CRR60475002500R	C111
3887223	CRR605610002500R	C111
3887224	CRR605612502500R	C111
3887225	CRR605612502500R	C111
3887226	CRR60562502500R	C111
3887227	CRR60563752500R	C111
3887495	CRR606312502500R	C111
3887496	CRR60633752500R	C111
3887497	CRR607010002500R	C111
3887498	CRR607012502500R	C111
3887499	CRR60702502500R	C111
3887500	CRR60703752500R	C111
3887501	CRR60705002500R	C111
3887502	CRR60705002500R	C111
3887503	CRR608810002500R	C111
3887504	CRR608812502500R	C111
3887505	CRR60882502500R	C111
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3892702	CB8490450060000R	C95
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3892704	CB8490450060006L	C96
3892705	CB8490450060006L	C96
3892706	CB849075030000L	C96
3892707	CB849075030000L	C96
3892708	CB849075030000R	C95
3892709	CB849075030006L	C96
3892901	CB210015015004RM	C97
3892902	CB210020015004RM	C97
3892936	CB523090025000R	C88
3892937	CB523090025006L	C89
3892938	CB5290100025000L	C90
3892939	CB5290100025000L	C90
3892940	CB5290100025000R	C90
3892941	CB5290100025000R	C90
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3892957	CB211070015004L	C82
3892958	CB312025020000L	C84
3892959	CB312025020006L	C84
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3892961	CB312035020000L	C84
3892962	CB312035020000R	C83
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3892964	CB5290110025000L	C90
3892965	CB5290110025000L	C90
3892966	CB5290110025000R	C90
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3892984	CB5290150025000L	C90
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3892986	CB5290150025000R	C90
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3892988	CB5290150025006L	C90
3892989	CB5290150025006R	C90
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3892991	CB5290160025000L	C90
3892992	CB5290160025000R	C90
3892993	CB5290160025000R	C90
3892994	CB5290160025006L	C90
3892995	CB5290160025006L	C90
3892996	CB5290160025006R	C90
3892997	CB5290175025000L	C90
3892998	CB5290175025000L	C90
3892999	CB5290175025000R	C90
3893000	CB5290175025000R	C90
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3893002	CB5290175025006L	C90
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3893004	CB529050025000L	C90
3893005	CB529050025000R	C90
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3893007	CB529050025006L	C90
3893008	CB529050025006R	C90
3893009	CB529050025006R	C90
3893010	CB529060025000L	C90
3893011	CB529060025000L	C90
3893012	CB529060025000R	C90
3893013	CB529060025006L	C90
3893014	CB529060025006L	C90
3893015	CB529060025006R	C90
3893016	CB529075025000L	C90
3893017	CB529075025000L	C90
3893018	CB529075025000R	C90
3893019	CB529075025006L	C90
3893020	CB529090025000L	C90
3893021	CB529090025000L	C90
3893022	CB529090025000R	C90
3893023	CB529090025000R	C90
3893024	CB529090025006L	C90
3893025	CB6320100025000L	C92

Index

Order No.	Catalogue No.	Page(s)
3893026	CB6320100025000L	C92
3893027	CB6320100025000R	C91
3893028	CB6320100025000R	C91
3893033	CB312035020000R	C83
3893034	CB312035020006L	C84
3893035	CB312035020006L	C84
3893036	CB312050020000L	C84
3893037	CB312050020000L	C84
3893038	CB312050020006L	C84
3893039	CB312060020000L	C84
3893040	CB312060020000L	C84
3893041	CB312060020000R	C83
3893042	CB312060020006L	C84
3893043	CB312070020000L	C84
3893044	CB312070020000L	C84
3893045	CB312070020000R	C83
3893046	CB312070020006L	C84
3893047	CB312080020000L	C84
3893048	CB312080020000L	C84
3893049	CB312080020000R	C83
3893050	CB312080020006L	C84
3893051	CB312080020006L	C84
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3893054	CB314025020006L	C84
3893055	CB314040020000L	C84
3893056	CB314040020000L	C84
3893057	CB314040020000R	C83
3893058	CB314040020006L	C84
3893059	CB314040020006L	C84
3893060	CB314050020000L	C84
3893061	CB314050020000L	C84
3893062	CB314050020000R	C83
3893063	CB314050020000R	C83
3893064	CB314050020006L	C84
3893065	CB314050020006L	C84
3893066	CB314060020000L	C84
3893067	CB314060020000L	C84
3893068	CB314060020000R	C83
3893069	CB314060020006L	C84
3893070	CB314070020000L	C84
3893071	CB314070020000L	C84
3893072	CB314070020000R	C83
3893073	CB314070020000R	C83
3893074	CB314070020006L	C84
3893075	CB314070020006L	C84
3893076	CB314075020000L	C84
3893077	CB314075020000L	C84
3893078	CB314075020000R	C83
3893079	CB314075020006L	C84
3893080	CB314075020006L	C84
3893083	CB210030015004RM	C97
3893084	CB210040015004RM	C97
3893085	CB210060015004RM	C97
3893086	CB210070015004RM	C97
3893087	CB211015015004RM	C97
3893088	CB211020015004RM	C97
3893089	CB211030015004RM	C97
3893090	CB211040015004RM	C97
3893091	CB211050015004RM	C97
3893092	CB211060015004RM	C97
3893093	CB211070015004RM	C97
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3893095	CB312035020006RM	C97
3893096	CB312050020006RM	C97
3893097	CB312060020006RM	C97
3893098	CB312070020006RM	C97
3893099	CB312080020006RM	C97
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3893102	CB314050020006RM	C97
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3893108	CB316040020006RM	C97
3893109	CB316050020006RM	C97
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3893111	CB316075020006RM	C97
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3893113	CB4180100025006RM	C98
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3893115	CB418035025006RM	C98
3893116	CB418050025006RM	C98
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3893118	CB418075025006RM	C98
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3893120	CB4200100025006RM	C98
3893121	CB4200110025006RM	C98
3893122	CB4200120025006RM	C98
3893123	CB4200130025006RM	C98
3893124	CB4200400025006RM	C98
3893156	CB314080020000L	C84
3893157	CB314080020000L	C84
3893158	CB314080020000R	C83
3893159	CB314080020000R	C83
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3893161	CB3160100020000L	C85
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3893168	CB316025020000L	C85
3893169	CB316025020000R	C85
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3893178	CB316050020000R	C85
3893179	CB316050020000R	C85
3893180	CB316050020006L	C85
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3893183	CB316060020000R	C85
3893184	CB316060020006L	C85
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3893188	CB316075020000R	C85
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3893334	CB420060025006L	C87
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3893346	CB420090025000L	C87
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3893348	CB420090025000R	C87
3893349	CB420090025006L	C87
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3893815	CB5230100025000L	C89
3893816	CB5230100025000R	C88
3893817	CB5230100025000R	C88
3893818	CB5230100025006L	C89
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3893820	CB5230115025000L	C89
3893821	CB5230115025000R	C88
3893822	CB5230115025000R	C88
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3893854	CB5230115025006L	C89
3893855	CB5230115025006R	C88
3893856	CB5230115025006R	C88
3893857	CB5230120025000L	C89
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3893865	CB5230125025000R	C88
3893866	CB5230125025000R	C88
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3893870	CB5230140025000L	C89
3893871	CB5230140025000L	C89
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3893874	CB5230140025006L	C89
3893875	CB5230140025006L	C89
3893876	CB5230140025006R	C88
3893877	CB5230150025000L	C89
3893878	CB5230150025000L	C89
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3893885	CB5230160025000L	C89
3893886	CB5230160025000R	C88
3893887	CB5230160025000R	C88
3893888	CB5230160025006L	C89
3893889	CB5230160025006L	C89
3893890	CB5230160025006R	C88
3893891	CB523040025000L	C89
3893892	CB523040025000L	C89
3893893	CB523040025000R	C88
3893894	CB523040025000R	C88
3893895	CB523040025006L	C89
3893896	CB523050025000L	C89
3893897	CB523050025000L	C89
3893898	CB523050025000R	C88
3893899	CB523050025000R	C88
3893900	CB523060025000L	C89
3893901	CB523060025000L	C89
3893902	CB523060025006L	C89
3893903	CB523070025000L	C89
3893904	CB523070025000L	C89
3893905	CB523070025000R	C88
3893906	CB523070025000R	C88
3893907	CB523070025006L	C89
3893908	CB523080025000L	C89
3893909	CB523080025000L	C89
3893910	CB523080025000R	C88
3893911	CB523080025000R	C88
3893912	CB523080025006L	C89
3893913	CB523090025000L	C89
3893914	CB523090025000L	C89
3895891	SCBM162540L	C19
3895892	SCBM162540R	C19
3896002	CCBM41527L	C12
3896003	SCBM162545L	C19
3896004	SCBM162545R	C19
3896005	SCBM202540L	C19
3896006	SCBM202545R	C19
3896010	SDBM162540L	C19
3896011	SDBM162540R	C19
3896012	SDBM162545L	C19
3896013	SDBM202540L	C19
3896014	SDBM202540R	C19
3896015	CCBM4816225R	C13
3896016	CCBM4816485L	C13
3896017	CCBM4816485R	C13
3896018	CCBM6516325R	C13
3896019	CCBM6612635R	C13
3896022	CCPM81525L	C25
3896023	CCBM51000L	C12
3896024	CCBM61000L	C12
3896025	CCBM61000R	C12
3896026	CCBM61520L	C12
3896027	CCBM81005L	C12
3896028	CCBM81520L	C12
3896030	FCBM61520L	C18
3896031	FCBM61520R	C18
3896032	FCBM81520L	C18
3896033	FCBM81525L	C18
3896035	FCBM51000L	C18
3896036	FCBM51000R	C18
3896037	FCBM51005L	C18
3896038	FCBM51005R	C18
3896039	GCBMW51523L	C22
3896040	GCBMW51523R	C22
3896042	QCBM102540L	C18
3896043	QCBM122540L	C18
3896044	QCBM122545L	C18
3896045	QCBMW102543L	C22
3896046	QCBMW122543L	C22
3896052	GSPM1316515L	C24
3896067	FCBM5312510L	C20
3896068	FCBM5312515L	C20
3896069	FCBM5316250R	C20
3896070	FCBM5316255L	C20
3896071	FCBM5316515R	C20
3896072	FCBM6612630R	C20
3896073	GCPM16254225R	C25
3896083	FCBM6612635R	C20
3896084	FCBM6616320R	C20
3896085	FCBM6616325L	C20
3896086	FCBM8216380R	C20
3896087	FCBM8216385L	C20
3896089	QSBM9916295L	C17
3896090	SSOM1325380R	C23
3896091	SCBM202545L	C19
3896092	SDBM202545R	C19
3896093	CCBM6612635L	C13
3896094	FCBM6616630R	C20
3896095	FCBM8216790R	C20
3896100	CIT31206002000R	C121
3896101	CIT31207502000L	C122
3896102	CIT31207502000R	C121
3896120	ATBM1038	C51
3896121	ATBM12100	C51

Order No.	Catalogue No.	Page(s)
3896122	ATBM1238	C51
3896143	CIT31402502000L	C122
3896144	CIT31402502000L	C122
3896145	CIT31402502000R	C121
3896146	CIT31404002000L	C122
3896147	CIT31405002000L	C122
3896148	CIT31407502000L	C122
3896149	CIT31407502000L	C122
3896150	CIT31407502000R	C121
3896151	CIT316010002000L	C122
3896152	CIT31602502000L	C122
3896153	CIT31602502000R	C121
3896154	CIT31602502000R	C121
3896155	CIT31604002000L	C122
3896156	CIT31604002000R	C121
3896157	CIT31605002000L	C122
3896158	CIT31605002000R	C121
3896159	CIT31607502000L	C122
3896160	CIT31607502000L	C122
3896161	CIT31607502000R	C121
3896162	CIT418010002500L	C120
3896163	CIT418010002500L	C120
3896164	CIT418010002500R	C120
3896165	CIT41803502500L	C120
3896166	CIT41803502500L	C120
3896167	CIT41805002500R	C120
3896168	CIT41807502500L	C120
3896169	CIT41807502500L	C120
3896170	CIT41807502500R	C120
3896171	CIT420010002500L	C120
3896172	CIT42004002500L	C120
3896173	CIT42006002500L	C120
3896174	CIT42007502500L	C120
3896175	CIT523010002500L	C120
3896176	CIT523010002500R	C120
3896177	CIT523015002500L	C120
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3896180	CIT52304002500L	C120
3896181	CIT52307502500L	C120
3896182	CIT529010002500L	C120
3896183	CIT529012502500L	C120
3896184	CIT529012502500L	C120
3896185	CIT529012502500R	C120
3896193	ATBM16100	C51
3896194	ATBM20102	C51
3896195	ATBM25102	C51
3896196	BSBM20152	C51
3896198	MTMM1040	C63
3896199	MTMM12100	C63
3896200	MTMM1240	C63
3896201	MTMM22127	C63
3896202	MTMM840	C63
3896204	CSBM5650L	C10
3896205	CSBM5650R	C10
3896206	CSBM5655L	C10
3896207	CSBM6650L	C10
3896208	CSBM6655L	C10
3896209	CSBM8760L	C10
3896211	FSBM61000L	C14
3896212	FSBM61005L	C14
3896213	FSBM81000L	C14
3897011	FSBM5216125R	C16
3897012	GCBMW81523L	C22
3897083	SCBM202540R	C19
3897084	SDBM202545L	C19
3897085	FCBM5316255R	C20
3897086	FCBM8216385R	C20
3897442	MG125040R	C68
3897483	MG156050L	C68
3897484	MG156050L	C68
3897485	MP062187L	C68
3897486	MP062187L	C68
3897487	MP094281L	C68
3897488	MP094281R	C68
3897489	MP125375L	C68
3897490	MP125375L	C68
3897491	MP156500L	C68
3897492	MP156500L	C68
3897493	MT09560F2L	C68
3897494	MT09560F2L	C68
3897495	MT12560F2L	C68
3897496	MT12560F2L	C68
3897497	MT12560F2R	C68
3897498	MT15660F2L	C68
3897499	MT15660F2L	C68
3897500	CB201505015000L	C80
3897501	CB201505015000L	C80
3897502	CB202007515000L	C80
3897503	CB202007515000L	C80
3897504	CB202510015000L	C80
3897505	CB202510015000L	C80
3897506	CB202510015000R	C80
3897507	CB203010015000L	C80
3897508	CB203010015000L	C80
3897509	CB203510015000L	C80
3897510	CB203510015000L	C80
3897511	CB203510015000R	C80
3897512	CB203515015000L	C80
3897513	CB203515015000L	C80
3897514	CB203515015000R	C80
3897515	CB203515015000R	C80
3897516	CB204010015000L	C80
3897517	CB204010015000L	C80
3897518	CB204010015000R	C80
3897519	CB204015015000L	C80
3897520	CB204015015000L	C80
3897521	CB204015015000R	C80
3897522	CB204510015000L	C80
3897523	CB204510015000L	C80
3897524	CB204510015000R	C80
3897525	CB204515015000L	C80
3897526	CB204515015000L	C80
3897527	CB204515015000R	C80
3897528	CB205015015000L	C80
3897529	CB205015015004L	C80
3897530	CB205015015004L	C80
3897531	CB205020015000L	C80
3897532	CB205020015000L	C80
3897533	CB205020015000R	C80
3897534	CB205020015000R	C80
3897535	CB205020015004L	C80
3897536	CB205020015004L	C80
3897537	CB205030015000L	C80
3897538	CB205030015000L	C80
3897539	CB205030015000R	C80
3897540	CB205030015000R	C80
3897541	CB205030015004L	C80
3897542	CB205040015000L	C80
3897543	CB205040015000L	C80
3897868	CTHM123270	C73
3897869	CTHM124770	C73
3897870	CTHM126470	C73
3897871	CTHM127970	C73
3897872	CTHM129570	C73
3897883	CTHM163270	C73
3897884	CTHM164770	C73
3897885	CTHM166470	C73
3897886	CTHM167970	C73
3897887	CTHM169570	C73
3897888	CTHM2012770	C73
3897889	CTHM203270	C73
3897890	CTHM204770	C73
3897891	CTHM206470	C73
3897892	CTHM207970	C73
3897893	CTHM209570	C73
3897894	GSPM101638225L	C24
3897895	GSPM1016385L	C24
3897896	GSPM131651225L	C24
3897897	GSPM131651225R	C24
3897899	CCPM61525L	C25
3897903	GCPM10254225L	C25
3897904	GCPM102545R	C25
3897905	GCPM12254225L	C25
3897906	GCPM12254225R	C25
3897907	GCPM122545L	C25
3897908	GCPM16254225L	C25
3897909	GCPM162545R	C25
3898641	CNGA120416S01020MT	B72
3898642	CNGA120416S02015MWMT	B72
3898673	TNGA160416S01025MT	B83
3898674	CNGA120412T02020MT	B72
3898675	CNGA120408S01020MT	B72
3898676	DNGA150408EMT	B76
3898677	CNGA120408S02020MT	B72
3898678	DNGA150408S01020MT	B77
3898679	TNGA160408S01020MT	B83
3898680	DCGW11T304S01015MT	B76
3898681	DPGW11T304EMT	B78
3898682	CCGW120404S01015MT	B71
3898683	CCGW120408S01015MT	B71
3898684	DCGW11T304S01015MT	B76
3898685	DCGW11T308S01015MT	B76
3898686	TCGW16T304S01015MT	B82
3898687	DPGW11T304S01015MT	B79
3898688	DPGW11T308S01015MT	B79
3898689	TPGW16T308S01015MT	B84
3898690	VBGW160404S01015MT	B85
3898691	VBGW160408S01015MT	B85
3898692	CNGA120404S01025ST	B72
3898693	CNGA120408S01025ST	B72
3898694	CNGA120412S01025ST	B72
3898695	CNGA120404S01025MT	B72
3898696	CNGA120408S01025MT	B72
3898697	CNGA120412S01025MT	B72
3898698	CNGA120404EFWMT	B72
3898699	CNGA120408EFWMT	B72
3898700	CNGA120412EFWMT	B72
3898701	DNGA150408S01025MT	B77
3898702	DNGA150412S01025MT	B77
3898703	SNMA120408S01025	B81
3898704	SNMA120412S01025	B81
3898705	TNGA160408S01025MT	B83
3898706	TNGA160412S01025MT	B83
3898707	VNGA160404S01025MT	B86
3898708	VNGA160408S01025MT	B86
3898709	CNMA120408S01025	B73
3898710	CPGW09T308S01015C	B74
3898711	CCGW09T308EC	B70
3898712	CPGW060204S01015C	B74
3898713	TPGW110204EC	B84
3898714	CPGW060208EC	B74
3898715	CPGW09T304EC	B74
3898716	CPGW09T308EC	B74
3898717	CPGN120304F	B74
3898718	CPGN120308F	B74
3898719	TPGN110304F	B83
3898720	TPGN110308F	B83
3898721	TPGN160304F	B83
3898722	TPGN160308F	B83
3898723	TPGN160312F	B83
3898724	TPGN220404F	B83
3898725	TPGN220408F	B83
3898726	CNGA120404FST	B72
3898727	CNGA120408FST	B72
3898728	CNMS120404FST	B73
3898729	CNMS120408FST	B73
3898730	DNGA150404FST	B77
3898731	DNGA150408FST	B77
3898732	DNMS150404FST	B78
3898733	DNMS150408FST	B78
3898734	TNMS160404FST	B83
3898735	TNMS160408FST	B83
3898736	VNGA160404FST	B86
3898737	VNGA160408FST	B86
3898738	VNMS160404FST	B86
3898739	VNMS160408FST	B86
3898740	WNGA080404FST	B87
3898741	WNGA080408FST	B87
3898742	SNMS120408FST	B81
3898743	SNMS120412FST	B81
3898744	CDHBS4T004FST	B71
3898745	CDHBS4T002FST	B71
3898746	CCGW060204FST	B70
3898749	CCGW09T304FST	B70
3898750	CCGW09T308FST	B70
3898751	CPGW060202FST	B74
3898752	CPGW060204FST	B74
3898753	CPGW060208FST	B74
3898754	CPGW09T304FST	B74
3898755	CPGW09T308FST	B74
3898756	CPGW120404FST	B74
3898757	CPGW120408FST	B74
3898758	CPGW060204FWST	B74
3898759	CPGW09T308FWST	B74
3898760	CPGW120408FWST	B74
3898761	DCGW070204FST	B75
3898762	DCGW11T304FST	B75
3898763	DPGW070202FST	B78
3898764	DPGW070204FST	B78
3898765	DPGW11T304FST	B78
3898766	DPGW070204FWST	B78
3898767	DPGW11T304FWST	B78
3898768	TCGW110204FST	B82
3898769	TCGW16T304FST	B82
3898770	TPGW110204FST	B84
3898771	TPGW110208FST	B84
3898772	TPGW16T304FST	B84
3898773	TPGW16T308FST	B84
3898774	VBGW110304FST	B85
3898775	VBGW160404FST	B85
3899888	PCKNL3232P16	A15
3899889	PCKNR3232P16	A15
3899890	SDJCR1212F07	A32
3899891	SDJCL1212F07	A32
3899892	SDJCL1010E07	A32
3900153	PCLNL1616H09	A16
3900154	PCLNR1616H09	A16
3900155	PDNNL3225P15	A17
3900156	PDNNR3225P15	A17
3900157	PSBNL2525M12	A18
3900158	PSBNR2525M12	A18
3900159	PSBNL5050T25	A18
3900160	PSDNN3225P15	A18
3900161	PSDNN3232P15	A18
3900162	PTGNL4040T27	A21
3900163	PTGNR4040T27	A21
3900164	PWLNR3232P08	A21
3900165	PWLNL3232P08	A21
3900166	PWLNL2525M06	A21
3900167	PWLNR2525M06	A21
3900168	SCLCL1212F09	A31
3900169	SCLCR1010E06	A31
3900170	SCLCR1212F09	A31
3900171	SCLCL1010E06	A31
3900172	SCLCR1212F06	A31
3900173	SCLCL1212F06	A31
3900174	SDJCL3225P15	A32
3900175	SDJCR3225P15	A32
3900176	SDJCL1212F11	A32
3900177	SDJCR1212F11	A32
3900178	SDNCN1212F11	A32
3900179	SDNCN3225P15	A32
3900180	SRDCN3225P16	A33
3900181	SRDCN3225P12	A33
3900182	SRDCN2020K06	A33
3900183	SRDCN2525M06	A33
3900184	STFCR1212F11	A34
3967072	440210M	D105

