


WIDIA ™



TURNING

A close-up, high-contrast photograph of a metal cutting tool, likely a lathe tool, in the process of machining a metal workpiece. The tool is positioned on the left, and the workpiece is on the right. The tool's cutting edge is visible, and it is creating a smooth, cylindrical surface on the workpiece. The background is dark, making the metallic surfaces stand out. The lighting highlights the texture of the metal and the precision of the machining process.

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 Authorized WIDIA Distributor or visit www.widia.com.

TURNING

Turning

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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 holmaking products in our portfolio and a skilled network of Authorized Distributor partners, you'll find everything you need from one single source.

80+ Years of Quality

1925

Application to register "WIDIA" as a trademark

1930

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

1962

First patent granted for coated carbide inserts

1987

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

2006

WIDIA celebrates 80 years

1926

Tungsten carbide production begins

1968

Launch of first global coated grade

2000

QS 9000 TES and VDA 6.4 certification for the WIDIA operations in Essen and Lichtenau

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 specialized network of Authorized Distributor partners whom you can count on to deliver much more than products.

They will show you how to:

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

The most powerful family of brands in the industry

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

Turning, Holmaking, Indexable Milling, and Tooling Systems

WIDIA

WIDIA
MANCHESTER

WIDIA
CLAPDICO

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 Authorized 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 organized in lines, cells, or as standalone units, our supply chain services program will eliminate unnecessary overhead, ensure tooling availability, shorten setup times, and minimize 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 Centers 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 Authorized Distributor nearest you.



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

To find the Authorized 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 holmaking 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 .010" to 3.000" (0,25mm to 75mm), position WIDIA™ as the preferred brand for high-quality, application-specific tools.

We specialize 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 Mold, 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 catalog. For more information about how these products can impact your bottom line, please contact your local Authorized WIDIA™ Distributor today.





Tools for External Turning, Internal Boring, and Cartridges

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Cartridges	A44–A73



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 program 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.

P style available in metric sizes only.



Clamping System S

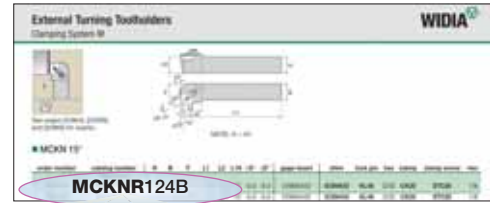
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

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 Catalog Numbers Work?

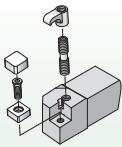
Each character in our catalog number signifies a specific trait of that product. Use the following key columns and corresponding images to easily identify which attributes apply.



M

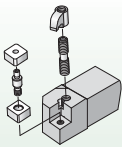
Insert
Clamping System

C



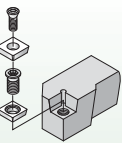
Top clamping
by clamping finger
for inserts without hole.

M



Top and hole clamping
for inserts with hole.

S



Center clamping by screw
for inserts with hole.

C

Insert Shape

A



B



C



D



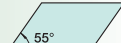
E



H



K



L



M



O



P



R



S



T



V



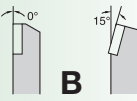
W



K

Toolholder
Style

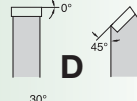
A



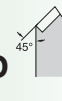
B



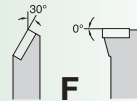
C



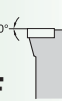
D



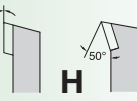
E



F



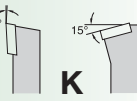
G



H



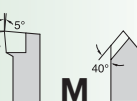
J



K



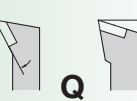
L



M



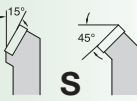
P



Q



R



S



U



V



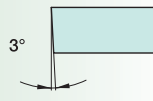
Y



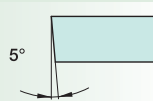
N

Insert Clearance
Angle

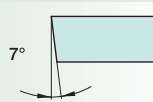
A



B



C



D



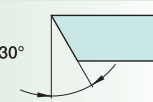
E



F



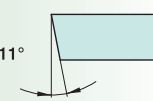
G



N



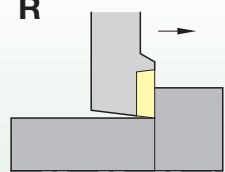
P



R

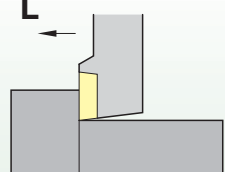
Hand of Tool

R



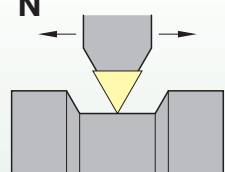
Right hand

L



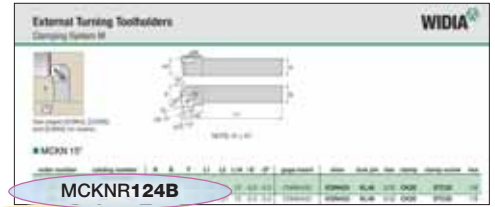
Left hand

N



Neutral

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



Additional Information

C Deep pocket for ceramic insert

S Single pocket locating wall


F Straight shank, no offset

1 2

Shank Dimensions

4

Insert Size



Insert IC
Number of 1/8ths of "D"

B

Qualified Surface and Length

Additional Information

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

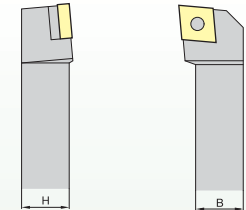
X Additional information

Insert Thickness (optional)

3 .188"

4 .250"

5 .312"



This two-digit number indicates the holder cross section.

- For shanks 5/8" square and larger, the number represents the number of sixteenths of width and height.
- For shanks under 5/8" square, the number of sixteenths of cross section are preceded by zero.
- For rectangular holders, the first digit represents the number of eighths of width "B" and the second digit the number of quarters of height "H", except for a toolholder 1-1/4" x 1-1/2", which is given the number 91.

A qualified back and end, 4" long

B qualified back and end, 4.5" long

C qualified back and end, 5" long

D qualified back and end, 6" long

E qualified back and end, 7" long

F qualified back and end, 8" long

G qualified back and end, 5.5" long

H qualified back and end, 5.625" long

I qualified back and end, 3" long

J qualified back and end, 5.3" long

K qualified back and end, 14" long

L qualified back and end, 6.8" long

M qualified front and end, 4" long

N qualified front and end, 4.5" long

P qualified front and end, 5" long

R qualified front and end, 6" long

S qualified front and end, 7" long

T qualified front and end, 8" long

U qualified front and end, 5.5" long

V qualified back and end, 3.5" long

W qualified front and end, 3.5" long

Y qualified back and end, 3.75" long

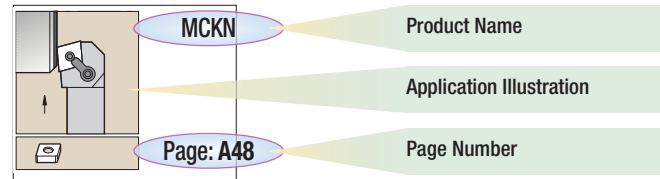
Z qualified back and end, 3.25" long

External Turning Toolholders

Overview

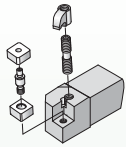


Each unique Clamping System offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



Clamping System M

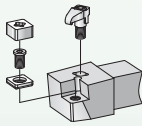
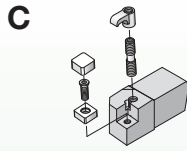
M



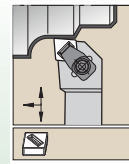
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.

	MCKN 15° Page: A8		MCLN -5° Page: A9		MCMN 40° Page: A10		MCRN 15° Page: A10
	MCYN 40° Page: A11		MDJN -3° Page: A11		MDPN 27.5° Page: A12		MRGN 0° Page: A12
	MSDN 45° Page: A13		MSKN 15° Page: A13		MSRN 15° Page: A14		MSSN 45° Page: A14
	MTCN 0° Page: A15		MTEN-S 30° Page: A15		MTFN 0° Page: A16		MTGN 0° Page: A16
	MTJN-S -3° Page: A17		MWLN -5° Page: A17				

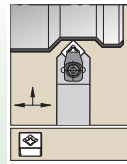
Clamping System C



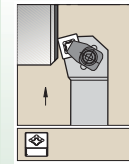
Top clamping system for negative and positive indexable inserts with countersunk hole to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs greater than .250".



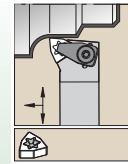
CCLN-MX
-5°
Page: **A18**



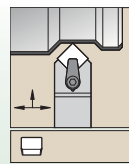
CSDN-MX
45°
Page: **A18**



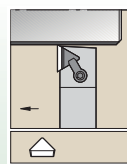
CSKN-MX
15°
Page: **A18**



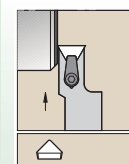
CWLN-MX
-5°
Page: **A19**



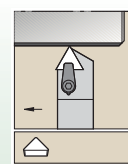
CSDP
45°
Page: **A19**



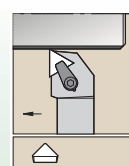
CTAP
0°
Page: **A20**



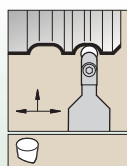
CTCP
0°
Page: **A20**



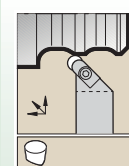
CTEP
30°
Page: **A20**



CTGP
0°
Page: **A21**



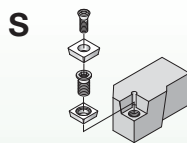
CRDP*
0°
Page: **A22**



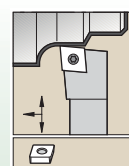
CRGP*
45°
Page: **A22**

*Exact Clamping System not shown.

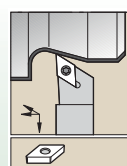
Clamping System S



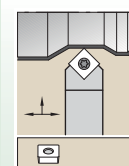
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs from .375" are secured by means of a threaded bushing.



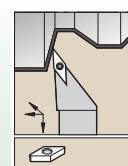
SCLC
-5°
Page: **A23**



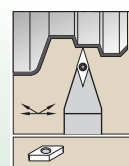
SDJC
-3°
Page: **A23**



SSDC
45°
Page: **A24**



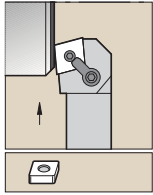
SVJB
-3°
Page: **A24**



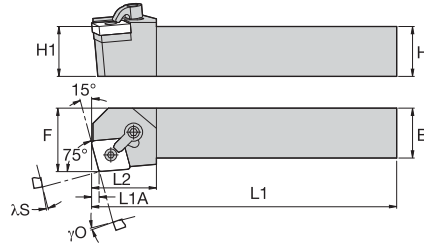
SWB
17.5°
Page: **A24**

External Turning Toolholders

Clamping System M



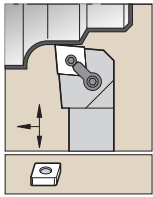
See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.



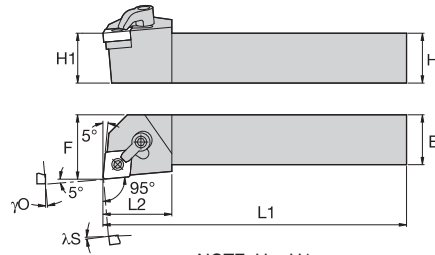
NOTE: H = H1

■ MCKN 15°

order number	catalog number	H	B	F	L1	L2	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand																
3851289	MCKNR124B	.75	.75	1.000	4.50	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951294	MCKNR164C	1.00	1.00	1.250	5.00	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951295	MCKNR164D	1.00	1.00	1.250	6.00	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851290	MCKNR165D	1.00	1.00	1.250	6.00	1.25	.15	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK9	STC4	5/32
3851292	MCKNR205D	1.25	1.25	1.500	6.00	1.25	.15	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK9	STC4	5/32
2951296	MCKNR166D	1.00	1.00	1.250	6.00	1.44	.18	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
3851293	MCKNR206D	1.25	1.25	1.500	6.00	1.47	.18	-5.0	-5.0	CNMA643	ISSN633	KL68	9/64	CK12	STC4	5/32
Left hand																
3851294	MCKNL124B	.75	.75	1.000	4.50	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851295	MCKNL164C	1.00	1.00	1.250	5.00	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	1/8	CK20	STC20	1/8
3851296	MCKNL164D	1.00	1.00	1.250	6.00	1.21	.12	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851297	MCKNL165D	1.00	1.00	1.250	6.00	1.25	.15	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK9	STC4	5/32
3851298	MCKNL205D	1.25	1.25	1.500	6.00	1.25	.15	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK9	STC4	5/32
2951293	MCKNL166D	1.00	1.00	1.250	6.00	1.44	.18	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
3851299	MCKNL206D	1.25	1.25	1.500	6.00	1.47	.18	-5.0	-5.0	CNMA643	ISSN633	KL68	9/64	CK12	STC4	5/32



See pages B16-B19, B47, B51-B52, and B74-B76 for inserts.



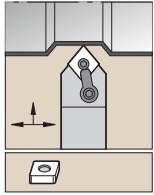
NOTE: H = H1

■ MCLN -5°

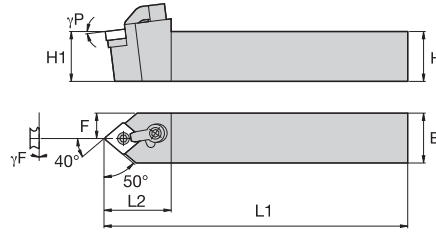
order number	catalog number	H	B	F	L1	L2	λS°	γ0°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand														
3851300	MCLNR103A	.63	.63	.875	4.00	1.00	-5.0	-5.0	CNMA322	—	KL33	5/64	CK6	STC5	3/32
3851301	MCLNR123B	.75	.75	1.000	4.50	1.00	-5.0	-5.0	CNMA322	ICSN332	KL34L	5/64	CK6	STC5	3/32
3851302	MCLNR163C	1.00	1.00	1.250	5.00	1.00	-5.0	-5.0	CNMA322	ICSN332	KL34L	5/64	CK6	STC5	3/32
2951304	MCLNR124B	.75	.75	1.000	4.50	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951305	MCLNR164C	1.00	1.00	1.250	5.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2953418	MCLNR164D	1.00	1.00	1.250	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851304	MCLNR854D	1.25	1.00	1.250	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2953422	MCLNR204D	1.25	1.25	1.500	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851303	MCLNR244D	1.50	1.50	2.000	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2953419	MCLNR165C	1.00	1.00	1.250	5.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
2953420	MCLNR165D	1.00	1.00	1.250	6.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
2953453	MCLNR205D	1.25	1.25	1.500	6.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
3851305	MCLNR245E	1.50	1.50	2.000	4.64	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
2953421	MCLNR166D	1.00	1.00	1.250	6.00	1.49	-5.0	-5.0	CNMA643	ICSN643	KL68	9/64	CK12	STC4	5/32
3851307	MCLNR856D	1.25	1.00	1.251	6.00	1.49	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
2953454	MCLNR206D	1.25	1.25	1.500	6.00	1.49	-5.0	-5.0	CNMA643	ICSN643	KL68	9/64	CK12	STC4	5/32
2953455	MCLNR246D	1.50	1.50	2.000	6.00	1.49	-5.0	-5.0	CNMA643	ICSN643	KL68	9/64	CK12	STC4	5/32
3851306	MCLNR246E	1.50	1.50	2.000	7.00	1.49	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
	Left hand														
3851308	MCLNL103A	.63	.63	.875	4.00	1.00	-5.0	-5.0	CNMA322	—	KL33	5/64	CK6	STC5	3/32
3851309	MCLNL123B	.75	.75	1.000	4.50	1.00	-5.0	-5.0	CNMA322	ICSN332	KL34L	5/64	CK6	STC5	3/32
2951297	MCLNL124B	.75	.75	1.000	4.50	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951298	MCLNL164C	1.00	1.00	1.250	5.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951299	MCLNL164D	1.00	1.00	1.250	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851311	MCLNL854D	1.25	1.00	1.250	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951301	MCLNL204D	1.25	1.25	1.500	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851310	MCLNL244D	1.50	1.50	2.000	6.00	1.20	-5.0	-5.0	CNMA432	ICSN433	KL46	1/8	CK20	STC20	1/8
3851312	MCLNL165C	1.00	1.00	1.250	5.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
3851313	MCLNL165D	1.00	1.00	1.250	6.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
2951302	MCLNL205D	1.25	1.25	1.500	6.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	1/8
3851314	MCLNL245E	1.50	1.50	2.000	7.00	1.37	-5.0	-5.0	CNMA543	ICSN533	KL58	1/8	CK12	STC4	5/32
2951300	MCLNL166D	1.00	1.00	1.250	6.00	1.49	-5.0	-5.0	CNMA643	ICSN643	KL68	9/64	CK12	STC4	5/32
3851317	MCLNL856D	1.25	1.00	1.250	6.00	1.49	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
2951303	MCLNL206D	1.25	1.25	1.500	6.00	1.49	-5.0	-5.0	CNMA643	ICSN643	KL68	9/64	CK12	STC4	1/8
3851315	MCLNL246D	1.50	1.50	2.000	6.00	1.49	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32
3851316	MCLNL246E	1.50	1.50	2.000	7.00	1.49	-5.0	-5.0	CNMA643	ICSN633	KL68	9/64	CK12	STC4	5/32

External Turning Toolholders

Clamping System M



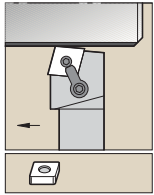
See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.



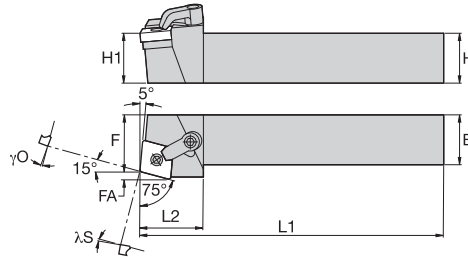
NOTE: H = H1

■ MCMN 40°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
3851318	MCMNN124B	.75	.75	.375	4.50	1.39	0.0	-7.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851319	MCMNN164D	1.00	1.00	.500	6.00	1.39	0.0	-7.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
3851320	MCMNN166D	1.00	1.00	.500	6.00	1.67	0.0	-7.0	CN..643	ICSN633	KL68	9/64	CK12	STC4	5/32
3851321	MCMNN206D	1.25	1.25	.625	6.00	1.67	0.0	-7.0	CN..643	ICSN633	KL68	9/64	CK12	STC4	5/32



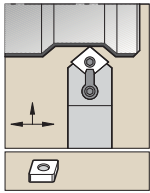
See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.



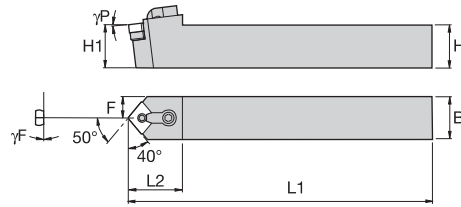
NOTE: H = H1

■ MCRN 15°

order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
2953457	MCRNR164D	1.00	1.00	1.251	6.00	1.24	.12	—	-5.0	-5.0	CN..432	ICSN433	KL46	3/32	CK9	STC4	5/32
	Left hand																
2953456	MCRNL206	1.25	1.25	1.501	6.00	1.49	.18	—	-5.0	-5.0	CN..643	ICSN643	KL68	9/64	CK12	STC4	5/32



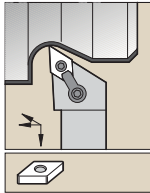
See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.



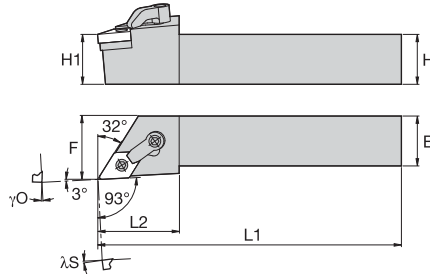
NOTE: H = H1

MCYN 40°

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
Left hand																		
2953458	MCYNN854	1.25	1.00	.500	6.00	1.25	—	—	0.0	-7.0	CN..432	ICSN433	KL46	3/32	CK20	STC11	1/8	



See pages B22–B25, B53, and B80–B81 for inserts.



NOTE: H = H1

MDJN -3°

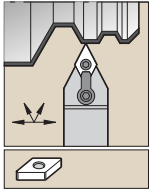
order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
Right hand																		
3851355	MDJNR163D	1.00	1.00	1.250	5.00	1.25	—	—	-5.0	-5.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32	
3851356	MDJNR203D	1.25	1.25	1.500	6.00	1.25	—	—	-5.0	-5.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32	
3851357	MDJNR243D	1.50	1.50	2.000	6.00	1.25	—	—	-5.0	-5.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32	
2953464	MDJNR124B	.75	.75	1.000	4.50	1.38	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK23	STC20	1/8	
2953465	MDJNR164C	1.00	1.00	1.250	5.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
2953466	MDJNR164D	1.00	1.00	1.250	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
2953469	MDJNR854D	1.25	1.00	1.250	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
2953467	MDJNR204D	1.25	1.25	1.500	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
2953468	MDJNR244E	1.50	1.50	2.000	7.00	1.25	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
Left hand																		
3851358	MDJNL163D	1.00	1.00	1.250	6.00	1.25	—	—	-5.0	-5.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32	
3851359	MDJNL203D	1.25	1.25	1.500	6.00	1.25	—	—	-5.0	-5.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32	
2953459	MDJNL124B	.75	.75	1.000	4.50	1.38	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK23	STC20	1/8	
3851360	MDJNL164C	1.00	1.00	1.250	5.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN443	KL46L	3/32	CK20	STC20	1/8	
2953460	MDJNL164D	1.00	1.00	1.250	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
3851361	MDJNL854D	1.25	1.00	1.250	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN443	KL46L	3/32	CK20	STC20	1/8	
2953461	MDJNL204D	1.25	1.25	1.500	6.00	1.24	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	
2953462	MDJNL244D	1.50	1.50	2.000	6.00	1.38	—	—	-5.0	-5.0	DN..432	IDSN443	KL46L	3/32	CK20	STC20	1/8	
2953463	MDJNL244E	1.50	1.50	2.000	7.00	1.25	—	—	-5.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK20	STC20	1/8	

External Turning Toolholders

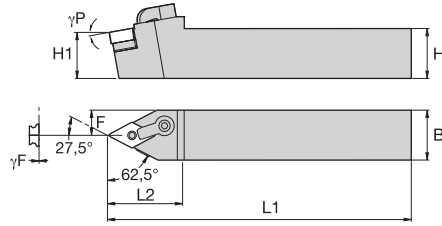
Clamping System M



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



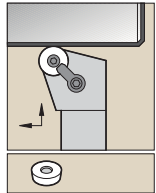
See pages B22–B25, B53, and B80–B81 for inserts.



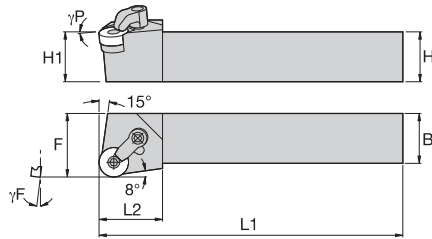
NOTE: H = H1

■ MDPN 27.5°

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
3851362	MDPNN163D	1.00	1.00	.500	6.00	1.50	—	—	0.0	-10.0	DN..332	IDSN322	KL34L	5/64	CK7	STC5	3/32
2953470	MDPNN164D	1.00	1.00	.500	6.00	1.63	—	—	0.0	-10.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32



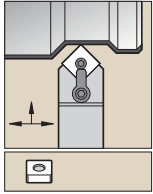
See page B28 for inserts.



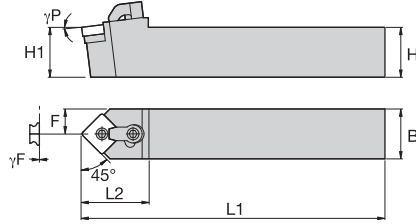
NOTE: H = H1

■ MRGN 0°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand															
2953472	MRGNR164D	1.00	1.00	1.250	6.00	1.00	—	-5.0	RN..43	IRSN43	KL46	3/32	CK9	STC4	5/32
3851363	MRGNR204D	1.25	1.25	1.500	6.00	1.00	-5.0	-5.0	RN..43	IRSN43	KL46	3/32	CK9	STC4	5/32
3851364	MRGNR248E	1.50	1.50	2.000	7.00	1.56	-5.0	-5.0	RN..86	IRSN84	KL810	5/32	CK24	STC19	3/16
Left hand															
2953471	MRGNL164D	1.00	1.00	1.250	6.00	1.00	-5.0	-5.0	RN..43	IRSN43	KL46	3/32	CK9	STC4	5/32
3851365	MRGNL204D	1.25	1.25	1.500	6.00	1.00	-5.0	-5.0	RN..43	IRSN43	KL46	3/32	CK9	STC4	5/32
3851366	MRGNL248E	1.50	1.50	2.000	7.00	1.56	-5.0	-5.0	RN..86	IRSN84	KL810	5/32	CK24	STC19	3/16



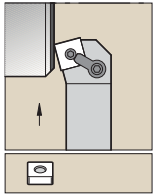
See pages B30–B32, B56–57, and B83–B84 for inserts.