Catalogue No.	Page(s)
170.004	A24
191.405	A66-67, A71-73, A75, A81-85, A87, A90-95, A97-99
191.406	A67, A69-71, A73-75, A77, A79-83, A85, A90-93, A95-99
191.407	A67, A69-71, A73-75, A77, A79, A82-83, A85, A91, A95-97
511.018	A16, A18-21, A46
511.022	A45, A79
511.023	A15-16, A18-21, A45-46, A79
511.024	A17
511.025	A15-16, A18-20, A45, A79
511.028	A21
511.03	A46
511.033	A15-16, A18-20
511.038	A18, A20
511.06	A17
512.013	A20-21, A46
512.023	A20-21, A46
512.025	A18-20, A79
512.031	A21
512.053	A18-20
512.06	A17
512.063	A18-20, A79
512.083	A18-20
512.092	A18, A20
512.1	A24
512.101	A24
512.111	A16
512.112	A15-16, A45, A79
512.117	A15-16, A45, A79
512.123	A15-16
512.134	A21
512.135	A21, A46
512.153	A17
513.018	A20-21, A46
513.019	A16, A18-20
513.02	A24
513.023	A15-21, A45-46, A79
513.025	A15-16, A18-21, A45, A79
513.033	A15-16, A18-20
513.038	A18, A20
513.06	A17
513.123	A24
514.018	A16
514.112	A46
514.118	A17-21, A46
514.122	A45, A79
514.123	A15-16, A18-21, A45-46, A79
514.125	A15-16, A18-20, A45, A79
514.128	A17, A21
514.133	A15-16, A18-20
514.138	A18, A20
515.018	A15-21, A45-46
515.022	A15-16, A18-21, A45
515.028	A18, A20
551.129	A24
551.13	A24
551.316	A22, A47, A49
551.317	A22-24, A49
551.332	A23
551.333	A24-25
552.21	A49
552.22	A22, A48
552.221	A22, A47-48
552.225	A48
552.228	A23
552.229	A24-25
552.23	A24-25
552.232	A49
552.24	A23-24
554.201	A48
554.252	A22-25, A47-49
554.253	A48
554.254	A48
557.111	A23-25, A48-49
557.125	A23
206262	D87
206263	D85
206264	D85
206265	D85
206266	D85
206271	D87
206272	D85
206273	D85
206274	D85
206275	D85
206276	D85
206277	D85
206278	D85
206279	D85
206280	D85
206281	D85
206282	D85
206283	D85
206284	D85
206285	D85
206417	D85
206418	D85
206419	D85
206424	D85
206439	D87
206440	D87
206445	D85
206446	D85
206447	D85
206448	D85
206449	D85
206450	D85
206451	D85
206452	D85
206453	D85
206454	D85
206455	D85
206456	D85
206506	D88
206507	D88
206508	D88
206509	D88
206510	D88
206511	D88
206518	D86
206519	D86
206522	D86
206523	D86
218125	D111
218126	D111
218134	D111
218142	D111
218143	D111
235201	D103
235202	D103
235203	D103
235204	D103
235205	D103
235206	D103
235207	D103
235208	D103
235209	D103
250205	D10
250206	D11
250207	D10
250208	D11
250217	D10
250218	D11
250219	D10
250220	D11
250221	D10
250222	D11
250223	D10
250224	D11
250227	D10
250228	D11
250229	D10
250230	D11
250231	D10
250232	D11
250233	D10
250234	D11
250235	D10
250236	D11
250237	D10
250238	D11
250241	D10
250242	D11
250243	D10
250244	D11
250245	D10
250246	D11
250247	D10
250248	D11
250249	D10
250250	D11
250251	D10
250252	D11
250253	D10
250254	D11
250255	D10
250256	D11
250257	D10
250258	D11
250275	D10
250276	D11
250277	D10
250278	D11
250281	D10
250282	D11
250283	D10
250284	D11
250285	D10
250286	D11
250295	D10
250296	D11
250401	D12
250402	D12
250403	D12
250404	D12
250405	D12
250406	D12
250407	D12
250408	D12
250409	D10
250410	D11
250411	D12
250412	D12
250413	D12
250414	D12
250415	D12
250416	D12
250417	D12
250418	D12
251217	D13
251218	D13
251219	D13
251220	D13
251221	D13
251222	D13
251223	D13
251224	D13
251233	D13
251234	D13
251235	D13
251236	D13
251237	D13
251238	D13
251239	D13
251240	D13
251249	D13
251250	D13
251251	D13
251252	D13
251253	D13
251254	D13
251255	D13
251256	D13
251265	D13
251266	D13
251267	D13
251268	D13
251269	D13
251270	D13
251271	D13
251272	D13
253201	D16
253202	D16
253203	D16
253204	D16
253205	D16
253206	D16
253207	D16
253208	D16
254201	D20
254202	D20
254203	D20
254204	D20
254205	D20
254206	D20
254207	D20
254208	D20
331101	D87
331102	D87
331109	D87
331110	D87
331117	D87
331118	D87
333101	D86
333102	D86
333103	D86
333104	D86
333111	D86
338221	D104
338222	D104
338223	D104
338224	D104
338225	D105
338226	D105
338227	D105
338228	D105
338229	D105
338230	D105
338231	D104
338232	D104
348101	D17
348102	D17
348103	D17
348104	D17
348105	D17
348106	D17
348107	D17
348108	D17
348109	D17
348110	D17
348111	D17
348112	D17
348113	D17
348114	D17
349101	D18
349102	D18
349103	D18
349104	D18
349105	D19
349106	D19
349107	D19
349108	D19
349109	D18
349110	D18
349111	D18
349112	D18
349113	D19
349114	D19
349115	D19
349116	D19
349117	D18
349118	D18
349119	D18
349120	D18
349121	D19
349122	D19
349123	D19
349124	D19
349125	D18
349126	D18
349127	D18
349128	D18
349129	D19
349130	D19
349131	D19
349132	D19
350103	D21
350104	D21
350105	D21
350106	D21
350107	D21
350108	D21
350109	D21
350110	D21
350111	D21
350112	D21
350113	D21
350114	D21
409182	D88
409183	D88
409184	D88
409185	D88
409186	D88
409187	D88
435126	D85
435127	D85

Catalogue No.	Page(s)
435128	D87
435129	D87
435130	D85
435131	D85
435140	D85
435141	D85
435142	D87
435143	D87
435152	D85
435153	D85
435154	D86
435155	D86
435156	D86
435157	D86
435170	D85
435171	D85
435180	D85
435181	D85
435194	D86
435200	D85
435201	D85
435202	D85
435203	D85
435204	D85
435205	D85
440202	D104
440203	D104
440204	D104
440205	D105
440206	D105
440207	D105
440208	D105
440209	D105
440211	D104
446101	D13
446102	D13
446103	D13-14
446104	D13-14
506101	D108
506101	D108
506101	D108
506101	D108
506102	D108
506102	D108
506102	D108
506103	D108
506103	D108
506103	D108
506104	D108
506104	D108
506105	D108
506105	D108
506106	D108
506107	D108
506108	D108
507295	D97
507295	D97
507295	D97
507296	D97
507296	D97
507296	D97
507297	D97
507297	D97
507297	D97
507348	D97
507349	D97
507350	D97
507351	D97
507352	D97
507353	D97
507363	D96
507363	D96
507363	D96
507364	D96
507364	D96
507364	D96
507365	D96
507365	D96
507365	D96
507366	D96
507367	D96
507368	D96
507369	D96
507370	D96
507371	D96
507372	D96
507372	D96
507373	D96
507373	D96
507373	D96
507374	D96
507374	D96
507374	D96
507378	D97
507378	D97
507378	D97
507379	D97
507379	D97
507379	D97
507380	D97
507380	D97
507380	D97
507383	D96
510101	D114
510102	D114
510103	D115
510103	D115
510103	D115
510103	D115
510104	D114
510106	D115
510106	D115
510107	D115
510108	D115
510108	D115
510113	D114
510114	D114
510115	D114
510116	D114
510117	D114
510118	D114
510119	D114
510120	D114
510121	D114
510122	D114
510123	D114
510124	D114
510128	D114
510132	D114
510134	D114
510135	D115
510135	D115
510136	D115
510136	D115
510136	D115
510136	D115
510137	D115
510138	D115
581107	D27
581107	D27
581108	D27
581108	D27
581109	D27
581109	D27
581110	D27
581110	D27
581111	D27
581111	D27
582113	D27
582113	D27
582114	D27
582114	D27
582115	D27
582115	D27
582116	D27
582116	D27
582117	D27
582117	D27
582118	D27
582118	D27
582119	D27
582120	D27
582120	D27
582122	D27
582122	D27
582129	D27
582129	D27
582130	D27
582130	D27
582131	D27
582131	D27
582149	D27
582149	D27
583125	D25
583125	D25
583126	D25
583126	D25
583127	D25
583127	D25
583128	D25
583129	D25
583135	D25
583135	D25
583136	D25
583136	D25
583137	D25
583137	D25
583138	D25
583139	D25
583155	D26
583156	D26
583157	D26
583158	D26
583159	D26
583160	D25
583161	D25
583162	D25
583163	D25
583164	D25
583165	D26
583166	D26
583167	D26
583168	D26
583169	D26
583170	D26
583171	D26
583172	D26
583173	D26
583174	D26
583175	D25
583175	D25
583176	D25
583176	D25
583177	D25
583177	D25
583178	D25
583179	D25
583180	D26
583181	D26
583182	D26
583183	D26
583184	D26
606190	D111
606193	D111
606218	D103
606219	D104-105
606243	D88
606244	D88
606247	D86
606249	D10-12
606255	D16
606256	D20
606266	D12
613135	D103
613137	D103
613139	D88
614125	D20
614126	D20
619151	D20
619155	D103
619168	D10-11, D13-14, D16, D20, D85
619205	D10-11, D13
619419	D16
4402122	D104
5821197	D27
44315900	E48
44315900	E48
44315901	E48
44315901	E48
123567230	D80
123567230	D80
123567230	D80
123567231	D80
123567231	D80
123567231	D80
123567240	D80
123567240	D80
123567240	D80
123567241	D80
123567241	D80
123567241	D80
123567320	D80
123567320	D80
123567320	D80
123567320	D80
123567320	D80
123567330	D80
123567330	D80
123567330	D80
123567330	D80
123567330	D80
123567340	D80
123567340	D80
123567340	D80
123567340	D80
123567350	D80
123567350	D80
123567350	D80
123567350	D80
123567350	D80
123567360	D80
123567360	D80
123567360	D80
123567360	D80
123567360	D80
123567380	D80
123567380	D80
123567380	D80
123567380	D80
123567380	D80
123567420	D80
123567420	D80
123567420	D80
123567430	D80
123567430	D80
123567430	D80
123567440	D80
123567440	D80
123567440	D80
123567450	D80
123567450	D80
123567450	D80
123567460	D80
123567460	D80
123567460	D80
123567480	D80
123567480	D80
123567480	D80
123567702	D81
123567702	D81
123567703	D81
123567703	D81
123567704	D81
123567704	D81
123567720	D81
123567720	D81
123567721	D81
123567721	D81
123567730	D81
123567730	D81
123567731	D81
123567731	D81
123567740	D81
123567740	D81
123567741	D81
123567741	D81
123567803	D81
123567804	D81
123567805	D81
123567806	D81
123568080	D82
123568080	D82
123568080	D82
123568080	D82
123568081	D82
123568100	D82
123568100	D82
123568100	D82
123568100	D82
123568101	D82
123568120	D82
123568120	D82
123568120	D82
123568120	D82
123568121	D82
123568140	D82
123568140	D82

Catalogue No.	Page(s)
123568140	D82
123568140	D82
123568141	D82
123568160	D82
123568160	D82
123568160	D82
123568160	D82
123568161	D82
12146003800	D73
12146009500	D73
12146012600	D71-72
12146012700	D71-72
12146013400	D73
12147789100	E45
12148001100	E45
12148005800	A51
12148007200	A58
12148007300	A50
12148021100	D75
12148021500	A29
12148021900	D75
12148024100	D75
12148024200	D75
12148024500	A29, D75
12148024800	D75
12148031686	D75
12148032086	D75
12148032586	D75
12148036000	D73
12148036300	A50-51
12148037700	A57
12148038800	A50, A52-54, A59
12148041100	D71-72, D75
12148041200	D71-72, D75
12148041300	D71-73
12148041400	A29, D73
12148068700	A50, A53-54, A57-59
12148080000	A52-53
12148095100	A57-59
12148566486	A29
12148566586	A29
12148583800	D75
12148586000	D75
12148586900	D75
12148589300	D75
12148589800	D75
12148596200	D71-72
12148597100	A29
12148599900	A29
12157200200	A57
12157200300	A57
12157200400	A57
12157200500	A57
12157200600	A57
12157200700	A57
12157200800	A57
12157200900	A57
12157201000	A57
12157201100	A57
12157201300	A57
12157210200	A57
12157210300	A57
12157210400	A57
12157210500	A57
12157210600	A57
12157210700	A57
12157210800	A57
12157210900	A57
12157211000	A57
12157211100	A57
12157211200	A57
12157211300	A57
12157211400	A57
12157211500	A57
12157301400	A59
12157301500	A59
12157301600	A59
12157301700	A59
12157301800	A58
12191061900	D75
12191062086	D75
12191062586	D75
12191062686	D75
12191063286	D75
12191814086	A29
12191815086	A29
12191824086	A29
12191825086	A29
12250110100	D74
12250110200	D74
12250110300	D74
12250110400	D74
12250110500	D74
12250110600	D74
12250110700	D74
12250110800	D74
12250110900	D74
12250111000	D74
12251212500	D73
12251213200	D73
12251221600	D73
12251221900	D73
12251222000	D73
12251222500	D73
12251223200	D73
12251233200	D73
12251234000	D73
12251332000	D73
12251342000	D73
12251343000	D73
12251344000	D73
12251352000	D73
12251353000	D73
12251354000	D73
12251355000	D73
12251356000	D73
12251358000	D73
12251368000	D73
12251762000	D72
12251762100	D72
12251762200	D72
12251762300	D72
12251762400	D72
12251762500	D72
12251763000	D72
12251763100	D72
12251763200	D72
12251763300	D72
12251763400	D72
12251763500	D72
12251764000	D72
12251764100	D72
12251764200	D72
12251764300	D72
12251764400	D72
12251764500	D72
12251765200	D72
12251765300	D72
12251765400	D72
12251765500	D72
12251766200	D72
12251766300	D72
12251766400	D72
12251766500	D72
12251768200	D72
12251768300	D72
12251768400	D72
12251768500	D72
12251782000	D71
12251782100	D71
12251783000	D71
12251783100	D71
12251783200	D71
12251783300	D71
12251783600	D71
12251783700	D71
12251784000	D71
12251784100	D71
12251784200	D71
12251784300	D71
12251784400	D71
12251784500	D71
12251785200	D71
12251785300	D71
12251785400	D71
12251785500	D71
12251786400	D71
12251786500	D71
12251788400	D71
12251788500	D71
252209M	D14
252210M	D14
252211M	D14
252212M	D14
252217M	D14
252218M	D14
252219M	D14
252220M	D14
252225M	D14
252226M	D14
252227M	D14
252228M	D14
2ER15ISO	E49
2ER175ISO	E49
2ERA60	E47
2IL05ISO	E50
2IL075ISO	E50
2IL10ISO	E50
2IL125ISO	E50
2IL15ISO	E50
2IL20ISO	E50
2IL32UN	E52
2ILA60	E48
2IR05ISO	E50
2IR075ISO	E50
2IR08ISO	E50
2IR10ISO	E50
2IR125ISO	E50
2IR15ISO	E50
2IR16UN	E52
2IR175ISO	E50
2IR18PG	E58
2IR18UN	E52
2IR20ISO	E50
2IR20UN	E52
2IR24UN	E52
2IR27UN	E52
2IR28UN	E52
2IR32UN	E52
2IRA60	E48
3EL05ISO	E49
3EL075ISO	E49
3EL10ISO	E49
3EL10UN	E51
3EL115NPT	E53
3EL125ISO	E49
3EL12UN	E51
3EL15ISO	E49
3EL16UN	E51
3EL175ISO	E49
3EL18NPT	E53
3EL20ISO	E49
3EL25ISO	E49
3EL27NPT	E53
3EL2TR	E59
3EL30ISO	E49
3EL3TR	E59
3EL8NPT	E53
3EL8RD	E58
3EL8UN	E51
3ELA60	E47
3ELAG60	E47
3ELG60	E47
3ER035ISO	E49
3ER05ISO	E49
3ER075ISO	E49
3ER07ISO	E49
3ER08ISO	E49
3ER10ISO	E49
3ER10RD	E58
3ER10UN	E51
3ER115NPT	E53
3ER11UN	E51
3ER125ISO	E49
3ER12UN	E51
3ER13UN	E51
3ER14NPT	E53
3ER14UN	E51
3ER15ISO	E49
3ER15TR	E59
3ER16UN	E51
3ER175ISO	E49
3ER18NPT	E53
3ER18UN	E51
3ER20ISO	E49
3ER20UN	E51
3ER24UN	E51
3ER25ISO	E49
3ER27NPT	E53
3ER27UN	E51
3ER28UN	E51
3ER2TR	E59
3ER30ISO	E49
3ER32UN	E51
3ER36UN	E51
3ER3TR	E59
3ER40UN	E51
3ER48UN	E51
3ER8NPT	E53
3ER8RD	E58
3ER8UN	E51
3ERA60	E47
3ERAG60	E47
3ERG60	E47
3IL05ISO	E50
3IL075ISO	E50
3IL10ISO	E50
3IL12UN	E52
3IL14NPT	E53
3IL15ISO	E50
3IL20ISO	E50
3IL25ISO	E50
3IL30ISO	E50
3IL3TR	E60
3IL8RD	E59
3IL8UN	E52
3ILA60	E48
3ILAG60	E48
3ILG60	E48
3IR05ISO	E50
3IR075ISO	E50
3IR08ISO	E50
3IR10ISO	E50
3IR10RD	E59
3IR10UN	E52
3IR115NPT	E53
3IR11UN	E52
3IR125ISO	E50
3IR12UN	E52
3IR14NPT	E53
3IR14UN	E52
3IR15ISO	E50
3IR15TR	E60
3IR16PG	E58
3IR16UN	E52
3IR175ISO	E50
3IR18NPT	E53
3IR18PG	E58
3IR18UN	E52
3IR20ISO	E50
3IR20UN	E52
3IR24UN	E52
3IR25ISO	E50
3IR27NPT	E53
3IR28UN	E52
3IR30ISO	E50
3IR32UN	E52
3IR36UN	E52
3IR3TR	E60
3IR6RD	E59
3IR8NPT	E53
3IR8RD	E59
3IR8UN	E52
3IRA60	E48
3IRAG60	E48
3IRG60	E48
440201M	D104
440210M	D105
4EL35ISO	E49
4EL40ISO	E49
4EL4TR	E59
4ELN60	E47
4ER35ISO	E49
4ER40ISO	E49
4ER45ISO	E49
4ER4RD	E58
4ER4TR	E59
4ER50ISO	E49
4ER5TR	E59
4ER6RD	E58
4ERN60	E47
4IL35ISO	E50
4IL40ISO	E50
4IL50ISO	E50
4IL5TR	E60
4ILN60	E48
4IR35ISO	E50
4IR40ISO	E50

Catalogue No.	Page(s)
4IR45ISO	E50
4IR4RD	E59
4IR4TR	E60
4IR50ISO	E50
4IR5TR	E60
4IR6RD	E59
4IRN60	E48
5EL6TR	E59
5ER55ISO	E49
5ER60ISO	E49
5ER6TR	E59
5ERQ60	E47
5IL55ISO	E50
5IL60ISO	E50
5IR60ISO	E50
5IR6TR	E60
5IRQ60	E48
A08JSCLCL06	A50
A08JSCLCR06	A50
A10KNNTOR1	D41, E19
A10KSCLCL06	A50
A10KSCLCR06	A50
A10KSDUCL07	A53
A10KSDUCR07	A53
A10KSTFCL11	A54
A10KSTFCR11	A54
A10KSTFPL11	A55
A10KSTFPR11	A55
A10KSTWPL11	A55
A10KSTWPR11	A55
A12MNNTOL2	D41, E19
A12MNNTOR1	D41, E19
A12MNNTOR2	D41, E19
A16MNNTOL2	D41, E19
A16MNNTOR2	D41, E19
A16RCTFPL11	A47
A16RCTFPR11	A47
A16RPWLNL06	A46
A16RPWLNR06	A46
A16RSCLCL09	A50
A16RSCLCR09	A50
A16RSDQCL07	A52
A16RSDQCR07	A52
A16RSDUCL07	A53
A16RSDUCL11	A53
A16RSDUCR07	A53
A16RSDUCR11	A53
A16RSTFPL11	A55
A16RSTFPR11	A55
A16RSVQBL11	A56
A16RSVQBR11	A56
A20QNNTOL2	D41, E19
A20QNNTOR2	D41, E19
A20SPWLNL06	A46
A20SPWLNR06	A46
A20SSCLCL09	A50
A20SSCLCR09	A50
A20SSDQCL11	A52
A20SSDQCR11	A52
A20SSDUCL11	A53
A20SSDUCR11	A53
A20SSVUBL11	A56
A20SSVUBR11	A56
A25RCTFPL16	A47
A25RCTFPR16	A47
A25RMCLNL12	A42
A25RMCLNR12	A42
A25RMDUNL15	A42
A25RMDUNR11	A42
A25RMDUNR15	A42
A25RMTFNL16	A43
A25RMTFNR16	A43
A25RMVUNL16	A44
A25RMVUNR16	A44
A25RMWLNL08	A43
A25RMWLNR06	A43
A25RMWLNR08	A43
A25RNNTOL2	D41, E19
A25RNNTOL3	D41, E19
A25RNNTOR2	D41, E19
A25RNNTOR3	D41, E19
A25RPWLNL08	A46
A25RPWLNR08	A46
A25TPCLNL12	A45
A25TPCLNR12	A45
A25TPTFNL16	A46
A25TPTFNR16	A46
A25TSCLCL12	A50
A25TSCLCR12	A50
A25TSDQCL11	A52
A25TSDQCR11	A52
A25TSDUCL11	A53
A25TSDUCR11	A53
A25TSVQBL16	A56
A25TSVQBR16	A56
A25TSVUBL16	A56
A25TSVUBR16	A56
A32SMCLNL12	A42
A32SMCLNR12	A42
A32SMDUNL15	A42
A32SMDUNR15	A42
A32SMTFNL16	A43
A32SMTFNR16	A43
A32SMVUNL16	A44
A32SMVUNR16	A44
A32SMWLNL08	A43
A32SMWLNR08	A43
A32SNNTOL3	D41, E19
A32SNNTOR3	D41, E19
A32SPWLNL08	A46
A32SPWLNR08	A46
A32TSCLCL12	A50
A32TSCLCR12	A50
A32TSDUCL15	A53
A32TSDUCR15	A53
A32UPCLNL12	A45
A32UPCLNR12	A45
A32UPTFNL16	A46
A32UPTFNR16	A46
A40TMCLNL12	A42
A40TMCLNR12	A42
A40TMCLNR16	A42
A40TMDUNL15	A42
A40TMDUNR15	A42
A40TMTFNL16	A43
A40TMTFNR16	A43
A40TMWLNL08	A43
A40TMWLNR08	A43
A40TNNTOL3	D41, E19
A40TNNTOL4	D41, E19
A40TNNTOR3	D41, E19
A40TNNTOR4	D41, E19
A40VPCLNL12	A45
A40VPCLNL16	A45
A40VPCLNR12	A45
A40VPCLNR16	A45
A40VPTFNL22	A46
A40VPTFNR22	A46
A50UMCLNL12	A42
A50UMCLNR12	A42
A50UMCLNR16	A42
A50UMCLNR19	A42
A50UMDUNL15	A42
A50UMDUNR15	A42
A50UMTFNL22	A43
A50UMTFNR22	A43
A50UNNTOL4	D41, E19
A50UNNTOR4	D41, E19
ABD06187R	C56
ABD06187R	C56
ABD06312R	C56
ABD06312R	C56
ABD09281R	C56
ABD09281R	C56
ABD09500R	C56
ABD09500R	C56
ABD09500RM	C56
ABD09500RM	C56
ABD125375R	C56
ABD125375R	C56
ABD125625R	C56
ABD125625R	C56
ABD125625RM	C56
ABD156500R	C56
ABD156500R	C56
ABD156875R	C56
ABD156875R	C56
ABD156875RM	C56
AGD09503	C56
AGD09503	C56
AGD12504	C56
AGD12504	C56
AGD15605	C56
AGD15605	C56
AKEY	C69
AL163L	E41
AL163R	E41
AL203L	E41
AL203R	E41
AL253L	E41
AL253R	E41
AL254L	E41
AL254R	E41
AL323R	E41
AL324R	E41
AL325R	E41
AL404R	E41
AL405R	E41
APD06187R	C57
APD09281R	C57
APD09281R	C57
APD125375R	C57
APD125375R	C57
APD156500R	C57
APD156500R	C57
AS832	C51, C69
ATBM1038	C51
ATBM12100	C51
ATBM1238	C51
ATBM16100	C51
ATBM1638	C51
ATBM20102	C51
ATBM25102	C51
ATBM838	C51
ATD09560F2	C57
ATD09560F2	C57
ATD12560F2	C57
ATD12560F2	C57
ATD15660F2	C57
ATD15660F2	C57
AVR203L	E44
AVR203R	E44
AVR253L	E44
AVR253R	E44
AVR254R	E44
AVR25D3L	E44
AVR25D3R	E44
AVR25D4L	E44
AVR25D4R	E44
AVR324R	E44
AVR325R	E44
AVR32D3R	E44
AVR403R	E44
AVR405R	E44
AVR505R	E44
AW250	C51, C69
BB1871250R	C58
BB187750R	C58
BB187750R	C58
BB2501000R	C58
BB2501000R	C58
BB2501750R	C58
BB2501750R	C58
BB3121250R	C58
BB3121250R	C58
BP187600R	C58
BP250825R	C58
BP250825R	C58
BP3121000R	C58
BP3121000R	C58
BS832	C51, C69
BSBM20152	C51
BW312	C51, C69
CATR42001000250016R	C118
CATR42001000250016R	C118
CATR4200400250016R	C118
CATR4200400250016R	C118
CATR4200600250016R	C118
CATR4200600250016R	C118
CATR4200750250016R	C118
CATR4200750250016R	C118
CATR52351000250014R	C118
CATR52351000250014R	C118
CATR52351250250014R	C118
CATR52351250250014R	C118
CATR52351750250014R	C118
CATR52351750250014R	C118
CATR5235500250014R	C118
CATR5235500250014R	C118
CATR5235750250014R	C118
CATR5235750250014R	C118
CATR63601000250012R	C118
CATR63601000250012R	C118
CATR63601250250012R	C118
CATR63601250250012R	C118
CATR63601800250012R	C118
CATR63601800250012R	C118
CATR6360500250012R	C118
CATR6360500250012R	C118
CATR6360750250012R	C118
CATR6360750250012R	C118
CATR84901500300010R	C118
CATR84901500300010R	C118
CATR8490150030005R	C118
CATR8490150030005R	C118
CATR8490150030006R	C118
CATR8490150030006R	C118
CATR8490150030008R	C118
CATR8490150030008R	C118
CATR84902000300010R	C118
CATR84902000300010R	C118
CATR8490200030005R	C118
CATR8490200030005R	C118
CATR8490200030006R	C118
CATR8490200030006R	C118
CATR8490200030008R	C118
CATR8490200030008R	C118
CATR8490750300010R	C118
CATR8490750300010R	C118
CATR849075030005R	C118
CATR849075030005R	C118
CATR849075030006R	C118
CATR849075030006R	C118
CATR849075030008R	C118
CATR849075030008R	C118
CATS42001000250016R	C119
CATS42001000250016R	C119
CATS4200400250016R	C119
CATS4200400250016R	C119
CATS4200600250016R	C119
CATS4200600250016R	C119
CATS4200750250016R	C119
CATS4200750250016R	C119
CATS52351000250014R	C119
CATS52351000250014R	C119
CATS52351250250014R	C119
CATS52351250250014R	C119
CATS52351750250014R	C119
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CATS5235500250014R	C119
CATS5235500250014R	C119
CATS5235750250014R	C119
CATS5235750250014R	C119
CATS52901000250014R	C119
CATS52901000250014R	C119
CATS5290750250014R	C119
CATS5290750250014R	C119
CATS63601000250012R	C119
CATS63601000250012R	C119
CATS63601250250012R	C119
CATS63601250250012R	C119
CATS63601800250012R	C119
CATS63601800250012R	C119
CATS6360500250012R	C119
CATS6360500250012R	C119
CATS6360750250012R	C119
CATS6360750250012R	C119
CATS84901500300010R	C119
CATS84901500300010R	C119
CATS8490150030005R	C119
CATS8490150030005R	C119
CATS8490150030006R	C119
CATS8490150030006R	C119
CATS8490150030007R	C119
CATS8490150030007R	C119
CATS8490150030008R	C119
CATS8490150030008R	C119
CATS8490150030009R	C119
CATS8490150030009R	C119
CATS84902000300010R	C119
CATS84902000300010R	C119
CATS8490200030005R	C119
CATS8490200030005R	C119
CATS8490200030006R	C119
CATS8490200030006R	C119
CATS8490200030007R	C119
CATS8490200030007R	C119
CATS8490200030008R	C119

Catalogue No.	Page(s)
CATS8490200030008R	C119
CATS8490200030009R	C119
CATS8490200030009R	C119
CATS8490750300010R	C119
CATS8490750300010R	C119
CATS849075030005R	C119
CATS849075030005R	C119
CATS849075030006R	C119
CATS849075030006R	C119
CATS849075030007R	C119
CATS849075030007R	C119
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CATS849075030008R	C119
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CATS849075030009R	C119
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CB211015015000R	C81
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CB211015015004R	C81
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CB211015015004RM	C97
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CB211020015000R	C81
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CB211070015000R	C81
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CB312025020000R	C83
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CB312050020000R	C83
CB312050020000R	C83
CB312050020006L	C84
CB312050020006L	C84
CB312050020006R	C83
CB312050020006R	C83
CB312050020006RM	C97
CB312050020006RM	C97
CB312060020000L	C84
CB312060020000L	C84
CB312060020000R	C83

Index

Catalogue No.	Page(s)
CB312060020000R	C83
CB312060020006L	C84
CB312060020006L	C84
CB312060020006R	C83
CB312060020006R	C83
CB312060020006RM	C97
CB312060020006RM	C97
CB312070020000L	C84
CB312070020000L	C84
CB312070020000R	C83
CB312070020000R	C83
CB312070020006L	C84
CB312070020006L	C84
CB312070020006R	C83
CB312070020006R	C83
CB312070020006RM	C97
CB312070020006RM	C97
CB312080020000L	C84
CB312080020000L	C84
CB312080020000R	C83
CB312080020000R	C83
CB312080020006L	C84
CB312080020006L	C84
CB312080020006R	C83
CB312080020006R	C83
CB312080020006RM	C97
CB312080020006RM	C97
CB314025020000L	C84
CB314025020000L	C84
CB314025020000R	C83
CB314025020000R	C83
CB314025020006L	C84
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CB314025020006R	C83
CB314025020006R	C83
CB314025020006RM	C97
CB314025020006RM	C97
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CB314040020000L	C84
CB314040020000R	C83
CB314040020000R	C83
CB314040020006L	C84
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CB314040020006R	C83
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CB314040020006RM	C97
CB314040020006RM	C97
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CB314050020000L	C84
CB314050020000R	C83
CB314050020000R	C83
CB314050020006L	C84
CB314050020006L	C84
CB314050020006R	C83
CB314050020006R	C83
CB314050020006RM	C97
CB314050020006RM	C97
CB314060020000L	C84
CB314060020000L	C84
CB314060020000R	C83
CB314060020000R	C83
CB314060020006L	C84
CB314060020006L	C84
CB314060020006R	C83
CB314060020006R	C83
CB314060020006RM	C97
CB314060020006RM	C97
CB314070020000L	C84
CB314070020000L	C84
CB314070020000R	C83
CB314070020000R	C83
CB314070020006L	C84
CB314070020006L	C84
CB314070020006R	C83
CB314070020006R	C83
CB314070020006RM	C97
CB314070020006RM	C97
CB314075020000L	C84
CB314075020000L	C84
CB314075020000R	C83
CB314075020000R	C83
CB314075020006L	C84
CB314075020006L	C84
CB314075020006R	C83
CB314075020006R	C83
CB314075020006RM	C97
CB314075020006RM	C97
CB314080020000L	C84
CB314080020000L	C84
CB314080020000R	C83
CB314080020000R	C83
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CB314080020006L	C84
CB314080020006R	C83
CB314080020006R	C83
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CB314080020006RM	C97
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CB3160100020000R	C85
CB3160100020000R	C85
CB3160100020006L	C85
CB3160100020006L	C85
CB3160100020006R	C85
CB3160100020006R	C85
CB3160100020006RM	C97
CB3160100020006RM	C97
CB316025020000L	C85
CB316025020000L	C85
CB316025020000R	C85
CB316025020000R	C85
CB316025020006L	C85
CB316025020006L	C85
CB316025020006R	C85
CB316025020006R	C85
CB316025020006RM	C97
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CB316040020000L	C85
CB316040020000L	C85
CB316040020000R	C85
CB316040020000R	C85
CB316040020006L	C85
CB316040020006L	C85
CB316040020006R	C85
CB316040020006R	C85
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CB316050020006L	C85
CB316050020006L	C85
CB316050020006R	C85
CB316050020006R	C85
CB316050020006RM	C97
CB316050020006RM	C97
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CB316060020000L	C85
CB316060020000R	C85
CB316060020000R	C85
CB316060020006L	C85
CB316060020006L	C85
CB316060020006R	C85
CB316060020006R	C85
CB316060020006RM	C97
CB316060020006RM	C97
CB316075020000L	C85
CB316075020000L	C85
CB316075020000R	C85
CB316075020000R	C85
CB316075020006L	C85
CB316075020006L	C85
CB316075020006R	C85
CB316075020006R	C85
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CB316075020006RM	C97
CB316090020000L	C85
CB316090020000L	C85
CB316090020000R	C85
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CB316090020006L	C85
CB316090020006L	C85
CB316090020006R	C85
CB316090020006R	C85
CB316090020006RM	C97
CB316090020006RM	C97
CB4180100025000L	C86
CB4180100025000L	C86
CB4180100025000R	C86
CB4180100025000R	C86
CB4180100025006L	C86
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CB4180100025006R	C86
CB4180100025006R	C86
CB4180100025006RM	C98
CB4180100025006RM	C98
CB4180110025000L	C86
CB4180110025000L	C86
CB4180110025000R	C86
CB4180110025000R	C86
CB4180110025006L	C86
CB4180110025006L	C86
CB4180110025006R	C86
CB4180110025006R	C86
CB4180110025006RM	C98
CB4180110025006RM	C98
CB418035025000L	C86
CB418035025000L	C86
CB418035025000R	C86
CB418035025000R	C86
CB418035025006L	C86
CB418035025006L	C86
CB418035025006R	C86
CB418035025006R	C86
CB418035025006RM	C98
CB418035025006RM	C98
CB418050025000L	C86
CB418050025000L	C86
CB418050025000R	C86
CB418050025000R	C86
CB418050025006L	C86
CB418050025006L	C86
CB418050025006R	C86
CB418050025006R	C86
CB418050025006RM	C98
CB418050025006RM	C98
CB418060025000L	C86
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CB418060025000R	C86
CB418060025000R	C86
CB418060025006L	C86
CB418060025006L	C86
CB418060025006R	C86
CB418060025006R	C86
CB418060025006RM	C98
CB418060025006RM	C98
CB418075025000L	C86
CB418075025000L	C86
CB418075025000R	C86
CB418075025000R	C86
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CB418090025000L	C86
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CB418090025006L	C86
CB418090025006R	C86
CB418090025006R	C86
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CB4200100025000R	C87
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CB4200100025006R	C87
CB4200100025006R	C87
CB4200100025006RM	C98
CB4200100025006RM	C98
CB4200110025000L	C87
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CB4200110025000R	C87
CB4200110025000R	C87
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CB420050025006R	C87
CB420050025006R	C87
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CB420050025006RM	C98
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CB420060025000L	C87
CB420060025000R	C87
CB420060025000R	C87
CB420060025006L	C87
CB420060025006L	C87
CB420060025006R	C87
CB420060025006R	C87
CB420060025006RM	C98
CB420060025006RM	C98
CB420070025000L	C87
CB420070025000L	C87
CB420070025000R	C87
CB420070025000R	C87
CB420070025006L	C87
CB420070025006L	C87
CB420070025006R	C87
CB420070025006R	C87
CB420070025006RM	C98
CB420070025006RM	C98
CB420080025000L	C87
CB420080025000L	C87
CB420080025000R	C87
CB420080025000R	C87
CB420080025006L	C87
CB420080025006L	C87
CB420080025006R	C87
CB420080025006R	C87
CB420080025006RM	C98
CB420080025006RM	C98
CB420090025000L	C87
CB420090025000L	C87
CB420090025000R	C87
CB420090025000R	C87
CB420090025006L	C87
CB420090025006L	C87
CB420090025006R	C87
CB420090025006R	C87
CB420090025006RM	C98
CB420090025006RM	C98
CB5230100025000L	C89
CB5230100025000L	C89
CB5230100025000R	C88
CB5230100025000R	C88
CB5230100025006L	C89
CB5230100025006L	C89
CB5230100025006R	C88
CB5230100025006R	C88
CB5230100025006RM	C98
CB5230100025006RM	C98
CB5230115025000L	C89

Index

Catalogue No.	Page(s)
CB5230115025000L	C89
CB5230115025000R	C88
CB5230115025000R	C88
CB5230115025006L	C89
CB5230115025006L	C89
CB5230115025006R	C88
CB5230115025006R	C88
CB5230115025006RM	C98
CB5230115025006RM	C98
CB5230120025000L	C89
CB5230120025000L	C89
CB5230120025000R	C88
CB5230120025000R	C88
CB5230120025006L	C89
CB5230120025006L	C89
CB5230120025006R	C88
CB5230120025006R	C88
CB5230120025006RM	C98
CB5230120025006RM	C98
CB5230125025000L	C89
CB5230125025000L	C89
CB5230125025000R	C88
CB5230125025000R	C88
CB5230125025006L	C89
CB5230125025006L	C89
CB5230125025006R	C88
CB5230125025006R	C88
CB5230125025006RM	C98
CB5230125025006RM	C98
CB5230140025000L	C89
CB5230140025000L	C89
CB5230140025000R	C88
CB5230140025000R	C88
CB5230140025006L	C89
CB5230140025006L	C89
CB5230140025006R	C88
CB5230140025006R	C88
CB5230140025006RM	C98
CB5230140025006RM	C98
CB5230150025000L	C89
CB5230150025000L	C89
CB5230150025000R	C88
CB5230150025000R	C88
CB5230150025006L	C89
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CB5230150025006R	C88
CB5230150025006R	C88
CB5230150025006RM	C98
CB5230150025006RM	C98
CB5230160025000L	C89
CB5230160025000L	C89
CB5230160025000R	C88
CB5230160025000R	C88
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CB523040025000L	C89
CB523040025000R	C88
CB523040025000R	C88
CB523040025006L	C89
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CB523040025006R	C88
CB523040025006R	C88
CB523040025006RM	C98
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CB523050025000L	C89
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CB523050025000R	C88
CB523050025000R	C88
CB523050025006L	C89
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CB523050025006R	C88
CB523050025006R	C88
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CB523060025000L	C89
CB523060025000L	C89
CB523060025000R	C88
CB523060025000R	C88
CB523060025006L	C89
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CB523090025000L	C89
CB523090025000R	C88
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CB5290110025006L	C90
CB5290110025006L	C90
CB5290110025006R	C90
CB5290110025006R	C90
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CB5290110025006RM	C98
CB5290125025000L	C90
CB5290125025000L	C90
CB5290125025000R	C90
CB5290125025000R	C90
CB5290125025006L	C90
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CB5290160025006RM	C98
CB5290160025006RM	C98
CB5290175025000L	C90
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CB5290175025000R	C90
CB5290175025000R	C90
CB5290175025006L	C90
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CB529050025006L	C90
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CB529050025006RM	C98
CB529050025006RM	C98
CB529060025000L	C90
CB529060025000L	C90
CB529060025000R	C90
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CB529060025006L	C90
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CB529090025000R	C90
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CB6320125025000R	C91
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CB6320150025000R	C91
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CB6320150025006R	C91
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CB6320250040000R	C91
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CB6320250040006RM	C99
CB6320300040000L	C92
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CB6320300040000R	C91
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CB632075025000L	C92
CB632075025000L	C92
CB632075025000R	C91
CB632075025000R	C91
CB632075025006L	C92
CB632075025006L	C92
CB632075025006R	C91
CB632075025006R	C91
CB632075025006RM	C99

Index

Catalogue No.	Page(s)
CB632075025006RM	C99
CB632090025000L	C92
CB632090025000L	C92
CB632090025000R	C91
CB632090025000R	C91
CB632090025006L	C92
CB632090025006L	C92
CB632090025006R	C91
CB632090025006R	C91
CB632090025006RM	C99
CB632090025006RM	C99
CB6360100025000L	C94
CB6360100025000L	C94
CB6360100025000R	C93
CB6360100025000R	C93
CB6360100025006L	C94
CB6360100025006L	C94
CB6360100025006R	C93
CB6360100025006R	C93
CB6360100025006RM	C99
CB6360100025006RM	C99
CB6360115025000L	C94
CB6360115025000L	C94
CB6360115025000R	C93
CB6360115025000R	C93
CB6360115025006L	C94
CB6360115025006L	C94
CB6360115025006R	C93
CB6360115025006R	C93
CB6360115025006RM	C99
CB6360115025006RM	C99
CB6360125025000L	C94
CB6360125025000L	C94
CB6360125025000R	C93
CB6360125025000R	C93
CB6360125025006L	C94
CB6360125025006L	C94
CB6360125025006R	C93
CB6360125025006R	C93
CB6360125025006RM	C99
CB6360125025006RM	C99
CB6360150025000L	C94
CB6360150025000L	C94
CB6360150025000R	C93
CB6360150025000R	C93
CB6360150025006L	C94
CB6360150025006L	C94
CB6360150025006R	C93
CB6360150025006R	C93
CB6360150025006RM	C99
CB6360150025006RM	C99
CB6360160025000L	C94
CB6360160025000L	C94
CB6360160025000R	C93
CB6360160025000R	C93
CB6360160025006L	C94
CB6360160025006L	C94
CB6360160025006R	C93
CB6360160025006R	C93
CB6360160025006RM	C99
CB6360160025006RM	C99
CB6360180025000L	C94
CB6360180025000L	C94
CB6360180025000R	C93
CB6360180025000R	C93
CB6360180025006L	C94
CB6360180025006L	C94
CB6360180025006R	C93
CB6360180025006R	C93
CB6360180025006RM	C99
CB6360180025006RM	C99
CB6360200040000L	C94
CB6360200040000L	C94
CB6360200040000R	C93
CB6360200040000R	C93
CB6360200040006L	C94
CB6360200040006L	C94
CB6360200040006R	C93
CB6360200040006R	C93
CB6360200040006RM	C99
CB6360200040006RM	C99
CB6360250040000L	C94
CB6360250040000L	C94
CB6360250040000R	C93
CB6360250040000R	C93
CB6360250040006L	C94
CB6360250040006L	C94
CB6360250040006R	C93
CB6360250040006R	C93
CB6360250040006RM	C99
CB6360250040006RM	C99
CB6360300040000L	C94
CB6360300040000L	C94
CB6360300040000R	C93
CB6360300040000R	C93
CB6360300040006L	C94
CB6360300040006L	C94
CB6360300040006R	C93
CB6360300040006R	C93
CB6360300040006RM	C99
CB6360300040006RM	C99
CB636050025000L	C94
CB636050025000L	C94
CB636050025000R	C93
CB636050025000R	C93
CB636050025006L	C94
CB636050025006L	C94
CB636050025006R	C93
CB636050025006R	C93
CB636050025006RM	C99
CB636050025006RM	C99
CB636060025000L	C94
CB636060025000L	C94
CB636060025000R	C93
CB636060025000R	C93
CB636060025006L	C94
CB636060025006L	C94
CB636060025006R	C93
CB636060025006R	C93
CB636060025006RM	C99
CB636060025006RM	C99
CB636075025000L	C94
CB636075025000L	C94
CB636075025000R	C93
CB636075025000R	C93
CB636075025006L	C94
CB636075025006L	C94
CB636075025006R	C93
CB636075025006R	C93
CB636075025006RM	C99
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CB636090025000L	C94
CB636090025000L	C94
CB636090025000R	C93
CB636090025000R	C93
CB636090025006L	C94
CB636090025006L	C94
CB636090025006R	C93
CB636090025006R	C93
CB636090025006RM	C99
CB636090025006RM	C99
CB8490100030000L	C96
CB8490100030000L	C96
CB8490100030000R	C95
CB8490100030000R	C95
CB8490100030006L	C96
CB8490100030006L	C96
CB8490100030006R	C95
CB8490100030006R	C95
CB8490100030006RM	C99
CB8490100030006RM	C99
CB8490125030000L	C96
CB8490125030000L	C96
CB8490125030000R	C95
CB8490125030000R	C95
CB8490125030006L	C96
CB8490125030006L	C96
CB8490125030006R	C95
CB8490125030006R	C95
CB8490125030006RM	C99
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CB8490150030000L	C96
CB8490150030000L	C96
CB8490150030000R	C95
CB8490150030000R	C95
CB8490150030006L	C96
CB8490150030006L	C96
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CB8490150030006RM	C99
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CB8490250040006L	C96
CB8490250040006L	C96
CB8490250040006R	C95
CB8490250040006R	C95
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CB8490260040000L	C96
CB8490260040000R	C95
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CB8490260040006L	C96
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CB8490350060000L	C96
CB8490350060000R	C95
CB8490350060000R	C95
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CB8490400060006L	C96
CB8490400060006L	C96
CB8490400060006R	C95
CB8490400060006R	C95
CB8490400060006RM	C99
CB8490400060006RM	C99
CB8490450060000L	C96
CB8490450060000L	C96
CB8490450060000R	C95
CB8490450060000R	C95
CB8490450060006L	C96
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CB849075030006L	C96
CB849075030006L	C96
CB849075030006R	C95
CB849075030006R	C95
CB849075030006RM	C99
CB849075030006RM	C99
CBIT	C69
CC09	C10
CC09	C11-13, C69
CC11	C10-13, C26, C69
CCBM41007L	C12
CCBM41007R	C12
CCBM41527L	C12
CCBM41527R	C12
CCBM4812225L	C13
CCBM4812225R	C13
CCBM4812485R	C13
CCBM4816225R	C13
CCBM4816485L	C13
CCBM4816485R	C13
CCBM51000L	C12
CCBM51000R	C12
CCBM51005L	C12
CCBM51005R	C12
CCBM51525L	C12
CCBM51525R	C12
CCBM5312250R	C13
CCBM5312255L	C13
CCBM5312255R	C13
CCBM5312510R	C13
CCBM5312515R	C13
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CCBM5316510R	C13
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CCBM61520R	C12
CCBM61525L	C12
CCBM61525R	C12
CCBM6516320R	C13
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CCGT120402AL1	B46
CCGT120402AL3	B46
CCGT120404AL1	B46
CCGT120404AL1	B46
CCGT120404AL3	B46
CCGT120404AL3	B46
CCGT120408AL1	B46