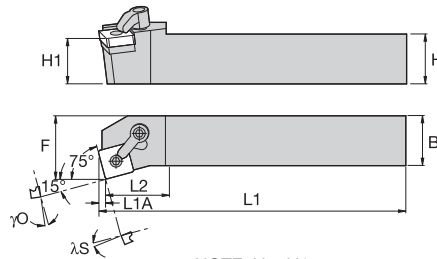
NOTE: H = H1

■ MSDN 45°

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
2953473	MSDNN083	.50	.50	.250	4.50	1.14	—	—	0.0	-7.0	SN..322	ISSN322	KL34	5/64	CK6	STC5	3/32
3851335	MSDNN103	.63	.63	.313	4.50	1.14	—	—	0.0	-7.0	SN..322	ISSN322	KL34	5/64	CK6	STC5	3/32
2953474	MSDNN123	.75	.75	.375	4.50	1.14	—	—	0.0	-7.0	SN..322	ISSN322	KL34	5/64	CK6	STC5	3/32
2953475	MSDNN124	.75	.75	.375	4.50	1.39	—	—	0.0	-7.0	SN..432	ISSN443	KL46	3/32	CK9	STC4	5/32
2953476	MSDNN164	1.00	1.00	.500	6.00	1.39	—	—	0.0	-7.0	SN..432	ISSN443	KL46	3/32	CK9	STC4	5/32
3851336	MSDNN855	1.25	1.00	.500	6.00	1.63	—	—	0.0	-7.0	SN..543	ISSN533	KL58	1/8	CK12	STC4	5/32
2953477	MSDNN206	1.25	1.25	.625	7.00	1.63	—	—	0.0	-7.0	SN..643	ISSN633	KL68	9/64	CK12	STC4	5/32
3851337	MSDNN246	1.50	1.50	.740	7.00	1.63	—	—	0.0	-7.0	SN..643	ISSN633	KL68	9/64	CK12	STC4	5/32



See pages B30–B32, B56–57, and B83–B84 for inserts.



NOTE: H = H1

■ MSKN 15°

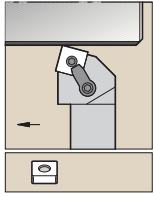
order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
2951308	Right hand MSKNR123B	.75	.75	.875	4.50	1.03	—	.09	-5.0	-5.0	SN..322	ISSN322	KL34	5/64	CK6	STC5	3/32

External Turning Toolholders

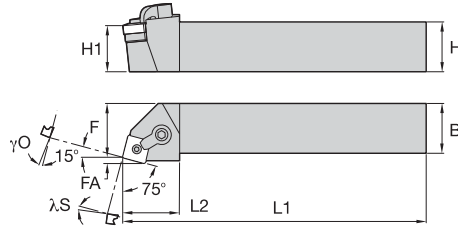
Clamping System M



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



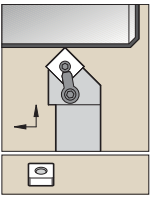
See pages B30–B32, B56–57, and B83–B84 for inserts.



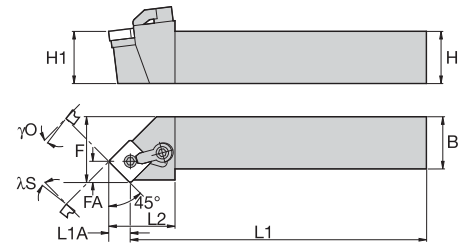
NOTE: H = H1

MSRN 15°

order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
	Right hand																	
2951311	MSRNR124B	.75	.75	.880	4.50	1.23	.12	—	-5.0	-5.0	SN..432	ISSN443	KL46	3/32	CK9	STC4	5/32	
2951312	MSRNR206D	1.25	1.25	1.321	6.00	1.50	.18	—	-5.0	-5.0	SN..643	ISSN633	KL68	9/64	CK12	STC4	5/32	
	Left hand																	
2951309	MSRNL165D	1.00	1.00	1.103	6.00	1.34	.15	—	-5.0	-5.0	SN..543	ISSN533	KL58	1/8	CK12	STC4	5/32	
2951310	MSRNL866E	1.50	1.00	1.071	7.00	1.50	.18	—	-5.0	-5.0	SN..643	ISSN633	KL68	9/64	CK12	STC4	5/32	



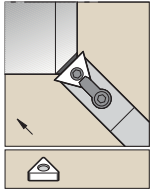
See pages B30–B32, B56–57, and B83–B84 for inserts.



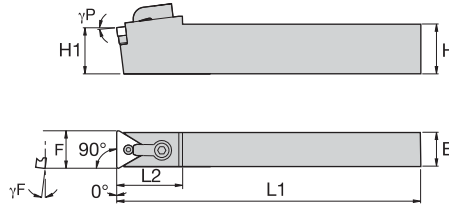
NOTE: H = H1

MSSN 45°

order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
	Right hand																	
3851322	MSSNR123B	.75	.75	.641	4.50	1.12	.25	.25	-5.5	-8.4	SN..322	ISSN322	KL34	5/64	CK6	STC5	3/32	
3851323	MSSNR124B	.75	.75	.662	4.50	1.24	.34	.33	-5.5	-8.4	SN..432	ISSN433	KL46	3/32	CK9	STC4	5/32	
2951323	MSSNR164D	1.00	1.00	.912	6.00	1.24	.34	.33	-5.5	-8.4	SN..432	ISSN443	KL46	3/32	CK9	STC4	5/32	
3851324	MSSNR854D	1.25	1.00	.912	6.00	1.24	.34	.33	-5.5	-8.4	SN..432	ISSN433	KL46	3/32	CK9	STC4	5/32	
3851325	MSSNR165D	1.00	1.00	.828	6.00	1.38	.42	.42	-5.5	-8.4	SN..543	ISSN533	KL58	1/8	CK9	STC4	5/32	
3851326	MSSNR205D	1.25	1.25	1.078	6.00	1.38	.42	.42	-5.5	-8.4	SN..543	ISSN533	KL58	1/8	CK9	STC4	5/32	
3851327	MSSNR206D	1.25	1.25	.992	6.00	1.48	.51	.53	-5.5	-8.4	SN..643	ISSN633	KL68	9/64	CK9	STC4	5/32	
3851328	MSSNR246D	1.50	1.50	1.511	6.00	1.48	.51	.53	-5.5	-8.4	SN..643	ISSN633	KL68	9/64	CK9	STC4	5/32	
	Left hand																	
3851329	MSSNL164D	1.00	1.00	.912	6.00	1.24	.34	.33	-5.5	-8.4	SN..432	ISSN433	KL46	3/32	CK9	STC4	5/32	
3851330	MSSNL854D	1.25	1.00	.912	6.00	1.24	.34	.33	-5.5	-8.4	SN..432	ISSN433	KL46	3/32	CK9	STC4	5/32	
3851331	MSSNL165D	1.00	1.00	.828	6.00	1.38	.42	.42	-5.5	-8.4	SN..543	ISSN533	KL58	1/8	CK9	STC4	5/32	
3851332	MSSNL205D	1.25	1.25	1.078	6.00	1.38	.42	.42	-5.5	-8.4	SN..543	ISSN533	KL58	1/8	CK9	STC4	5/32	
3851333	MSSNL206D	1.25	1.25	.992	6.00	1.48	.51	.53	-5.5	-8.4	SN..643	ISSN633	KL68	9/64	CK9	STC4	5/32	
3851334	MSSNL246D	1.50	1.50	1.511	6.00	1.48	.51	.53	-5.5	-8.4	SN..643	ISSN633	KL68	9/64	CK9	STC4	5/32	



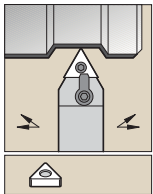
See pages B36–B39, B58, and B86 for inserts.



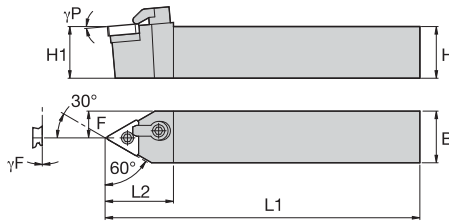
NOTE: H = H1

■ MTCN 0°

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
2951324	MTCNN644	1.00	.75	.775	8.00	1.43	—	—	0.0	-7.0	TN..432	ITSN423	KL46	3/32	CK12	STC4	5/32



See pages B36–B39, B58, and B86 for inserts.



NOTE: H = H1

■ MTEN-S 30°

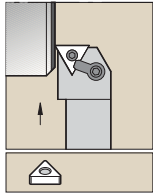
order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
2951325	MTENNS103	.63	.63	.312	4.50	1.16	—	—	0.0	-10.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
2951326	MTENNS123	.75	.75	.375	4.50	1.16	—	—	0.0	-10.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
3851368	MTENNS163	1.00	1.00	.495	5.00	1.16	—	—	—	—	TN..332	ITSN323	KL34L	5/64	CK6	STC5	3/32
2951327	MTENNS164	1.00	1.00	.500	6.00	1.50	—	—	0.0	-10.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32
3851369	MTENNS854	1.25	1.00	.490	6.00	1.41	—	—	0.0	-10.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32
2951328	MTENNS205	1.25	1.25	.625	6.00	1.64	—	—	0.0	-10.0	TN..543	ITSN534	KL58	1/8	CK9	STC4	5/32

External Turning Toolholders

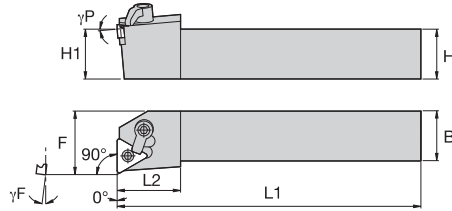
Clamping System M



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



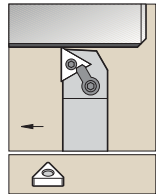
See pages B36–B39, B58, and B86 for inserts.



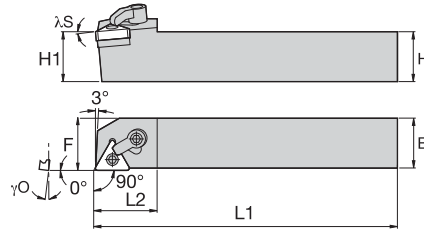
NOTE: H = H1

■ MTFN 0°

order number	catalog number	H	B	F	L1	L2	FA	L1A	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
Right hand																		
2951330	MTFNR123B	.75	.75	1.000	4.50	.94	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
2951331	MTFNR164D	1.00	1.00	1.250	6.00	1.22	—	—	-5.0	-5.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32	
3851339	MTFNR854D	1.25	1.00	1.250	6.00	1.22	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851338	MTFNR204D	1.25	1.25	1.500	6.00	1.22	—	—	—	—	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851340	MTFNR205D	1.25	1.25	1.500	6.00	1.43	—	—	—	—	TN..543	ITSN534	KL58	1/8	CK12	STC4	5/32	
3851341	MTFNR245D	1.50	1.50	2.000	6.00	1.43	—	—	—	—	TN..543	ITSN534	KL58	1/8	CK12	STC4	5/32	
Left hand																		
2951329	MTFNL123B	.75	.75	1.000	4.50	.94	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
3851342	MTFNL163D	1.00	1.00	1.250	6.00	.94	—	—	-5.0	-5.0	TN..332	ITSN323	KL34L	5/64	CK6	STC5	3/32	
3851343	MTFNL204D	1.25	1.25	1.500	6.00	1.22	—	—	—	—	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851344	MTFNL245D	1.50	1.50	2.000	6.00	1.43	—	—	0.0	-10.0	TN..543	ITSN534	KL58	1/8	CK12	STC4	5/32	



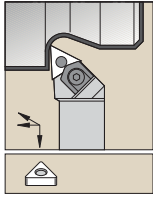
See pages B36–B39, B58, and B86 for inserts.



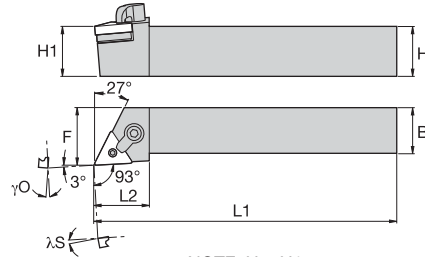
NOTE: H = H1

■ MTGN 0°

order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex	
Right hand																		
3851345	MTGNR103B	.63	.63	.875	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
2951332	MTGNR123B	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
3851346	MTGNR163D	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
2951333	MTGNR164C	1.00	1.00	1.250	5.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32	
2951334	MTGNR164D	1.00	1.00	1.250	6.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851347	MTGNR204D	1.25	1.25	1.500	6.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851348	MTGNR205D	1.25	1.25	1.250	6.00	1.44	—	—	-5.0	-5.0	TN..543	ITSN534	KL58	1/8	CK9	STC4	5/32	
Left hand																		
3851349	MTGNL103B	.63	.63	.875	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32	
3851350	MTGNL123B	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN323	KL34L	5/64	CK6	STC5	3/32	
3851351	MTGNL164C	1.00	1.00	1.250	5.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851352	MTGNL164D	1.00	1.00	1.250	6.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851353	MTGNL204D	1.25	1.25	1.500	6.00	1.20	—	—	-5.0	-5.0	TN..432	ITSN433	KL46	3/32	CK9	STC4	5/32	
3851354	MTGNL205D	1.25	1.25	1.250	6.00	1.44	—	—	-5.0	-5.0	TN..543	ITSN534	KL58	1/8	CK9	STC4	5/32	



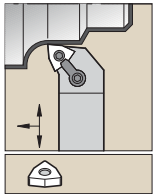
See pages B36–B39, B58, and B86 for inserts.



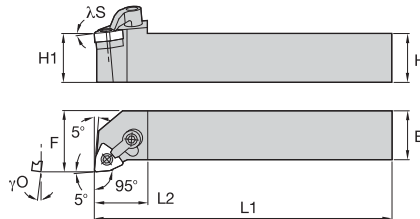
NOTE: H = H1

■ MTJN-S -3°

order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
2951340	MTJNRS123	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
2951341	MTJNRS163	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
2951342	MTJNRS164	1.00	1.00	1.250	6.00	1.19	—	—	-5.0	-5.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32
2951343	MTJNRS246	1.50	1.50	2.000	7.00	1.63	—	—	-5.0	-5.0	TN..663	ITSN636	KL68L	9/64	CK12	STC4	5/32
	Left hand																
2951335	MTJNLS123	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
2951336	MTJNLS163	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK6	STC5	3/32
2951337	MTJNLS164	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32
2951338	MTJNLS204	1.25	1.25	1.500	6.00	1.19	—	—	-5.0	-5.0	TN..432	ITSN423	KL46	3/32	CK9	STC4	5/32
2951339	MTJNLS246	1.50	1.50	2.000	7.00	1.63	—	—	-5.0	-5.0	TN..663	ITSN636	KL68L	9/64	CK12	STC4	5/32



See pages B44–B46, B60, and B89 for inserts.



NOTE: H = H1

■ MWLN -5°

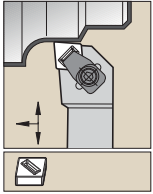
order number	catalog number	H	B	F	L1	L2	FA	L1A	λS°	γO°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand																
2951346	MWLN123B	.75	.75	1.000	4.50	.88	—	—	-5.0	-5.0	WN..332	IWSN332	KL34L	5/64	CK6	STC5	3/32
3851370	MWLN163D	1.00	1.00	1.250	6.00	.87	—	—	-5.0	-5.0	WN..332	IWSN322	KL34L	5/64	CK6	STC5	3/32
2951347	MWLN124B	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK21	STC20	1/8
2951348	MWLN164D	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK9	STC4	5/32
2951349	MWLN204D	1.25	1.25	1.500	6.00	1.12	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK9	STC4	5/32
	Left hand																
3851371	MWLN123B	.75	.75	1.000	4.50	.87	—	—	-5.0	-5.0	WN..332	IWSN322	KL34L	5/64	CK6	STC5	3/32
3851372	MWLN163D	1.00	1.00	1.250	6.00	.87	—	—	-5.0	-5.0	WN..332	IWSN322	KL34L	5/64	CK6	STC5	3/32
2951344	MWLN124B	.75	.75	1.000	4.50	1.12	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK21	STC20	1/8
2951345	MWLN164D	1.00	1.00	1.250	6.00	1.12	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK9	STC4	5/32
3851373	MWLN204D	1.25	1.25	1.500	6.00	1.13	—	—	-5.0	-5.0	WN..432	IWSN433	KL46	3/32	CK9	STC4	5/32

External Turning Toolholders

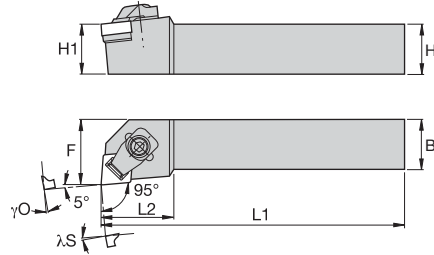
Clamping System C



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



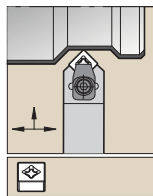
See pages B51–B52 for inserts.



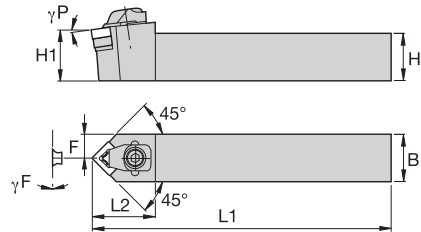
NOTE: H = H1

■ CCLN-MX -5°

order number	catalog number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	Torx	clamp assembly	Torx
Right hand														
3093607	CCLNR164DMX5	1.00	1.00	1.250	6.00	1.25	-5.0	-5.0	CN.X452	552.221	554.260	T20	551.326	T25
3093608	CCLNR165DMX5	1.00	1.00	1.250	6.00	1.38	-5.0	-5.0	CN.X553	552.223	554.261	T25	551.342	T25
Left hand														
3093605	CCLNL164DMX5	1.00	1.00	1.250	6.00	1.25	-5.0	-5.0	CN.X452	552.221	554.260	T20	551.326	T25
3093606	CCLNL244DMX5	1.50	1.50	2.000	6.00	1.25	-5.0	-5.0	CN.X452	552.221	554.260	T20	551.326	T25



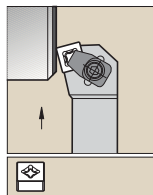
See pages B56–B57 for inserts.



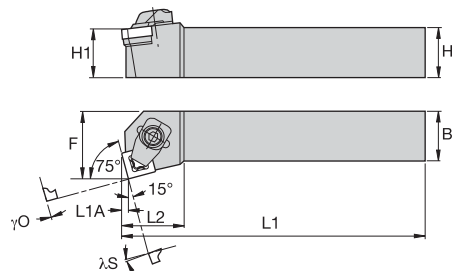
NOTE: H = H1

■ CSDN-MX 45°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	Torx	clamp assembly	Torx
3093609	CSDNN164DMX5	1.00	1.00	.500	6.00	1.38	0.0	-7.0	SN.X452	552.232	554.260	T20	551.326	T25



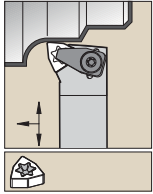
See pages B56–B57 for inserts.



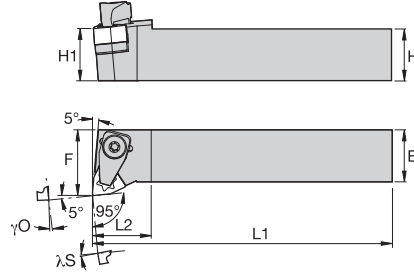
NOTE: H = H1

■ CSKN-MX 15°

order number	catalog number	H	B	F	L1	L2	L1A	λS°	γO°	gage insert	shim	shim screw	Torx	clamp assembly	Torx
Right hand															
3093281	CSKNR164DMX5	1.00	1.00	1.250	6.00	1.06	.12	-5.0	-5.0	SN.X452	552.232	554.260	T20	551.326	T25
Left hand															
3093282	CSKNL164DMX5	1.00	1.00	1.250	6.00	1.06	.12	-5.0	-5.0	SN.X452	552.232	554.260	T20	551.326	T25



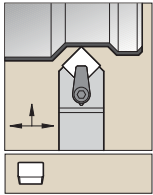
See page B60 for inserts.



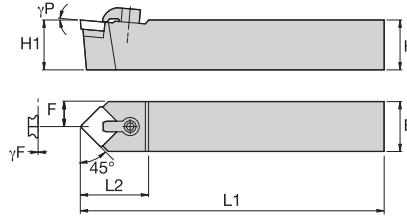
NOTE: H = H1

■ **CWLN-MX -5°**

order number	catalog number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	Torx	clamp assembly	Torx
Right hand														
3093603	CWLN164DMX5	1.00	1.00	1.250	6.00	1.12	-5.0	-5.0	WN.X452	552.210	554.260	T20	551.326	T25
Left hand														
3093604	CWLN164DMX5	1.00	1.00	1.250	6.00	1.12	-5.0	-5.0	WN.X452	552.210	554.260	T20	551.326	T25



See pages B34 and B56 for inserts.



NOTE: H = H1

■ **CSDP 45°**

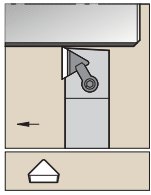
order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
2951032	CSDPN103	.63	.63	.310	4.50	.94	0.0	5.0	SP.322	SM120	SL344	—	CK7	STC5	3/32
2951284	CSDPN124	.75	.75	.372	4.50	1.38	0.0	5.0	SP.422	SM40	S111	1/16	CK10	STC8	5/32
2951285	CSDPN164	1.00	1.00	.497	6.00	1.38	0.0	5.0	SP.422	SM40	S111	1/16	CK9	STC4	5/32

External Turning Toolholders

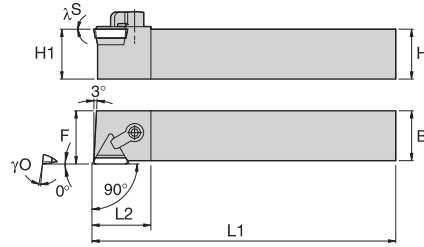
Clamping System C



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



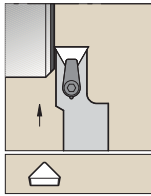
See pages B40–B41, B59, and B86–B87 for inserts.



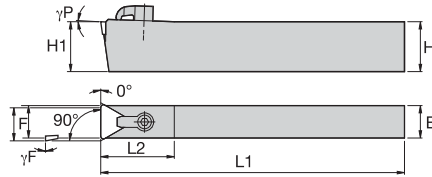
NOTE: H = H1

CTAP 0°

order number	catalog number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand														
2951286	CTAPR082B	.50	.50	.500	4.50	.75	0.0	5.0	TP.221	SM119	SL344	—	CK19	STC9	3/32
2951287	CTAPR123B	.75	.75	.750	4.50	1.06	0.0	5.0	TP.322	SM41	S111	1/16	CK10	STC8	5/32



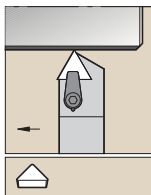
See pages B40–B41, B59, and B86–B87 for inserts.



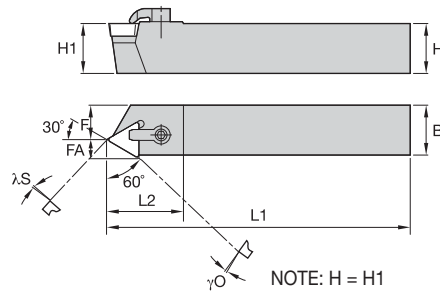
NOTE: H = H1

CTCP 0°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Left hand														
2951288	CTCPN443	1.00	.50	.542	8.00	1.19	0.0	3.0	TP.322	SM41	S111	1/16	CK23	STC11	1/8



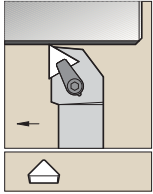
See pages B40–B41, B59, and B86–B87 for inserts.



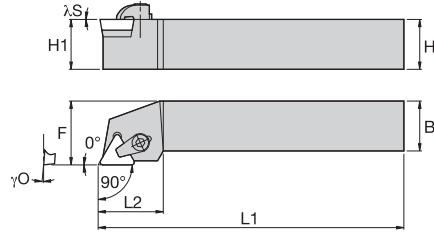
NOTE: H = H1

CTEP 30°

order number	catalog number	H	B	F	L1	L2	FA	λS°	γO°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand															
2951289	CTEPR123B	.75	.75	.460	4.50	1.25	.28	0.0	5.0	TP.322	SM41	S111	1/16	CK10	STC8	5/32
2951290	CTEPR163D	1.00	1.00	.700	6.00	1.25	.28	0.0	5.0	TP.322	SM41	S111	1/16	CK9	STC4	5/32



See pages B40–B41, B59, and B86–B87 for inserts.



NOTE: H = H1

■ CTGP 0°

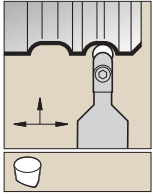
order number	catalog number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
2951292	Right hand CTGPR123B	.75	.75	1.000	4.50	1.13	0.0	5.0	TPG322	SM41	S111	1/16	CK10	STC8	5/32
2951291	Left hand CTGPL123B	.75	.75	1.000	4.50	1.13	0.0	5.0	TPG322	SM41	S111	1/16	CK10	STC8	5/32

External Turning Toolholders

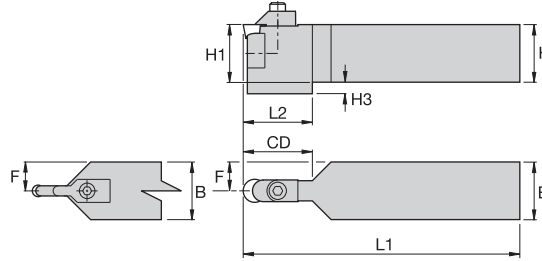
Clamping System C



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



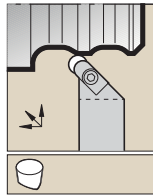
See page B54 for inserts.