Catalogue No.	Page(s)
CCGT120408AL1	B46
CCGT120408AL3	B46
CCGT120408AL3	B46
CCGW060202EC	B70
CCGW060202EFWC	B70
CCGW060202EFWM	B70
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CCGW060202S01015C	B70
CCGW060202S01015C	B70
CCGW060204EFWC	B70
CCGW060204EFWM	B70
CCGW060204FST	B70
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CDG50302R	C45
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CDHBS4T004M	C38
CDHBS4T004M	C38
CDHBS4T0X0	C38
CDHBS4T0X0	C38
CDHBS4T0X0	C38
CDHBS4T0X0	C38
CDHBS4T0X0	C38
CDHBS4T0X0M	C38
CDHBS4T0X0M	C38
CDHHS4T002	C38
CDHHS4T002	C38
CDHHS4T002L	C38
CDHHS4T002L	C38

Catalogue No.	Page(s)
CDHHS4T002L	C38
CDHHS4T002L	C38
CDHHS4T002R	C38
CDHHS4T002R	C38
CDHHS4T002R	C38
CDHHS4T004	C38
CDHHS4T004L	C38
CDHHS4T004L	C38
CDHHS4T004L	C38
CDHHS4T004R	C38
CDJNL2525M15MN7	A23
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CDJNR3225P15MN7	A23
CDT50022R	C45
CDT50022R	C45
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CELNR2525M13MF7	A23
CELNR2525M13MN7	A24
CFG100620753500R	C105
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CHB636025004000R	C100
CHB848015003000R	C100
CHB848015003000R	C100
CHB848020003000R	C100
CHB848020003000R	C100
CHB848025004000R	C100
CHB848025004000R	C100
CHB848030004000R	C100
CHB848030004000R	C100
CHB848035006000R	C100
CHB848035006000R	C100
CHB848040006000R	C100
CHB848040006000R	C100
CHB848045006000R	C100
CHB848045006000R	C100
CIT20400751500L	C122
CIT20400751500L	C122
CIT20400751500R	C121
CIT20400751500R	C121
CIT20401001500L	C122
CIT20401001500L	C122
CIT20401001500R	C121
CIT20401001500R	C121
CIT20401501500L	C122
CIT20401501500L	C122
CIT20401501500R	C121
CIT20401501500R	C121
CIT20501001500L	C122
CIT20501001500L	C122
CIT20501001500R	C121
CIT20501001500R	C121
CIT20501501500L	C122

Index

Catalogue No.	Page(s)
CIT20501501500L	C122
CIT20501501500R	C121
CIT20501501500R	C121
CIT20502001500L	C122
CIT20502001500L	C122
CIT20502001500R	C121
CIT20502001500R	C121
CIT20602001500L	C122
CIT20602001500L	C122
CIT20602001500R	C121
CIT20602001500R	C121
CIT20602501500L	C122
CIT20602501500L	C122
CIT20602501500R	C121
CIT20602501500R	C121
CIT20603001500L	C122
CIT20603001500L	C122
CIT20603001500R	C121
CIT20603001500R	C121
CIT20802501500L	C122
CIT20802501500L	C122
CIT20802501500R	C121
CIT20802501500R	C121
CIT20803501500L	C122
CIT20803501500L	C122
CIT20803501500R	C121
CIT20803501500R	C121
CIT20805001500L	C122
CIT20805001500L	C122
CIT20805001500R	C121
CIT20805001500R	C121
CIT21002501500L	C122
CIT21002501500L	C122
CIT21002501500R	C121
CIT21002501500R	C121
CIT21003501500L	C122
CIT21003501500L	C122
CIT21003501500R	C121
CIT21003501500R	C121
CIT21005001500L	C122
CIT21005001500L	C122
CIT21005001500R	C121
CIT21005001500R	C121
CIT21006001500L	C122
CIT21006001500L	C122
CIT21006001500R	C121
CIT21006001500R	C121
CIT31202502000L	C122
CIT31202502000L	C122
CIT31202502000R	C121
CIT31202502000R	C121
CIT31204002000L	C122
CIT31204002000L	C122
CIT31204002000R	C121
CIT31204002000R	C121
CIT31205002000L	C122
CIT31205002000L	C122
CIT31205002000R	C121
CIT31205002000R	C121
CIT31206002000L	C122
CIT31206002000L	C122
CIT31206002000R	C121
CIT31206002000R	C121
CIT31207502000L	C122
CIT31207502000L	C122
CIT31207502000R	C121
CIT31207502000R	C121
CIT31402502000L	C122
CIT31402502000L	C122
CIT31402502000R	C121
CIT31402502000R	C121
CIT31404002000L	C122
CIT31404002000L	C122
CIT31404002000R	C121
CIT31404002000R	C121
CIT31405002000L	C122
CIT31405002000L	C122
CIT31405002000R	C121
CIT31405002000R	C121
CIT31407502000L	C122
CIT31407502000L	C122
CIT31407502000R	C121
CIT31407502000R	C121
CIT316010002000L	C122
CIT316010002000L	C122
CIT316010002000R	C121
CIT316010002000R	C121
CIT31602502000L	C122
CIT31602502000L	C122
CIT31602502000R	C121
CIT31602502000R	C121
CIT31604002000L	C122
CIT31604002000L	C122
CIT31604002000R	C121
CIT31604002000R	C121
CIT31605002000L	C122
CIT31605002000L	C122
CIT31605002000R	C121
CIT31605002000R	C121
CIT31607502000L	C122
CIT31607502000L	C122
CIT31607502000R	C121
CIT31607502000R	C121
CIT418010002500L	C120
CIT418010002500L	C120
CIT418010002500R	C120
CIT418010002500R	C120
CIT41803502500L	C120
CIT41803502500L	C120
CIT41803502500R	C120
CIT41803502500R	C120
CIT41805002500L	C120
CIT41805002500L	C120
CIT41805002500R	C120
CIT41805002500R	C120
CIT41807502500L	C120
CIT41807502500L	C120
CIT41807502500R	C120
CIT41807502500R	C120
CIT420010002500L	C120
CIT420010002500L	C120
CIT420010002500R	C120
CIT420010002500R	C120
CIT42004002500L	C120
CIT42004002500R	C120
CIT42006002500L	C120
CIT42006002500L	C120
CIT42006002500R	C120
CIT42006002500R	C120
CIT42007502500L	C120
CIT42007502500L	C120
CIT42007502500R	C120
CIT42007502500R	C120
CIT523010002500L	C120
CIT523010002500L	C120
CIT523010002500R	C120
CIT523010002500R	C120
CIT523015002500L	C120
CIT523015002500L	C120
CIT523015002500R	C120
CIT523015002500R	C120
CIT52304002500L	C120
CIT52304002500L	C120
CIT52304002500R	C120
CIT52304002500R	C120
CIT52306002500L	C120
CIT52306002500L	C120
CIT52306002500R	C120
CIT52306002500R	C120
CIT52307502500L	C120
CIT52307502500L	C120
CIT52307502500R	C120
CIT52307502500R	C120
CIT529010002500L	C120
CIT529010002500L	C120
CIT529010002500R	C120
CIT529010002500R	C120
CIT529012502500L	C120
CIT529012502500L	C120
CIT529012502500R	C120
CIT529012502500R	C120
CIT529017502500L	C120
CIT529017502500L	C120
CIT529017502500R	C120
CIT529017502500R	C120
CIT52905002500L	C120
CIT52905002500L	C120
CIT52905002500R	C120
CIT52905002500R	C120
CIT52907502500L	C120
CIT52907502500L	C120
CIT52907502500R	C120
CIT52907502500R	C120
CIT632010002500L	C123
CIT632010002500L	C123
CIT632010002500R	C123
CIT632010002500R	C123
CIT632012502500L	C123
CIT632012502500L	C123
CIT632012502500R	C123
CIT632012502500R	C123
CIT632018002500L	C123
CIT632018002500L	C123
CIT632018002500R	C123
CIT632018002500R	C123
CIT63205002500L	C123
CIT63205002500L	C123
CIT63205002500R	C123
CIT63205002500R	C123
CIT63207502500L	C123
CIT63207502500L	C123
CIT63207502500R	C123
CIT63207502500R	C123
CIT636010002500L	C123
CIT636010002500L	C123
CIT636010002500R	C123
CIT636010002500R	C123
CIT636012502500L	C123
CIT636012502500L	C123
CIT636012502500R	C123
CIT636012502500R	C123
CIT636018002500L	C123
CIT636018002500L	C123
CIT636018002500R	C123
CIT636018002500R	C123
CIT63605002500L	C123
CIT63605002500L	C123
CIT63605002500R	C123
CIT63605002500R	C123
CIT63607502500L	C123
CIT63607502500L	C123
CIT63607502500R	C123
CIT63607502500R	C123
CIT849015003000L	C123
CIT849015003000L	C123
CIT849015003000R	C123
CIT849015003000R	C123
CIT849020003000L	C123
CIT849020003000L	C123
CIT849020003000R	C123
CIT849020003000R	C123
CIT84907503000L	C123
CIT84907503000L	C123
CIT84907503000R	C123
CIT84907503000R	C123
CKEY	C69
CKJNL2525M16	A24
CKJNL3225P16	A24
CKJNR2525M16	A24
CKJNR3225P16	A24
CKM10	A25-26, A28, A47
CKM12	A8-10, A13, A42
CKM13	A27
CKM19	A27-28, A47
CKM20	A43, A83
CKM21	A8-11, A13-14, A42-43
CKM22	A9, A42
CKM26	A11
CKM31	A11-12, A44
CKM34	A67, A69, A71, A73, A75, A77, A81, A83
CKM35	A69, A71, A75, A77, A83
CKM36	A67, A69, A71, A73, A75
CKM37	A71, A73
CKM38	A77
CKM41	A69
CKM6	A12-13, A43
CKM7	A9, A26-27, A42
CKM9	A11, A26-28, A43
CM109	D41, E19
CM146	D41, E19
CM147	D41, E19
CM182	D39, E15
CM183	D39, E15
CM184LP	D39, E15
CM185LP	D39, E15
CM214	A30
CM216	A30
CM219	A30
CM72LP	D38, D40-41, E14-16, E19
CM73LP	D38, D40-41, E14-16, E19
CM74	D38, D40-41, E14-15, E19
CM75	D38, D40-41, E14-15, E19
CM80	D38, D40, E14-15
CM81	D38, D40, E14-15
CNGA120404EFWMT	B72
CNGA120404EFWMT	B72
CNGA120404FST	B72
CNGA120404S01020MT	B72
CNGA120404S01025FWMT	B72
CNGA120404S01025FWMT	B72
CNGA120404S01025MT	B72
CNGA120404S01025MT	B72
CNGA120404S01025MT	B72
CNGA120404S01025MT	B72
CNGA120404S01025ST	B72
CNGA120404T02020	B50
CNGA120408EFWMT	B72
CNGA120408EFWMT	B72
CNGA120408EMT	B72
CNGA120408EMT	B72
CNGA120408FST	B72
CNGA120408S01020FWMT	B72
CNGA120408S01020MT	B72
CNGA120408S01020MT	B72
CNGA120408S01025FWMT	B72
CNGA120408S01025FWMT	B72
CNGA120408S01025MT	B72
CNGA120408S01025MT	B72
CNGA120408S01025MT	B72
CNGA120408S01025MT	B72
CNGA120408S01025ST	B72
CNGA120408S02020MT	B72
CNGA120408T01020FW	B50
CNGA120408T02020	B50
CNGA120408T02020	B50
CNGA120412EFWMT	B72
CNGA120412EFWMT	B72
CNGA120412EMT	B72
CNGA120412S01025MT	B72
CNGA120412S01025MT	B72
CNGA120412S01025MT	B72
CNGA120412S01025MT	B72
CNGA120412S01025ST	B72
CNGA120412T01020FW	B50
CNGA120412T02020	B50
CNGA120412T02020	B50
CNGA120412T02020MT	B72
CNGA120416S01020MT	B72
CNGA120416S02015MWMT	B72
CNGA120416T01020FW	B50
CNGA120416T02020	B50
CNGA160612T02020	B50
CNGA160612T02020	B50
CNGA160616T02020	B50
CNGA190612T02020	B50
CNGA190612T02020	B50
CNGA190616T02020	B50
CNGA190616T02020	B50
CNGM190612AL1	B46
CNGN120404T02020	B50
CNGN120408T01020	B50
CNGN120408T02020	B50
CNGN120408T02020	B50
CNGN120412T01020	B50
CNGN120412T02020	B50
CNGN120412T02020	B50
CNGN120416T01020	B50
CNGN120416T02020	B50
CNGN120416T02020	B50
CNGN120712T01020	B50
CNGN120712T02020	B50
CNGN120712T02020	B50
CNGN120716T01020	B50
CNGN120716T02020	B50
CNGN160716T02020	B50
CNGX120708T02020	B50
CNGX120712T01020FW	B51
CNGX120712T02020	B50
CNGX120716T02020	B50
CNGX160716T02020	B50
CNMA120404	F11
CNMA120404	F11
CNMA120404	B16
CNMA120404	B16
CNMA120404S01020ST	B73
CNMA120408	B16
CNMA120408	F11
CNMA120408	F11

Catalogue No.	Page(s)
CNMA120408	F11
CNMA120408	B16
CNMA120408	B16
CNMA120408FST	B73
CNMA120408S01020MTV	B73
CNMA120408S01020MTV	B73
CNMA120408S01020ST	B73
CNMA120408S01020ST	B73
CNMA120408S01025	B73
CNMA120408S02020	B73
CNMA120408T02020	B51
CNMA120412	F11
CNMA120412	F11
CNMA120412	B16
CNMA120412	B16
CNMA120412S01020ST	B73
CNMA120412S02020	B73
CNMA120412T02020	B51
CNMA120416	B16
CNMA120416T02020	B51
CNMA160612	B16
CNMA160612T02020	B51
CNMA160616T02020	B51
CNMA190612	B16
CNMA190616	B16
CNMA190616	B16
CNMG09030849	B17
CNMG09030849	B17
CNMG09030849	B17
CNMG120404	F11
CNMG120404	F11
CNMG120404	F11
CNMG120404	F11
CNMG120404	F11
CNMG120404	B16
CNMG120404	B16
CNMG120404	B16
CNMG120404	B16
CNMG120404	B16
CNMG120404	B16
CNMG12040422	B16
CNMG12040422	B16
CNMG12040422	F11
CNMG12040422	B16
CNMG12040422	B16
CNMG12040422	B16
CNMG12040422	B16
CNMG12040422	B16
CNMG12040422	B16
CNMG1204044	B16
CNMG1204044	B16
CNMG1204044	B16
CNMG12040448	B17
CNMG12040448	B17
CNMG12040448	B17
CNMG12040448	B17
CNMG120404FL	B17
CNMG120404FM	B18
CNMG120404FW	B18
CNMG120404FW	B18
CNMG120408	B16
CNMG120408	B16
CNMG120408	F11
CNMG120408	F11
CNMG120408	F11
CNMG120408	F11
CNMG120408	F11
CNMG120408	B16
CNMG120408	B16
CNMG120408	B16
CNMG120408	B16
CNMG120408	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	F11
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG12040822	B16
CNMG1204084	B16
CNMG1204084	B16
CNMG1204084	B16
CNMG1204084	B16
CNMG12040848	B17
CNMG12040848	B17
CNMG12040848	B17
CNMG12040848	B17
CNMG12040848	B17
CNMG12040849	F11
CNMG12040849	B17
CNMG12040849	F11
CNMG12040849	B17
CNMG12040849	B17
CNMG12040849	B17
CNMG12040849	B17
CNMG12040849	B17
CNMG1204085	B17
CNMG1204085	F11
CNMG1204085	F11
CNMG1204085	F11
CNMG1204085	B17
CNMG1204085	B17
CNMG1204085	B17
CNMG1204085	B17
CNMG1204085	B17
CNMG1204085	B17
CNMG120408AP	B17
CNMG120408AP	B17
CNMG120408AP	B17
CNMG120408AP	B17
CNMG120408AP	B17
CNMG120408AP	B17
CNMG120408FL	B17
CNMG120408FM	F12
CNMG120408FR	F12
CNMG120408FR	F12
CNMG120408FR	B18
CNMG120408FW	B18
CNMG120408FW	B18
CNMG120408MW	B18
CNMG120408MW	B18
CNMG120408MW	B18
CNMG120408SL	B18
CNMG120408SL	B18
CNMG120408SL	B18
CNMG120408SL	B18
CNMG120412	F11
CNMG120412	F11
CNMG120412	B16
CNMG120412	B16
CNMG120412	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041222	B16
CNMG12041248	B17
CNMG12041248	B17
CNMG12041248	B17
CNMG12041249	B17
CNMG12041249	B17
CNMG12041249	B17
CNMG12041249	B17
CNMG12041249	B17
CNMG12041249	B17
CNMG1204125	B17
CNMG1204125	F11
CNMG1204125	F11
CNMG1204125	F11
CNMG1204125	B17
CNMG1204125	B17
CNMG1204125	B17
CNMG1204125	B17
CNMG1204125	B17
CNMG1204125	B17
CNMG120412AP	B17
CNMG120412AP	B17
CNMG120412AP	B17
CNMG120412AP	B17
CNMG120412AP	B17
CNMG120412FM	B18
CNMG120412FR	F12
CNMG120412FR	B18
CNMG120412FW	B18
CNMG120412FW	B18
CNMG120412MW	B18
CNMG120412MW	B18
CNMG120412MW	B18
CNMG120412SL	B18
CNMG1204165	B17
CNMG1204165	B17
CNMG1204165	B17
CNMG1204165	B17
CNMG120416SL	B18
CNMG120416SL	B18
CNMG160608	B16
CNMG160608	B16
CNMG1606085	B17
CNMG1606085	B17
CNMG1606085	B17
CNMG1606085	B17
CNMG1606085	B17
CNMG1606085	B17
CNMG160608SL	B18
CNMG160608SL	B18
CNMG160608SL	B18
CNMG160608SL	B18
CNMG160612	B16
CNMG1606125	B17
CNMG1606125	B17
CNMG1606125	B17
CNMG1606125	B17
CNMG1606125	B17
CNMG1606125	B17
CNMG160612SL	B18
CNMG160612SL	B18
CNMG160612SL	B18
CNMG160612SL	B18
CNMG1606165	B17
CNMG1606165	B17
CNMG1606165	B17
CNMG1606165	B17
CNMG1606165	B17
CNMG1606165	B17
CNMG160616SL	B18
CNMG160616SL	B18
CNMG1906085	B17
CNMG1906085	B17
CNMG1906085	B17
CNMG1906085	B17
CNMG1906085	B17
CNMG1906085	B17
CNMG190612	F11
CNMG190612	F11
CNMG190612	F11
CNMG190612	F11
CNMG190612	F11
CNMG190612	B16
CNMG190612	B16
CNMG190612	B16
CNMG1906125	B17
CNMG1906125	F11
CNMG1906125	F11
CNMG1906125	B17
CNMG1906125	B17
CNMG1906125	B17
CNMG1906125	B17
CNMG1906125	B17
CNMG190612SL	B18
CNMG190612SL	B18
CNMG190612SL	B18
CNMG190616	F11
CNMG190616	F11
CNMG190616	F11
CNMG190616	F11
CNMG190616	F11
CNMG190616	B16
CNMG190616	B16
CNMG1906165	B17
CNMG1906165	F11
CNMG1906165	F11
CNMG1906165	B17
CNMG1906165	B17
CNMG1906165	B17
CNMG1906165	B17
CNMG1906165	B17
CNMG190616SL	B18
CNMG190616SL	B18
CNMG1906245	B17
CNMG1906245	B17
CNMM12040865	B19
CNMM12040865	B19
CNMM12040865	B19
CNMM12040865	B19
CNMM12040865	B19
CNMM1204088	B19
CNMM1204088	G54
CNMM12041265	B19
CNMM12041265	B19
CNMM12041265	B19
CNMM12041265	B19
CNMM12041265	B19
CNMM1204128	B19
CNMM1204128	B19
CNMM1204128	G54
CNMM12041665	B19
CNMM12041665	B19
CNMM16060865	B19
CNMM16060865	B19
CNMM16060865	B19
CNMM16061265	B19
CNMM16061265	B19
CNMM16061265	B19
CNMM16061265	B19
CNMM16061265	B19
CNMM1606128	B19
CNMM1606128	B19
CNMM1606128	G54
CNMM16061665	B19
CNMM16061665	B19
CNMM1606168	B19
CNMM1606168	G54
CNMM19061265	B19
CNMM19061265	B19
CNMM19061265	B19
CNMM19061265	B19
CNMM19061265	B19
CNMM1906128	B19
CNMM1906128	G54
CNMM19061665	B19
CNMM19061665	B19
CNMM19061665	B19
CNMM19061665	B19
CNMM1906168	F12
CNMM1906168	B19
CNMM1906168	B19
CNMM1906168	B19
CNMM1906168	G54
CNMM190616SR	B19
CNMM190616SR	B19
CNMM190616SR	B19
CNMM190616SR	G54
CNMM19062465	B19
CNMM19062465	B19
CNMM1906248	B19
CNMM1906248	G54
CNMM190624SR	B19
CNMM190624SR	B19
CNMM190624SR	B19
CNMM190624SR	G54
CNMM250916SR	B19
CNMM250916SR	G54
CNMM2509248	B19
CNMM2509248	G54
CNMM250924SR	B19
CNMM250924SR	B19
CNMM250924SR	B19
CNMM250924SR	G54
CNMM250924SRL	G54
CNMN090308S02020	B73
CNMN090312S02020	B73
CNMN120408S02020	B73
CNMN120412S02020	B73
CNMP120404SM	B19
CNMP120404SM	B19
CNMP120408SM	B19
CNMP120408SM	B19
CNMP120408SM	B19
CNMP120412SM	B19
CNMP120412SM	B19
CNMP120412SM	B19
CNMP160608SM	B19
CNMP160612SM	B19
CNMP160612SM	B19
CNMP190612SM	B19
CNMP190616SM	B19
CNMS120404FST	B73
CNMS120408FST	B73
CNMX120712T02020	B51
CNMX120716T02020	B51
COR4097500250015R	C109

Catalogue No.	Page(s)
COR4097500250015R	C109
COR4142563250040R	C109
COR4142563250040R	C109
COR4145625250040R	C109
COR4145625250040R	C109
COR6175750250015R	C109
COR6175750250015R	C109
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CRSNR3225P12MN4	A25
CRSNR3225P12MN7	A25
CS412	A30
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CSBM4510255R	C11
CSBM4512125L	C11
CSBM4512125R	C11
CSBM4512255L	C11
CSBM4657L	C10
CSBM4657R	C10
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CSBM5210125R	C11
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CSBM8765L	C10
CSBM8765R	C10
CSBPL2020K12	A25
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CSBPR2525M12	A25
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CSDPN2020K12	A26
CSDPN2525M12	A26
CSKPR10CA09	A80-81
CSKPR12CA12	A80-81
CSM22156	C27
CSM22187	C27
CSM22250	C27
CSM22312	C27
CSM22375	C27
CSM22500	C27
CSMM5640R	C26
CSMM6760R	C26
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CSPM712255L	C24
CSPM712255R	C24
CSPM81232225L	C24
CSPM81232225R	C24
CSPM812325L	C24
CSPM812325R	C24
CSRPR10CA09	A80-81
CSRPR12CA12	A80-81
CSSPL10CA09	A82-83
CSSPL12CA12	A82-83
CSSPL20CA12	A82-83
CSSPL2525M12	A26
CSSPR10CA09	A82-83
CSSPR12CA12	A82-83
CSSPR2020K12	A26
CSSPR2525M12	A26
CSWM 035 040	A85, A87, A89
CSWM 040 050	A85, A87, A89, A91, A97-99
CSWM 060 050	A67, A69, A71, A73, A75, A77, A79, A81, A83, A85, A87, A91-93, A95, A97-99
CSWM 080 050	A67, A69, A71, A73, A75, A77, A79, A83, A85, A91, A95, A97
CSWM 100 080	A69, A71, A75, A77
CT11	C21-22, C69
CT15	C21-22, C24-25, C69

Catalogue No.	Page(s)
CTCPN2510M11	A27
CTCPN2514M16	A27
CTCPN2518M22	A27
CTCPN2520M22	A27
CTCPN4018R22	A27
CTCPN4020R22	A27
CTDPL1212F11	A27
CTDPR1212F11	A27
CTDPR2525M16	A27
CTFPL12CA16	A82-83
CTFPL2020K16	A28
CTFPL2525M16	A28
CTFPR10CA11	A82-83
CTFPR12CA16	A82-83
CTFPR16CA16	A82-83
CTFPR2020K16	A28
CTFPR20CA22	A82-83
CTFPR2525M16	A28
CTGPL1212F11	A28
CTGPL2020K16	A28
CTGPL2525M16	A28
CTGPR1212F11	A28
CTGPR1616H11	A28
CTGPR2020K11	A28
CTGPR2020K16	A28
CTGPR2525M16	A28
CTGPR2525M22	A28
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CTHM209570	C73
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DCGT070202MU	B20
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DCGT070204AL1	B47
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DCGT11T308AL3	B47
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DCGW070202S01015C	B75
DCGW070202S01015C	B75
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DCGW070204S01015C	B75
DCGW070204S01015C	B75
DCGW070204S01015C	B75
DCGW070204S01015M	B76
DCGW11T304FST	B75
DCGW11T304S01015M	B76
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DCMT150408MU	B21
DCMT150408MU	B21
DCMT150408MU	B21
DCMT150412	B20
DCMT150412	B20
DCMT150412	B20
DCMT150412	B20
DCMT150412MU	B21
DCMT150412MU	B21
DCMT150412MU	B21
DCMT150412MU	B21

Index

Catalogue No.	Page(s)
DCMT150412MU	B21
DCMT150412MU	B21
DCMT150416	B20
DCMT150416	B20
DCMT150416	B20
DCMT150416	B20
DCMT150416	B20
DCMT150416	B20
DCMW070202S01020MT	B76
DCMW070202S01020ST	B76
DCMW070204	B21
DCMW070204	B21
DCMW070204	B21
DCMW070204FST	B76
DCMW070204S01020MT	B76
DCMW11T304	B21
DCMW11T304	F12
DCMW11T304	B21
DCMW11T304	B21
DCMW11T304FST	B76
DCMW11T304FST	B76
DCMW11T304S01020ST	B76
DCMW11T304S01020ST	B76
DCMW11T308FST	B76
DCMW11T308S01020MT	B76
DCMW150408	B21
DCMW150408	B21
DCMW150408	B21
DCMX11T302L18	B21
DCMX11T302R18	B21
DCMX11T302R18	B21
DCMX11T304L18	B21
DCMX11T304L18	B21
DCMX11T304R18	B21
DCMX11T304R18	B21
DCMX11T308R18	B21
DCMX150404R25	B21
DCMX150408R29	B21
DNGA150404EFWMT	B77
DNGA150404FST	B77
DNGA150404S01020MT	B77
DNGA150404S01025MT	B77
DNGA150404S01025MT	B77
DNGA150404S01025MT	B77
DNGA150404T02020	B52
DNGA150408EFWMT	B77
DNGA150408EFWMT	B77
DNGA150408EMT	B76
DNGA150408EMT	B76
DNGA150408EMT	B76
DNGA150408FST	B77
DNGA150408S01020MT	B77
DNGA150408S01025MT	B77
DNGA150408S01025MT	B77
DNGA150408S01025MT	B77
DNGA150408S01025MT	B77
DNGA150408T02020	B52
DNGA150408T02020	B52
DNGA150412EFWMT	B77
DNGA150412EMT	B76
DNGA150412S01025MT	B77
DNGA150412S01025MT	B77
DNGA150412S01025MT	B77
DNGA150412T02020	B52
DNGA150412T02020	B52
DNGA150604T02020	B52
DNGA150608S01020MT	B77
DNGA150608T02020	B52
DNGA150612T02020	B52
DNGA150612T02020	B52
DNGN150704T02020	B52
DNGN150708T01020	B52
DNGN150708T02020	B52
DNGN150712T01020	B52
DNGN150712T02020	B52
DNGN150716T01020	B52
DNGN150716T02020	B52
DNGX120712T02020	B52
DNGX120716T02020	B52
DNGX150708T02020	B52
DNGX150712T02020	B52
DNGX150716T02020	B52
DNMA110408S02020	B77
DNMA110412S02020	B77
DNMA150404S01020ST	B77
DNMA150408	B22
DNMA150408	B22
DNMA150412	B22
DNMA150412	B22
DNMA150412T02020	B52
DNMA150604S01020ST	B77
DNMA150608	B22
DNMA150608	B22
DNMA150612	B22
DNMA150612	B22
DNMA150612S01020MTV	B77
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040422	B22
DNMG11040448	B23
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040822	B22
DNMG11040848	B23
DNMG11040849	B23
DNMG11040849	B23
DNMG11040849	B23
DNMG11040849	B23
DNMG11040849	B23
DNMG1104085	F13
DNMG1104085	F13
DNMG1104085	B23
DNMG110408FM	F13
DNMG110408FM	B24
DNMG11041222	B22
DNMG11041248	B23
DNMG11041249	B23
DNMG11T3085	F13
DNMG15040422	B22
DNMG15040422	B22
DNMG150404CT	B24
DNMG150404FW	B24
DNMG150404FW	B24
DNMG150408	B22
DNMG15040822	B22
DNMG15040822	B22
DNMG15040848	B23
DNMG15040849	B23
DNMG15040849	B23
DNMG1504085	B23
DNMG1504085	B23
DNMG150408AP	B23
DNMG150408CT	B24
DNMG150408CT	B24
DNMG150408FW	B24
DNMG150408FW	B24
DNMG150408MW	B24
DNMG150408MW	B24
DNMG150412	B22
DNMG15041222	B22
DNMG15041222	B22
DNMG1504125	B23
DNMG150412AP	B23
DNMG150412MW	B24
DNMG150412MW	B24
DNMG150604	F13
DNMG150604	F13
DNMG150604	F13
DNMG150604	B22
DNMG150604	B22
DNMG150604	B22
DNMG150604	B22
DNMG150604	B22
DNMG150604	B22
DNMG150604	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	F13
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG15060422	B22
DNMG1506044	B22
DNMG1506044	B22
DNMG1506044	B22
DNMG1506044	B22
DNMG15060448	B23
DNMG150604CT	B24
DNMG150604CT	B24
DNMG150604CT	B24
DNMG150604FW	B24
DNMG150604FW	B24
DNMG150608	F13
DNMG150608	F13
DNMG150608	F13
DNMG150608	F13
DNMG150608	B22
DNMG150608	B22
DNMG150608	B22
DNMG150608	B22
DNMG150608	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG15060822	B22
DNMG1506084	B22
DNMG1506084	B22
DNMG1506084	B22
DNMG1506084	B22
DNMG15060848	B23
DNMG15060848	B23
DNMG15060849	B23
DNMG15060849	F13
DNMG15060849	B23
DNMG15060849	B23
DNMG15060849	B23
DNMG15060849	B23
DNMG15060849	B23
DNMG1506085	B23
DNMG1506085	F13
DNMG1506085	F13
DNMG1506085	B23
DNMG1506085	B23
DNMG1506085	B23
DNMG1506085	B23
DNMG1506085	B23
DNMG150608AP	B23
DNMG150608AP	B23
DNMG150608AP	B23
DNMG150608AP	B23
DNMG150608AP	B23
DNMG150608AP	B23
DNMG150608CT	B24
DNMG150608CT	B24
DNMG150608CT	B24
DNMG150608CT	B24
DNMG150608FW	B24
DNMG150608FW	B24
DNMG150608MW	B24
DNMG150608MW	B24
DNMG150608SL	B24
DNMG150608SL	B24
DNMG150608SL	B24
DNMG150608SL	B24
DNMG150612	F13
DNMG150612	F13
DNMG150612	B22
DNMG150612	B22
DNMG150612	B22
DNMG15061222	B22
DNMG15061222	B22
DNMG15061222	B22
DNMG15061222	B22
DNMG15061222	B22
DNMG15061222	B22
DNMG15061248	B23
DNMG15061249	B23
DNMG15061249	B23
DNMG15061249	B23
DNMG15061249	B23
DNMG15061249	B23
DNMG1506125	B23
DNMG1506125	F13
DNMG1506125	F13
DNMG1506125	B23
DNMG1506125	B23
DNMG1506125	B23
DNMG1506125	B23
DNMG1506125	B23
DNMG1506125	B23
DNMG1506125	B23
DNMG150612AP	B23
DNMG150612AP	B23
DNMG150612AP	B23
DNMG150612AP	B23
DNMG150612CT	B24
DNMG150612CT	B24
DNMG150612CT	B24
DNMG150612CT	B24
DNMG150612MW	B24
DNMG150612MW	B24
DNMG150612SL	B24
DNMG150612SL	B24
DNMG150612SL	B24
DNMG15061648	B23
DNMG15061649	B23
DNMG15061649	B23
DNMG1506165	B23
DNMG1506165	F13
DNMG1506165	B23
DNMG1506165	B23
DNMG1506165	B23
DNMG1506165	B23
DNMG1506165	B23
DNMM15060865	B25
DNMM15060865	B25
DNMM15060865	B25
DNMM15060865	B25
DNMM15060865	B25
DNMM15061265	B25
DNMM15061265	B25
DNMM15061265	B25
DNMM15061265	B25
DNMM15061265	B25
DNMM15061665	B25
DNMM15061665	B25
DNMM15061665	B25
DNMP150404SM	B25
DNMP150404SM	B25
DNMP150408SM	B25
DNMP150408SM	B25
DNMP150412SM	B25
DNMP150604SM	B25
DNMP150604SM	B25
DNMP150608SM	B25
DNMP150608SM	B25
DNMP150608SM	B25
DNMP150612SM	B25
DNMP150612SM	B25
DNMP150612SM	B25
DNMS150404FST	B78
DNMS150408FST	B78
DNMX150716T02020	B52
DPGW070202EC	B78
DPGW070202EM	B78
DPGW070202FST	B78
DPGW070204FST	B78
DPGW070204FWST	B78
DPGW070204S01015C	B78
DPGW070204S01015M	B78
DPGW070208S01015C	B78
DPGW070208S01015M	B78
DPGW11T304EMT	B78
DPGW11T304FST	B78
DPGW11T304FWST	B78
DPGW11T304S01015M	B78
DPGW11T304S01015MT	B79
DPGW11T304S01015MT	B79
DPGW11T308S01015M	B78
DPGW11T308S01015MT	B79
DPGW11T308S01015MT	B79
E06JSCFPL04	A51
E06JSCFPR04	A51
E06JSCLPL04	A51
E06JSCLPR04	A51
E08KSCFCL06	A51
E08KSCFCR06	A51
E08KSCLCL06	A50
E08KSCLCL065	A50
E08KSCLCR06	A50
E08KSCLCR065	A50

Catalogue No.	Page(s)
E10MSCLCL06	A50
E10MSTFCL11	A54
E10MSTFCR11	A54
E12QSCLCL06	A50
E12QSCLCR06	A50
E12QSDQCL07	A52
E12QSDQCR07	A52
E12QSDUCL07	A53
E12QSDUCR07	A53
E12QSTFCL11	A54
E12QSTFCR11	A54
E16RSCLCL09	A50
E16RSCLCL09T3	A50
E16RSCLCR09	A50
E16RSCLCR09T3	A50
E16RSDQCL07	A52
E16RSDQCR07	A52
E16RSDUCL07	A53
E16RSDUCR07	A53
E16RSTFCL16	A54
E16RSTFCR16	A54
E20SSCLCL09	A50
E20SSCLCL09T3	A50
E20SSCLCR09	A50
E20SSCLCR09T3	A50
E20SSDQCL11	A52
E20SSDQCR11	A52
E20SSDUCL11	A53
E20SSDUCR11	A53
E20SSTFCL16	A54
E20SSTFCR16	A54
E25TSCLCL09	A50
E25TSCLCL09T3	A50
E25TSCLCR09	A50
E25TSCLCR09T3	A50
E25TSDUCL11	A53
E25TSDUCR11	A53
E25TSTFCL16	A54
E25TSTFCR16	A54
E32USCLCR12	A50
ENGN130704T02020	B53
ENGN130708T02020	B53
ENGN130712T02020	B53
ENGN130716T02020	B53
ENGX130716T02020	B53
FBIT	C69
FC11	C14, C16, C18, C20, C69
FC14	C16, C20, C69
FCBM51000L	C18
FCBM51000R	C18
FCBM51005L	C18
FCBM51005R	C18
FCBM5312250R	C20
FCBM5312255L	C20
FCBM5312255R	C20
FCBM5312510L	C20
FCBM5312515L	C20
FCBM5316250R	C20
FCBM5316255L	C20
FCBM5316255R	C20
FCBM5316510R	C20
FCBM5316515R	C20
FCBM61520L	C18
FCBM61520R	C18
FCBM61525L	C18
FCBM61525R	C18
FCBM6612320R	C20
FCBM6612325L	C20
FCBM6612325R	C20
FCBM6612630R	C20
FCBM6612635R	C20
FCBM6616320R	C20
FCBM6616325L	C20
FCBM6616325R	C20
FCBM6616630R	C20
FCBM6616635R	C20
FCBM81520L	C18
FCBM81520R	C18
FCBM81525L	C18
FCBM81525R	C18
FCBM8212380R	C20
FCBM8212385L	C20
FCBM8212385R	C20
FCBM8212790R	C20
FCBM8212795R	C20
FCBM8216380R	C20
FCBM8216385L	C20
FCBM8216385R	C20
FCBM8216790R	C20
FCBM8216795R	C20
FKEY	C69
FSBM5212125L	C16
FSBM5212125R	C16
FSBM5212255R	C16
FSBM5216125R	C16
FSBM61000L	C14
FSBM61000R	C14
FSBM61005L	C14
FSBM61005R	C14
FSBM6612190R	C16
FSBM6612195L	C16
FSBM6612195R	C16
FSBM6612320R	C16
FSBM6612325R	C16
FSBM6616190R	C16
FSBM6616195R	C16
FSBM6616320L	C16
FSBM6616325R	C16
FSBM81000L	C14
FSBM81000R	C14
FSBM81005L	C14
FSBM81005R	C14
FSBM8212250R	C16
FSBM8212380L	C16
FSBM8212380R	C16
FSBM8212385R	C16
FSBM8216380R	C16
FSBM8216385R	C16
GCBMW51523L	C22
GCBMW51523R	C22
GCBMW61523L	C22
GCBMW61523R	C22
GCBMW81523L	C22
GCBMW81523R	C22
GCHT060202	C40
GCHT060202	C40
GCHT060204	C40
GCHT060204	C40
GCHW060202	C40
GCHW060202	C40
GCHW060202	C40
GCHW060204	C40
GCHW060204	C40
GCHW060204	C40
GCPM10254225L	C25
GCPM10254225R	C25
GCPM102545L	C25
GCPM102545R	C25
GCPM12254225L	C25
GCPM12254225R	C25
GCPM122545L	C25
GCPM122545R	C25
GCPM16254225L	C25
GCPM16254225R	C25
GCPM162545L	C25
GCPM162545R	C25
GPHT050102	C40
GPHT050102	C40
GPHT050104	C40
GPHT050104	C40
GPHW050102	C40
GPHW050102	C40
GPHW050102	C40
GPHW050104	C40
GPHW050104	C40
GPHW050104	C40
GSBMW51003L	C21
GSBMW51003R	C21
GSBMW61003L	C21
GSBMW61003R	C21
GSBMW81003L	C21
GSBMW81003R	C21
GSPM101638225L	C24
GSPM101638225R	C24
GSPM1016385L	C24
GSPM1016385R	C24
GSPM131651225L	C24
GSPM131651225R	C24
GSPM1316515L	C24
GSPM1316515R	C24
GT21	C24-25, C69
GTBIT	C69
GTKEY	C69
HNUH160615	G10
HNUH220725	G10
HNUH321425	G10
HNUN160615	G10
HNUN221015	G10
HNUN221025	G10
HNUQ160612	G10
HNUR220725	G11
HNUR221025	G11
HNUU120625	G11
HNUU160615	G11
HNUX120625	G11
HNUX160615	G11
HNUX160625	G11
HNUX160725	G11
HNUX221015	G11
HNUX221025	G11
HNUX221025–10	G11
HNUX221025–1A	G11
HNUX280930	G11
HNUX280930–10	G11
ICSN432	A8-9, A42, A67, A69
ICSN533	A8-9, A42
ICSN633	A42, A69
ICSN643	A8-9
IDSN322	A42
IDSN332	A9
IDSN432	A9, A42, A69, A71
IRSN43	A14
ISSN432	A10, A71, A73, A75
ISSN433	A13
ISSN533	A10, A13
ISSN633	A10, A13, A71, A75
ITSN322	A11, A43, A77
ITSN433	A11, A43, A77
ITSN534	A77
IVSN322	A11-12, A44
IVSN432	A11
IWSN322	A13
IWSN433	A43
KLM33	A67, A71, A73, A75
KLM33L	A42-43, A77
KLM34L	A9, A11-13, A43-44, A77
KLM43	A42-43, A67, A69, A71, A73, A75
KLM46	A8-11, A13-14, A42-43, A67, A69, A71, A77
KLM46L	A9
KLM46S	A67, A69, A71, A73, A75
KLM54	A71, A73
KLM58	A8-10, A13, A42, A77
KLM68	A8-10, A13, A42, A69, A71, A75
KNUX160405L11	F13
KNUX160405L11	F13
KNUX160405L11	F13
KNUX160405R11	F13
KNUX160405R11	F13
KNUX160405R11	F13
KNUX160410L11	F13
KNUX160410L12	F13
KNUX160410R11	F13
KNUX160410R12	F13
KNUX160415R12	F13
KUAM20	A85, A87, A89, A91, A97-99
KUAM22	A67, A69, A71, A73, A75, A77, A81, A83
KUAM23	A79, A85, A91-93, A95, A97-99
KUAM24	A83
KUAM25	A67, A69, A71, A73, A75, A77, A83, A85, A91, A95, A97
KUAM26	A77, A83
KUAM27	A69, A71, A75
KUAM28	A67, A71, A73, A75, A79, A81, A83, A85, A87, A91-93, A95, A97-99
KUAM30	A67, A71, A73, A75, A81, A83, A85, A87, A91-93, A95, A97-99
KUAM31	A67, A69, A71, A73, A75, A77, A79, A81, A83, A85, A91-93, A95, A97-99
KUAM32	A67, A69, A71, A73, A75, A77, A79, A83, A85, A91, A95, A97
KUAM33	A75
KUAM34	A85, A87, A89, A91, A97-99
KUAM35	A85, A87, A89
LNMR351432	G54
LNMR501432	G54
LNMR501432HD	G54
LNMX181220–HP	G12
LNMX181220–SP	G12
LNMX181220HP	B26
LNMX181220HP	B26
LNMX181220SP	B26
LNMX181220SP	B26
LNUN301020	G12
LNUN381020	G12
LNUN401020	G12
LNUN501020	G12
LNUX19194013	B26
LNUX19194013	B26
LNUX19194016	B26
LNUX19194016	B26
LNUX191940RRP	B26
LNUX191940T	B26
LNUX191940T	B26
LNUX30194013	B26
LNUX30194016	B26
LNUX301940T	B26
LNUX301940T	B26
LNUX400924EN95	B26
LNUX400924EN95	G55
LTM16	C69
MB010062L	C67
MB010062L	C67
MB010062R	C67
MB010062R	C67
MB030187L	C67
MB030187L	C67
MB030187R	C67
MB030187R	C67
MB062187L	C67
MB062187L	C67
MB062187R	C67
MB062187R	C67
MB062312L	C67
MB062312L	C67
MB062312R	C67
MB062312R	C67
MB094281L	C67
MB094281L	C67
MB094281R	C67
MB094281R	C67
MB094500L	C67
MB094500L	C67
MB094500R	C67
MB094500R	C67
MB125375L	C67
MB125375L	C67
MB125375R	C67
MB125375R	C67
MB125625L	C67
MB125625L	C67
MB125625R	C67
MB125625R	C67
MB156500L	C67
MB156500L	C67
MB156500R	C67
MB156500R	C67
MB156875L	C67
MB156875L	C67
MB156875R	C67
MB156875R	C67
MBIT	C69
MCFNL12CA12	A66-67
MCFNL16CA12	A66-67
MCFNR10CA09	A66-67
MCFNR12CA12	A66-67
MCFNR16CA12	A66-67
MCFNR20CA12	A66-67
MCKNL12CA12	A66-67
MCKNL2525M12	A8
MCKNL3225P16	A8
MCKNR12CA12	A66-67
MCKNR16CA12	A66-67
MCKNR2525M12	A8
MCKNR3225P16	A8
MCLNL12CA12	A68-69
MCLNL16CA12	A68-69
MCLNL2020K12	A8
MCLNL20CA12	A68-69
MCLNL2525M12	A8
MCLNL2525M16	A8
MCLNL2525M19	A8
MCLNL25CA19	A68-69