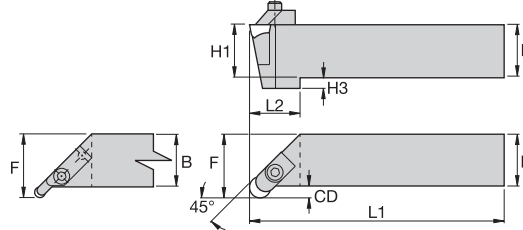
NOTE: H = H1

■ CRDP 0°

order number	catalog number	H	B	F	L1	L2	CD	H3	gage insert	nest	clamp	clamp screw	hex
3871495	CRDPN162DV	1.00	1.00	.496	6.00	—	.75	—	R..V23	NST1	CM214	MS1321	2.5mm
3871496	CRDPN163DV	1.00	1.00	.496	6.00	—	1.13	—	R..V35	NST2	CM219	CS412	3.5mm
3871497	CRDPN203DV	1.25	1.25	.621	6.00	—	1.13	—	R..V35	NST2	CM219	CS412	3.5mm
3871498	CRDPN164DV	1.00	1.00	.496	6.00	1.50	1.50	.25	R..V45	NST3	CM216	CS412	3.5mm
3871499	CRDPN204DV	1.25	1.25	.621	6.00	—	1.50	—	R..V45	NST3	CM216	CS412	3.5mm



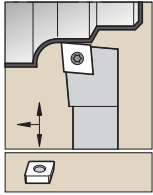
See page B54 for inserts.



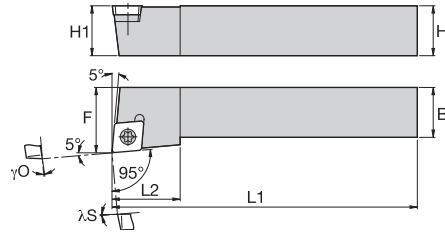
NOTE: H = H1

■ CRGP 45°

order number	catalog number	H	B	F	L1	L2	CD	H3	gage insert	nest	clamp	clamp screw	hex
	Right hand												
3871500	CRGPR162DV	1.00	1.00	1.250	6.00	—	.25	—	R..V23	NST1	CM214	MS1321	2.5mm
3871502	CRGPR163DV	1.00	1.00	1.250	6.00	—	.25	—	R..V35	NST2	CM219	CS412	3.5mm
3871504	CRGPR203DV	1.25	1.25	1.500	6.00	—	.25	—	R..V35	NST2	CM219	CS412	3.5mm
3871506	CRGPR164DV	1.00	1.00	1.250	6.00	1.19	.25	.25	R..V45	NST3	CM216	CS412	3.5mm
3871508	CRGPR204DV	1.25	1.25	1.500	6.00	—	.25	—	R..V45	NST3	CM216	CS412	3.5mm
	Left hand												
3871501	CRGPL162DV	1.00	1.00	1.250	6.00	—	.25	—	R..V23	NST1	CM214	MS1321	2.5mm
3871503	CRGPL163DV	1.00	1.00	1.250	6.00	—	.25	—	R..V35	NST2	CM219	CS412	3.5mm
3871505	CRGPL203DV	1.25	1.25	1.500	6.00	—	.25	—	R..V35	NST2	CM219	CS412	3.5mm
3871507	CRGPL164DV	1.00	1.00	1.250	6.00	1.19	.25	.25	R..V45	NST3	CM216	CS412	3.5mm
3871509	CRGPL204DV	1.25	1.25	1.500	6.00	—	.25	—	R..V45	NST3	CM216	CS412	3.5mm



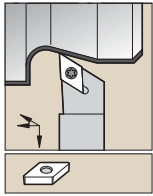
See pages B14–B16, B47, and B72–B73 for inserts.



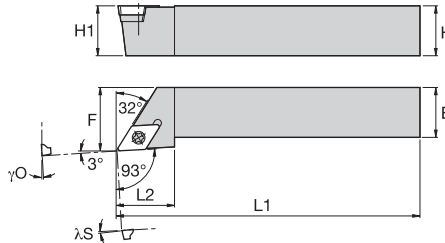
NOTE: H = H1

■ SCLC -5°

order number	catalog number	H	B	F	L1	L2	λS°	γ0°	gage insert	shim	shim screw	hex	insert screw	Torx
Right hand														
2951352	SCLCR062	.38	.38	.500	2.50	.50	0.0	0.0	CC..2151	—	—	—	MS1153	T7
2951363	SCLCR083	.50	.50	.625	3.50	.63	0.0	0.0	CC..3252	—	—	—	MS1155	T15
2951364	SCLCR103	.63	.63	.750	4.00	.62	0.0	0.0	CC..3252	SKCP343	SRS3	3.5mm	MS1156	T15
2951365	SCLCR123	.75	.75	1.000	4.50	.62	0.0	0.0	CC..3252	SKCP343	SRS3	3.5mm	MS1156	T15
2951366	SCLCR164D	1.00	1.00	1.250	6.00	.75	0.0	0.0	CC..432	SKCP453	SRS4	4mm	MS1158	T15
Left hand														
2951350	SCLCL062	.38	.38	.500	2.50	.50	0.0	0.0	CC..2151	—	—	—	MS1153	T7
2951351	SCLCL083	.50	.50	.625	3.50	.63	0.0	0.0	CC..3252	—	—	—	MS1155	T15



See pages B20–B21, B48, and B79–B80 for inserts.



NOTE: H = H1

■ SDJC -3°

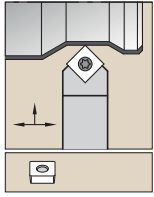
order number	catalog number	H	B	F	L1	L2	λS°	γ0°	gage insert	shim	shim screw	hex	insert screw	Torx
Right hand														
2951369	SDJCR062	.38	.38	.500	2.50	.62	0.0	0.0	DC..2151	—	—	—	MS1153	T7
2951370	SDJCR123	.75	.75	1.000	4.50	.88	0.0	0.0	DC..3252	SKDP343	SRS3	3.5mm	MS1156	T15
2951371	SDJCR163	1.00	1.00	1.250	6.00	.88	0.0	0.0	DC..3252	SKDP343	SRS3	3.5mm	MS1156	T15
Left hand														
2951367	SDJCL102	.63	.63	.750	4.00	.62	0.0	0.0	DC..2151	—	—	—	MS1153	T7
2951368	SDJCL163	1.00	1.00	1.250	6.00	.88	0.0	0.0	DC..3252	SKDP343	SRS3	3.5mm	MS1156	T15

External Turning Toolholders

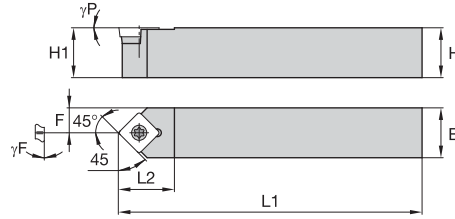
Clamping System S



Tools for External Turning, Internal Boring, and Cartridges • External Turning Toolholders



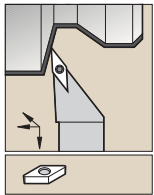
See pages B28–B29, B49, and B83 for inserts.



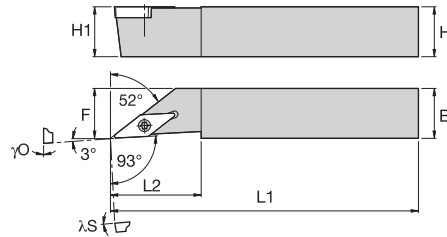
NOTE: H = H1

SSDC 45°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	insert screw	Torx
	Left hand										
2951372	SSDCN083	.50	.50	.250	3.50	.63	0.0	0.0	SC..3252	MS1155	T15



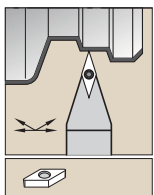
See pages B42 and B88 for inserts.



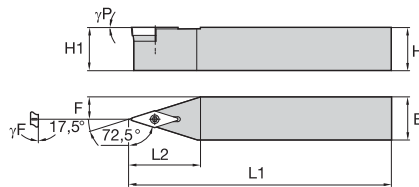
NOTE: H = H1

SVJB -3°

order number	catalog number	H	B	F	L1	L2	λS°	γO°	gage insert	shim	shim screw	hex	insert screw	Torx
	Right hand													
2951375	SVJBR123	.75	.75	1.000	4.50	1.38	0.0	0.0	VB..332	SKVN343	SRS3	3.5mm	MS1156	T15
2951376	SVJBR163	1.00	1.00	1.250	6.00	1.38	0.0	0.0	VB..332	SKVN343	SRS3	3.5mm	MS1156	T15
	Left hand													
2951373	SVJBL123	.75	.75	1.000	4.50	1.38	0.0	0.0	VB..332	SKVN343	SRS3	3.5mm	MS1156	T15
2951374	SVJBL163	1.00	1.00	1.250	6.00	1.38	0.0	0.0	VB..332	SKVN343	SRS3	3.5mm	MS1156	T15



See pages B42 and B88 for inserts.



NOTE: H = H1

SVB 17.5°

order number	catalog number	H	B	F	L1	L2	γF°	γP°	gage insert	shim	shim screw	hex	insert screw	Torx
	Left hand													
2951377	SVVBN163	1.00	1.00	.500	6.00	1.31	0.0	0.0	VB..332	SKVN343	SRS3	3.5 mm	MS1156	T15



WIN WITH WIDIA™

WIDIA 



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Our new WIDIA Victory TN Turning Grades provide you significant and measurable productivity gains — no matter how challenging your cut.

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- Drastically reduce cycle times — with up to 50% higher speed/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!

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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.

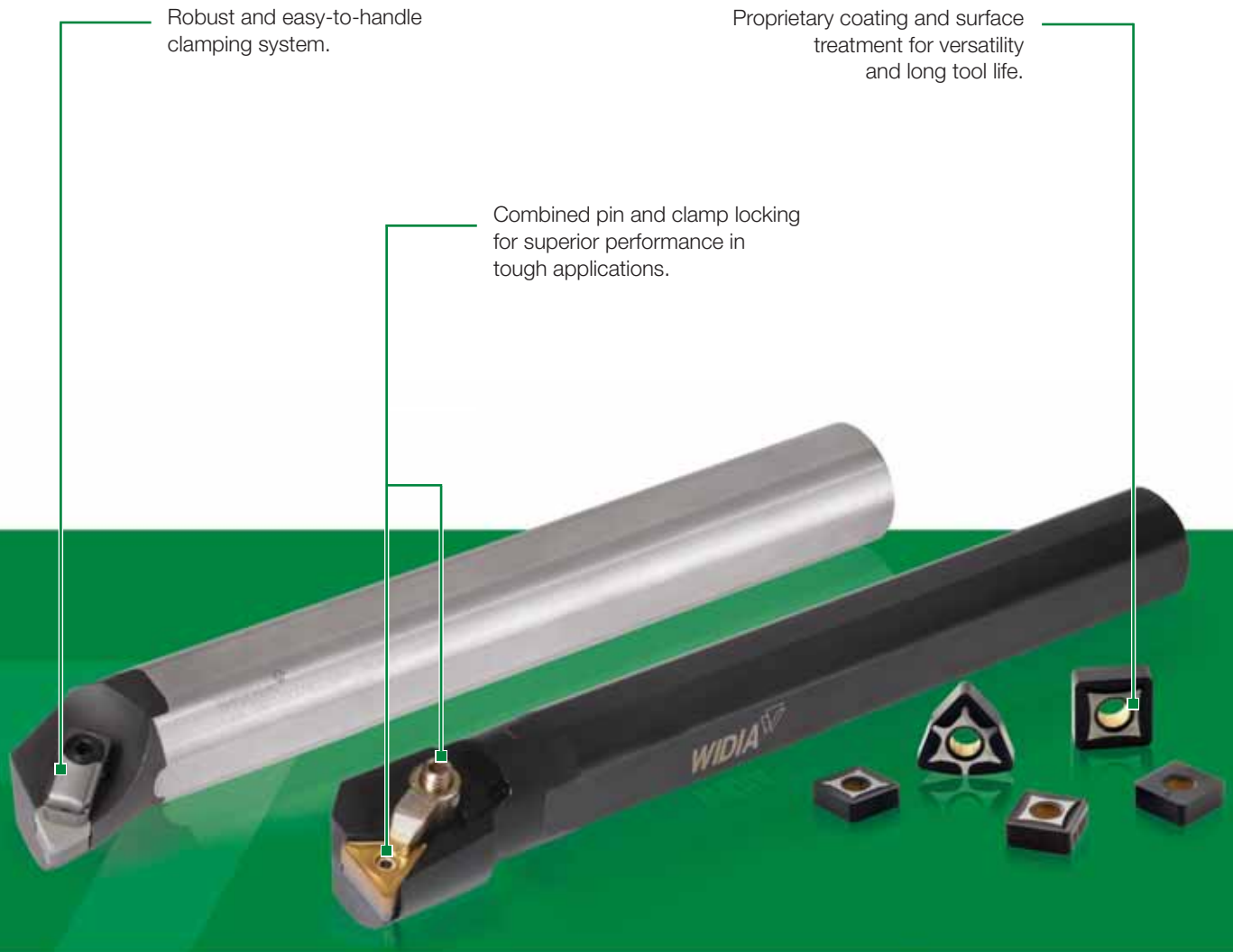
Clamping System M

- 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.

P style available in metric sizes only.



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

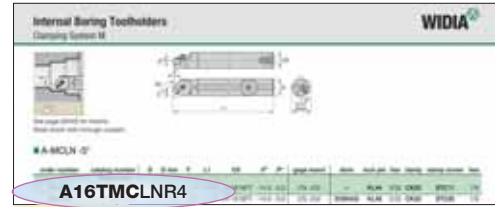
- Screw clamping system for positive indexable inserts.
- Compact design for high reliability and cost efficiency.
- Carbide shim for additional tool protection.

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 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.



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

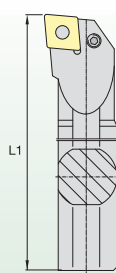
16

Shank Diameter

A two-digit number that indicates the bar diameter in 1/16" increments.

T

Length of Boring Bar*

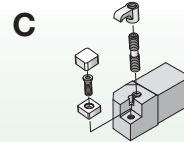


F	—	3"
G	—	3.5"
H	—	4"
J	—	4.5"
K	—	5"
L	—	5.5"
M	—	6"
N	—	6.5"
P	—	6.75"
Q	—	7"
R	—	8"
S	—	10"
T	—	12"
U	—	14"
V	—	16"
W	—	18"
Y	—	20"

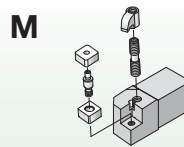
*Used only when more than one length is available or a special length is required.

M

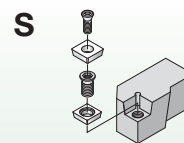
Insert Clamping System



Top clamping by clamping finger for inserts without hole



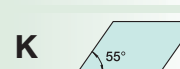
Top and hole clamping for inserts with hole



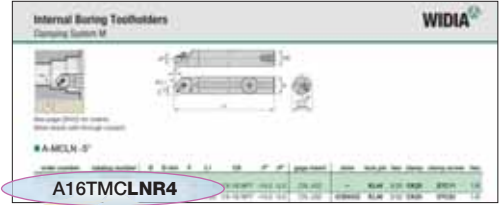
Center clamping by screw for inserts with hole

C

Insert Shape

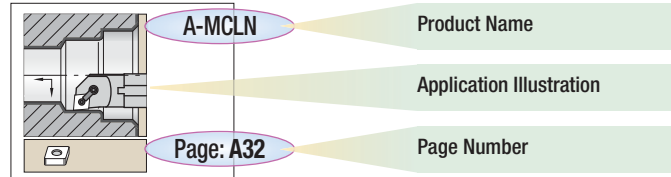


By referencing this easy-to-use guide, you can identify the correct product to meet your needs.



L	N	R	4	
Boring Bar Style	Insert Clearance Angle	Hand of Tool	Insert Size	Additional Information
		<p>Right-hand boring bar</p> <p>Left-hand boring bar</p>	<p>Insert IC Number of 1/8ths of "D"</p>	<p>M.. MF, MN, MX for ceramic and PCBN inserts</p>

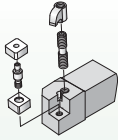
Each unique Clamping System offers product options to fill your specific toolholder needs. Find the illustration that fits your application and navigate to the corresponding page to get the correct solution.



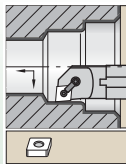
Tools for External Turning, Internal Boring, and Cartridges • Internal Boring Toolholders

Clamping System M

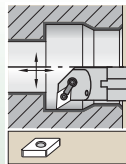
M



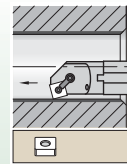
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.



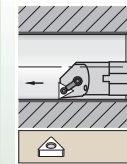
A-MCLN
-5°
Page:
A32



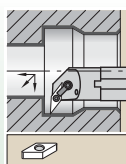
A-MDUN
-3°
Page:
A32



A-MSKN
15°
Page:
A33



A-MTFN
0°
Page:
A33



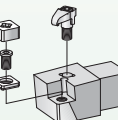
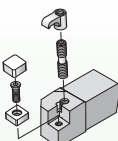
A-MVUN
-3°
Page:
A34



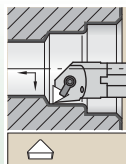
A-MWLN
5°
Page:
A34

Clamping System C

C



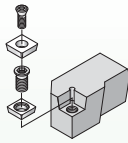
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs greater than .250".



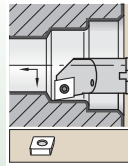
A-CTFP
0°
Page:
A35

Clamping System S

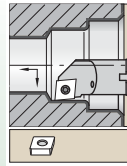
S



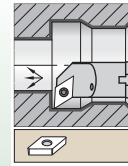
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs from .375" are secured by means of a threaded bushing.



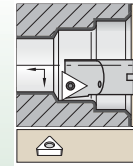
A-SCFC
0°
Page: **A36**



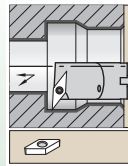
A-SCLC
-5°
Page: **A36**



A-SDUC
-3°
Page: **A37**



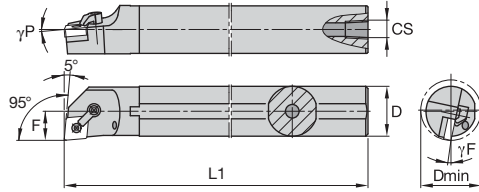
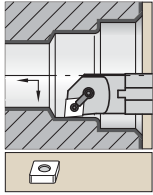
A-STFC
0°
Page: **A37**



A-SVUB
-3°
Page: **A37**

Internal Boring Toolholders

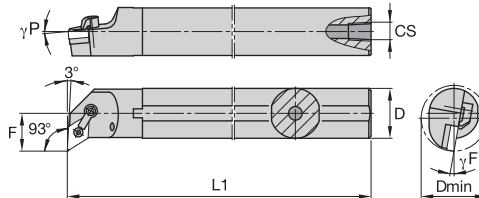
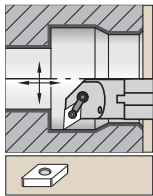
Clamping System M



Steel shank with through coolant.
See pages B16–B19, B47, B51–B52,
and B74–B76 for inserts.

■ A-MCLN -5°

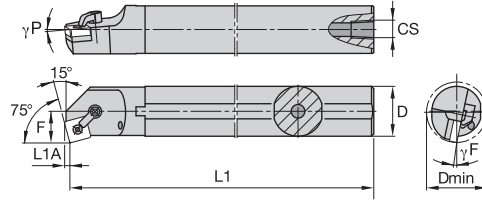
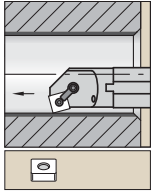
order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand															
2993573	A16TMCLNR4	1.000	1.200	.640	12.00	1/4-18 NPT	-14.0	-5.0	CN..432	—	KL44	3/32	CK20	STC11	1/8
2951402	A20UMCLNR4	1.250	1.470	.760	14.00	1/4-18 NPT	-14.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951410	A24UMCLNR4	1.500	1.760	.885	14.00	1/4-18 NPT	-12.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951420	A28UMCLNR4	1.750	2.010	1.010	14.00	1/4-18 NPT	-12.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951421	A32VMCLNR6	2.000	2.400	1.276	16.00	1/4-18 NPT	-12.0	-5.0	CN..643	ICSN633	KL68	9/64	CK12	STC4	5/32
2951424	A40VMCLNR6	2.500	3.030	1.526	16.00	1/4-18 NPT	-10.0	-5.0	CN..643	ICSN633	KL68	9/64	CK12	STC4	5/32
Left hand															
2951397	A16TMCLNL4	1.000	1.200	.640	12.00	1/4-18 NPT	-14.0	-5.0	CN..432	—	KL44	3/32	CK20	STC11	1/8
2951401	A20UMCLNL4	1.250	1.470	.760	14.00	1/4-18 NPT	-14.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951409	A24UMCLNL4	1.500	1.760	.885	14.00	1/4-18 NPT	-12.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8
2951419	A28UMCLNL4	1.750	2.010	1.010	14.00	1/4-18 NPT	-12.0	-5.0	CN..432	ICSN433	KL46	3/32	CK20	STC20	1/8



Steel shank with through coolant.
See pages B22–B25, B53,
and B80–B81 for inserts.

■ A-MDUN -3°

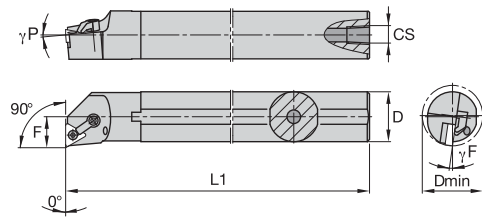
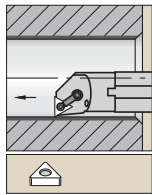
order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand															
2951404	A20UMDUNR4	1.250	1.705	.995	14.00	1/4-18 NPT	-12.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32
2951412	A24UMDUNR4	1.500	2.000	1.120	14.00	1/4-18 NPT	-10.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32
2951423	A32VMDUNR4	2.000	2.500	1.370	16.00	1/4-18 NPT	-8.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32
Left hand															
2951403	A20UMDUNL4	1.250	1.705	.995	14.00	1/4-18 NPT	-12.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32
2951411	A24UMDUNL4	1.500	2.000	1.120	14.00	1/4-18 NPT	-10.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32
2951422	A32VMDUNL4	2.000	2.500	1.370	16.00	1/4-18 NPT	-8.0	-5.0	DN..432	IDSN433	KL46L	3/32	CK12	STC4	5/32



Steel shank with through coolant.
See pages B30–B32, B56–B57,
and B83–B84 for inserts.

■ A-MSKN 15°

order number	catalog number	D	D min	F	L1	L1A	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand															
2951413	A24UMSKNR4	1.500	1.760	.885	14.00	.12	1/4-18 NPT	-10.0	-5.0	SN..432	ISSN432	KL46	3/32	CK9	STC4	5/32



Steel shank with through coolant.
See pages B36–B39, B58,
and B86 for inserts.

■ A-MTFN 0°

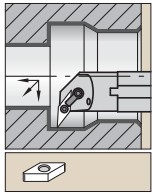
order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
	Right hand														
2951405	A20UMTFNR3	1.250	1.470	.760	14.00	1/4-18 NPT	-12.0	-5.0	TN..332	—	KL33L	5/64	CK7	STC9	3/32
2951414	A24UMTFNR3	1.500	1.760	.890	14.00	1/4-18 NPT	-10.0	-5.0	TN..332	ITSN333	KL34L	5/64	CK7	STC9	3/32
2951415	A24UMTFNR4	1.500	1.760	.890	14.00	1/4-18 NPT	-10.0	-5.0	TN..332	ITSN433	KL46	3/32	CK9	STC4	5/32

Internal Boring Toolholders

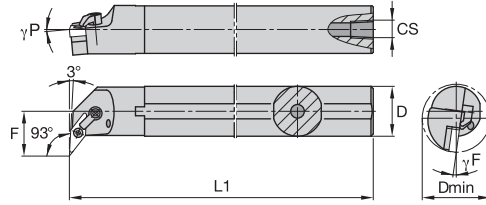
Clamping System M



Tools for External Turning, Internal Boring, and Cartridges • Internal Boring Toolholders

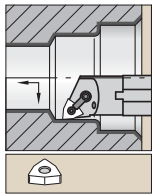


Steel shank with through coolant.
See pages B43, B59, and B89 for inserts.

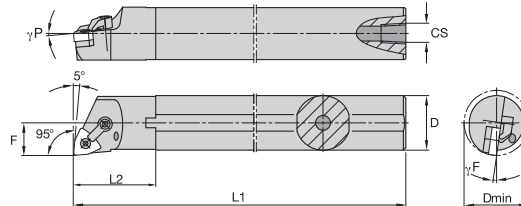


■ A-MVUN -3°

order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand															
3883412	A20UMVUNR3	1.250	1.705	1.000	14.00	1/4-18 NPT	-12.0	-5.0	VN..332	IVSN322	KL34L	5/64	CK43	STC4	5/32
3883414	A24UMVUNR3	1.500	2.000	1.125	14.00	1/4-18 NPT	-12.0	-5.0	VN..332	IVSN322	KL34L	5/64	CK43	STC4	5/32
Left hand															
3883411	A20UMVUNL3	1.250	1.705	1.000	14.00	1/4-18 NPT	-12.0	-5.0	VN..332	IVSN322	KL34L	5/64	CK43	STC4	5/32
3883413	A24UMVUNL3	1.500	2.000	1.125	14.00	1/4-18 NPT	-12.0	-5.0	VN..332	IVSN322	KL34L	5/64	CK43	STC4	5/32

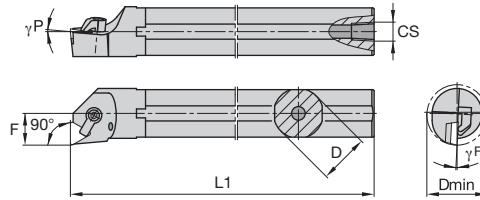
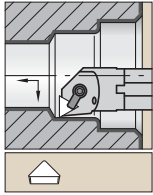


Steel shank with through coolant.
See pages B44–B46, B60, and B89 for inserts.