Catalogue No.	Page(s)
MCLNL3225P12	A8
MCLNL3225P16	A8
MCLNL3225P19	A8
MCLNL3232P19	A8
MCLNL4040R19	A8
MCLNR12CA12	A68-69
MCLNR16CA12	A68-69
MCLNR2020K12	A8
MCLNR20CA12	A68-69
MCLNR2525M12	A8
MCLNR2525M16	A8
MCLNR2525M19	A8
MCLNR25CA19	A68-69
MCLNR3225P12	A8
MCLNR3225P16	A8
MCLNR3225P19	A8
MCLNR3232P19	A8
MCLNR4040R19	A8
MCMNN2020K12	A9
MCMNN2525M12	A9
MCMNN3225P16	A9
MCMNN4040R19	A9
MDJNL16CA15	A68-69
MDJNL2020K11	A9
MDJNL2020K15	A9
MDJNL2525M11	A9
MDJNL2525M15	A9
MDJNL3225P15	A9
MDJNR16CA15	A68-69
MDJNR2020K11	A9
MDJNR2020K15	A9
MDJNR20CA15	A68-69
MDJNR2525M11	A9
MDJNR2525M15	A9
MDJNR3225P15	A9
MDQNL16CA15	A70-71
MDQNL20CA15	A70-71
MDQNR16CA15	A70-71
MDQNR20CA15	A70-71
MG095030L	C68
MG095030L	C68
MG095030R	C68
MG095030R	C68
MG125040L	C68
MG125040L	C68
MG125040R	C68
MG125040R	C68
MG156050L	C68
MG156050L	C68
MG156050R	C68
MG156050R	C68
MKEY	C69
MP062187L	C68
MP062187L	C68
MP062187R	C68
MP062187R	C68
MP094281L	C68
MP094281L	C68
MP094281R	C68
MP094281R	C68
MP125375L	C68
MP125375L	C68
MP125375R	C68
MP125375R	C68
MP156500L	C68
MP156500L	C68
MP156500R	C68
MP156500R	C68
MRGNL2525M12	A14
MRGNR2525M12	A14
MS1034	D41, E19
MS1071	D87
MS1073	D87
MS109	A83
MS110	A47
MS111	A25-28, A83
MS1152	A97-99
MS1153	A31-34, A50, A52-56, A85, A87, A89, A91, A97-99
MS1154	A33, A91
MS1155	A31-32, A50, A52-53, A56, A85, A87, A91-93, A95, A97-99
MS1156	A31-35
MS1157	A50, A85, A91, A93, A95
MS1158	A31-34, A50, A53
MS1160	A33
MS1200	D38-41, E14-15, E19
MS125	A27-28, A83
MS1321	A30
MS1495	D86
MS1933	A85, A87, A89
MS1939	A50
MS2111	D38-41, E14-16, E19
MS2173	A85, A87, A89
MS2175	A85, A87, A89, A91, A97-99
MS318	D85
MS326	D14
MS352	D38, D40, E14-15
MS364	A68-71, A74-77
MS412	D85
MS518	D88
MS959	A26
MS960	A27-28
MSBNL2020K12	A13
MSBNL2525M12	A13
MSBNL3225P12	A13
MSBNL3232P15	A13
MSBNL3232P19	A13
MSBNL4040R19	A13
MSBNR2020K12	A13
MSBNR2525M12	A13
MSBNR3225P12	A13
MSBNR3232P15	A13
MSBNR3232P19	A13
MSBNR4040R19	A13
MSDNN2020K12	A10
MSDNN2525M12	A10
MSDNN2525M15	A10
MSDNN3225P12	A10
MSDNN3232P19	A10
MSKNL10CA09	A70-71
MSKNL12CA12	A70-71
MSKNL16CA12	A70-71
MSKNL20CA15	A70-71
MSKNR10CA09	A70-71
MSKNR12CA12	A70-71
MSKNR16CA12	A70-71
MSKNR20CA15	A70-71
MSKNR25CA19	A70-71
MSM46	C63, C69
MSRNL12CA12	A72-73
MSRNL16CA12	A72-73
MSRNL20CA15	A72-73
MSRNR10CA09	A72-73
MSRNR12CA12	A72-73
MSRNR16CA12	A72-73
MSRNR20CA15	A72-73
MSSNL10CA09	A72-73
MSSNL12CA12	A72-73
MSSNL16CA12	A72-73
MSSNL2020K12	A10
MSSNL20CA15	A72-73
MSSNL2525M12	A10
MSSNL3232P19	A10
MSSNR10CA09	A72-73
MSSNR12CA12	A72-73
MSSNR16CA12	A72-73
MSSNR2020K12	A10
MSSNR20CA15	A72-73
MSSNR2525M12	A10
MSSNR3232P19	A10
MSTNR10CA09	A74-75
MSTNR12CA12	A74-75
MSTNR16CA12	A74-75
MSYNL10CA09	A74-75
MSYNR10CA09	A74-75
MSYNR12CA12	A74-75
MSYNR16CA12	A74-75
MSYNR25CA19	A74-75
MT09560F2L	C68
MT09560F2L	C68
MT09560F2R	C68
MT09560F2R	C68
MT12560F2L	C68
MT12560F2L	C68
MT12560F2R	C68
MT12560F2R	C68
MT15660F2L	C68
MT15660F2L	C68
MT15660F2R	C68
MT15660F2R	C68
MTENNS2020K16	A11
MTENNS2525M16	A11
MTENNS2525M22	A11
MTENNS3225P22	A11
MTFNL12CA16	A76-77
MTFNL16CA16	A76-77
MTFNL20CA22	A76-77
MTFNR12CA16	A76-77
MTFNR16CA16	A76-77
MTFNR20CA22	A76-77
MTFNR25CA27	A76-77
MTGNL12CA16	A76-77
MTGNL16CA16	A76-77
MTGNL20CA22	A76-77
MTGNR12CA16	A76-77
MTGNR16CA16	A76-77
MTGNR20CA22	A76-77
MTMM1040	C63
MTMM12100	C63
MTMM1240	C63
MTMM16100	C63
MTMM22127	C63
MTMM840	C63
MVJNL2020K16	A11
MVJNL2525M16	A11
MVJNL3225P16	A11
MVJNL3225P22	A11
MVJNR2020K16	A11
MVJNR2525M16	A11
MVJNR3225P16	A11
MVJNR3225P22	A11
MVONL2525M16	A12
MVONR2525M16	A12
MVVNN2020K16	A12
MVVNN2525M16	A12
MVVNN3225P16	A12
MWLNL2020K06	A13
MWLNL2525M06	A13
MWLNR2020K06	A13
MWLNR2525M06	A13
NA3L4	E29
NA3L6	E29
NA3L8	E29
NA3R4	E29
NA3R6	E29
NA3R8	E29
NA4L4	E29
NA4R4	E29
NA6L2	E29
NA6L3	E29
NA6R2	E29
NA6R3	E29
NAS3L12	E30
NAS3L6	E30
NAS3L8	E30
NAS3R8	E30
NASL1010M2Q	D39, E15
NASL1212M2Q	D39, E15
NASL1616K3Q	D39, E15
NASR1010M2Q	D39, E15
NASR1212M2Q	D39, E15
NASR1616K3Q	D39, E15
NB2L	D57
NB2R	D57
NB3L	D57
NB3R	D57
NDC310RDL75	E28
NDC3115VR75	E27
NDC38RDL75	E28
NDC38RDR75	E28
NDC8115VR75M	E27
NDC88VR75M	E27
NEL1616H2	D40, E15
NEL2020K2	D40, E15
NEL2525M2	D40, E15
NEL2525M3	D40, E15
NEL2525M4	D40, E15
NEL3225P3	D40, E15
NEL3225P4	D40, E15
NEL3232P4	D40, E15
NEL3232P5	D40, E15
NER1616H2	D40, E15
NER2020K2	D40, E15
NER2525M2	D40, E15
NER2525M3	D40, E15
NER2525M4	D40, E15
NER3225P3	D40, E15
NER3225P4	D40, E15
NER3232P4	D40, E15
NER3232P5	D40, E15
NF3125LK	D53
NF3125RK	D53
NF3156LK	D53
NF3M200LK	D53
NF3M200RK	D53
NF3M300LK	D53
NF3M300RK	D53
NFD3125LK	D53
NFD3125RK	D53
NFD3M300LK	D53
NFD3M300RK	D53
NFD4189LK	D53
NFD4189RK	D53
NFD4250RK	D53
NG1047L	D47
NG1062L	D47
NG1094L	D47
NG2031L	D47
NG2031LK	D49
NG2031LK	D49
NG2031R	D47
NG2031R	D47
NG2031R	D47
NG2031RK	D48
NG2031RK	D48
NG2041R	D47
NG2047LK	D49
NG2047RK	D48
NG2047RK	D48
NG2058L	D47
NG2058R	D47
NG2062L	D47
NG2062LK	D49
NG2062LK	D49
NG2062R	D47
NG2062R	D47
NG2062R	D47
NG2062RK	D48
NG2062RK	D48
NG2094LK	D49
NG2094LK	D49
NG2094RK	D48
NG2094RK	D48
NG2125LK	D49
NG2125LK	D49
NG2125RK	D48
NG2125RK	D48
NG2M050LK	D49
NG2M050LK	D49
NG2M050RK	D48
NG2M050RK	D48
NG2M080LK	D49
NG2M080LK	D49
NG2M080RK	D48
NG2M080RK	D48
NG2M100LK	D49
NG2M100LK	D49
NG2M100RK	D48
NG2M100RK	D48
NG2M120LK	D49
NG2M120LK	D49
NG2M120RK	D48
NG2M120RK	D48
NG2M140LK	D49
NG2M140LK	D49
NG2M140RK	D48
NG2M140RK	D48
NG2M150LK	D49
NG2M150RK	D48
NG2M170LK	D49
NG2M170LK	D49
NG2M170RK	D48
NG2M170RK	D48
NG2M175LK	D49
NG2M175RK	D48
NG2M195LK	D49
NG2M195LK	D49
NG2M195RK	D48
NG2M195RK	D48
NG2M200LK	D49
NG2M200LK	D49
NG2M200RK	D48
NG2M200RK	D48
NG2M220LK	D49
NG2M220RK	D48
NG2M225LK	D49

Catalogue No.	Page(s)
NG2M225LK	D49
NG2M225RK	D48
NG2M225RK	D48
NG2M250LK	D49
NG2M250RK	D48
NG2M275LK	D49
NG2M275LK	D49
NG2M275RK	D48
NG2M275RK	D48
NG2M300LK	D49
NG2M300LK	D49
NG2M300RK	D48
NG2M300RK	D48
NG2M325LK	D49
NG2M325RK	D48
NG3047L	D47
NG3047L	D47
NG3047L	D47
NG3047LK	D49
NG3047LK	D49
NG3047R	D47
NG3047R	D47
NG3047R	D47
NG3047RK	D48
NG3047RK	D48
NG3062L	D47
NG3062L	D47
NG3062L	D47
NG3062LK	D50
NG3062LK	D50
NG3062LK	D50
NG3062R	D47
NG3062R	D47
NG3062R	D47
NG3062RK	D48
NG3062RK	D48
NG3062RK	D48
NG3072LK	D50
NG3072LK	D50
NG3072RK	D48
NG3072RK	D48
NG3078LK	D50
NG3078LK	D50
NG3078RK	D48
NG3078RK	D48
NG3094L	D47
NG3094L	D47
NG3094L	D47
NG3094LK	D50
NG3094LK	D50
NG3094R	D47
NG3094R	D47
NG3094R	D47
NG3094RK	D48
NG3094RK	D48
NG3125L	D47
NG3125L	D47
NG3125L	D47
NG3125LK	D50
NG3125LK	D50
NG3125R	D47
NG3125R	D47
NG3125R	D47
NG3125RK	D48
NG3125RK	D48
NG3156LK	D50
NG3156LK	D50
NG3156RK	D49
NG3156RK	D49
NG3189LK	D50
NG3189LK	D50
NG3189LK	D50
NG3189RK	D49
NG3189RK	D49
NG3189RK	D49
NG3M100LK	D49
NG3M100RK	D48
NG3M120LK	D50
NG3M120LK	D50
NG3M120RK	D48
NG3M120RK	D48
NG3M150LK	D50
NG3M150LK	D50
NG3M150RK	D48
NG3M150RK	D48
NG3M175LK	D50
NG3M175RK	D48
NG3M200LK	D50
NG3M200LK	D50
NG3M200RK	D48
NG3M200RK	D48
NG3M220LK	D50
NG3M220RK	D48
NG3M225LK	D50
NG3M225LK	D50
NG3M225LK	D50
NG3M225RK	D48
NG3M225RK	D48
NG3M225RK	D48
NG3M250LK	D50
NG3M250LK	D50
NG3M250RK	D48
NG3M250RK	D48
NG3M275LK	D50
NG3M275LK	D50
NG3M275RK	D48
NG3M275RK	D48
NG3M300LK	D50
NG3M300LK	D50
NG3M300LK	D50
NG3M300RK	D48
NG3M300RK	D48
NG3M300RK	D48
NG3M320LK	D50
NG3M320RK	D48
NG3M325LK	D50
NG3M325RK	D48
NG3M350LK	D50
NG3M350RK	D49
NG3M400LK	D50
NG3M400LK	D50
NG3M400LK	D50
NG3M400RK	D49
NG3M400RK	D49
NG3M400RK	D49
NG3M425LK	D50
NG3M425LK	D50
NG3M425RK	D49
NG3M425RK	D49
NG3M450LK	D50
NG3M450RK	D49
NG4125LK	D50
NG4125LK	D50
NG4125RK	D49
NG4125RK	D49
NG4189LK	D50
NG4189LK	D50
NG4189RK	D49
NG4189RK	D49
NG4250L	D47
NG4250L	D47
NG4250LK	D50
NG4250LK	D50
NG4250R	D47
NG4250R	D47
NG4250RK	D49
NG4250RK	D49
NG4M300LK	D50
NG4M300RK	D49
NG4M350LK	D50
NG4M350LK	D50
NG4M350RK	D49
NG4M350RK	D49
NG4M400LK	D50
NG4M400LK	D50
NG4M400LK	D50
NG4M400RK	D49
NG4M400RK	D49
NG4M400RK	D49
NG4M450LK	D50
NG4M450RK	D49
NG4M500LK	D50
NG4M500LK	D50
NG4M500LK	D50
NG4M500RK	D49
NG4M500RK	D49
NG4M500RK	D49
NG4M550LK	D50
NG4M550RK	D49
NG4M600LK	D50
NG4M600LK	D50
NG4M600RK	D49
NG4M600RK	D49
NG5M500L	D47
NGD2M150LK	D51
NGD2M150LK	D51
NGD2M150RK	D51
NGD2M150RK	D51
NGD2M200LK	D51
NGD2M200LK	D51
NGD2M200RK	D51
NGD2M200RK	D51
NGD2M250LK	D51
NGD2M250LK	D51
NGD2M250RK	D51
NGD2M250RK	D51
NGD3062LK	D51
NGD3062LK	D51
NGD3062RK	D51
NGD3062RK	D51
NGD3094LK	D51
NGD3094LK	D51
NGD3094LK	D51
NGD3094RK	D51
NGD3094RK	D51
NGD3094RK	D51
NGD3125LK	D51
NGD3125LK	D51
NGD3125RK	D51
NGD3125RK	D51
NGD3189LK	D51
NGD3189LK	D51
NGD3189RK	D51
NGD3189RK	D51
NGD3M200LK	D51
NGD3M200LK	D51
NGD3M200RK	D51
NGD3M200RK	D51
NGD3M250LK	D51
NGD3M250LK	D51
NGD3M250RK	D51
NGD3M250RK	D51
NGD3M300LK	D51
NGD3M300LK	D51
NGD3M300RK	D51
NGD3M300RK	D51
NGD3M350LK	D51
NGD3M350LK	D51
NGD3M350RK	D51
NGD3M350RK	D51
NGD3M400LK	D51
NGD3M400LK	D51
NGD3M400RK	D51
NGD3M400RK	D51
NGD4125LK	D51
NGD4125LK	D51
NGD4125RK	D51
NGD4125RK	D51
NGD4189LK	D51
NGD4189LK	D51
NGD4189RK	D51
NGD4189RK	D51
NGD4250LK	D51
NGD4250LK	D51
NGD4250RK	D51
NGD4250RK	D51
NGD4M400LK	D51
NGD4M400LK	D51
NGD4M400RK	D51
NGD4M400RK	D51
NGD4M450LK	D51
NGD4M450LK	D51
NGD4M450RK	D51
NGD4M450RK	D51
NGD4M500LK	D51
NGD4M500LK	D51
NGD4M500RK	D51
NGD4M500RK	D51
NGD4M550LK	D51
NGD4M550LK	D51
NGD4M550RK	D51
NGD4M550RK	D51
NGP2062L	D52
NGP2062R	D52
NGP2M150L	D52
NGP2M150L	D52
NGP2M150R	D52
NGP2M150R	D52
NGP2M200L	D52
NGP2M200L	D52
NGP2M200R	D52
NGP2M200R	D52
NGP2M250L	D52
NGP2M250L	D52
NGP2M250R	D52
NGP2M250R	D52
NGP2M300L	D52
NGP2M300L	D52
NGP2M300R	D52
NGP2M300R	D52
NGP3M150L	D52
NGP3M150L	D52
NGP3M150R	D52
NGP3M150R	D52
NGP3M200L	D52
NGP3M200L	D52
NGP3M200R	D52
NGP3M200R	D52
NGP3M250L	D52
NGP3M250L	D52
NGP3M250R	D52
NGP3M250R	D52
NGP3M300L	D52
NGP3M300L	D52
NGP3M300R	D52
NGP3M300R	D52
NJK3008R20	E26
NJP3014R12	E26
NL82R	E41
NNGJ281020	B27
NNGJ281020	B27
NNGJ281020	G12
NNGJ281020–1A	G12
NNGJ281020–1D	G12
NNGJ281020–HP	G12
NNGJ281020–SP	G12
NNGJ2810201D	B27
NNGJ2810201D	B27
NNUJ220820–11	G13
NNUJ220820–12	G13
NNUJ22082011	B27
NNUJ221020–12	G13
NNUJ280820	G13
NNUJ281020–10	G13
NNUJ281020–1A	G13
NNUJ281020–1B	G13
NNUX220820	G14
NNUX220820–10	G14
NNUX220820–11	G14
NNUX221020	G14
NNUX221020–1	G14
NNUX281020	G14
NP2002RK	D54
NP2002RK	D54
NP3002RK	D54
NP3002RK	D54
NP3012RK	D54
NR2031L	D55
NR2031L	D55
NR2031R	D55
NR2031R	D55
NR2047L	D55
NR2047R	D55
NR2M050L	D55
NR2M050L	D55
NR2M050L	D55
NR2M050R	D55
NR2M050R	D55
NR2M050R	D55
NR2M075L	D55
NR2M075L	D55
NR2M075L	D55
NR2M075R	D55
NR2M075R	D55
NR2M075R	D55
NR2M100L	D55
NR2M100L	D55
NR2M100L	D55
NR2M100R	D55
NR2M100R	D55
NR2M100R	D55
NR2M125L	D55
NR2M125L	D55
NR2M125L	D55
NR2M125R	D55
NR2M125R	D55
NR2M125R	D55
NR2M150L	D55

Index

Catalogue No.	Page(s)
NR2M150L	D55
NR2M150L	D55
NR2M150R	D55
NR2M150R	D55
NR2M150R	D55
NR2M175L	D55
NR2M175L	D55
NR2M175L	D55
NR2M175R	D55
NR2M175R	D55
NR2M175R	D55
NR3031L	D55
NR3031L	D55
NR3031L	D55
NR3031LK	D56
NR3031LK	D56
NR3031R	D55
NR3031R	D55
NR3031R	D55
NR3031RK	D56
NR3031RK	D56
NR3047L	D55
NR3047L	D55
NR3047L	D55
NR3047LK	D56
NR3047LK	D56
NR3047R	D55
NR3047R	D55
NR3047R	D55
NR3047RK	D56
NR3047RK	D56
NR3062L	D55
NR3062L	D55
NR3062L	D55
NR3062LK	D56
NR3062LK	D56
NR3062R	D55
NR3062R	D55
NR3062R	D55
NR3062RK	D56
NR3062RK	D56
NR3078LK	D56
NR3078LK	D56
NR3078RK	D56
NR3078RK	D56
NR3094L	D55
NR3094L	D55
NR3094R	D55
NR3094R	D55
NR3M100L	D55
NR3M100L	D55
NR3M100L	D55
NR3M100R	D55
NR3M100R	D55
NR3M100R	D55
NR3M125L	D55
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NRD4125R	D56
NRD4125R	D56
NSL1010E2	D38, E14
NSL1212F2	D38, E14
NSL1616H2	D38, E14
NSL2020K2	D38, E14
NSL2020K3	D38, E14
NSL2525M2	D38, E14
NSL2525M3	D38, E14
NSL2525M4	D38, E14
NSL3225P3	D38, E14
NSL3225P4	D38, E14
NSL3232P3	D38, E14
NSL3232P4	D38, E14
NSL3232P5	D38, E14
NSR1010E2	D38, E14
NSR1212F2	D38, E14
NSR1616H2	D38, E14
NSR2020K2	D38, E14
NSR2020K3	D38, E14
NSR2525M2	D38, E14
NSR2525M3	D38, E14
NSR2525M4	D38, E14
NSR3225P3	D38, E14
NSR3225P4	D38, E14
NSR3232P3	D38, E14
NSR3232P4	D38, E14
NSR3232P5	D38, E14
NST1	A30
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NST3	A30
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NVR102L	E44
NVR102R	E44
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NVR204R	E44
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NWC3R14E	E28
OVR122R	E45
OVR152R	E45
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PSDNN4040S25	A18
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PSKNL16CA12	A78-79
PSKNL2020K12	A19
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PSKNL4040S19	A19
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PSKNR1616H09	A19
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PSKNR2020K12	A19
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PSSNL3225P12	A20

Catalogue No.	Page(s)
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Q8BIT	C69
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QSBM1316630R	C17
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QSOM9516385R	C23
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QTM20	C21-22, C69
QTM26	C21-22, C69
RCGT0803M0AL1	B47
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RNGN120700T15015	B54
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RNMC501800	G55
RNMG090300	G14
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RNMH381200–13	G14
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RNMH38120013	G56
RNMH501800	G14
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RNMM381200	G14
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S08ASCACL069	A59
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S12DSCACR06	A59
S12DSCMCN06	A58
S16FSCACL09	A59
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S16FSCMCN09	A58
S16FSTCCN16	A59
S30MSSDCN12	A58
S32SCCLNL12MX7	A47
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S40TCCLNL12MN4	A48
S40TCCLNL12MN7	A48
S40TCCLNL12MX7	A47
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S40TCCLNR12MN7	A48
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S40TCSSNL12MX7	A49
S40TCSSNR12MX7	A49
S40TCSYNL12MN7	A49
S40TCSYNR12MN7	A49
S40TCWLNL08MX7	A49
S40TCWLNR08MX7	A49
SBIT	C69
SC30	C15, C19, C23, C69
SCBM162540L	C19
SCBM162540R	C19
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SCBM202540L	C19
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SCFPL08CA06	A84-85
SCFPR06CA05	A84-85
SCFPR08CA06	A84-85
SCFPR10CA09	A84-85
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SCGN090412T00520	B54
SCGPL08CA06	A84-85
SCGPR08CA06	A84-85
SCGT09T304AL1	B48
SCGT09T308AL1	B48
SCGT120408AL1	B48
SCGT120408AL3	B48
SCLCL1010E06	A31
SCLCL1212F06	A31
SCLCL1212F09	A31
SCLCL12CA12	A84-85
SCLCL1616H09	A31
SCLCL16CA12	A84-85
SCLCL2020K09	A31
SCLCL2020K12	A31
SCLCL2525M12	A31
SCLCR1010E06	A31
SCLCR10CA09	A84-85
SCLCR1212F06	A31
SCLCR1212F09	A31
SCLCR12CA12	A84-85
SCLCR1616H09	A31
SCLCR2020K09	A31
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SCLCR2525M12	A31
SCLPL06CA05	A86-87
SCLPL08CA06	A86-87
SCLPL10CA09	A86-87
SCLPR06CA05	A86-87
SCLPR08CA06	A86-87
SCLPR10CA09	A86-87
SCMT090304	B29
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SCMT090308	B29
SCMT090308MU	B29

Catalogue No.	Page(s)
SCMT090308MU	B29
SCMT090308MU	B29
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SCMW09T308	B29
SCMW09T308FST	B80
SCMW09T308FST	B80
SCMW120408	B29
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SCMW120408	B29
SCMW120408	B29
SCMX190412	F14
SCRPL08CA06	A86-87
SCRPR08CA06	A86-87
SCSPL08CA06	A88-89
SCSPR06CA05	A88-89
SCSPR08CA06	A88-89
SCTPL08CA06	A88-89
SCTPR06CA05	A88-89
SCTPR08CA06	A88-89
SCUN120412T00520	B54
SCWPL08CA06	A88-89
SCWPR08CA06	A88-89
SDBM162540L	C19
SDBM162540R	C19
SDBM162545L	C19
SDBM162545R	C19
SDBM202540L	C19
SDBM202540R	C19
SDBM202545L	C19
SDBM202545R	C19
SDHCL1616H11	A31
SDHCL2020K11	A31
SDHCL2525M11	A31
SDHCL2525M15	A31
SDHCR1616H11	A31
SDHCR2020K11	A31
SDHCR2525M11	A31
SDHCR2525M15	A31
SDJCL1010E07	A32
SDJCL1212F07	A32
SDJCL1212F11	A32
SDJCL1616H07	A32
SDJCL1616H11	A32
SDJCL2020K07	A32
SDJCL2020K11	A32
SDJCL2020K15	A32
SDJCL2525M11	A32
SDJCL2525M15	A32
SDJCL3225P15	A32
SDJCR1010M07	A32
SDJCR1212F07	A32
SDJCR1212F11	A32
SDJCR1616H07	A32
SDJCR1616H11	A32
SDJCR2020K07	A32
SDJCR2020K11	A32
SDJCR2020K15	A32
SDJCR2525M11	A32
SDJCR2525M15	A32
SDJCR3225P15	A32
SDJPL10CA07	A90-91
SDJPR10CA07	A90-91
SDNCN0808L07	A32
SDNCN1010M07	A32
SDNCN1212F11	A32
SDNCN1616H11	A32
SDNCN2020K11	A32
SDNCN2525M11	A32
SDNCN2525M15	A32
SDNCN3225P15	A32
SKCP343	A31
SKCP453	A31, A50
SKDP343	A31-32
SKDP453	A31-32, A53
SKEY	C69
SKRN100300	A33
SKRN1203M0	A33
SKRN160400	A33
SKSN566K	A71, A73
SKSP343	A33-34
SKSP453	A33-34
SKTP343	A34
SKVN343	A35
SM819	A27-28
SM820	A26
SM837	A27-28, A83
SM840	A25-26, A83
SM841	A27-28, A47, A83
SMYE3	E41, E44
SMYE4	E41, E44
SMYE5	E41, E44
SMYI3	E41, E44
SMYI4	E41, E44
SNGA120404S01025MT	B80
SNGA120408S01020MT	B80
SNGA120408S01025MT	B80
SNGA120408S01025MT	B80
SNGA120408T02020	B55
SNGA120408T02020	B55
SNGA120412S01025MT	B80
SNGA120412S01025MT	B80
SNGA120412T02020	B55
SNGA120412T02020	B55
SNGA120416T02020	B55
SNGA120416T02020	B55
SNGA150612T02020	B55
SNGA150616T02020	B55
SNGN090308T02020	B55
SNGN090412T00515	B55
SNGN120408T00520	B55
SNGN120408T02020	B55
SNGN120408T02020	B55
SNGN120412	B30
SNGN120412FMTV	B81
SNGN120412T01020	B55
SNGN120412T02020	B55
SNGN120412T02020	B55
SNGN120416T01020	B55
SNGN120416T02020	B55
SNGN120416T02020	B55
SNGN120704T02020	B55
SNGN120708T02020	B55
SNGN120712T00520	B55
SNGN120712T01020	B55
SNGN120712T02020	B55
SNGN120712T02020	B55
SNGN120716T00520	B55
SNGN120716T01020	B55
SNGN120716T02020	B55
SNGN120716T02020	B55
SNGN120720T02020	B55
SNGN120720T10015	B55
SNGN150712T02020	B55
SNGN150716T02020	B55
SNGN190720K20015	B55
SNGN190720T20015	B55
SNGX120708T02020	B56
SNGX120712T01020FW	B56
SNGX120712T02020	B56
SNGX120716T02020	B56
SNGX150716T02020	B56
SNMA120404	F15
SNMA120408	B30
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SNMA120408	B30
SNMA120408	B30
SNMA120408S01025	B81
SNMA120408S02020	B81
SNMA120412	F15
SNMA120412	F15
SNMA120412	B30
SNMA120412	B30
SNMA120412S01025	B81
SNMA120412S02020	B81
SNMA120412T02020	B56
SNMA120416T02020	B56
SNMA150616T02020	B56
SNMA190612	B30
SNMA190616	B30
SNMA190616	B30
SNMA250724	F15
SNMA250724	F15
SNMG09030422	B30
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SNMG090308	B30
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SNMG120404	F15
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SNMG12040422	B30
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SNMG12040448	B31
SNMG120408	B30
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SNMG1204085	F15
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SNMG1204085	B31
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SNMG120408AP	B31
SNMG120408AP	B31
SNMG120408AP	B31
SNMG120408AP	B31
SNMG120408AP	B31
SNMG120408SL	B32
SNMG120412	F15
SNMG120412	B30
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SNMG1204124	B30
SNMG12041248	B31
SNMG12041249	B31
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SNMG1204125	B31
SNMG1204125	F15
SNMG1204125	F15
SNMG1204125	B31
SNMG1204125	B31
SNMG1204125	B31
SNMG1204125	B31
SNMG120412AP	B31
SNMG120412AP	B31
SNMG120412AP	B31
SNMG120412SL	B32
SNMG12041622	B30
SNMG12041622	B30

Catalogue No.	Page(s)
SNMG12041649	B31
SNMG1204165	B31
SNMG1204165	B31
SNMG120416SL	B32
SNMG1506085	B31
SNMG1506085	B31
SNMG1506085	B31
SNMG1506085	B31
SNMG150608SL	B32
SNMG150612	B30
SNMG150612	B30
SNMG1506125	B31
SNMG1506125	B31
SNMG1506125	B31
SNMG1506125	B31
SNMG1506125	B31
SNMG150612SL	B32
SNMG150612SL	B32
SNMG1506165	B31
SNMG1506165	B31
SNMG1506165	B31
SNMG150616SL	B32
SNMG1506245	B31
SNMG1506245	B31
SNMG1906085	B31
SNMG1906085	B31
SNMG1906085	B31
SNMG1906085	B31
SNMG1906085	B31
SNMG190612	B30
SNMG190612	F15
SNMG190612	F15
SNMG190612	F15
SNMG190612	F15
SNMG190612	F15
SNMG190612	B30
SNMG1906125	B31
SNMG1906125	F15
SNMG1906125	F15
SNMG1906125	B31
SNMG1906125	B31
SNMG1906125	B31
SNMG1906125	B31
SNMG1906125	B31
SNMG190612SL	B32
SNMG190612SL	B32
SNMG190616	F15
SNMG190616	B30
SNMG190616	B30
SNMG1906165	B31
SNMG1906165	F15
SNMG1906165	B31
SNMG1906165	B31
SNMG1906165	B31
SNMG1906165	B31
SNMG1906165	B31
SNMG190616SL	B32
SNMG190616SL	B32
SNMG250716	F15
SNMG250716	F15
SNMG250724	F15
SNMG250724	F15
SNMM12040865	B32
SNMM12040865	B32
SNMM12040865	B32
SNMM12040865	B32
SNMM1204088	F15
SNMM12041265	B32
SNMM12041265	B32
SNMM12041265	B32
SNMM12041265	B32
SNMM1204128	B32
SNMM1204128	G57
SNMM12041665	B32
SNMM1506128	B32
SNMM1506128	B32
SNMM1506128	G57
SNMM15061665	B32
SNMM19061265	B32
SNMM19061265	B32
SNMM19061265	B32
SNMM19061265	B32
SNMM1906128	B32
SNMM1906128	G57
SNMM190616	F15
SNMM19061665	B32
SNMM19061665	B32
SNMM19061665	B32
SNMM1906168	F15
SNMM1906168	B32
SNMM1906168	B32
SNMM1906168	B32
SNMM1906168	B32
SNMM1906168	G57
SNMM190616SR	B32
SNMM190616SR	B32
SNMM190616SR	B32
SNMM190616SR	G57
SNMM19062465	B32
SNMM1906248	B32
SNMM1906248	G57
SNMM190624SR	B32
SNMM190624SR	G57
SNMM250724	F15
SNMM250724	F15
SNMM2507248	F15
SNMM2507248	B32
SNMM2507248	B32
SNMM2507248	B32
SNMM2507248	B32
SNMM2507248	G57
SNMM2507248B	G57
SNMM250724SR	G57
SNMM250724SRL	G57
SNMM250916SR	B32
SNMM250916SR	B32
SNMM250916SR	G57
SNMM250924SR	B32
SNMM250924SR	B32
SNMM250924SR	B32
SNMM250924SR	G57
SNMM250924TSR	G57
SNMN090308S02020	B81
SNMN090312S02020	B81
SNMN090312S02020	B81
SNMN090316S02020	B81
SNMN120308S02020	B81
SNMN120312S02020	B81
SNMN120316S02020	B81
SNMN120412T02020	B56
SNMN120416T02020	B56
SNMN120416T02020	B81
SNMP120408SM	B33
SNMP120408SM	B33
SNMP120408SM	B33
SNMP120412SM	B33
SNMP120412SM	B33
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SNMP150608SM	B33
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SNMP150612SM	B33
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SNMP150616SM	B33
SNMP150616SM	B33
SNMP190616SM	B33
SNMS120408FST	B81
SNMS120412FST	B81
SNMX120712T02020	B57
SNMX120716T02020	B57
SNMX150716T02020	B57
SNMX381224	G57
SNUN090308	B33
SNUN120408	B33
SNUN120408	B33
SNUN120408	F16
SNUN120408	F16
SNUN120408	B33
SNUN120412	B33
SNUN120412	B33
SNUN120412	B33
SNUN120412	B33
SNUN150412	B33
SNUN190412	B33
SNUN190416	F16
SOUN1904ZZT2	B34
SOUN1904ZZT3	B34
SOUN2506ZZT2	B34
SOUN2506ZZT3	B34
SPGN090304	B34
SPGN090304	B34
SPGN090308	B34
SPGN090308	B34
SPGN090308	B34
SPGN090308T01020	B57
SPGN120304	B34
SPGN120304T01020	B57
SPGN120308	B34
SPGN120308	B34
SPGN120308	B34
SPGN120308T01020	B57
SPGN120312	B34
SPGN120312	B34
SPGN190412	B34
SPMR090308	B34
SPMR090308	B34
SPMR090308	B34
SPMR120304	B34
SPMR120304	B34
SPMR120304	B34
SPMR120304	B34
SPMR120308	B34
SPMR120308	B34
SPMR120312	B34
SPMR120312	B34
SPMR120312	B34
SPUN090304	B34
SPUN090308	B34
SPUN090308	B34
SPUN090308	F16
SPUN120304	B34
SPUN120304	B34
SPUN120304	B34
SPUN120304	B34
SPUN120304	B34
SPUN120304T00520	B57
SPUN120308	B34
SPUN120308	B34
SPUN120308	B34
SPUN120308	F16
SPUN120308	F16
SPUN120308	F16
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SPUN120308	F16
SPUN120308	B34
SPUN120308	B34
SPUN120308	B34
SPUN120308	B34
SPUN120308T00520	B57
SPUN120312	B34
SPUN120312	B34
SPUN120312	F16
SPUN120312	F16
SPUN120312	B34
SPUN120312T00520	B57
SPUN120412	B34
SPUN120412	B34
SPUN150412	B34
SPUN150412	B34
SPUN150412	B34
SPUN150412T	B34
SPUN190412	B34
SPUN190412	B34
SPUN190412	B34
SPUN190416	F16
SPUN190416	F16
SPUN190416T	B34
SPUN250620T	B34
SPUN250620T	B34
SPUN250620T	B34
SRDCN1616H06	A33
SRDCN1616H08	A33
SRDCN2020K06	A33
SRDCN2020K08	A33
SRDCN2020K10	A33
SRDCN2525M06	A33
SRDCN2525M08	A33
SRDCN2525M10	A33
SRDCN2525M12	A33
SRDCN3225P12	A33
SRDCN3225P16	A33
SRGCL12CA10	A90-91
SRGCR08CA06	A90-91
SRGCR10CA08	A90-91
SRS3	A31-35
SRS4	A31-34, A50, A53
SRS5	A33
SSA3T	E41, E44
SSA4T	E41, E44
SSA5T	E41, E44
SSBCL1616H09	A33
SSBCL2020K12	A33
SSBCL2525M12	A33
SSBCR1616H09	A33
SSBCR2020K12	A33
SSBCR2525M12	A33
SSBM161780L	C15
SSBM161780R	C15
SSBM161785L	C15
SSBM202030L	C15
SSBM202030R	C15
SSBM202035L	C15
SSKCL12CA12	A90-91
SSKCR10CA09	A90-91
SSKCR12CA12	A90-91
SSKCR16CA12	A90-91
SSKPL10CA09	A92-93
SSKPR10CA09	A92-93
SSKPR12CA09	A92-93
SSN2T	E41, E44
SSOM1325380R	C23
SSOM1325385R	C23
SSOM1325630R	C23
SSOM1325635R	C23
SSRCL12CA12	A92-93
SSRCR12CA12	A92-93
SSRPL10CA09	A92-93
SSRPR10CA09	A92-93
SSSCL12CA12	A94-95
SSSCL1616H09	A34
SSSCL2020K12	A34
SSSCL2525M12	A34
SSSCR10CA09	A94-95
SSSCR12CA12	A94-95
SSSCR1616H09	A34
SSSCR16CA12	A94-95
SSSCR2020K12	A34
SSSCR2525M12	A34
SSSPL10CA09	A94-95
SSSPR10CA09	A94-95
SSY3T	E41, E44
SSY4T	E41, E44
SSY5T	E41, E44
STBIT	C69
STCM11	A42-43, A83
STCM20	A8-14, A42-44
STCM37	A77
STCM38	A67, A69, A71, A73, A75, A77, A81, A83
STCM39	A77
STCM4	A8-11, A13, A26-28, A42-43
STCM40	A69, A71, A73
STCM5	A9, A12-13, A27, A42-43
STCM8	A25-26, A28, A47, A69, A71, A75, A83
STCM9	A26-28, A47, A67, A69, A71, A73, A75, A77
STFCL1616H16	A34
STFCL2020K16	A34
STFCL2525M16	A34
STFCR1212F11	A34
STFCR1616H16	A34
STFCR2020K16	A34
STFCR2525M16	A34
STFPL08CA09	A96-97
STFPL10CA11	A96-97
STFPL12CA16	A96-97
STFPR08CA09	A96-97
STFPR10CA11	A96-97
STFPR12CA16	A96-97
STFPR16CA16	A96-97
STGPL08CA09	A96-97
STGPL10CA11	A96-97
STGPR08CA09	A96-97
STGPR10CA11	A96-97
STGPR12CA16	A96-97
STKEY	C69
STM31	C69
STTPR08CA09	A98-99
STTPR10CA11	A98-99
STTPR12CA16	A98-99
STWPL10CA11	A98-99
STWPL12CA16	A98-99
STWPR08CA09	A98-99
STWPR10CA11	A98-99
STWPR12CA16	A98-99
SVHBL2020K16	A35
SVHBL2525M16	A35
SVHBL3225P16	A35
SVHBR2020K16	A35
SVHBR2525M16	A35