■ A-MWLN 5°

order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	lock pin	hex	clamp	clamp screw	hex
Right hand															
2951390	A12SMWLNLR3	.750	.930	.500	10.00	1/8-27 NPT	-14.0	-5.0	WN..332	—	KL33L	5/64	CK6	STC5	3/32
2951398	A16TMWLNLR4	1.000	1.220	.640	12.00	1/4-18 NPT	-12.0	-5.0	WN..432	—	KL44	3/32	CK20	STC11	1/8
2951407	A20UMWLNLR4	1.250	1.470	.765	14.00	1/4-18 NPT	-14.0	-5.0	WN..432	IWSN433	KL46	3/32	CK20	STC20	1/8
2951417	A24UMWLNLR4	1.500	1.760	.890	14.00	1/4-18 NPT	-12.0	-5.0	WN..432	IWSN433	KL46	3/32	CK20	STC20	1/8
Left hand															
2951406	A20UMWLNLR4	1.250	1.470	.765	14.00	1/4-18 NPT	-14.0	-5.0	WN..432	IWSN433	KL46	3/32	CK20	STC20	1/8
2951416	A24UMWLNLR4	1.500	1.760	.890	14.00	1/4-18 NPT	-12.0	-5.0	WN..432	IWSN433	KL46	3/32	CK20	STC20	1/8



Steel shank with through coolant.
See pages B40–B41, B59,
and B86–B87 for inserts.

■ A-CTFP 0°

order number	catalog number	D	D min	F	L1	CS	γF°	γP°	gage insert	shim	shim screw	hex	clamp	clamp screw	hex
	Right hand														
2951396	A16TCTFPR3	1.000	1.200	.640	12.00	1/4-18 NPT	0.0	5.0	TP..322	—	—	—	CK20	STC11	1/8
2951400	A20UCTFPR3	1.250	1.470	.765	14.00	1/4-18 NPT	-3.0	5.0	TP..322	SM41	S19	1/16	CK10	STC8	5/32

WIN WITH WIDIA™



PCBN Inserts for Hard Turning

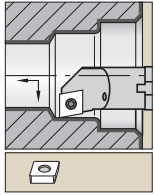
PCBN Inserts are available in a wide range of grades, making them ideal for all your continuous to heavily interrupted turning applications.

- Best choice for hardened steels and powdered metals.
- Coated grades for increased tool life and consistent results.
- Uncoated grades for superior surface finish in close-tolerance machining.

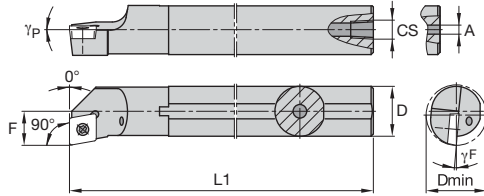
To learn more about our innovations, contact your local Authorized Distributor or visit www.widia.com.

Internal Boring Toolholders

Clamping System S

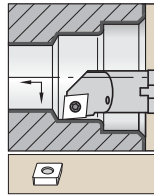


Steel shank with through coolant.
See pages B14–B16, B47,
and B72–B73 for inserts.

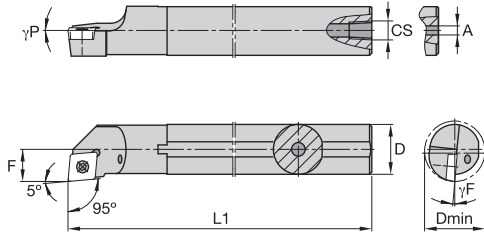


■ A-SCFC 0°

order number	catalog number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	insert screw ID drive size
Right hand												
3883416	A08RSCFCR2	.500	.600	.312	8.00	—	1/16-27 NPT	-7.0	0.0	CC..2151	MS1153	T7
3883418	A10SSCFCR2	.625	.770	.406	10.00	—	1/8-27 NPT	-5.0	0.0	CC..2151	MS1153	T7
3883421	A12SSCFCR3	.750	.930	.500	10.00	—	1/8-27 NPT	-5.0	0.0	CC..3252	MS1155	T15
Left hand												
3883415	A08RSCFCL2	.500	.600	.312	8.00	—	1/16-27 NPT	-7.0	0.0	CC..2151	MS1153	T7
3883417	A10SSCFCL2	.625	.770	.406	10.00	—	1/8-27 NPT	-5.0	0.0	CC..2151	MS1153	T7
3883419	A12SSCFCL3	.750	.930	.500	10.00	—	1/8-27 NPT	-5.0	0.0	CC..3252	MS1155	T15

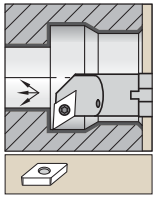


Steel shank with through coolant.
See pages B14–B16, B47,
and B72–B73 for inserts.

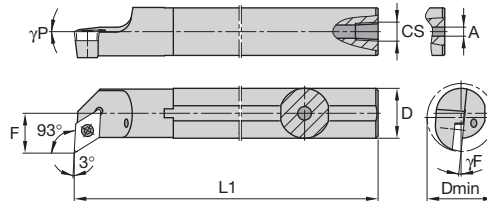


■ A-SCLC -5°

order number	catalog number	D	D min	F	L1	A	CS	γF°	γP°	gage insert	insert screw	insert screw ID drive size
Right hand												
2951383	A06MSCLCR2	.375	.480	.250	6.00	.125	—	-8.0	0.0	CC..2151	MS1153	T7
2951386	A08RSCLCR2	.500	.600	.312	8.00	—	1/16-27 NPT	-7.0	0.0	CC..2151	MS1153	T7
2951388	A10SSCLCR2	.625	.770	.406	10.00	—	1/8-27 NPT	-5.0	0.0	CC..2151	MS1153	T7
2951392	A12SSCLCR3	.750	.930	.500	10.00	—	1/8-27 NPT	-5.0	0.0	CC..3252	MS1155	T15
2951399	A16TSCLCR3	1.000	1.200	.640	12.00	—	1/4-18 NPT	-4.0	0.0	CC..3252	MS1155	T15
2951408	A20USCLCR4	1.250	1.470	.765	14.00	—	1/4-18 NPT	-5.0	0.0	CC..432	MS1157	T15
2951418	A24USCLCR4	1.500	1.760	.890	14.00	—	1/4-18 NPT	-4.0	0.0	CC..432	MS1157	T15
Left hand												
2951391	A12SSCLCL3	.750	.930	.500	10.00	—	1/8-27 NPT	-5.0	0.0	CC..3252	MS1155	T15

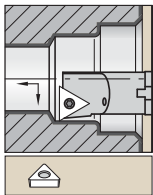


Steel shank with through coolant.
See pages B20–B21, B48,
and B79–B80 for inserts.

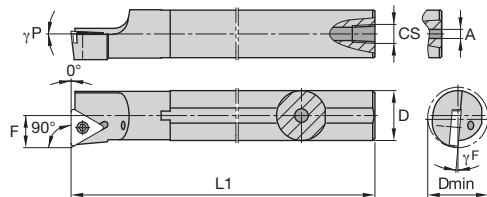


■ A-SDUC -3°

order number	catalog number	D	D min	F	L1	A	CS	γ_F°	γ_P°	gage insert	insert screw	insert screw ID drive size
Right hand												
2951394	A12SSDUCR3	.750	.980	.562	10.00	—	1/8-27 NPT	-5.0	0.0	DC..3252	MS1155	T15
Left hand												
2951393	A12SSDUCL3	.750	.980	.562	10.00	—	1/8-27 NPT	-5.0	0.0	DC..3252	MS1155	T15

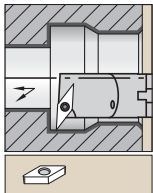


Steel shank with through coolant.
See pages B36, B49, and B85 for inserts.

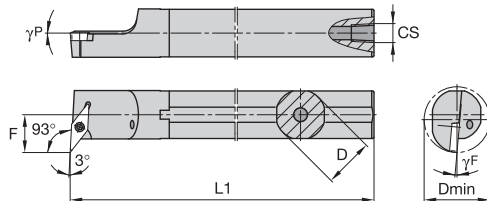


■ A-STFC 0°

order number	catalog number	D	D min	F	L1	A	CS	γ_F°	γ_P°	gage insert	insert screw	insert screw ID drive size
Right hand												
2951385	A06MSTFCR2	.375	.480	.250	6.00	.125	—	-8.0	0.0	TC..2151	MS1153	T7
2951387	A08RSTFCR2	.500	.600	.312	8.00	—	1/16-27 NPT	-7.0	0.0	TC..2151	MS1153	T7
2951389	A10SSTFCR2	.625	.770	.406	10.00	—	1/8-27 NPT	-5.0	0.0	TC..2151	MS1153	T7
2951395	A12SSTFCR2	.750	.930	.500	10.00	—	1/8-27 NPT	-5.0	0.0	TC..2151	MS1153	T7



Steel shank with through coolant.
See pages B42 and B88 for inserts.



■ A-SVUB -3°

order number	catalog number	D	D min	F	L1	CS	γ_F°	γ_P°	gage insert	insert screw	insert screw ID drive size	
Right hand												
3883423	A12SSVUBR2	.750	.980	.562	10.00	1/8-27 NPT	-6.0	0.0	VB..221	MS1153	T7	
3883425	A16TSVUBR3	1.000	1.300	.750	12.00	1/4-18 NPT	-6.0	0.0	VB..332	MS1155	T15	
Left hand												
3883422	A12SSVUBL2	.750	.980	.562	10.00	1/8-27 NPT	-6.0	0.0	VB..221	MS1153	T7	
3883424	A16TSVUBL3	1.000	1.300	.750	12.00	1/4-18 NPT	-6.0	0.0	VB..332	MS1155	T15	

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.

P style available in metric sizes only.

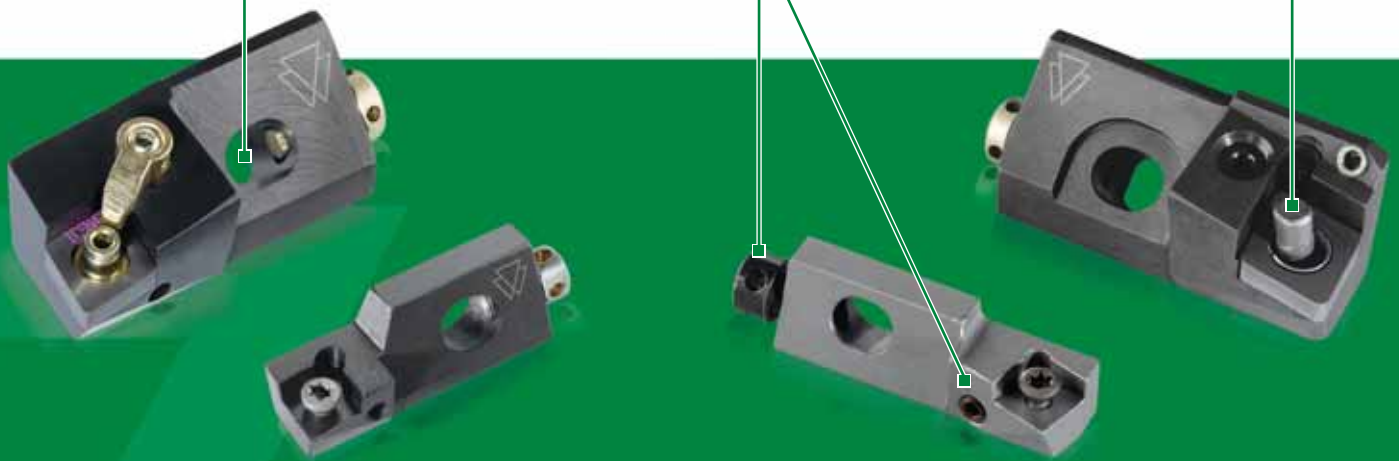
Simple and secure mounting to the tool by a single cartridge clamping screw.

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

Same clamping systems as standard turning toolholders.

Overall sizes to DIN and ISO are ideal for single- and multi-tooth turning, boring, and spotting tools.

Precise axial and radial positioning by adjustment screws.



Clamping System C

- Top clamping system for negative and positive indexable inserts to DIN 4968.
- This universal clamping system is robust and easy to handle.
- Some height-adjustable clamps enable the use of additional chipbreakers.
- A carbide shim provides additional tool protection.

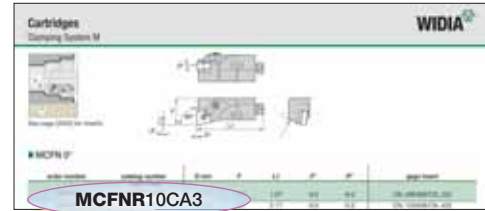


Clamping System S

- Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967.
- Compact design using a minimum of spare parts for high reliability and cost efficiency.
- A carbide shim provides additional tool protection.
- Toolholders with cutting edge heights upwards of .625" (16,0mm) and insert ICs from .375" (9,52mm) are secured by means of a threaded bushing.

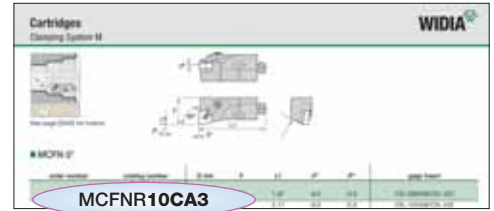
How Do Catalog Numbers Work?

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.



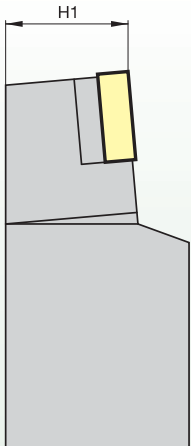
M	C	F	N	R
Insert Clamping System	Insert Shape	Cartridge Style	Insert Clearance Angle	Hand of Tool
<p>C</p> <p>Top clamping by clamping finger for inserts without hole</p>	<p>C</p> <p>80°</p>	<p>F</p> <p>0°</p> <p>K</p> <p>15°</p>	<p>C</p> <p>7°</p>	<p>Right-hand cartridge</p> <p>R</p>
<p>M</p> <p>Top and hole clamping for inserts with hole</p>	<p>D</p> <p>55°</p>	<p>L</p> <p>5°</p> <p>J</p> <p>3°</p>	<p>N</p> <p>0°</p>	<p>Left-hand cartridge</p> <p>L</p>
<p>S</p> <p>Center clamping by screw for inserts with hole</p>	<p>R</p>	<p>Q</p> <p>27.5°</p> <p>R</p> <p>15°</p>	<p>P</p> <p>11°</p>	
	<p>S</p> <p>90°</p>	<p>S</p> <p>45°</p> <p>G</p> <p>0°</p>		
	<p>T</p> <p>60°</p>			
	<p>W</p> <p>80°</p>			

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



10

Cartridge Size



H1 = cutting edge height of cartridge, in inches

C

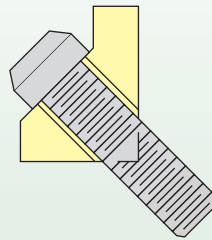
Identifying Code of Cartridge

C = Cartridge

A

Mounting Design of Cartridge

A-design conforming to ISO 5611



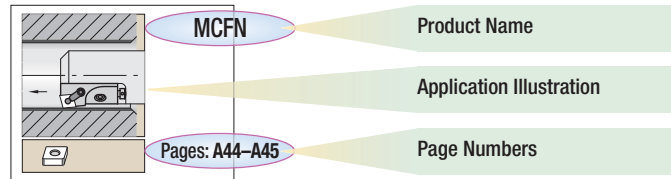
3

Insert Size



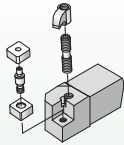
Insert IC
Number of 1/8ths of "D"

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

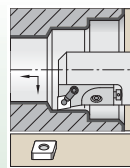


Clamping System M

M



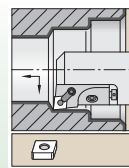
Combined pin/wedge clamp for negative inserts. An extremely sturdy clamping system, specially designed for interrupted cuts. The tool is protected by a carbide shim.



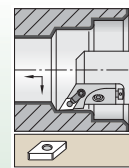
MCFN
0°
Pages:
A44-A45



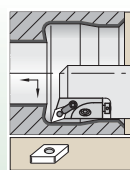
MCKN
15°
Pages:
A44-A45



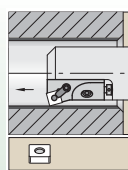
MCLN
-5°
Pages:
A46-A47



MDJN
-5°
Pages:
A46-A47



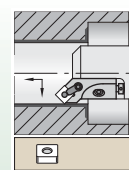
MDQN
-17.5°
Pages:
A48-A49



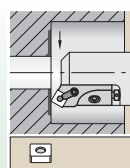
MSKN
15°
Pages:
A48-A49



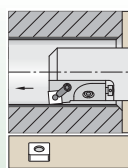
MSRN
15°
Pages:
A50-A51



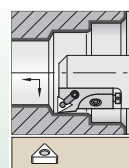
MSSN
45°
Pages:
A50-A51



MSTN
30°
Pages:
A52-A53



MSYN
5°
Pages:
A52-A53



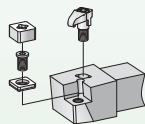
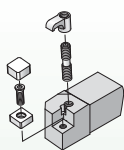
MTFN
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Pages:
A54-A55



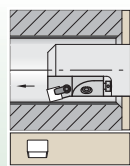
MTGN
0°
Pages:
A54-A55

Clamping System C

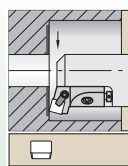
C



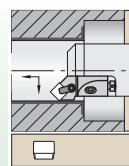
Top clamping system for negative and positive indexable inserts to DIN 4968. This universal clamping system is robust and easy to handle. Some height-adjustable clamps enable the use of additional chipbreakers. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs greater than .250".



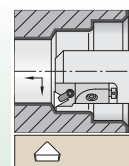
CSKP
15°
Pages:
A56-A57



SRP
15°
Pages:
A56-A57

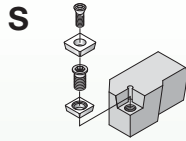


CSSP
45°
Pages:
A56-A57

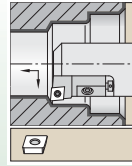


CTFP
0°
Page:
A58

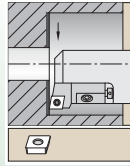
Clamping System S



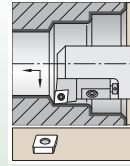
Screw clamping system for positive indexable inserts with countersunk hole to DIN 4967. Compact design using a minimum of spare parts for high reliability and cost efficiency. A carbide shim provides additional tool protection. Toolholders with cutting edge heights upwards of .625" and insert ICs from .375" are secured by means of a threaded bushing.



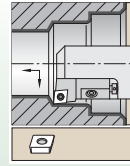
SCFP
0°
Pages:
A60-A61



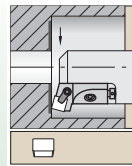
SCGP
0°
Pages:
A60-A61



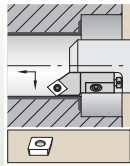
SCLC
-5°
Pages:
A60-A61



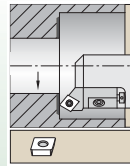
SCLP
-5°
Pages:
A62-A63



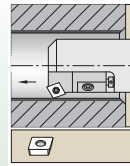
SCRП
15°
Pages:
A62-A63



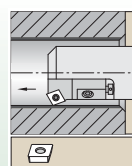
SCSP
45°
Pages:
A62-A63



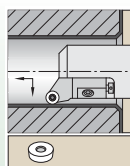
SCTP
30°
Pages:
A64-A65



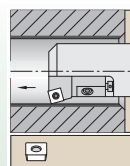
SCWP
30°
Pages:
A64-A65



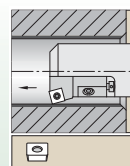
SDJP
-3°
Pages:
A64-A65



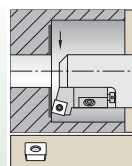
SRGC
Pages:
A66-A67



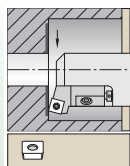
SSKC
15°
Pages:
A66-A67



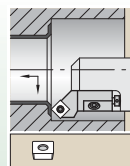
SSKP
15°
Pages:
A66-A67



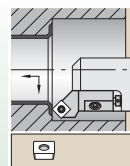
SSRC
15°
Pages:
A68-A69



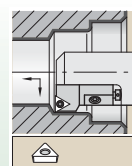
SSRP
15°
Pages:
A68-A69



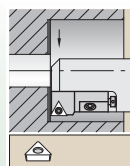
SSSC
45°
Pages:
A68-A69



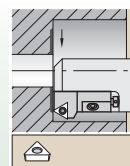
SSSP
Pages:
A70-A71



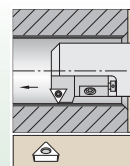
STFP
0°
Pages:
A70-A71



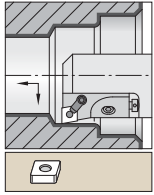
STGP
0°
Pages:
A72-A73



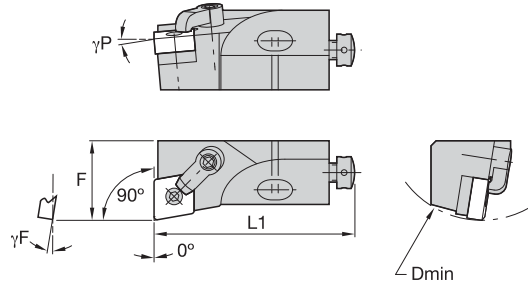
STTP
30°
Pages:
A72-A73



STWP
30°
Pages:
A72-A73

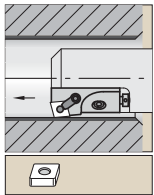


See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.

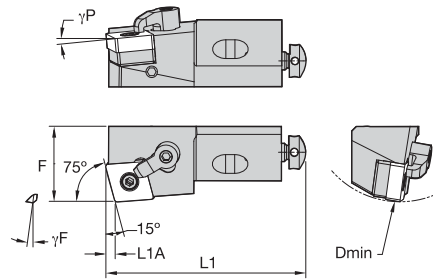


■ MCFN 0°

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
	Right hand						
3870421	MCFNR10CA3	1.575	.551	1.97	-9.0	-9.0	CN..090308/CN..322
3870420	MCFNR12CA4	1.969	.787	2.17	-9.0	-5.0	CN..120408/CN..432
3870419	MCFNR16CA4	2.362	.984	2.48	-9.0	-5.0	CN..120408/CN..432
3870418	MCFNR20CA4	2.756	.984	2.76	-9.0	-5.0	CN..120408/CN..432
	Left hand						
3870423	MCFNL12CA4	1.969	.787	2.17	-9.0	-5.0	CN..120408/CN..432
3870422	MCFNL16CA4	2.362	.984	2.48	-9.0	-5.0	CN..120408/CN..432



See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.

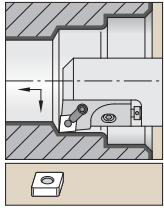


■ MCKN 15°

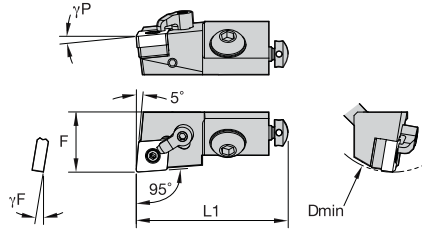
order number	catalog number	D min	F	L1	L1A	γ_F°	γ_P°	gage insert
	Right hand							
3870416	MCKNR12CA4	1.969	.787	2.17	.121	-9.0	-5.0	CN..120408/CN..432
3870415	MCKNR16CA4	2.362	.984	2.48	.121	-9.0	-5.0	CN..120408/CN..432
	Left hand							
3870417	MCKNL12CA4	1.969	.787	2.17	.121	-9.0	-5.0	CN..120408/CN..432

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

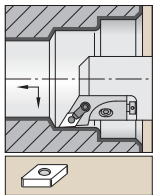


See pages B16–B19, B47, B51–B52, and B74–B76 for inserts.

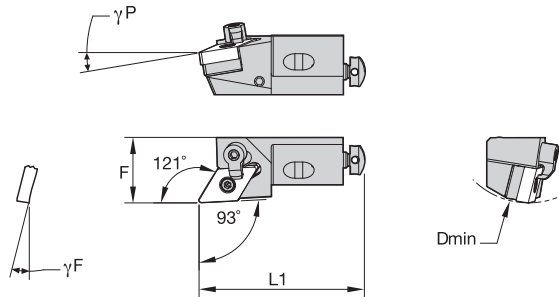


■ MCLN -5°

order number	catalog number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870410	MCLNR12CA4	1.969	.787	2.17	-9.0	-5.0	CN..120408/CN..432
3870409	MCLNR16CA4	2.362	.984	2.48	-9.0	-5.0	CN..120408/CN..432
3870408	MCLNR20CA4	2.756	.984	2.76	-9.0	-5.0	CN..120408/CN..432
3870407	MCLNR25CA6	3.937	1.260	3.94	-9.0	-5.0	CN..190612/CN..643
	Left hand						
3870414	MCLNL12CA4	1.969	.787	2.17	-9.0	-5.0	CN..120408/CN..432
3870413	MCLNL16CA4	2.362	.984	2.48	-9.0	-5.0	CN..120408/CN..432
3870412	MCLNL20CA4	2.756	.984	2.76	-9.0	-5.0	CN..120408/CN..432
3870411	MCLNL25CA6	3.937	1.260	3.94	-9.0	-5.0	CN..190612/CN..643



See pages B22–B25, B53, and B80–B81 for inserts.

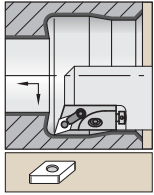


■ MDJN -3°

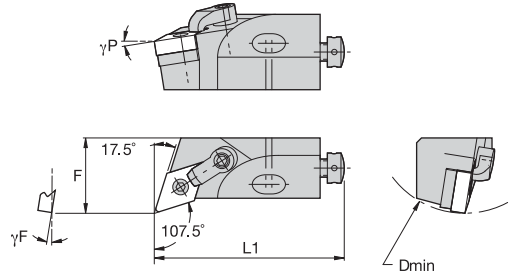
order number	catalog number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870405	MDJNR16CA4	2.362	.984	2.48	-9.0	-9.0	DN..150408/DN..3.532
3870404	MDJNR20CA4	2.756	.984	2.76	-8.5	-8.5	DN..150408/DN..3.532
	Left hand						
3870406	MDJNL16CA4	2.362	.984	2.48	-9.0	-9.0	DN..150408/DN..3.532

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

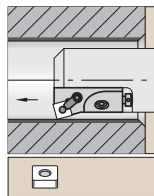


See pages B22–B25, B53, and B80–B81 for inserts.

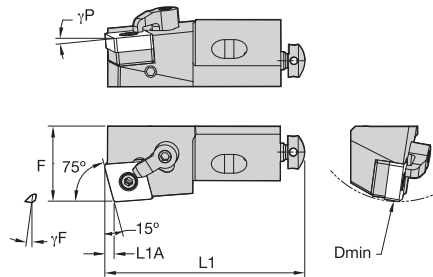


■ MDQN -17.5°

order number	catalog number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870361	MDQNR16CA4	2.362	.984	2.48	-9.0	-6.0	DN..150408/DN..3.532
3870360	MDQNR20CA4	2.756	.984	2.76	-9.0	-8.0	DN..150408/DN..3.532
	Left hand						
3870403	MDQNL16CA4	2.362	.984	2.48	-9.0	-6.0	DN..150408/DN..3.532
3870362	MDQNL20CA4	2.756	.984	2.76	-9.0	-8.0	DN..150408/DN..3.532



See pages B30–B32, B56–B57, and B83–B84 for inserts.

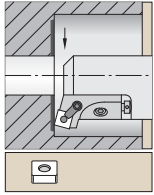


■ MSKN 15°

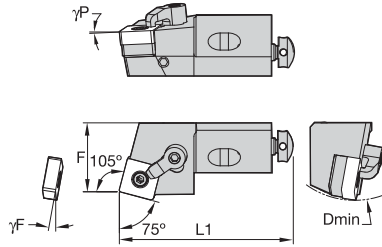
order number	catalog number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3870352	MSKNR10CA3	1.575	.551	1.97	.087	-9.0	-5.0	SN..090308/SN..322
3870351	MSKNR12CA4	1.969	.787	2.17	.120	-9.0	-5.0	SN..120408/SN..432
3870350	MSKNR16CA4	2.362	.984	2.48	.120	-9.0	-5.0	SN..120408/SN..432
3870349	MSKNR20CA5	2.756	.984	2.76	.147	-9.0	-5.0	SN..150612/SN..543
3870348	MSKNR25CA6	3.937	1.260	3.94	.180	-9.0	-5.0	SN..190612/SN..543
	Left hand							
3870356	MSKNL10CA3	1.575	.551	1.97	.087	-9.0	-5.0	SN..090308/SN..322
3870355	MSKNL12CA4	1.969	.787	2.17	.120	-9.0	-5.0	SN..120408/SN..432
3870354	MSKNL16CA4	2.362	.984	2.48	.120	-9.0	-5.0	SN..120408/SN..432
3870353	MSKNL20CA5	2.756	.984	2.76	.147	-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

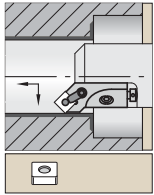


See pages B30–B32, B56–B57, and B83–B84 for inserts.

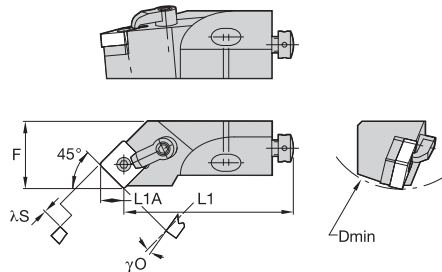


■ MSRN 15°

order number	catalog number	D min	F	L1	γ^F	γ^P	gage insert
	Right hand						
3870344	MSRNR10CA3	1.575	.551	1.97	-9.0	-5.0	SN..090308/SN..322
3870343	MSRNR12CA4	1.969	.787	2.17	-9.0	-5.0	SN..120408/SN..432
3870342	MSRNR16CA4	2.362	.984	2.48	-9.0	-5.0	SN..120408/SN..432
3870341	MSRNR20CA5	2.756	.984	2.76	-9.0	-5.0	SN..150612/SN..543
	Left hand						
3870347	MSRNL12CA4	1.969	.787	2.17	-9.0	-5.0	SN..120408/SN..432
3870346	MSRNL16CA4	2.362	.984	2.48	-9.0	-5.0	SN..120408/SN..432
3870345	MSRNL20CA5	2.756	.984	2.76	-9.0	-5.0	SN..150612/SN..543



See pages B30–B32, B56–B57, and B83–B84 for inserts.

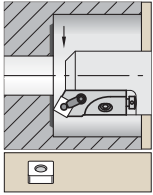


■ MSSN 45°

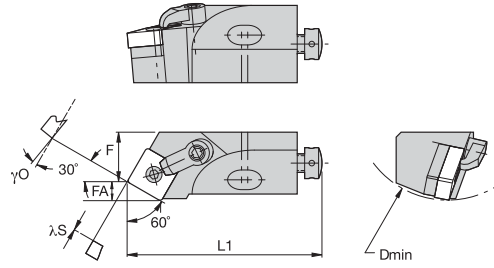
order number	catalog number	D min	F	L1	L1A	λS	γO	gage insert
	Right hand							
3870336	MSSNR10CA3	1.575	.551	1.73	.240	-13.0	0.0	SN..090308/SN..322
3870335	MSSNR12CA4	1.969	.787	1.85	.328	-13.0	0.0	SN..120408/SN..432
3870334	MSSNR16CA4	2.362	.984	2.09	.328	-13.0	0.0	SN..120408/SN..432
3870333	MSSNR20CA5	2.756	.984	2.36	.404	-13.0	0.0	SN..150612/SN..543
	Left hand							
3870340	MSSNL10CA3	1.575	.551	1.73	.240	-13.0	0.0	SN..090308/SN..322
3870339	MSSNL12CA4	1.969	.787	1.85	.328	-13.0	0.0	SN..120408/SN..432
3870338	MSSNL16CA4	2.362	.984	2.09	.328	-13.0	0.0	SN..120408/SN..432
3870337	MSSNL20CA5	2.756	.984	2.36	.404	-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

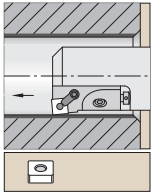


See pages B30–B32, B56–B57, and B83–B84 for inserts.

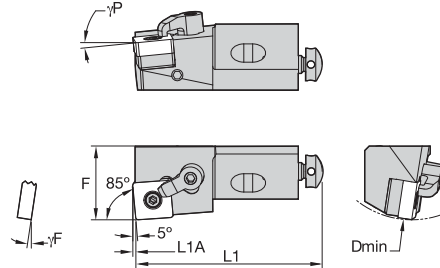


■ **MSTN 30°**

order number	catalog number	D min	F	L1	FA	λS°	γO°	gage insert
	Right hand							
3870312	MSTNR10CA3	1.575	.354	1.97	.52	-11.0	0.0	SN..090308/SN..322
3870311	MSTNR12CA4	1.969	.512	2.17	.23	-11.0	0.0	SN..120408/SN..432
3870310	MSTNR16CA4	2.362	.591	2.48	.23	0.0	-11.0	SN..120408/SN..432



See pages B30–B32, B56–B57, and B83–B84 for inserts.

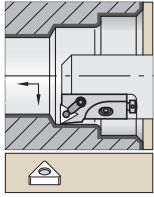


■ **MSYN 5°**

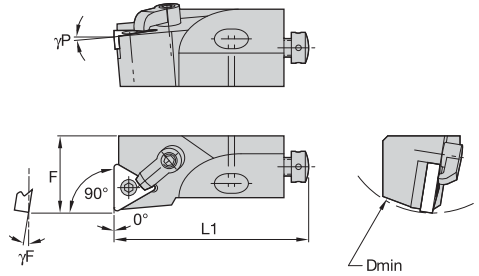
order number	catalog number	D min	F	L1	L1A	γF°	γP°	gage insert
	Right hand							
3870308	MSYNR10CA3	1.575	.551	1.97	.030	-9.0	-5.0	SN..090308/SN..322
3870307	MSYNR12CA4	1.969	.787	2.17	.040	-9.0	-5.0	SN..120408/SN..432
3870306	MSYNR16CA4	2.362	.984	2.48	.040	-9.0	-5.0	SN..120408/SN..432
	Left hand							
3870305	MSYNR25CA6	3.937	1.260	3.94	.061	-9.0	-5.0	SN..190612/SN..643
3870309	MSYNL10CA3	1.575	.551	1.97	.030	-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

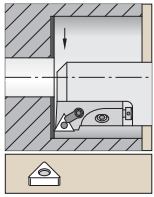


See pages B36–B39, B58, and B86 for inserts.

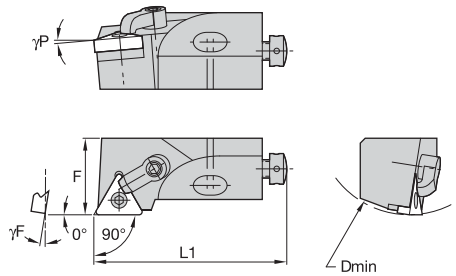


■ MTFN 0°

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
Right hand							
3871303	MTFNR12CA3	1.969	.787	2.17	-9.0	-5.0	TN..160408/TN..332
3871302	MTFNR16CA3	2.362	.984	2.48	-9.0	-5.0	TN..160408/TN..332
3871301	MTFNR20CA4	2.756	.984	2.76	-9.0	-5.0	TN..220408/TN..432
Left hand							
3871300	MTFNR25CA5	3.937	1.260	3.94	-9.0	-5.0	TN..270612/TN..443
3871306	MTFNL12CA3	1.969	.787	2.17	-9.0	-5.0	TN..160408/TN..332
3871305	MTFNL16CA3	2.362	.984	2.48	-9.0	-5.0	TN..160408/TN..332
3871304	MTFNL20CA4	2.756	.984	2.76	-9.0	-5.0	TN..220408/TN..432



See pages B36–B39, B58, and B86 for inserts.

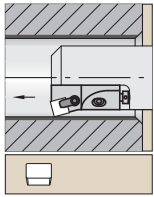


■ MTGN 0°

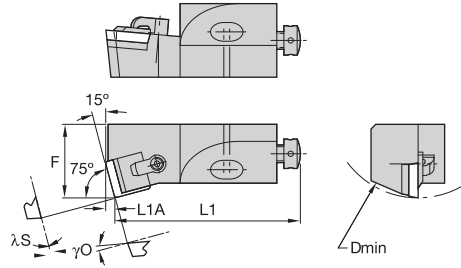
order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
Right hand							
3871296	MTGNR12CA3	1.969	.787	2.17	-9.0	-5.0	TN..160408/TN..332
3871295	MTGNR16CA3	2.362	.984	2.48	-9.0	-5.0	TN..160408/TN..332
3871294	MTGNR20CA4	2.756	.984	2.76	-9.0	-5.0	TN..220408/TN..432
Left hand							
3871299	MTGNL12CA3	1.969	.787	2.17	-9.0	-5.0	TN..160408/TN..332
3871298	MTGNL16CA3	2.362	.984	2.48	-9.0	-5.0	TN..160408/TN..332
3871297	MTGNL20CA4	2.756	.984	2.76	-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

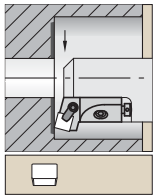


See pages B34 and B56 for inserts.

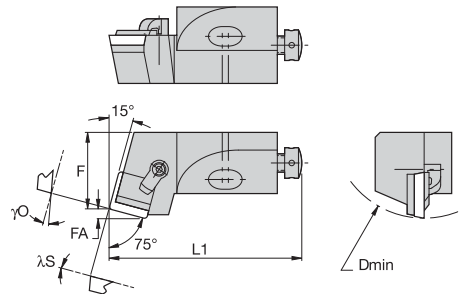


CSKP 15°

order number	catalog number	D min	F	L1	L1A	λS°	γ0°	gage insert
	Right hand							
3870437	CSKPR10CA3	1.575	.551	1.97	.088	0.0	5.0	SP..090308/SP..322
3870436	CSKPR12CA4	1.969	.787	2.17	.121	0.0	5.0	SP..120308/SP..422

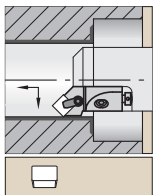


See pages B34 and B56 for inserts.

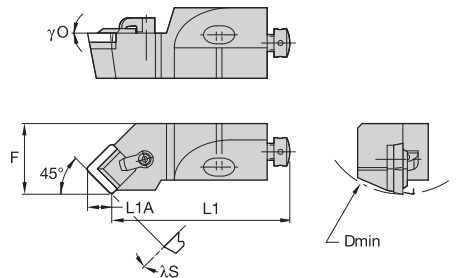


CSRP 15°

order number	catalog number	D min	F	L1	FA	λS°	γ0°	gage insert
	Right hand							
3870435	CSRPR10CA3	1.575	.551	1.97	.09	0.0	0.0	SP..090308/SP..322
3870434	CSRPR12CA4	1.969	.787	2.17	.12	3.0	0.0	SP..120308/SP..422



See pages B34 and B56 for inserts.



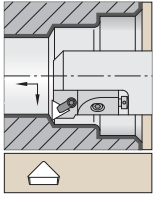
CSSP 45°

order number	catalog number	D min	F	L1	L1A	λS°	γ0°	gage insert
	Right hand							
3870430	CSSPR10CA3	1.575	.551	1.73	.239	0.0	0.0	SP..090308/SP..322
3870429	CSSPR12CA4	1.969	.787	1.85	.328	0.0	0.0	SP..120308/SP..422
	Left hand							
3870433	CSSPL10CA3	1.575	.551	1.73	.239	0.0	0.0	SP..090308/SP..322
3870432	CSSPL12CA4	1.969	.787	1.85	.328	0.0	0.0	SP..120308/SP..422
3870431	CSSPL20CA4	2.756	.984	2.36	.328	0.0	0.0	SP..120308/SP..422

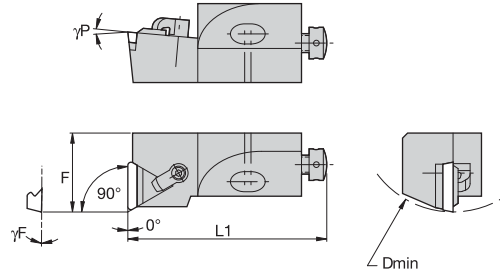
clamp	clamp screw	hex	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
CKM34	STCM38	2mm	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
CKM34	STCM38	2mm	KUAM22	2mm	KUAM31	191.406	4mm	CSWM 060 050

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

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



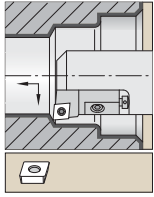
See pages B40–B41, B59, and B86–B87 for inserts.



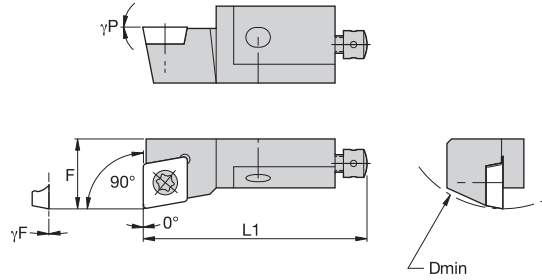
■ CTFP 0°

order number	catalog number	D min	F	L1	γ^F	γ^P	gage insert
	Right hand						
3870427	CTFPR10CA2	1.575	.551	1.97	0.0	5.0	TP..110304/TP..421
3870426	CTFPR12CA3	1.969	.787	2.17	0.0	5.0	TP..160308/TP..322
3870425	CTFPR16CA3	2.362	.984	2.48	0.0	5.0	TP..160308/TP..322
3870424	CTFPR20CA4	2.756	.984	2.76	0.0	5.0	TP..220408/TP..432
	Left hand						
3870428	CTFPL12CA3	1.969	.787	2.17	0.0	5.0	TP..160308/TP..322

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

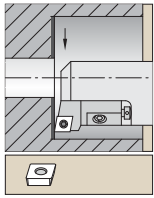


See pages B14–B16, B47, and B72–B73 for inserts.

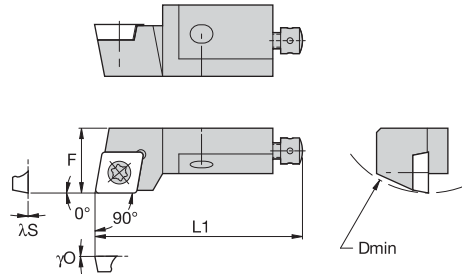


■ SCFP 0°

order number	catalog number	D min	F	L1	γ°	γ°	gage insert
Right hand							
3871284	SCFPR06CA05	.787	.315	.98	0.0	0.0	CP..050204/CP..18151
3871283	SCFPR08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151
3871272	SCFPR10CA09	1.575	.551	1.97	0.0	0.0	CP..09T308/CP..3252
Left hand							
3871285	SCFPL08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151

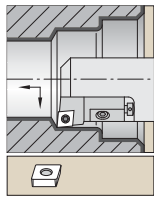


See pages B14–B16, B47, and B72–B73 for inserts.

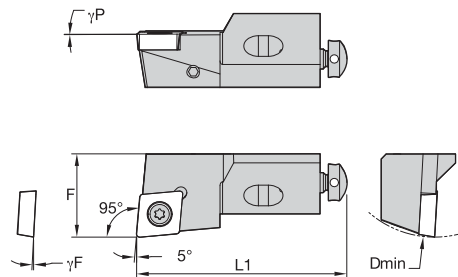


■ SCGP 0°

order number	catalog number	D min	F	L1	λ°	γ°	gage insert
Right hand							
3871270	SCGPR08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151
Left hand							
3871271	SCGPL08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151



See pages B14–B16, B47, and B72–B73 for inserts.



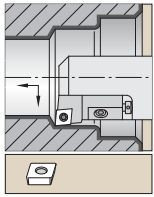
■ SCLC -5°

order number	catalog number	D min	F	L1	γ°	γ°	gage insert
Right hand							
3871268	SCLCR10CA09	1.575	.551	1.97	-3.0	0.0	CC..09T308/CC..3252
3871265	SCLCR12CA12	1.969	.787	2.17	-3.0	0.0	CC..120408/CC..432
Left hand							
3871267	SCLCL12CA12	1.969	.787	2.17	-3.0	0.0	CC..120408/CC..432
3871266	SCLCL16CA12	2.362	.984	2.48	-3.0	0.0	CC..120408/CC..432

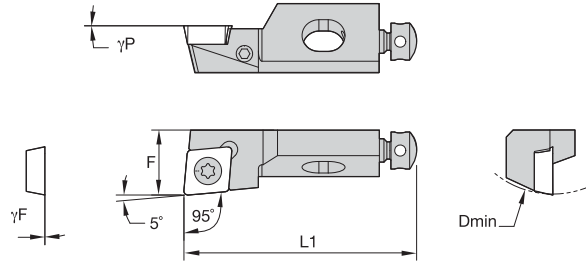
insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	KUAM34	1.5mm	KUAM35	MS2173	2mm	CSWM 035 040
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050
MS1155	T15	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM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

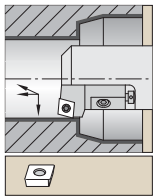


See pages B14–B16, B47, and B72–B73 for inserts.

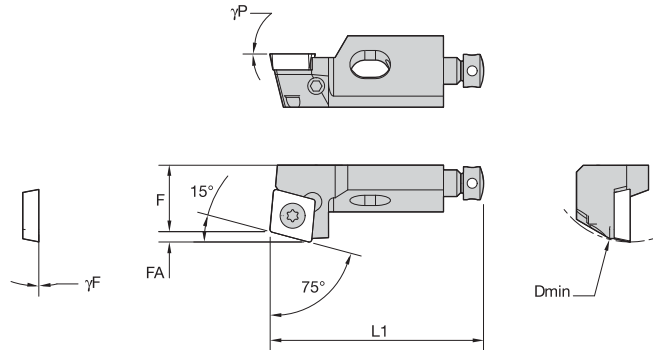


■ SCLP -5°

order number	catalog number	D min	F	L1	γF°	γP°	gage insert
Right hand							
3871261	SCLPR06CA05	.787	.315	.98	0.0	0.0	CP..050204/CP..18151
3871260	SCLPR08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151
3871259	SCLPR10CA09	1.575	.551	1.97	0.0	0.0	CP..09T308/CP..3252
Left hand							
3871264	SCLPL06CA05	.787	.315	.98	0.0	0.0	CP..050204/CP..18151
3871263	SCLPL08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151
3871262	SCLPL10CA09	1.575	.551	1.97	0.0	0.0	CP..09T308/CP..3252

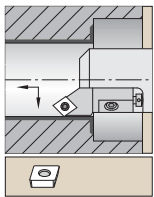


See pages B14–B16, B47, and B72–B73 for inserts.

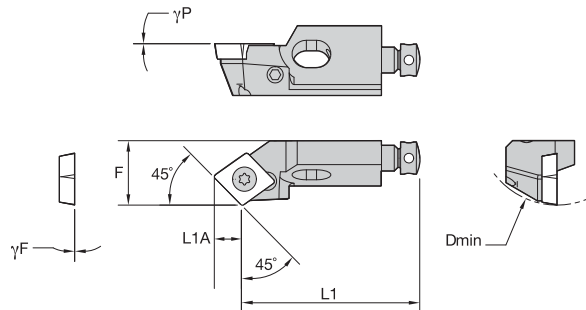


■ SCRPR 15°

order number	catalog number	D min	F	L1	FA	γF°	γP°	gage insert
Right hand								
3871257	SCRPR08CA06	.984	.394	1.26	.06	0.0	0.0	CP..060204/CP..2151
Left hand								
3871258	SCRPL08CA06	.984	.394	1.26	.06	0.0	0.0	CP..060204/CP..2151



See pages B14–B16, B47, and B72–B73 for inserts.



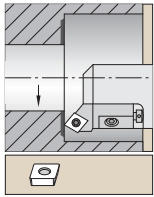
■ SCSPL 45°

order number	catalog number	D min	F	L1	L1A	γF°	γP°	gage insert
Right hand								
3871255	SCSPR06CA05	.787	.315	.83	.144	0.0	0.0	CP..050204/CP..18151
3871254	SCSPR08CA06	.984	.394	1.10	.166	0.0	0.0	CP..060204/CP..2151
Left hand								
3871256	SCSPL08CA06	.984	.394	1.10	.166	0.0	0.0	CP..060204/CP..2151

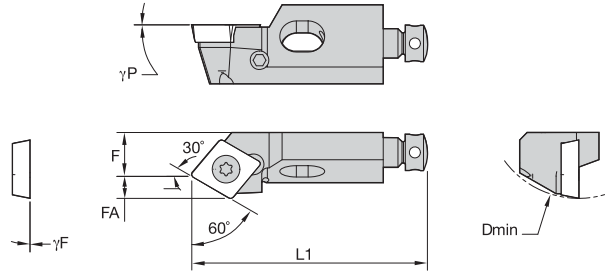
insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	KUAM34	1.5mm	KUAM35	MS2173	2mm	CSWM 035 040
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050
MS1155	T15	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
MS1933	T7	KUAM34	1.5mm	KUAM35	MS2173	2mm	CSWM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

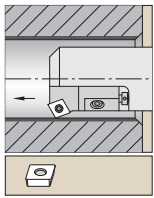


See pages B14–B16, B47, and B72–B73 for inserts.

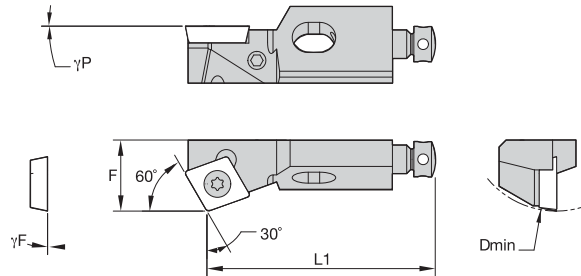


■ Sctp 30°

order number	catalog number	D min	F	L1	FA	γ_F°	γ_P°	gage insert
	Right hand							
3871252	SCTPR06CA05	.787	.217	.98	.10	0.0	0.0	CP..060204/CP..18151
3871251	SCTPR08CA06	.984	.236	1.26	.12	0.0	0.0	CP..060204/CP..2151
	Left hand							
3871253	SCTPL08CA06	.984	.236	1.26	.12	0.0	0.0	CP..060204/CP..2151

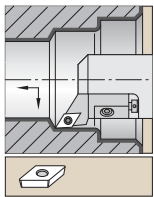


See pages B14–B16, B47, and B72–B73 for inserts.