Catalogue No.	Page(s)
SVHBR3225P16	A35
SVJBL1616H16	A35
SVJBL2020K16	A35
SVJBL2525M16	A35
SVJBL3225P16	A35
SVJBR1616H16	A35
SVJBR2020K16	A35
SVJBR2525M16	A35
SVJBR3225P16	A35
SVN71/72…R/L	G58
SVN76…F1	G58
SVN76…F2	G59
SVN76…F3	G59
SVN76…F4	G59
SVN77…R/L	G58
SVN80…R/L	G58
SVVBN2020K16	A35
SVVBN2525M16	A35
SVVBN3225P16	A35
TCGT1102022	B35
TCGT110202AL1	B48
TCGT110202MU	B35
TCGT110202MU	B35
TCGT110202MU	B35
TCGT110204AL1	B48
TCGT16T302AL1	B48
TCGT16T304AL1	B48
TCGT16T308AL1	B48
TCGW110202EC	B82
TCGW110202EM	B82
TCGW110202S01015C	B82
TCGW110204FST	B82
TCGW110204S01015C	B82
TCGW110204S01015C	B82
TCGW110204S01015M	B82
TCGW16T304FST	B82
TCGW16T304S01015M	B82
TCGW16T304S01015MT	B82
TCGW16T308S01015M	B82
TCMT110202	B35
TCMT110202	B35
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TCMT110202	B35
TCMT110204	B35
TCMT110204	B35
TCMT110204	B35
TCMT110204	F16
TCMT110204	F16
TCMT110204	F16
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TCMT110204	B35
TCMT110204	B35
TCMT110204	B35
TCMT110204	B35
TCMT110204	B35
TCMT110204	B35
TCMT1102042	B35
TCMT1102042	B35
TCMT1102042	B35
TCMT110204MU	B36
TCMT110204MU	B36
TCMT110204MU	B36
TCMT110204MU	B36
TCMT110204MU	B36
TCMT110208	B35
TCMT110208	B35
TCMT110208	B35
TCMT110208	B35
TCMT110208	B35
TCMT110208	B35
TCMT110208	B35
TCMT1102082	B35
TCMT110208MU	B36
TCMT110208MU	B36
TCMT110208MU	B36
TCMT110208R	F16
TCMT110208R	F16
TCMT16T304	B35
TCMT16T304	B35
TCMT16T304	B35
TCMT16T304	F16
TCMT16T304	B35
TCMT16T304	B35
TCMT16T304	B35
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TCMT16T304	B35
TCMT16T3042	B35
TCMT16T3042	B35
TCMT16T30441	B35
TCMT16T30441	B35
TCMT16T30441	B35
TCMT16T30441	B35
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TCMT16T304MU	B36
TCMT16T304MU	B36
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TCMT16T304MU	B36
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TCMT16T304MU	B36
TCMT16T304MU	B36
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	F16
TCMT16T308	F16
TCMT16T308	F16
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T308	B35
TCMT16T30841	B35
TCMT16T30841	B35
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T308MU	B36
TCMT16T312	B35
TCMT16T312	B35
TCMT16T312	B35
TCMT16T312	B35
TCMT16T312MU	B36
TCMT16T312MU	B36
TCMT16T312MU	B36
TCMT220408	B35
TCMT220408	B35
TCMT220408	B35
TCMT220408	B35
TCMT220408	B35
TCMT220408	B35
TCMT220408	B35
TCMT220408MU	B36
TCMT220408MU	B36
TCMT220408MU	B36
TCMT220412	B35
TCMT220412	B35
TCMT220412	B35
TCMT220412	B35
TCMT220412	B35
TCMT220412MU	B36
TCMT220412MU	B36
TCMW110202S01020ST	B82
TCMW110204	B36
TCMW110204	B36
TCMW110204	B36
TCMW110204	B36
TCMW110204FST	B82
TCMW110204FST	B82
TCMW110204S01020ST	B82
TCMW16T304	B36
TCMW16T304	B36
TCMW16T304	B36
TCMW16T304	B36
TCMW16T304FST	B82
TCMW16T304FST	B82
TCMW16T308S01020ST	B82
TDHB07S102	C41
TDHB07S102	C41
TDHB07S102	C41
TDHB07S102	C41
TDHB07S102	C41
TDHB07S102	C41
TDHB07S102M	C41
TDHB07S102M	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104	C41
TDHB07S104M	C41
TDHB07S104M	C41
TDHB07S108	C41
TDHB07S108	C41
TDHB07S108	C41
TDHB07S108	C41
TDHB07S108M	C41
TDHB07S108M	C41
TDHB07S1X0	C41
TDHB07S1X0	C41
TDHB07S1X0	C41
TDHB07S1X0	C41
TDHB07S1X0	C41
TDHB07S1X0M	C41
TDHB07S1X0M	C41
TDHH07S102	C41
TDHH07S102	C41
TDHH07S102L	C41
TDHH07S102L	C41
TDHH07S102L	C41
TDHH07S102L	C41
TDHH07S102R	C41
TDHH07S102R	C41
TDHH07S104	C41
TDHH07S104L	C41
TDHH07S104L	C41
TDHH07S104L	C41
TDHH07S104L	C41
TDHH07S104R	C41
TEGN110304	F17
TEGN160304	F17
TEGN160308	F17
TNGA160404S01025MT	B83
TNGA160404S01025MT	B83
TNGA160408EFWMT	B83
TNGA160408S01020MT	B83
TNGA160408S01025MT	B83
TNGA160408S01025MT	B83
TNGA160408S01025MT	B83
TNGA160408T02020	B58
TNGA160408T02020	B58
TNGA160412EFWMT	B83
TNGA160412S01025MT	B83
TNGA160412S01025MT	B83
TNGA160412S01025MT	B83
TNGA160412T02020	B58
TNGA160412T02020	B58
TNGA160416S01025MT	B83
TNGA160416T02020	B58
TNGA160416T02020	B58
TNGA220408T02020	B58
TNGN110308T02020	B58
TNGN160404T02020	B58
TNGN160408T01020	B58
TNGN160408T02020	B58
TNGN160408T02020	B58
TNGN160412T01020	B58
TNGN160412T02020	B58
TNGN160412T02020	B58
TNGN160416T02020	B58
TNGN160708T02020	B58
TNGN160712T02020	B58
TNGN220408T02020	B58
TNGN220416T02020	B58
TNMA160408	B36
TNMA160408	F17
TNMA160408	F17
TNMA160408	F17
TNMA160408	B36
TNMA160408	B36
TNMA160412	B36
TNMA160412	B36
TNMA220408	B36
TNMA220408	B36
TNMA220412	B36
TNMA220412	B36
TNMA220416	B36
TNMA220416	B36
TNMG11030422	B36
TNMG11030422	B36
TNMG11030822	B36
TNMG11030822	B36
TNMG160404	B36
TNMG160404	F17
TNMG160404	F17
TNMG160404	B36
TNMG160404	B36
TNMG160404	B36
TNMG160404	B36
TNMG160404	B36
TNMG16040422	B36
TNMG16040422	B36
TNMG16040422	F17
TNMG16040422	F17
TNMG16040422	B36
TNMG16040422	B36
TNMG16040422	B36
TNMG16040422	B36
TNMG16040422	B36
TNMG16040422	B36
TNMG1604044	B37
TNMG16040448	B37
TNMG16040448	B37
TNMG16040448	B37
TNMG16040448	B37
TNMG160404FL	F18
TNMG160404FL	B38
TNMG160404FM	F18
TNMG160404FM	B38
TNMG160408	B36
TNMG160408	B36
TNMG160408	F17
TNMG160408	F17
TNMG160408	F17
TNMG160408	F17
TNMG160408	F17
TNMG160408	F17
TNMG160408	B36
TNMG160408	B36
TNMG160408	B36
TNMG160408	B36
TNMG160408	B36
TNMG160408	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	F17
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG16040822	B36
TNMG1604084	B37
TNMG1604084	B37
TNMG16040848	B37
TNMG16040848	B37
TNMG16040848	B37
TNMG16040849	B37
TNMG16040849	F17
TNMG16040849	F17
TNMG16040849	B37
TNMG16040849	B37
TNMG16040849	B37
TNMG16040849	B37
TNMG16040849	B37
TNMG1604085	B37
TNMG1604085	F18
TNMG1604085	F18
TNMG1604085	F18
TNMG1604085	F18
TNMG1604085	B37
TNMG1604085	B37
TNMG1604085	B37
TNMG1604085	B37
TNMG1604085	B37
TNMG160408AP	B37
TNMG160408AP	B37
TNMG160408AP	B37
TNMG160408AP	B37
TNMG160408AP	B37
TNMG160408AP	B37
TNMG160408FL	F18
TNMG160408FL	B38
TNMG160408FM	F18
TNMG160408FM	B38
TNMG160408FR	F18
TNMG160412	F17
TNMG160412	F17

Index

Catalogue No.	Page(s)
TNMG160412	B36
TNMG160412	B36
TNMG16041222	B36
TNMG16041222	B36
TNMG16041222	B36
TNMG16041222	B36
TNMG16041222	B36
TNMG16041248	B37
TNMG16041249	B37
TNMG16041249	B37
TNMG16041249	B37
TNMG16041249	B37
TNMG1604125	B37
TNMG1604125	F18
TNMG1604125	F18
TNMG1604125	B37
TNMG1604125	B37
TNMG1604125	B37
TNMG1604125	B37
TNMG1604125	B37
TNMG160412AP	B37
TNMG160412AP	B37
TNMG160412AP	B37
TNMG160412FR	F18
TNMG160412FR	B38
TNMG16041648	B37
TNMG1604165	B37
TNMG220404	B36
TNMG220404	B36
TNMG220404	B36
TNMG220404	B36
TNMG22040448	B37
TNMG220408	B36
TNMG220408	B36
TNMG220408	F17
TNMG220408	F17
TNMG220408	B36
TNMG220408	B36
TNMG220408	B36
TNMG220408	B36
TNMG22040848	B37
TNMG22040849	B37
TNMG22040849	B37
TNMG22040849	B37
TNMG22040849	B37
TNMG2204085	B37
TNMG2204085	F18
TNMG2204085	F18
TNMG2204085	B37
TNMG2204085	B37
TNMG2204085	B37
TNMG2204085	B37
TNMG2204085	B37
TNMG220412	F17
TNMG220412	F17
TNMG220412	F17
TNMG220412	F17
TNMG220412	B36
TNMG220412	B36
TNMG22041249	B37
TNMG22041249	B37
TNMG22041249	B37
TNMG2204125	B37
TNMG2204125	F18
TNMG2204125	F18
TNMG2204125	F18
TNMG2204125	B37
TNMG2204125	B37
TNMG2204125	B37
TNMG220416	F17
TNMG220416	B36
TNMG22041649	B37
TNMG22041649	B37
TNMG2204165	B37
TNMG2204165	F18
TNMG2204165	B37
TNMG2706085	B37
TNMG2706125	B37
TNMG2706125	B37
TNMG2706125	B37
TNMG2706165	B37
TNMG2706245	B37
TNMM16040865	B38
TNMM16040865	B38
TNMM16040865	B38
TNMM16040865	B38
TNMM16041265	B38
TNMM1604128	B38
TNMM1604128	G57
TNMM16041665	B38
TNMM22040865	B38
TNMM22040865	B38
TNMM22040865	B38
TNMM22040865	B38
TNMM2204088	B38
TNMM2204088	B38
TNMM2204088	G57
TNMM22041265	B38
TNMM22041265	B38
TNMM22041265	B38
TNMM2204128	B38
TNMM2204128	G57
TNMM22041665	B38
TNMM22041665	B38
TNMM2204168	F18
TNMM2204168	B38
TNMM2204168	B38
TNMM2204168	G57
TNMM2706128	B38
TNMM2706128	G57
TNMM2706248	B38
TNMM2706248	G57
TNMP160404SM	B39
TNMP160404SM	B39
TNMP160408SM	B39
TNMP160408SM	B39
TNMP160408SM	B39
TNMP160412SM	B39
TNMP160412SM	B39
TNMP160412SM	B39
TNMP220404SM	B39
TNMP220404SM	B39
TNMP220408SM	B39
TNMP220408SM	B39
TNMP220408SM	B39
TNMP220412SM	B39
TNMP220412SM	B39
TNMP220412SM	B39
TNMS160404FST	B83
TNMS160408FST	B83
TNUN160308	B39
TNUN160308	F18
TNUN160312	B39
TNUN160408	B39
TNUN160408	B39
TNUN160408	F18
TNUN160408	B39
TNUN160412	B39
TNUN220412	F18
TNUN220416	B39
TPGA110204	B40
TPGA110208	B40
TPGN110204	B40
TPGN110208	B40
TPGN110304	B40
TPGN110304	B40
TPGN110304	F19
TPGN110304F	B83
TPGN110304T01020	B58
TPGN110308	B40
TPGN110308	B40
TPGN110308F	B83
TPGN110308FST	B83
TPGN110308T01020	B58
TPGN110312T01020	B58
TPGN160304	B40
TPGN160304	B40
TPGN160304	B40
TPGN160304F	B83
TPGN160304FST	B83
TPGN160304T00520	B58
TPGN160304T01020	B58
TPGN160308	B40
TPGN160308	B40
TPGN160308	B40
TPGN160308	B40
TPGN160308F	B83
TPGN160308FST	B83
TPGN160308T00520	B58
TPGN160308T01020	B58
TPGN160308T02020	B58
TPGN160312	B40
TPGN160312F	B83
TPGN160312T01020	B58
TPGN160312T02020	B58
TPGN220404F	B83
TPGN220408F	B83
TPGR160308	B40
TPGT110202HP	C43
TPGT110202HP	C43
TPGT110204HP	C43
TPGT110204HP	C43
TPGT16T304HP	C43
TPGT16T304HP	C43
TPGW110202EC	B84
TPGW110202EM	B84
TPGW110204EC	B84
TPGW110204FST	B84
TPGW110204S01015C	B84
TPGW110204S01015C	B84
TPGW110204S01015C	B84
TPGW110204S01015M	B84
TPGW110208FST	B84
TPGW110208S01015C	B84
TPGW110208S01015C	B84
TPGW110208S01015C	B84
TPGW110208S01015M	B84
TPGW110208S01015M	B84
TPGW16T304FST	B84
TPGW16T304S01015M	B84
TPGW16T308FST	B84
TPGW16T308S01015M	B84
TPGW16T308S01015MT	B84
TPHB110202	C42
TPHB110202	C42
TPHB110202	C42
TPHB110202	C42
TPHB110202	C42
TPHB110202M	C42
TPHB110202M	C42
TPHB110204	C42
TPHB110204	C42
TPHB110204	C42
TPHB110204	C42
TPHB110204	C42
TPHB110204	C42
TPHB110204M	C42
TPHB110204M	C42
TPHB110208	C42
TPHB110208	C42
TPHB110208	C42
TPHB110208	C42
TPHB110208M	C42
TPHB1102X0	C42
TPHB1102X0	C42
TPHB1102X0	C42
TPHB1102X0	C42
TPHB1102X0	C42
TPHB1102X0M	C42
TPHB1102X0M	C42
TPHB160302	C42
TPHB160302	C42
TPHB160302	C42
TPHB160302	C42
TPHB160302	C42
TPHB160304	C42
TPHB160304	C42
TPHB160304	C42
TPHB160304	C42
TPHB160304	C42
TPHB160304	C42
TPHB160304M	C42
TPHB160308	C42
TPHB160308	C42
TPHB160308	C42
TPHB160308	C42
TPHB160308	C42
TPHB160308M	C42
TPHB160316	C42
TPHB1603X0	C42
TPHB1603X0	C42
TPHB1603X0	C42
TPHB1603X0	C42
TPHB1603X0	C42
TPHB1603X0	C42
TPHH110202	C43
TPHH110202	C43
TPHH110202	C43
TPHH110202	C43
TPHH110202L	C42
TPHH110202L	C42
TPHH110202L	C42
TPHH110202R	C42
TPHH110204	C43
TPHH110204	C43
TPHH110204	C43
TPHH110204	C43
TPHH110204	C43
TPHH110204L	C42
TPHH110204L	C42
TPHH110204L	C42
TPHH110204L	C42
TPHH110204R	C42
TPHH110204R	C42
TPHH110208L	C42
TPHH110208L	C42
TPHH110208R	C42
TPHH110208R	C42
TPHH160302L	C42
TPHH160302L	C42
TPHH160302L	C42
TPHH160302L	C42
TPHH160302R	C42
TPHH160302R	C42
TPHH160304L	C42
TPHH160304L	C42
TPHH160304L	C42
TPHH160304L	C42
TPHH160304LF	C43
TPHH160304LF	C43
TPHH160304LF	C43
TPHH160304LF	C43
TPHH160304LF	C43
TPHH160304R	C42
TPHH160304R	C42
TPHH160308L	C42
TPHH160308L	C42
TPHH160308L	C42
TPHH160308LF	C43
TPHH160308LF	C43
TPHH160308LF	C43
TPHH160308LF	C43
TPHH160308LF	C43
TPHH160308LF	C43
TPHH160308R	C42
TPHH17T305LF	C43
TPHH17T309LF	C43
TPHH17T309LF	C43
TPMR110304	B41
TPMR110304	F19
TPMR110304	F19
TPMR110304	F19
TPMR110304	B41
TPMR110304	B41
TPMR110304	B41
TPMR110308	B41
TPMR110308	F19
TPMR110308	F19
TPMR110308	B41
TPMR110308	B41
TPMR110308	B41
TPMR110308	B41
TPMR110308	B41
TPMR160304	B41
TPMR160304	B41
TPMR160304	F19
TPMR160304	F19
TPMR160304	B41
TPMR160304	B41
TPMR160304	B41
TPMR160304	B41
TPMR160308	B41
TPMR160308	B41
TPMR160308	F19
TPMR160308	B41
TPMR160308	B41
TPMR160308	B41
TPMR160308	B41
TPMR160308	B41
TPMR160312	B41
TPMR160312	B41
TPMR160312	B41
TPMR160312	B41
TPMT110202LF	C44
TPMT110202LF	C44
TPMT110204LF	C44

Index

Catalogue No.	Page(s)
TPMT110204LF	C44
TPMT160304LF	C44
TPMT160304LF	C44
TPMT160308LF	C44
TPMT160308LF	C44
TPMT160312LF	C44
TPUN110304	B41
TPUN110304	B41
TPUN110304	F19
TPUN110304	F19
TPUN110304	B41
TPUN110304	B41
TPUN110308	B41
TPUN110308	B41
TPUN110308	F19
TPUN110308	F19
TPUN110308	F19
TPUN110308	B41
TPUN110308	B41
TPUN160304	B41
TPUN160304	B41
TPUN160304	F19
TPUN160304	F19
TPUN160304	F19
TPUN160304	F19
TPUN160304	F19
TPUN160304	B41
TPUN160304	B41
TPUN160304	B41
TPUN160304	B41
TPUN160304	B41
TPUN160308	B41
TPUN160308	B41
TPUN160308	B41
TPUN160308	F19
TPUN160308	F19
TPUN160308	F19
TPUN160308	F19
TPUN160308	F19
TPUN160308	F19
TPUN160308	B41
TPUN160308	B41
TPUN160308	B41
TPUN160308	B41
TPUN160308	B41
TPUN160312	B41
TPUN160312	B41
TPUN160312	B41
TPUN160312	F19
TPUN160312	F19
TPUN160312	F19
TPUN160312	B41
TPUN160312	B41
TPUN220408	B41
TPUN220408	B41
TPUN220408	B41
TPUN220408	B41
TPUN220408	B41
TPUN220412	B41
TPUN220412	B41
TPUN220412	B41
TPUN220412	F19
TPUN220412	F19
TPUN220412	F19
TPUN220412	B41
TPUN220412	B41
TPUN220412	B41
TPUN220416	B41
TPUN270620T	B41
TPUR160308L	B41
TPUR160308R	B41
VBGW110304FST	B85
VBGW160404FST	B85
VBGW160404S01015M	B85
VBGW160404S01015MT	B85
VBGW160404S01015MT	B85
VBGW160404S01015MT	B85
VBGW160408S01015M	B85
VBGW160408S01015MT	B85
VBGW160408S01015MT	B85
VBGW160408S01015MT	B85
VBGW160408S01015MT	B85
VBMT160404	B42
VBMT160404	B42
VBMT160404	F19
VBMT160404	F19
VBMT160404	B42
VBMT160404	B42
VBMT160404	B42
VBMT160404	B42
VBMT160404	B42
VBMT160404	B42
VBMT160408	B42
VBMT160408	B42
VBMT160408	F19
VBMT160408	F19
VBMT160408	F19
VBMT160408	F19
VBMT160408	B42
VBMT160408	B42
VBMT160408	B42
VBMT160408	B42
VBMT160408	B42
VBMT160408	B42
VBMT160412	B42
VBMT160412	B42
VBMT160412	B42
VBMT160412	B42
VBMT160412	B42
VBMT160412	B42
VBMT160412	B42
VBMW160408S01020ST	B85
VBMW160412S01020MT	B85
VCGT110302AL1	B49
VCGT110302AL1	B49
VCGT110302AL3	B49
VCGT110304AL1	B49
VCGT110304AL3	B49
VCGT110308AL1	B49
VCGT160404AL1	B49
VCGT160404AL1	B49
VCGT160404AL3	B49
VCGT160404AL3	B49
VCGT160408AL1	B49
VCGT160408AL1	B49
VCGT160408AL3	B49
VCGT160408AL3	B49
VCGT160412AL1	B49
VCGT160412AL3	B49
VCGT160412AL3	B49
VCGT220530AL1	B49
VCGT220530AL3	B49
VCGT220530AL3	B49
VCMT16T304	F20
VCMT16T304	F20
VCMT16T308	F20
VCMT16T308	F20
VCMT16T308	F20
VCMT16T308	B42
VCMW110304FST	B86
VCMW160402FST	B86
VNGA160404FST	B86
VNGA160404S01020MT	B86
VNGA160404S01025MT	B86
VNGA160404S01025MT	B86
VNGA160404S01025MT	B86
VNGA160404S01025MT	B86
VNGA160404T02020	B59
VNGA160408FST	B86
VNGA160408S01020MT	B86
VNGA160408S01025MT	B86
VNGA160408S01025MT	B86
VNGA160408S01025MT	B86
VNGA160408S01025MT	B86
VNGA160408T02020	B59
VNGA160408T02020	B59
VNGA160412T02020	B59
VNGA220408T02020	B59
VNMG12T304	F20
VNMG12T304	F20
VNMG12T308	F20
VNMG12T308	F20
VNMG12T308	B43
VNMG16040422	B43
VNMG16040822	B43
VNMP160404SM	B43
VNMP160408SM	B43
VNMP160408SM	B43
VNMS160404FST	B86
VNMS160408FST	B86
WNGA080404FST	B87
WNGA080404S01025MT	B87
WNGA080408FST	B87
WNGA080408S01020MT	B87
WNGA080408S01025MT	B87
WNGA080408T02020	B59
WNGA080412T02020	B59
WNGA080416T02020	B59
WNGX080712T02020	B59
WNMA080408	B43
WNMA080408	B43
WNMA080412	B43
WNMA080412	B43
WNMG06040422	B43
WNMG06040422	B43
WNMG06040422	B43
WNMG06040422	B43
WNMG06040422	B43
WNMG06040422	B43
WNMG06040448	B44
WNMG060404FL	F21
WNMG060404FL	B44
WNMG06040822	B43
WNMG06040822	B43
WNMG06040822	B43
WNMG06040822	B43
WNMG06040822	B43
WNMG06040848	B44
WNMG06040849	B44
WNMG06040849	B44
WNMG06040849	B44
WNMG06040849	B44
WNMG06040849	B44
WNMG0604085	B44
WNMG0604085	F21
WNMG0604085	F21
WNMG0604085	F21
WNMG0604085	B44
WNMG060408FR	F21
WNMG060408FR	B45
WNMG06041248	B44
WNMG0604125	B44
WNMG0604125	B44
WNMG060412FR	F21
WNMG060412FR	B45
WNMG0804044	B43
WNMG0804044	B43
WNMG0804044	B43
WNMG0804044	B43
WNMG08040448	B44
WNMG080404FW	B45
WNMG080404FW	B45
WNMG0804084	B43
WNMG0804084	B43
WNMG0804084	B43
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WNMG08040848	B44
WNMG08040849	B44
WNMG08040849	F21
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WNMG08040849	B44
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WNMG0804085	B44
WNMG0804085	F21
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WNMG0804085	B44
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WNMG0804085	B44
WNMG0804085	B44
WNMG080408AP	B44
WNMG080408AP	B44
WNMG080408AP	B44
WNMG080408AP	B44
WNMG080408AP	B44
WNMG080408FW	B45
WNMG080408FW	B45
WNMG080408MW	B45
WNMG080408MW	B45
WNMG080408MW	B45
WNMG080408SL	B45
WNMG080408SL	B45
WNMG080408SL	B45
WNMG0804124	B43
WNMG0804124	B43
WNMG0804124	B43
WNMG08041248	B44
WNMG08041249	B44
WNMG08041249	B44
WNMG08041249	B44
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WNMG08041249	B44
WNMG0804125	B44
WNMG0804125	F21
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WNMG080412AP	B44
WNMG080412AP	B44
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WNMG080412AP	B44
WNMG080412FW	B45
WNMG080412FW	B45
WNMG080412MW	B45
WNMG080412MW	B45
WNMG080412SL	B45
WNMG080412SL	B45
WNMG080412SL	B45
WNMG08041648	B44
WNMG08041649	B44
WNMG0804165	B44
WNMG0804165	B44
WNMG0804165	B44
WNMP080408SM	B45
WNMP080412SM	B45
WPHT040201	C44
WPHT040201	C44
WPHT040202	C44
WPHT040202	C44
WPHT040204	C44
WPHT040204	C44
WPHTS30101	C44
WPHTS30101	C44
WPHTS30102	C44
WPHTS30102	C44
WPHTS30104	C44
WPHTS30104	C44
WPMT040204LF	C44
WPMT06T304LF	C44
WPMT06T308LF	C44
WPMTS3T104LF	C44
ZNUG181215	G14
ZNUN181215	G14
ZNUR181215	G14
ZNUX120715L	G14
ZNUX181215–1	G14
ZNUX181215L	G14
ZNUX251815L	G14
ZNUX302020–1	G14

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Metalcutting Safety

IMPORTANT SAFETY INSTRUCTIONS

Read before using the tools in this catalogue!

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 produce 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 Kennametal 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 Kennametal's Metalcutting Safety booklet, available free from Kennametal at 724.539.5747 or fax 724.539.5439. For specific product safety and environmental questions, contact our Corporate Environmental Health and Safety Office at 724.539.5066 or fax 724.539.5372.

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