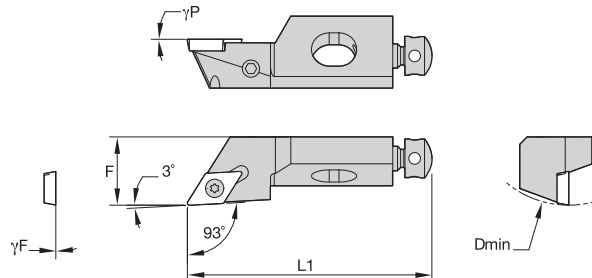


■ Scwp 30°

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
	Right hand						
3871249	SCWPR08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151
	Left hand						
3871250	SCWPL08CA06	.984	.394	1.26	0.0	0.0	CP..060204/CP..2151



See pages B20–B21, B48, and B79–B80 for inserts.



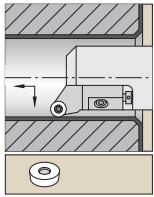
■ Sdjp -3°

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
	Right hand						
3871247	SDJPR10CA07	1.575	.551	1.97	0.0	0.0	DP..070204/DP..2151
	Left hand						
3871248	SDJPL10CA07	1.575	.551	1.97	0.0	0.0	DP..070204/DP..2151

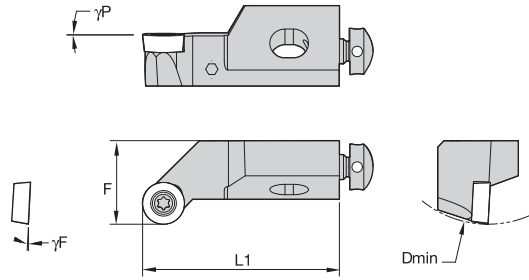
insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1933	T7	—	—	KUAM35	MS2173	2mm	CSWM 035 040
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050

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

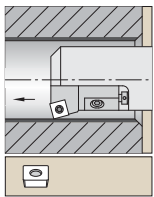


See pages B27–B28 and B48 for inserts.

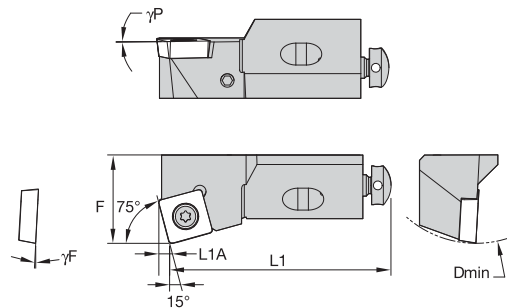


SRGC

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
	Right hand						
3871245	SRGCR08CA06	.984	.394	1.26	-4.0	0.0	RC..0602M0/RC..215
3871244	SRGCR10CA08	1.575	.551	1.97	-3.0	0.0	RC..0803M0/RC..0803M0
	Left hand						
3871246	SRGCL12CA10	1.969	.787	2.17	-3.0	0.0	RC..10T3M0/RC..10T3M0

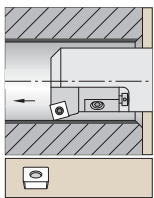


See pages B28–B29, B49, and B83 for inserts.

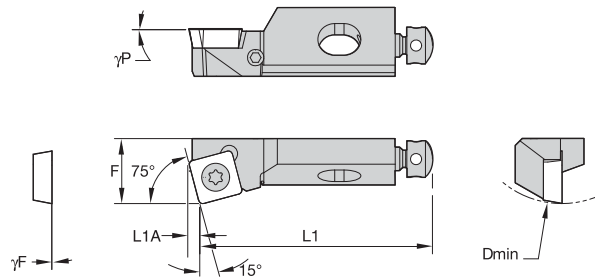


SSKC 15°

order number	catalog number	D min	F	L1	L1A	γ_F°	γ_P°	gage insert
	Right hand							
3871192	SSKCR10CA09	1.575	.551	1.97	.088	-4.3	-2.5	SC..09T308/SC..3252
3871191	SSKCR12CA12	1.969	.787	2.17	.121	-3.0	0.0	SC..120408/SC..432
3871190	SSKCR16CA12	2.362	.984	2.48	.121	-3.0	0.0	SC..120408/SC..432
	Left hand							
3871243	SSKCL12CA12	1.969	.787	2.17	.121	-3.0	0.0	SC..120408/SC..432



See pages B28–B29, B49, and B83 for inserts.



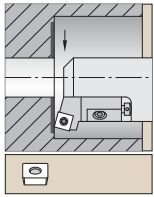
SSKP 15°

order number	catalog number	D min	F	L1	L1A	γ_F°	γ_P°	gage insert
	Right hand							
3870393	SSKPR10CA09	1.575	.551	1.97	.088	0.0	0.0	SP..09T308/SP..3252
3870392	SSKPR12CA09	1.969	.787	2.17	.088	0.0	0.0	SP..09T308/SP..3252
	Left hand							
3870394	SSKPL10CA09	1.575	.551	1.97	.088	0.0	0.0	SP..09T308/SP..3252

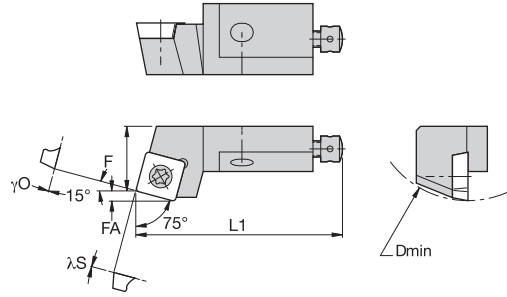
insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1153	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050
MS1154	T9	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
MS1155	T15	KUAM23	2.5mm	KUAM31	191.406	4mm	CSWM 060 050

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

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

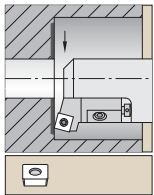


See pages B28–B29, B49, and B83 for inserts.

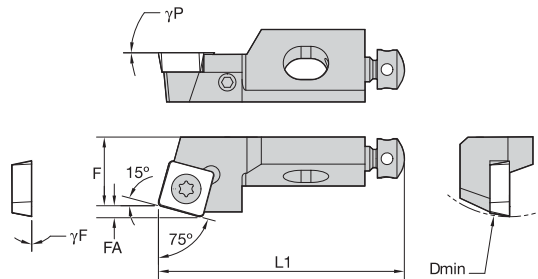


■ SSRC 15°

order number	catalog number	D min	F	L1	FA	γO°	λS°	gage insert
	Right hand							
3870390	SSRCR12CA12	1.969	.787	2.17	.12	0.0	-3.0	SC..120408/SC..432
	Left hand							
3870391	SSRCL12CA12	1.969	.787	2.17	.12	0.0	-3.0	SC..120408/SC..432

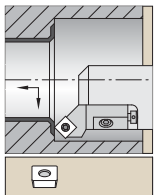


See pages B28–B29, B49, and B83 for inserts.

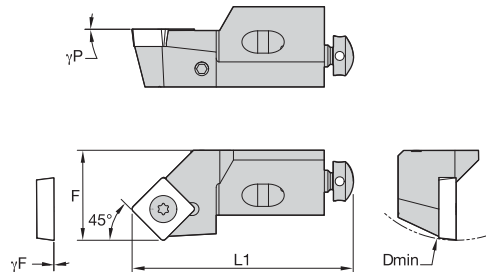


■ SSRP 15°

order number	catalog number	D min	F	L1	FA	γF°	γP°	gage insert
	Right hand							
3870388	SSRPR10CA09	1.575	.551	1.97	.09	0.0	0.0	SP..09T308/SP..3252
	Left hand							
3870389	SSRPL10CA09	1.575	.551	1.97	.09	0.0	0.0	SP..09T308/SP..3252



See pages B28–B29, B49, and B83 for inserts.



■ SSSC 45°

order number	catalog number	D min	F	L1	γF°	γP°	gage insert
	Right hand						
3870386	SSSCR10CA09	1.575	.551	1.73	-3.0	0.0	SC..09T308/SC..3252
3870385	SSSCR12CA12	1.969	.787	1.85	-3.0	0.0	SC..120408/SC..432
3870384	SSSCR16CA12	2.362	.984	2.09	0.0	0.0	SC..120408/SC..432
	Left hand						
3870387	SSSCL12CA12	1.969	.787	1.85	-3.0	0.0	SC..120408/SC..432

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
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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

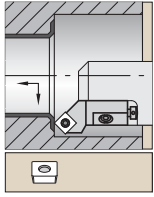
MS1155	T15	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050
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insert screw	Torx	radial adjusting screw	hex	axial adjusting screw	mounting screw	hex	washer
MS1155	T15	KUAM28	2mm	KUAM30	191.405	4mm	CSWM 060 050

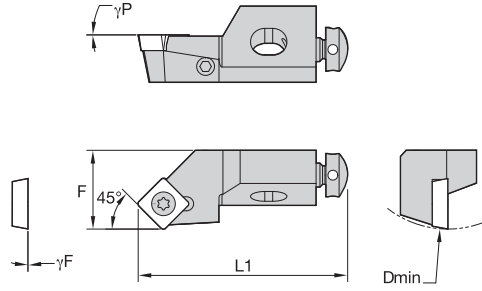
MS1157	T15	KUAM23	2.5mm	KUAM31	191.406	4mm	CSWM 060 050
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MS1157	T15	KUAM25	2.5mm	KUAM32	191.407	5mm	CSWM 080 050
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MS1157	T15	KUAM23	2.5mm	KUAM31	191.406	4mm	CSWM 060 050
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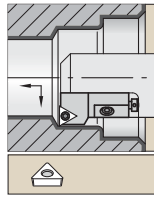


See pages B28–B29, B49, and B83 for inserts.

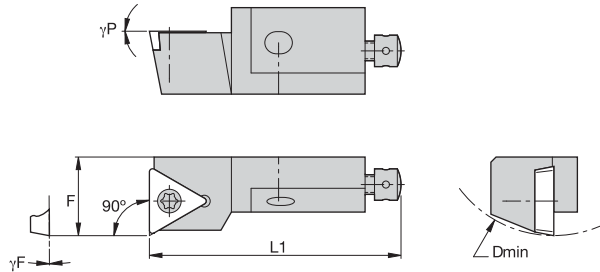


SSSP 45°

order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
3870382	Right hand SSSPR10CA09	1.575	.551	1.73	0.0	0.0	SP..09T308/SP..3252
3870383	Left hand SSSPL10CA09	1.575	.551	1.73	0.0	0.0	SP..09T308/SP..3252



See pages B36, B49, and B85 for inserts.

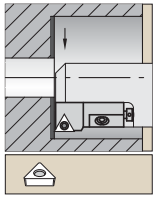


STFP 0°

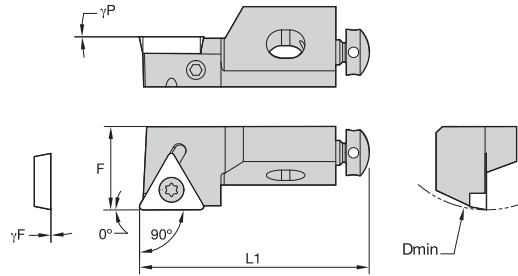
order number	catalog number	D min	F	L1	γ_F°	γ_P°	gage insert
3870378	Right hand STFPR08CA09	.984	.394	1.26	0.0	0.0	TP..090204/TP..18151
3870377	STFPR10CA11	1.575	.551	1.97	0.0	0.0	TP..110204/TP..2151
3870376	STFPR12CA16	1.969	.787	2.17	0.0	0.0	TP..16T308/TP..3252
3870375	STFPR16CA16	2.362	.984	2.48	0.0	0.0	TP..16T308/TP..3252
3870381	Left hand STFPL08CA09	.984	.394	1.26	0.0	0.0	TP..090204/TP..18151
3870380	STFPL10CA11	1.575	.551	1.97	0.0	0.0	TP..110204/TP..2151
3870379	STFPL12CA16	1.969	.787	2.17	0.0	0.0	TP..16T308/TP..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	KUAM28	2mm	KUAM30	191.405	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
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

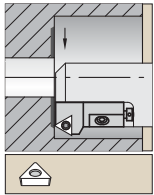


See pages B36, B49, and B85 for inserts.

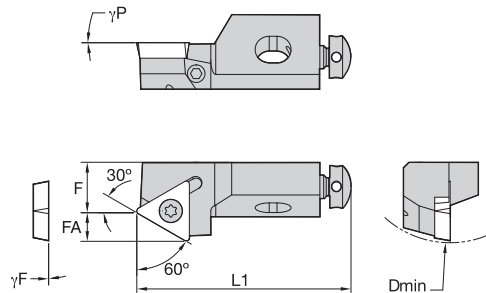


STGP 0°

order number	catalog number	D min	F	L1	γF°	γP°	gage insert
Right hand							
3870372	STGPR08CA09	.984	.394	1.26	0.0	0.0	TP..090204/TP..18151
3870371	STGPR10CA11	1.575	.551	1.97	0.0	0.0	TP..110204/TP..2151
3870370	STGPR12CA16	1.969	.787	2.17	0.0	0.0	TP..16T308/TP..3252
Left hand							
3870374	STGPL08CA09	.984	.394	1.26	0.0	0.0	TP..090204/TP..18151
3870373	STGPL10CA11	1.575	.551	1.97	0.0	0.0	TP..110204/TP..2151

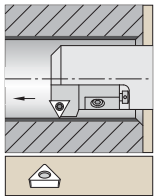


See pages B36, B49, and B85 for inserts.

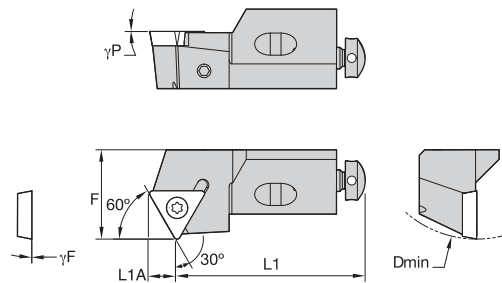


STTP 30°

order number	catalog number	D min	F	L1	FA	γF°	γP°	gage insert
Right hand								
3870369	STTPR08CA09	.984	.236	1.26	.17	0.0	0.0	TP..090204/TP..18151
3870368	STTPR10CA11	1.575	.354	1.97	.19	0.0	0.0	TP..110204/TP..2151
3870367	STTPR12CA16	1.969	.512	2.17	.28	0.0	0.0	TP..16T308/TP..3252



See pages B36, B49, and B85 for inserts.



STWP 30°

order number	catalog number	D min	F	L1	L1A	γF°	γP°	gage insert
Right hand								
3870364	STWPR08CA09	.984	.394	1.10	.169	0.0	0.0	TP..090204/TP..18151
3870363	STWPR10CA11	1.575	.551	1.73	.196	0.0	0.0	TP..110204/TP..2151
3870252	STWPR12CA16	1.969	.787	1.85	.284	0.0	0.0	TP..16T308/TP..3252
Left hand								
3870366	STWPL10CA11	1.575	.551	1.73	.196	0.0	0.0	TP..110204/TP..2151
3870365	STWPL12CA16	1.969	.787	1.85	.284	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
MS1152	T7	KUAM34	1.5mm	KUAM20	MS2175	2.5mm	CSWM 040 050
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
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

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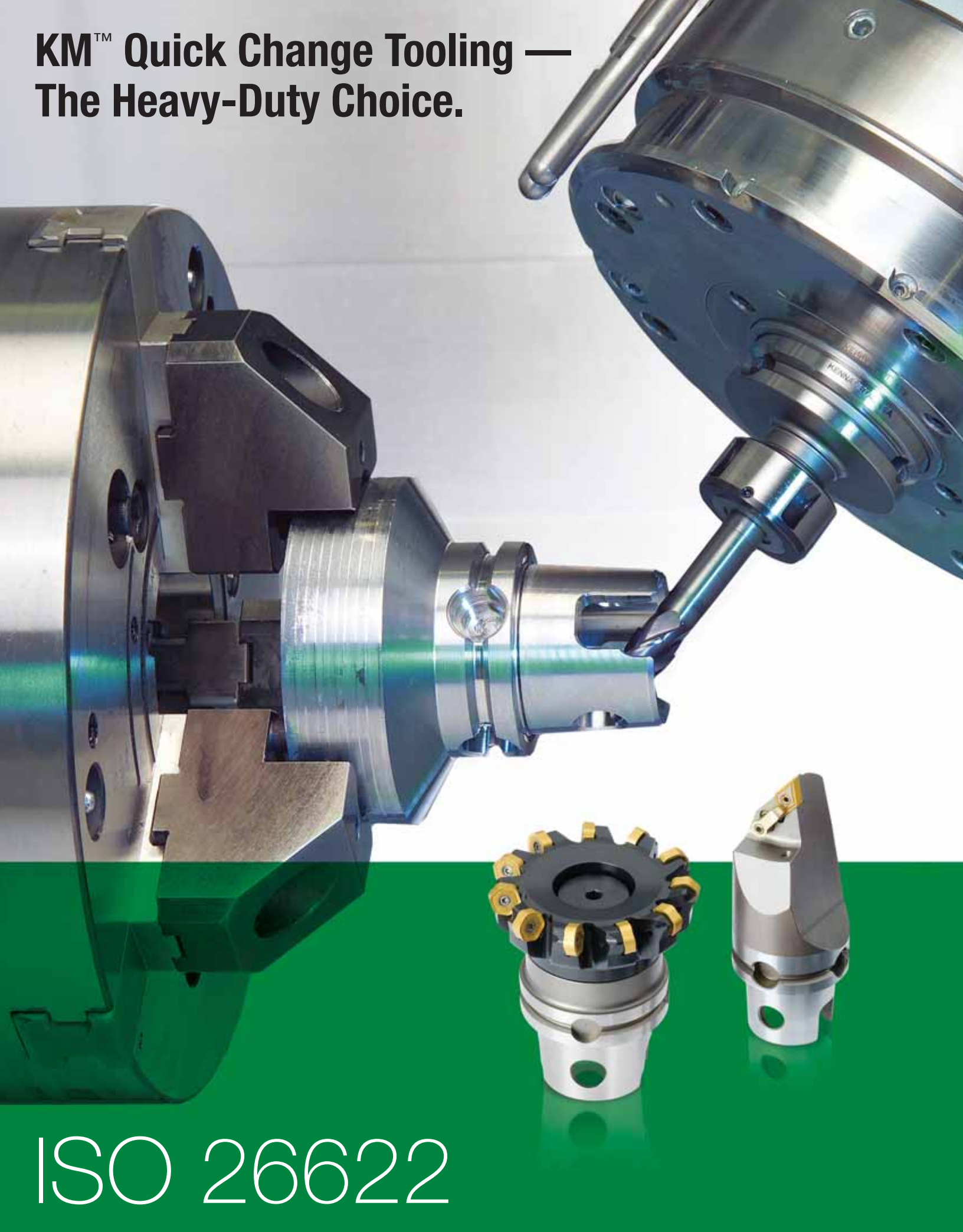
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ISO 26622

Cutting Speed (vc) SFM

ANSI ISO 513	VDI 3323	Finishing (d.o.c. x f = .0394 x .0039)				Medium (d.o.c. x f = .0787 x .0079)				Roughing (d.o.c. x f = .1575 x .0098)				Heavy roughing (d.o.c. x f = .2362 x .0236)											
		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											
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0315-.1969 • .0063-.0157				.0394-.3150 • .0079-.0236											
	1	1275	1800	2165		1180	1705	2030		1115	1570	1900		915	1310	1570		655	950	1145		590	850	1015	
	2	1245	1770	2130		1180	1670	2000		1115	1570	1900		850	1210	1440		620	885	1045		490	720	850	
	3	1045	1505	1800		1015	1440	1735		950	1375	1640		590	850	1015		520	750	915		360	520	620	
	4	950	1345	1605		885	1275	1540		850	1210	1440		620	885	1045		425	620	750		360	490	590	
	5	720	1045	1245		685	980	1180		655	915	1115		425	620	750		295	425	520		245	360	425	
	6	980	1410	1705		950	1345	1605		885	1275	1540		655	950	1145		455	655	785		360	520	620	
	7	950	1345	1605		885	1275	1540		850	1210	1440		620	885	1045		425	620	750		360	490	590	
	8	820	1145	1375		750	1080	1310		720	1045	1245		520	750	915		360	490	590		275	390	455	
	9	720	1045	1245		685	980	1180		655	915	1115		425	620	750		295	425	520		245	360	425	
	11	720	1045	1245		685	980	1180		655	915	1115		425	620	750		295	425	520		245	360	425	
	12	590	850	1015		590	820	980		490	720	850		455	655	785		390	555	655		360	520	620	
13.1	490	720	850		490	685	820		425	620	750		390	555	655		325	455	555		275	390	455		
13.2	260	360	425		245	340	410		210	310	375		195	275	325		160	225	275		145	210	260		
M	Geometry	22				22 • FW • 48				22 • 48 • AP • MW • SM				48 • SM • SR											
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0235-.1969 • .0047-.0157				.0197-.2362 • .0039-.0236											
	14.1	915	1310	1570		590	820	980		490	720	850		455	620	750		360	490	590					
	14.2	820	1210	1440		455	655	785		425	590	720		360	520	620		275	390	455					
K	Geometry	22				22 • FW • 5				5 • MW • NMA				22 • 5 • NMA											
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0394-.3150 • .0079-.0236				.0394-.3150 • .0047-.0236											
	15	—	—	—		950	1345	1605		885	1275	1540		820	1180	1410		750	1080	1310					
	16	—	—	—		750	1080	1310		590	820	980		555	785	950		425	620	750					
	17	915	1310	1570		820	1180	1410		685	980	1180		620	885	1045		490	720	850					
	18	915	1145	1375		785	1115	1345		620	885	1045		490	685	820		360	520	620					
	19	—	—	—		1115	1605	1935		950	1345	1605		820	1180	1410		750	1080	1310					
N	Geometry	22				22 • SM • 48				22 • SM • 48				22 • SM • 48											
	d.o.c. [inch] • f [inch]	.0394 • .0039				.0197-.0394 • .0039-.0197				.0197-.0394 • .0039-.0197				.0197-.0394 • .0039-.0197											
	21	—	—	—		2620	3280	3940		1640	2030	2420		1640	2030	2420		980	1210	1440					
	22	—	—	—		1310	1640	1965		980	1210	1440		980	1210	1440		655	820	980					
	23	—	—	—		1965	2420	2880		1640	2030	2420		1640	2030	2420		980	1210	1440					
	24	—	—	—		1965	2420	2880		1640	2030	2420		1640	2030	2420		980	1210	1440					
	25	—	—	—		1310	1640	1965		980	1210	1440		980	1210	1440		655	820	980					
	26	—	—	—		1310	1640	1965		980	1210	1440		980	1210	1440		655	820	980					
	27	—	—	—		655	820	980		490	620	750		490	620	750		325	425	520					
	28	—	—	—		325	425	520		325	425	520		325	425	520		260	340	420					
S	Geometry	22				22 • SM • 48				22 • SM • 48				22 • SM • 48											
	d.o.c. [inch] • f [inch]	< .0394 • .0039				.0197-.0394 • .0039-.0197				.0197-.0394 • .0039-.0197				.0197-.0394 • .0039-.0197											
	31	110	160	195		160	225	275		150	210	260		150	210	260		85	120	145					
	32	90	130	155		125	180	210		110	160	195		110	160	195		65	95	115					
	33	70	100	120		100	140	170		110	155	195		110	155	195		55	75	95					
	34	45	65	75		65	85	100		65	85	100		65	85	100		45	55	65					
	35	45	65	75		65	90	110		70	100	120		55	80	95		45	55	65					

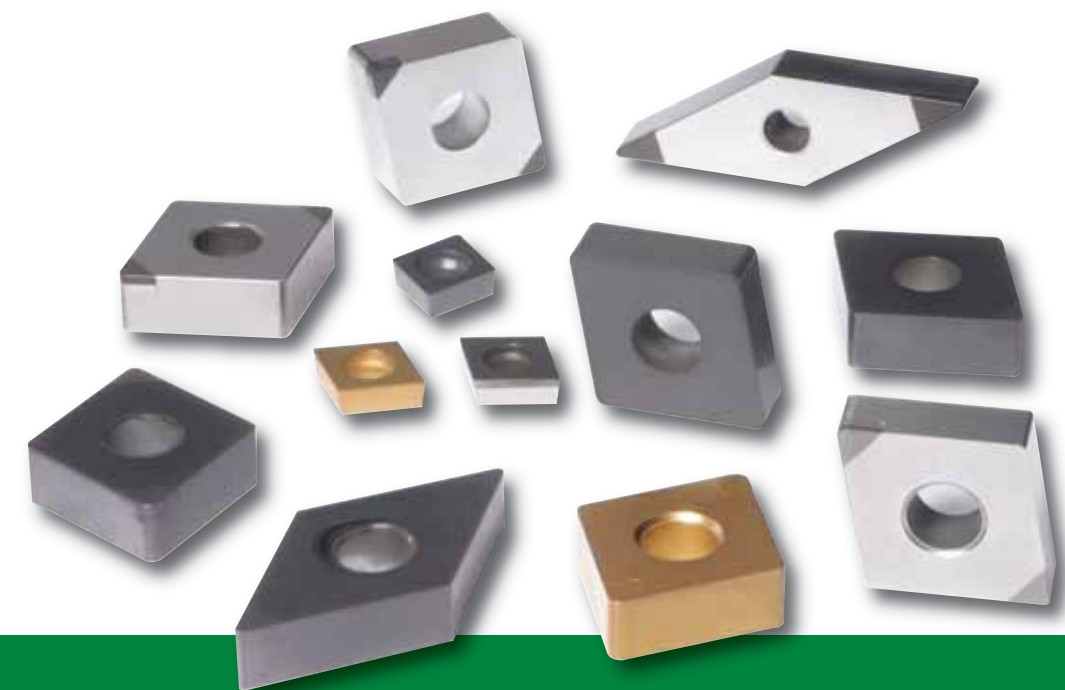
Speed and Feed for Negative Inserts

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

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

ANSI ISO 513	VDI 3323	Finishing (d.o.c. x f = .0394 x .0039)				Medium (d.o.c. x f = .0787 x .0079)				Roughing (d.o.c. x f = .1575 x .0098)			
		min	Start	max		min	Start	max		min	Start	max	
P	Geometry	2 • 41				2 • MU				2 • MU • CMT			
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0118-.1772 • .0032-.0138			
	1	1275	1800	2165		1180	1705	2030		1115	1570	1900	
	2	1245	1770	2130		1180	1670	2000		1115	1570	1900	
	3	1045	1505	1800		1015	1440	1735		950	1375	1640	
	4	950	1345	1605		885	1275	1540		850	1210	1440	
	5	720	1045	1245		685	980	1180		655	915	1115	
	6	980	1410	1705		950	1345	1605		885	1275	1540	
	7	950	1345	1605		885	1275	1540		850	1210	1440	
	8	820	1145	1375		750	1080	1310		720	1045	1245	
	9	720	1045	1245		685	980	1180		655	915	1115	
	11	720	1045	1245		685	980	1180		655	915	1115	
	12	590	850	1015		590	820	980		490	720	850	
13.1	490	720	850		490	685	820		425	620	750		
13.2	260	360	425		245	340	410		210	310	375		
M	Geometry	MU				MU				MU • CMT			
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0118-.1772 • .0032-.0138			
	14.1	915	1310	1570		590	820	980		490	720	850	
	14.2	820	1210	1440		455	655	785		425	590	720	
K	Geometry	MU				MU				MU			
	d.o.c. [inch] • f [inch]	.0079-.0787 • .0020-.0079				.0079-.0787 • .0020-.0079				.0118-.1772 • .0032-.0138			
	15	—	—	—		950	1345	1605		885	1275	1540	
	16	—	—	—		750	1080	1310		590	820	980	
	17	915	1310	1570		820	1180	1410		685	980	1180	
	18	915	1145	1375		785	1115	1345		620	885	1045	
	19	—	—	—		1115	1605	1935		950	1345	1605	
N	Geometry	2				2				2			
	d.o.c. [inch] • f [inch]	.0394 • .0039				.0197-.0394 • .0039-.0197				.0197-.0394 • .0039-.0197			
	21	—	—	—		2620	3280	3940		1640	2030	2420	
	22	—	—	—		1310	1640	1965		980	1210	1440	
	23	—	—	—		1965	2420	2880		1640	2030	2420	
	24	—	—	—		1965	2420	2880		1640	2030	2420	
	25	—	—	—		1310	1640	1965		980	1210	1440	
	26	—	—	—		1310	1640	1965		980	1210	1440	
	27	—	—	—		655	820	980		490	620	750	
	28	—	—	—		325	425	520		325	425	520	
S	Geometry	CMT				MU				CMT			
	d.o.c. [inch] • f [inch]	.0276-.1181 • .0047-.0079				.1180-.0787 • .0032-.0079				.2760-.1969 • .0047-.0157			
	31	110	160	195		160	225	275		150	210	260	
	32	90	130	155		125	180	210		110	160	195	
	33	70	100	120		100	140	170		110	155	195	
	34	45	65	75		65	85	100		65	85	100	
	35	45	65	75		65	90	110		70	100	120	



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.



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.



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
Catalog Numbering System .....	.B12–B13
Carbide Inserts .....	.B14–B46
Inserts for Aluminum .....	.B47–B50
Ceramic Inserts .....	.B51–B60
Cubic Boron Nitride and Polycrystalline Diamond Inserts .....	.B62–B89
Overview .....	.B62–B63
Cutting Material Groups .....	.B64
Custom Solutions • CBN and PCD .....	.B65
Grades and Grade Descriptions .....	.B66–B67
Speed and Feed Chart .....	.B68–B69
Catalog Numbering System .....	.B70–B71
Inserts .....	.B72–B89



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

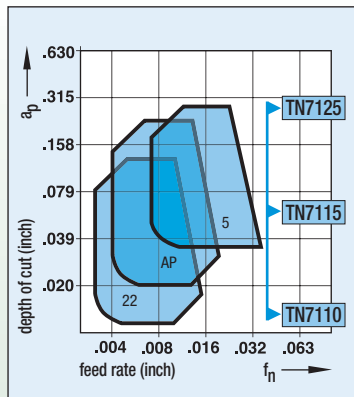
ISO 513	P				
	01	10	20	30	40
Hard Metal Coated		TN7105			
			TN7110		
				TN7115	
					TN7125

wear resistance = harder

- TN7105** — Finish and fine turning.
- TN7110** — Light to medium turning under favorable conditions.
- TN7115** — Medium roughing also slightly interrupted cuts.
- TN7125** — General roughing, also with interrupted cuts.
- TN7135** — Heavy turning and heavily interrupted cut.

toughness = softer

Start-Up Recommendations for Steel



Double-Sided, Negative Inserts

Roughing

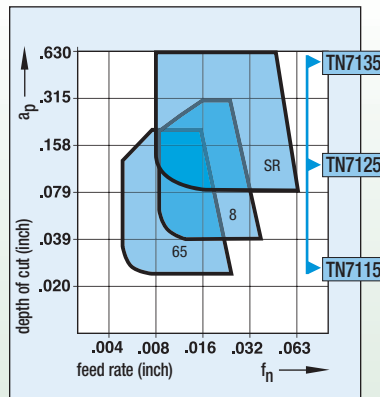
Interrupted cut and/or heavy scale
USE: 5 geometry

Medium Turning

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

Finishing

Non-interrupted cut, no scale
USE: 22 geometry



Single-Sided, Negative Inserts

Heavy Duty Turning

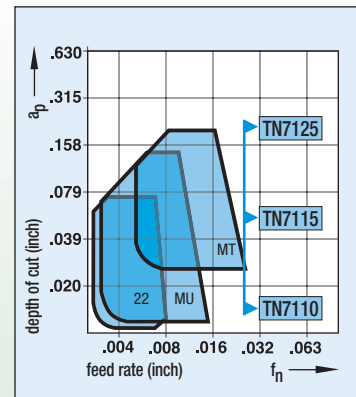
Very large depth of cut and feed rates < 0.031"
USE: SR geometry

Heavy Roughing

Interrupted cut and/or large scale
USE: 8 geometry

Roughing

Lightly interrupted cut, minimum scale
USE: 65 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

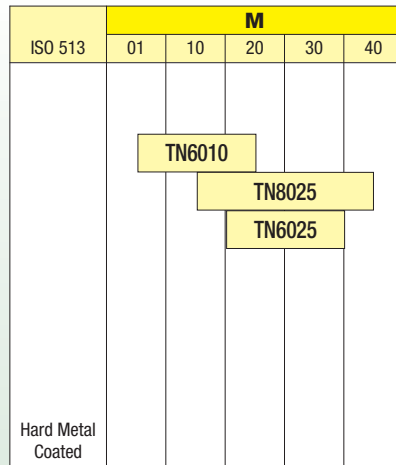
Non-interrupted cut, no scale
USE: 22 geometry

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

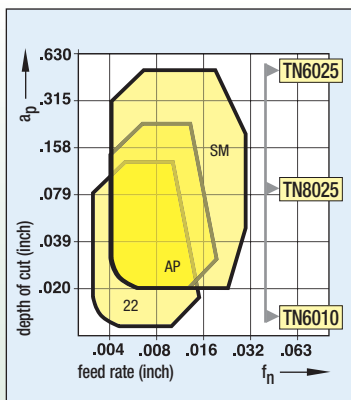
TN6010 — Finish and fine turning.

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

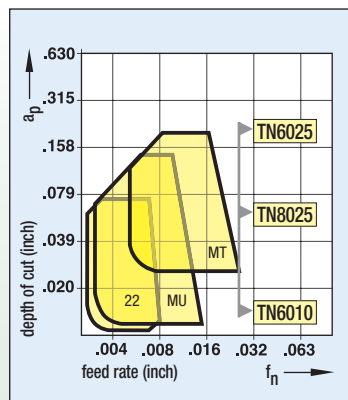
Medium to roughing with positive chip groove
USE: SM geometry

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

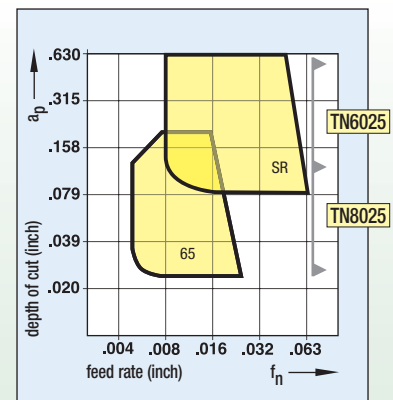
Interrupted cut and/or scale
USE: STANDARD MT geometry

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.

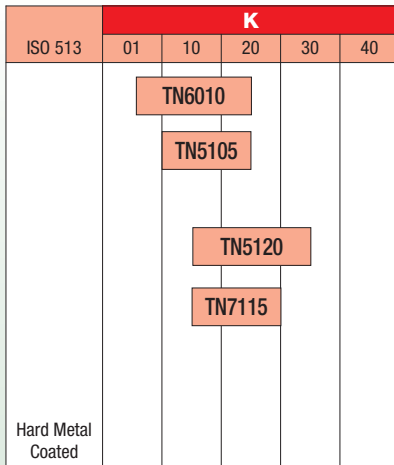
1 Select the Insert Geometry:

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



TN6010 — Finish and fine turning.

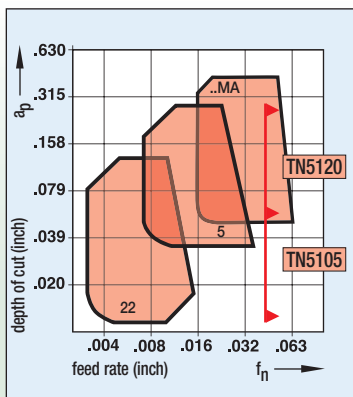
TN5105 — Preferred for gray cast iron finishing operations.

TN5120 — Preferred for all gray 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

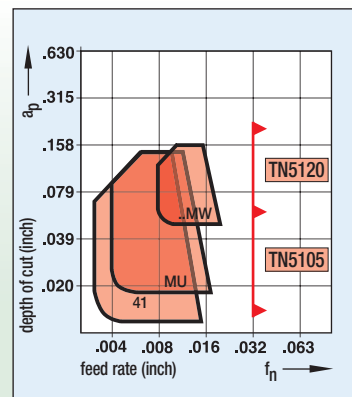
Interrupted cut and/or heavy scale
USE: 5 geometry

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

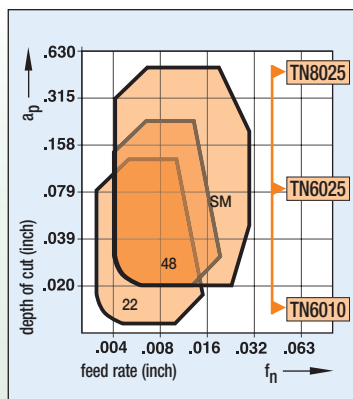
ISO 513	S				
	01	10	20	30	40
Hard Metal Coated	THM				
	TN6010				
			TN6025		
			TN8025		

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

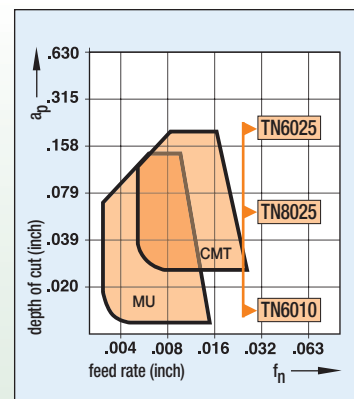
Medium to roughing with positive chip groove
 USE: SM geometry

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

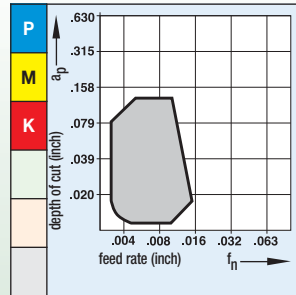
General turning and boring
 USE: MU geometry

Double-Sided, Negative Inserts

22



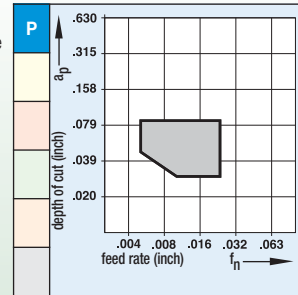
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.



FL



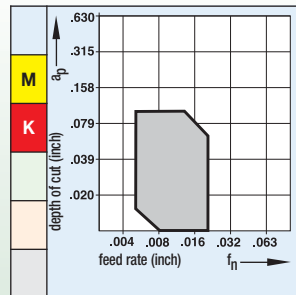
Double-sided insert with adjusted inclination angle for good chip control at low depths of cut.



FW



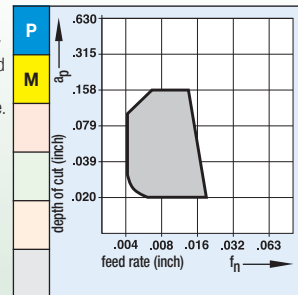
Wiper geometry for finishing, when good surface finish is needed using high feed rates. First choice for high-performance finishing.



4



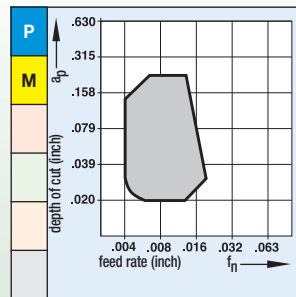
Semi-finishing geometry for light- to medium-duty steel machining. Reduced back forces result from adjusted inclination angle. Well-suited for positive, vibration-prone parts.



48



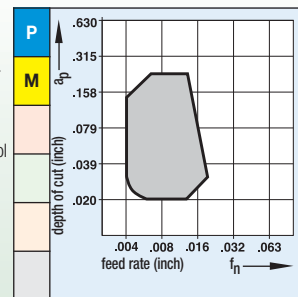
For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.



AP



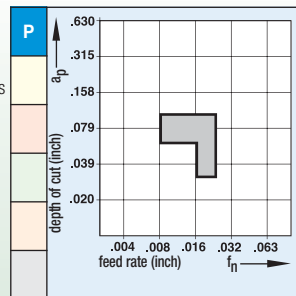
For near-net shape turning with low depths of cut and medium feeds. Stabilized cutting edge. Optimized chip forming and corrugated cutting edges ensure good control and chip evacuation. For steels, rolled or drawn components with casting or forging skin.



FR



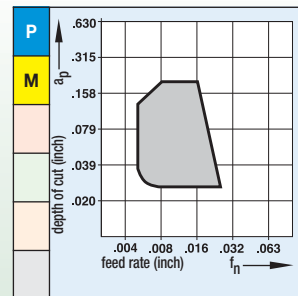
Double-sided insert with medium positive geometry. Adjusted inclination angle. Reduces cutting forces. Provides good chip control over wide range of feed rates.



49



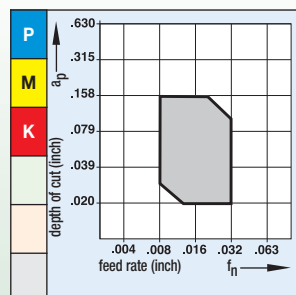
For medium to rough turning. Outstanding chip control due to specially configured chipbreaker element in corner area. Good chip forming with low depths of cut.



MW



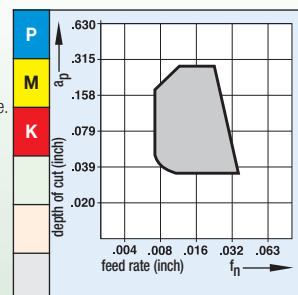
Wiper geometry for light to medium turning with high feed rates. Feed twice as high as with edges with full corner radii to produce same surface finish.



5



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

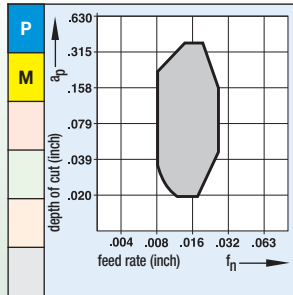


Double-Sided, Negative Inserts

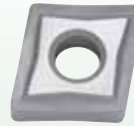
SL



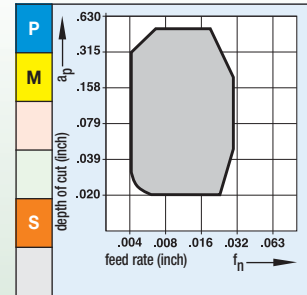
For medium to light roughing of steels, difficult-to-machine high alloy titanium and aluminum materials. High strength to deal with heavy chip deformation.



SM



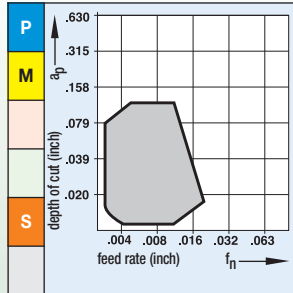
For medium duty machining of tough work materials, such as chrome- and nickel-based alloys. Minimizes tendency for materials to adhere to insert.



CT



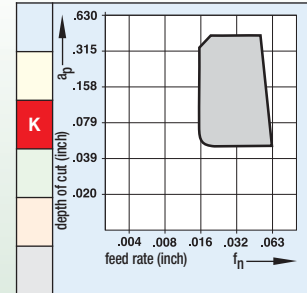
Designed for outward copy turning. Where other geometries produce long chips, the unique distribution of the cut results in good chip control.



..MA



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

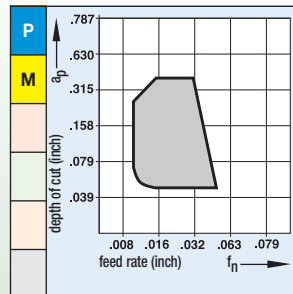


Single-Sided, Negative Inserts

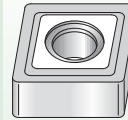
65



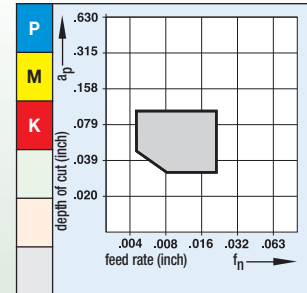
Rough-turning geometry with chip control extending to medium-duty range. Positive rake angle lowers cutting forces, reducing power requirements. Used on low-tensile and stainless steels.



..MG



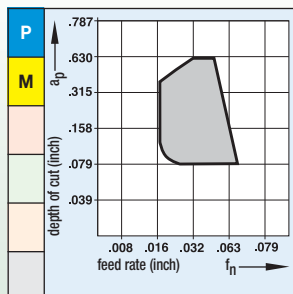
For light machining to light roughing.



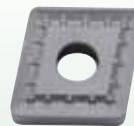
8



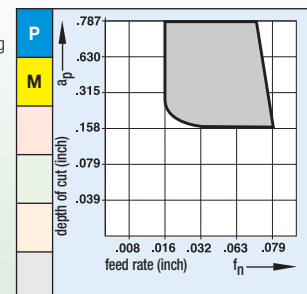
Stable cutting edge for heaviest chip sections and highest metal removal rates. For interrupted cuts and applications involving high cutting edge loading. Depths of cut up to .630", feeds up to .063".



SR



Strong cutting edge for highest loads in roughing with depths of cut up to .866" and feeds up to .079".



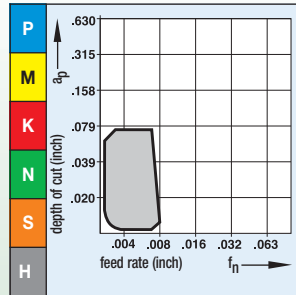
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Single-Sided, Positive Inserts

2



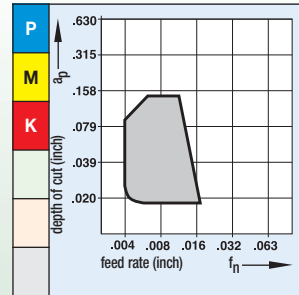
Sharp edge for finish machining. Good chip control with very small chip sections. High dimensional accuracy and smooth surface finishes. Inserts with .008" corner radius precision-ground on all sides.



41



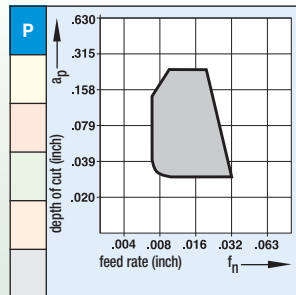
Preferred for light- to medium-duty machining. Low cutting forces and reduced power requirements due to positive rake angle. Good chip control over a wide range. Also used on short-chipping cast iron.



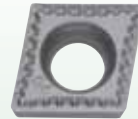
67



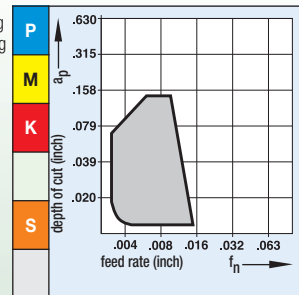
Provides chip control in the medium-duty range. Positive rake reduces cutting forces and power consumption. Used on low-strength and stainless steels.



MU



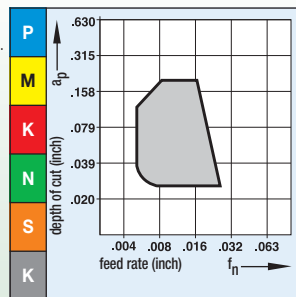
Medium universal turning includes rough machining with medium chip loads and finish machining with low chip loads.



MT



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



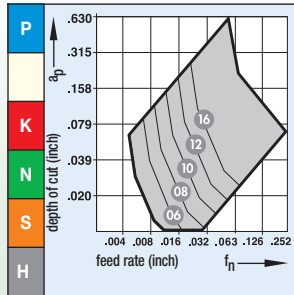
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Round, Positive Inserts

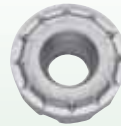
RCMT/RCMX



For straight turning, facing, and profile turning. Used at small depths of cut and high feeds up to 0.1 x D.



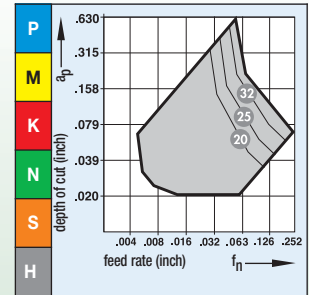
RCMT43



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

feeds:
 $f \leq 0.1 \times D$

depths of cut:
 $a_p \leq 0.4 \times D$

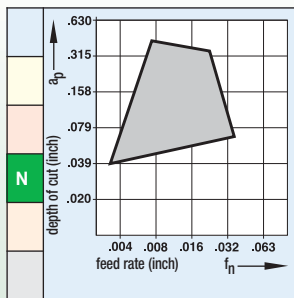


Single-Sided, Positive Inserts for Aluminum Machining

AL1



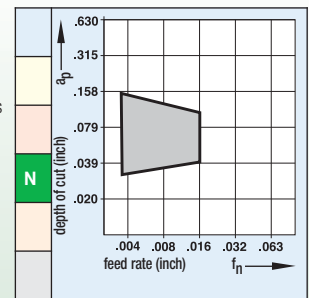
For turning cast aluminum, light alloys, non-ferrous metals, high-melting metals, plastics, glass fiber, reinforced plastics, laminated board, carbon, and fine ceramics.



AL2



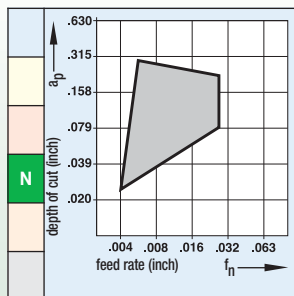
For difficult-to-machine aluminum alloys with low Si contents, wrought alloys, and extrusions. Achieves optimum results on difficult-to-machine materials.



AL3



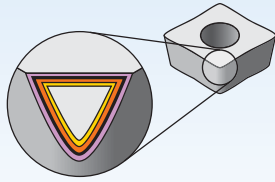
For cost-effective machining of aluminum, non-ferrous metals, and plastics. Extremely sharp cutting edges result in optimum part finishes with low cutting forces and short chips. Finishing of steel, stainless steel, and gray iron is possible with the coated grade HCK10.



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

Grades and Grade Descriptions

Inserts



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

NEW!

NEW!

NEW!

NEW!

NEW!

NEW!

Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
HCK10 HC-N10	Coated carbide. PVD — TiAlN-Al ₂ O ₃ on micro-grain carbide. Light and medium machining. For aluminum alloys.									
TN5105 HC-K15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ . Increased wear resistance for long tool life at high cutting speeds. Enhanced edge strength against depth-of-cut notching in interrupted cuts.									
TN5120 HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ . Light and medium machining. For cast irons.									
TN6010 HC-S10	Coated carbide. PVD — TiAlN Nano-multi-layer. Light machining. For difficult-to-machine alloys and stainless steels.									
TN6025 HC-S25	Coated carbide. PVD — TiAlN Nano-multi-layer. Light and medium machining. For difficult-to-machine alloys and stainless steels.									
TN7105 HC-P05	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Extremely wear resistant. Light machining. For steels and nodular cast iron in non-interrupted cuts.									
TN7110 HC-P10	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Very wear resistant. Light and medium machining. For steels.									
TN7115 HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.									
TN7125 HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good toughness properties. Medium and heavy machining. For steels.									

NEW!

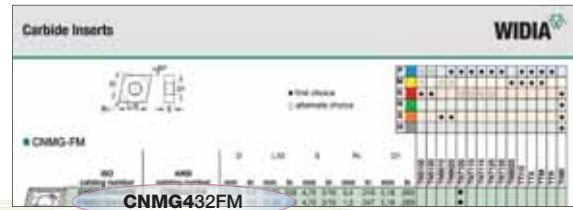
Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
 TN7135 HC-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Proven on all roughing and heavy roughing operations, wet or dry, on interrupted and non-interrupted cuts.	P								
 TN8025 HC-M25	Coated carbide. MT-CVD /CVD — TiN-TiCN-Al ₂ O ₃ -ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI 300 series.	M								
 HWK10 HF-N10	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light machining. For non-ferrous metals and non-metals.	N								
 HWK15 HF-N15	Uncoated carbide. Micro-grain carbide with high cutting edge stability. Light and medium machining. For non-ferrous metals and non-metals.	N								
 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 unfavorable conditions.	K								
		N								
 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 unfavorable conditions.	S								
		H								
 TTM HW-P25	Uncoated carbide. Medium machining. For steels and nodular cast iron.	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 unfavorable conditions.	P								
		M								
 TTX HW-P35	Uncoated carbide. Very wear-resistant grade. Light machining. To be used in favorable conditions.	P								
		M								
 TT15 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 favorable conditions.	P								
		M								
 CW2015 CM-H10	Mixed (black) ceramic. Matrix Al ₂ O ₃ and TiCN. Good toughness properties combined with good wear resistance. Semi-finishing and finishing. For hardened iron base materials and gray cast iron (finishing).	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 gray cast iron.	K								
 CW3020 C4	Whisker ceramic with a matrix of Al ₂ O 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								

NEW!

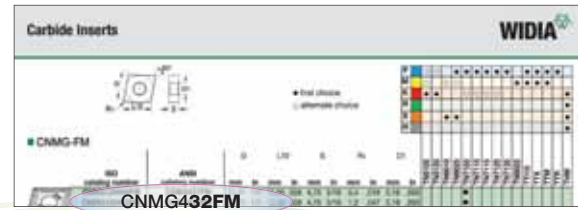
How Do Catalog Numbers Work?

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		N		M		G		4																																																																																																																																																																																																																							
Insert Shape		Insert Clearance Angle		Tolerance Class		Insert Features		Size																																																																																																																																																																																																																							
H	Hexagon 120°	A	3°	<p>Tolerances apply prior to edge prep and coating</p> <p>D = Theoretical diameter of the insert inscribed circle S = Thickness B = See figures below</p>	N		<p>Code for inch cutting edge length "L10"</p> <table border="1"> <thead> <tr> <th></th> <th>"D"</th> <th>C</th> <th>D</th> <th>R</th> <th>S</th> <th>T</th> <th>V</th> <th>W</th> </tr> </thead> <tbody> <tr> <td>1.2 (5)</td> <td>5/32</td> <td>S4</td> <td>04</td> <td>03</td> <td>03</td> <td>06</td> <td>—</td> <td>—</td> </tr> <tr> <td>1.5 (6)</td> <td>3/16</td> <td>04</td> <td>05</td> <td>04</td> <td>04</td> <td>08</td> <td>08</td> <td>S3</td> </tr> <tr> <td>1.8 (7)</td> <td>7/32</td> <td>05</td> <td>06</td> <td>05</td> <td>05</td> <td>09</td> <td>09</td> <td>03</td> </tr> <tr> <td>—</td> <td>.236</td> <td>—</td> <td>—</td> <td>06</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>2</td> <td>1/4</td> <td>06</td> <td>07</td> <td>06</td> <td>06</td> <td>11</td> <td>11</td> <td>04</td> </tr> <tr> <td>2.5</td> <td>5/16</td> <td>08</td> <td>09</td> <td>07</td> <td>07</td> <td>13</td> <td>13</td> <td>05</td> </tr> <tr> <td>—</td> <td>.315</td> <td>—</td> <td>—</td> <td>08</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>3</td> <td>3/8</td> <td>09</td> <td>11</td> <td>09</td> <td>09</td> <td>16</td> <td>16</td> <td>06</td> </tr> <tr> <td>—</td> <td>.394</td> <td>—</td> <td>—</td> <td>10</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>3.5</td> <td>7/16</td> <td>11</td> <td>13</td> <td>11</td> <td>11</td> <td>19</td> <td>19</td> <td>07</td> </tr> <tr> <td>—</td> <td>.472</td> <td>—</td> <td>—</td> <td>12</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>4</td> <td>1/2</td> <td>12</td> <td>15</td> <td>12</td> <td>12</td> <td>22</td> <td>22</td> <td>08</td> </tr> <tr> <td>4.5</td> <td>9/16</td> <td>14</td> <td>17</td> <td>14</td> <td>14</td> <td>24</td> <td>24</td> <td>09</td> </tr> <tr> <td>5</td> <td>5/8</td> <td>16</td> <td>19</td> <td>15</td> <td>15</td> <td>27</td> <td>27</td> <td>10</td> </tr> <tr> <td>—</td> <td>.630</td> <td>—</td> <td>—</td> <td>16</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>5.5</td> <td>11/16</td> <td>17</td> <td>21</td> <td>17</td> <td>17</td> <td>30</td> <td>30</td> <td>11</td> </tr> <tr> <td>6</td> <td>3/4</td> <td>19</td> <td>23</td> <td>19</td> <td>19</td> <td>33</td> <td>33</td> <td>13</td> </tr> <tr> <td>—</td> <td>.787</td> <td>—</td> <td>—</td> <td>20</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>7</td> <td>7/8</td> <td>22</td> <td>27</td> <td>22</td> <td>22</td> <td>38</td> <td>38</td> <td>15</td> </tr> <tr> <td>—</td> <td>.984</td> <td>—</td> <td>—</td> <td>25</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> <tr> <td>8</td> <td>1</td> <td>25</td> <td>31</td> <td>25</td> <td>25</td> <td>44</td> <td>44</td> <td>17</td> </tr> <tr> <td>10</td> <td>1-1/4</td> <td>32</td> <td>38</td> <td>31</td> <td>31</td> <td>54</td> <td>54</td> <td>21</td> </tr> <tr> <td>—</td> <td>1.260</td> <td>—</td> <td>—</td> <td>32</td> <td>—</td> <td>—</td> <td>—</td> <td>—</td> </tr> </tbody> </table>		"D"	C	D	R	S	T	V	W	1.2 (5)	5/32	S4	04	03	03	06	—	—	1.5 (6)	3/16	04	05	04	04	08	08	S3	1.8 (7)	7/32	05	06	05	05	09	09	03	—	.236	—	—	06	—	—	—	—	2	1/4	06	07	06	06	11	11	04	2.5	5/16	08	09	07	07	13	13	05	—	.315	—	—	08	—	—	—	—	3	3/8	09	11	09	09	16	16	06	—	.394	—	—	10	—	—	—	—	3.5	7/16	11	13	11	11	19	19	07	—	.472	—	—	12	—	—	—	—	4	1/2	12	15	12	12	22	22	08	4.5	9/16	14	17	14	14	24	24	09	5	5/8	16	19	15	15	27	27	10	—	.630	—	—	16	—	—	—	—	5.5	11/16	17	21	17	17	30	30	11	6	3/4	19	23	19	19	33	33	13	—	.787	—	—	20	—	—	—	—	7	7/8	22	27	22	22	38	38	15	—	.984	—	—	25	—	—	—	—	8	1	25	31	25	25	44	44	17	10	1-1/4	32	38	31	31	54	54	21	—	1.260	—	—	32	—	—	—	—
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O	Octagon 135°	B	5°	R																																																																																																																																																																																																																											
P	Pentagon 108°	C	7°	F																																																																																																																																																																																																																											
R	Round —	D	15°	A																																																																																																																																																																																																																											
S	Square 90°	E	20°	M																																																																																																																																																																																																																											
T	Triangular 60°	F	25°	G																																																																																																																																																																																																																											
C	Rhomboid 80°	G	30°	W																																																																																																																																																																																																																											
D	55°	N	0°	T																																																																																																																																																																																																																											
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V	35°	B	82°	H																																																																																																																																																																																																																											
W	Trigon 80° with enlarged corner angles	N/K	55°	C																																																																																																																																																																																																																											
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X				X	Special Design																																																																																																																																																																																																																										

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



3

Thickness
S

symbol	thickness
inch	inch
.5 (1)	1/32
.6	.040
1 (2)	1/16
1.2	5.64
1.5	3/32
2	1/8
2.5	5/32
3	3/16
3.5	7/32
4	1/4
5	5/16
6	3/8
7	7/16
18	1/2

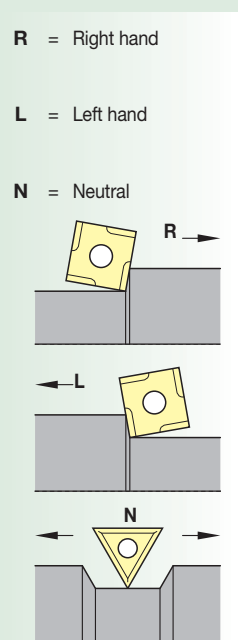
2

Corner Radius "Rε"

symbol	corner radius
inch	inch
X0	.0015
0	.004
.5	.008
1	1/64
2	1/32
3	3/64
4	1/16
5	5/64
6	3/32
7	7/64
8	1/8
—	round insert

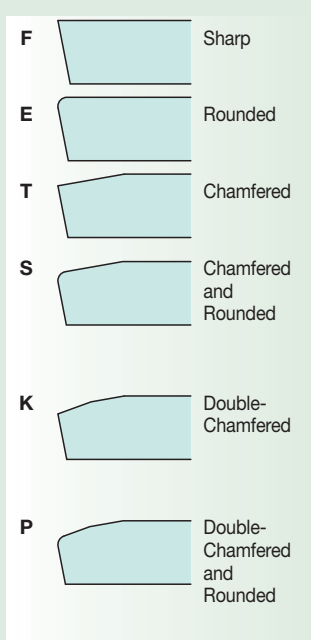
Hand of Insert (optional)

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

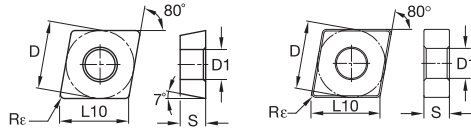


FM

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 0.043"
- 13 = Railroad Light
- 16 = Railroad Medium
- 18 = Ground Chip Groove "width of chip groove 0.071"
- 22 = Finishing
- 25 = Ground Chip Groove "width of chip groove 0.098"
- 29 = Ground Chip Groove "width of chip groove 0.114"
- 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 275 HB
- MU = Medium Universal
- MW = Medium Wiper
- RRP = Railroad Positive
- SL = Light Medium Roughing
- SM = Sharp Medium
- SP = Soft Peeling for materials up to 275 HB
- SR = Super Rough
- T = Negative Land

"D"	± Tolerance on "D"				"D"	± Tolerance on "B"			
	Class M Tolerance			Class U Tolerance		Class M Tolerance			Class U Tolerance
	Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C		Shapes S, T, C, R, & W	Shape D	Shape V	Shapes S, T, & C
inch	inch	inch	inch	inch	inch	inch	inch	inch	
5/32	.002	—	—	—	5/32	.003	—	—	—
3/16	.002	—	—	.003	3/16	.003	—	—	.005
7/32	.002	.002	.002	.003	7/32	.003	.004	—	.005
1/4	.002	.002	.002	.003	1/4	.003	.004	—	.005
5/16	.002	.002	.002	.003	5/16	.003	.004	—	.005
3/8	.002	.002	.002	.003	3/8	.003	.004	.007	.005
7/16	.003	.003	.003	.005	7/16	.005	.006	—	—
1/2	.003	.003	.003	.005	1/2	.005	.006	.010	.008
9/16	.003	.003	.003	.005	9/16	.005	.006	—	—
5/8	.004	.004	.004	.007	5/8	.006	.007	—	.011
11/16	.004	.004	.004	.007	11/16	.006	.007	—	.011
3/4	.004	.004	.004	.007	3/4	.006	.007	—	.011
7/8	.005	—	—	.010	7/8	.006	—	—	.015
1	.005	—	—	.010	1	.007	—	—	.015
1 1/4	.006	—	—	.010	1 1/4	.008	—	—	.015




● first choice
○ alternate choice

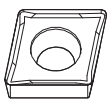
P	■	■	■	■
M	■	■	■	■
K	■	■	■	■
N	■	●	●	●
S	■	■	■	■
H	■	■	■	■

Inserts • Inserts for Aluminum


■ CCGT-AL1

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CCGT060202AL1	CCGT21505AL1	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,80	.110	●	●	
	CCGT2151AL1	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110	●	●	
CCGT09T302AL1	CCGT32505AL1	9,53	3/8	9,67	.381	3,97	5/32	0,2	.008	4,40	.173	●	●	
	CCGT3251AL1	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	●	●	
CCGT09T308AL1	CCGT3252AL1	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173	●	●	
	CCGT4305AL1	12,70	1/2	12,90	.508	4,76	3/16	0,2	.008	5,50	.217	●	●	
CCGT120404AL1	CCGT431AL1	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,50	.217	●	●	
CCGT120408AL1	CCGT432AL1	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,50	.217	●	●	

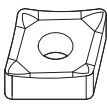
■ CCGT-AL2

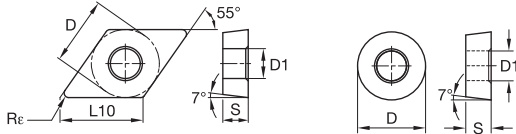
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CCGT060202AL2	CCGT21505AL2	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,80	.110			●
	CCGT2151AL2	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110			●
CCGT09T304AL2	CCGT3251AL2	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173			●
CCGT09T308AL2	CCGT3252AL2	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173			●

■ CCGT-AL3

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CCGT060202AL3	CCGT21505AL3	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,80	.110	●	●	
	CCGT2151AL3	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110	●	●	
CCGT09T302AL3	CCGT32505AL3	9,53	3/8	9,67	.381	3,97	5/32	0,2	.008	4,40	.173			●
	CCGT3251AL3	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	●	●	
CCGT09T308AL3	CCGT3252AL3	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173			●
	CCGT4305AL3	12,70	1/2	12,90	.508	4,76	3/16	0,2	.008	5,50	.217			●
CCGT120404AL3	CCGT431AL3	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,50	.217	●	●	
CCGT120408AL3	CCGT432AL3	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,50	.217	●	●	

■ CNGM-AL1

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CNGM190612AL1	CNGM643AL1	19,05	3/4	19,34	.762	6,35	1/4	1,2	.047	7,93	.313			●

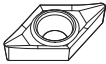


● first choice
○ alternate choice

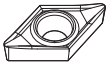
P			
M			
K			
N	●	●	●
S			
H			

Inserts • Inserts for Aluminum

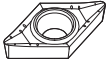
■ DCGT-AL1

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DCGT070202AL1	DCGT21505AL1	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	●	●	
DCGT070204AL1	DCGT2151AL1	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110	●	●	
DCGT11T302AL1	DCGT32505AL1	9,53	3/8	11,63	.458	3,97	5/32	0,2	.008	4,40	.173	●	●	
DCGT11T304AL1	DCGT3251AL1	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	●	●	
DCGT11T308AL1	DCGT3252AL1	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	●	●	

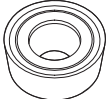
■ DCGT-AL2

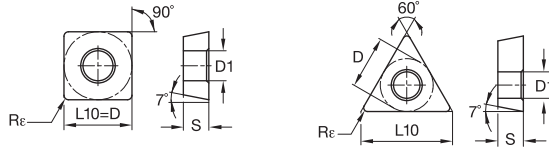
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DCGT070204AL2	DCGT2151AL2	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110			●
DCGT11T304AL2	DCGT3251AL2	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173			●
DCGT11T308AL2	DCGT3252AL2	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173			●

■ DCGT-AL3

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DCGT070202AL3	DCGT21505AL3	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	●	●	
DCGT070204AL3	DCGT2151AL3	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110	●	●	
DCGT11T302AL3	DCGT32505AL3	9,53	3/8	11,63	.458	3,97	5/32	0,2	.008	4,40	.173			●
DCGT11T304AL3	DCGT3251AL3	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	●	●	
DCGT11T308AL3	DCGT3252AL3	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	●	●	

■ RCGT-AL1

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
 RCGT0803M0AL1	RCGT0803M0AL1	8,00	.315	—	—	3,18	1/8	—	—	3,40	.134	●	●	
RCGT1003M0AL1	RCGT1003M0AL1	10,00	.394	—	—	3,18	1/8	—	—	4,40	.173	●	●	



● first choice
○ alternate choice

P	Blue			
M	Yellow			
K	Red			
N	Green	●	●	●
S	Orange			
H	Grey			

■ **SCGT-AL1**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
SCGT09T304AL1	SCGT3251AL1	9,53	3/8	9,53	.375	3,97	5/32	0,4	.016	4,40	.173			●
SCGT09T308AL1	SCGT3252AL1	9,53	3/8	9,53	.375	3,97	5/32	0,8	.031	4,40	.173			●
SCGT120408AL1	SCGT432AL1	12,70	1/2	12,70	.500	4,76	3/16	0,8	.031	5,50	.217			●

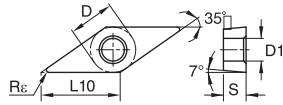
■ **SCGT-AL3**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
SCGT120408AL3	SCGT432AL3	12,70	1/2	12,70	.500	4,76	3/16	0,8	.031	5,50	.217			●

■ **TCGT-AL1**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
TCGT110202AL1	TCGT21505AL1	6,35	1/4	11,00	.433	2,38	3/32	0,2	.008	2,80	.110			●
TCGT110204AL1	TCGT2151AL1	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110			●
TCGT16T302AL1	TCGT32505AL1	9,53	3/8	16,50	.650	3,97	5/32	0,2	.008	4,40	.173			●
TCGT16T304AL1	TCGT3251AL1	9,53	3/8	16,50	.650	3,97	5/32	0,4	.016	4,40	.173			●
TCGT16T308AL1	TCGT3252AL1	9,53	3/8	16,50	.650	3,97	5/32	0,8	.031	4,40	.173			●

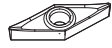
Inserts • Inserts for Aluminum



● first choice
○ alternate choice

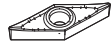
P			
M			
K			
N	●	●	●
S			
H			

■ VCGT-AL1



ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
VCGT110302AL1	VCGT2205AL1	6,35	1/4	11,07	.436	3,18	1/8	0,2	.008	2,80	.110	●	●	
VCGT110304AL1	VCGT221AL1	6,35	1/4	11,07	.436	3,18	1/8	0,4	.016	2,80	.110	●	●	
VCGT110308AL1	VCGT222AL1	6,35	1/4	11,07	.436	3,18	1/8	0,8	.031	2,80	.110	●	●	
VCGT160404AL1	VCGT331AL1	9,53	3/8	16,61	.654	4,76	3/16	0,4	.031	4,40	.173	●	●	
VCGT160408AL1	VCGT332AL1	9,53	3/8	16,61	.654	4,76	3/16	0,8	.031	4,40	.173	●	●	
VCGT160412AL1	VCGT333AL1	9,53	3/8	16,61	.654	4,76	3/16	1,2	.047	4,40	.173	●	●	
VCGT220530AL1	VCGT4358AL1	12,70	1/2	22,14	.872	5,56	7/32	3,0	.118	5,50	.217	●	●	

■ VCGT-AL3



ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		HCK10	HWK10	HWK15
		mm	in	mm	in	mm	in	mm	in	mm	in			
VCGT110302AL3	VCGT2205AL3	6,35	1/4	11,07	.436	3,18	1/8	0,2	.008	2,80	.110			●
VCGT110304AL3	VCGT221AL3	6,35	1/4	11,07	.436	3,18	1/8	0,4	.016	2,80	.110			●
VCGT160404AL3	VCGT331AL3	9,53	3/8	16,61	.654	4,76	3/16	0,4	.031	4,40	.173	●	●	
VCGT160408AL3	VCGT332AL3	9,53	3/8	16,61	.654	4,76	3/16	0,8	.031	4,40	.173	●	●	
VCGT160412AL3	VCGT333AL3	9,53	3/8	16,61	.654	4,76	3/16	1,2	.047	4,40	.173	●	●	
VCGT220530AL3	VCGT4358AL3	12,70	1/2	22,14	.872	5,56	7/32	3,0	.118	5,50	.217	●	●	

Inserts • Inserts for Aluminum

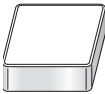


● first choice
○ alternate choice


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

Inserts • Ceramic Inserts


■ CNG

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CNGN120404T02020	CNG431T0820	12,70	.500	12,90	.508	4,76	3/16	0,4	.016	—	—	●	■	■
CNGN120408T01020	CNG432T0420	12,70	.500	12,90	.508	4,76	3/16	0,8	.031	—	—	●	■	■
CNGN120408T02020	CNG432T0820	12,70	.500	12,90	.508	4,76	3/16	0,8	.031	—	—	●	■	■
CNGN120412T01020	CNG433T0420	12,70	.500	12,90	.508	4,76	3/16	1,2	.047	—	—	●	■	■
CNGN120412T02020	CNG433T0820	12,70	.500	12,90	.508	4,76	3/16	1,2	.047	—	—	●	■	■
CNGN120416T01020	CNG434T0420	12,70	.500	12,90	.508	4,76	3/16	1,6	.063	—	—	●	■	■
CNGN120416T02020	CNG434T0820	12,70	.500	12,90	.508	4,76	3/16	1,6	.063	—	—	●	■	■
CNGN120712T01020	CNG453T0420	12,70	.500	12,90	.508	7,94	5/16	1,2	.047	—	—	●	■	■
CNGN120712T02020	CNG453T0820	12,70	.500	12,90	.508	7,94	5/16	1,2	.047	—	—	●	■	■
CNGN120716T01020	CNG454T0420	12,70	.500	12,90	.508	7,94	5/16	1,6	.063	—	—	●	■	■
CNGN120716T02020	CNG454T0820	12,70	.500	12,90	.508	7,94	5/16	1,6	.063	—	—	●	■	■
CNGN160716T02020	CNG554T0820	15,88	.625	16,12	.635	7,94	5/16	1,6	.063	—	—	●	■	■

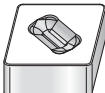
■ CNGA

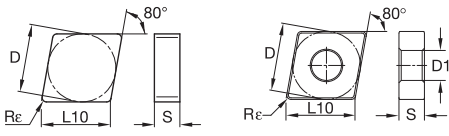
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CNGA120404T02020	CNGA431T0820	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,16	.203	●	■	■
CNGA120408T02020	CNGA432T0820	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	●	■	■
CNGA120412T02020	CNGA433T0820	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203	●	■	■
CNGA120416T02020	CNGA434T0820	12,70	1/2	12,90	.508	4,76	3/16	1,6	.063	5,16	.203	●	■	■
CNGA160612T02020	CNGA543T0820	15,88	5/8	16,12	.635	6,35	1/4	1,2	.047	6,35	.250	●	■	■
CNGA160616T02020	CNGA544T0820	15,88	5/8	16,12	.635	6,35	1/4	1,6	.063	6,35	.250	●	■	■
CNGA190612T02020	CNGA643T0820	19,05	3/4	19,34	.762	6,35	1/4	1,2	.047	7,93	.313	●	■	■
CNGA190616T02020	CNGA644T0820	19,05	3/4	19,34	.762	6,35	1/4	1,6	.063	7,93	.313	●	■	■

■ CNGA-FW

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CNGA120408T01020FW	CNGA432T0420FW	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	●	■	■
CNGA120412T01020FW	CNGA433T0420FW	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203	●	■	■
CNGA120416T01020FW	CNGA434T0420FW	12,70	1/2	12,90	.508	4,76	3/16	1,6	.063	5,16	.203	●	■	■

■ CNGX

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 CNGX120708T02020	CNGX452T0820	12,70	1/2	12,90	.508	7,94	5/16	0,8	.031	—	—	●	■	■
CNGX120712T02020	CNGX453T0820	12,70	1/2	12,90	.508	7,94	5/16	1,2	.047	—	—	●	■	■
CNGX120716T02020	CNGX454T0820	12,70	1/2	12,90	.508	7,94	5/16	1,6	.063	—	—	●	■	■
CNGX160716T02020	CNGX554T0820	15,88	5/8	16,12	.635	7,94	5/16	1,6	.063	—	—	●	■	■

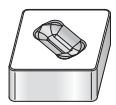


● first choice
○ alternate choice

P			
M			
K	●	●	●
N			
S		●	
H	●		

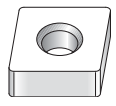
Inserts • Ceramic Inserts

■ CNGX-FW



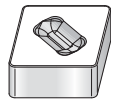
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
CNGX120712T01020FW	CNGX453T0420FW	12,70	1/2	12,90	.508	7,9	5/16	1,2	.047	—	—			●

■ CNMA

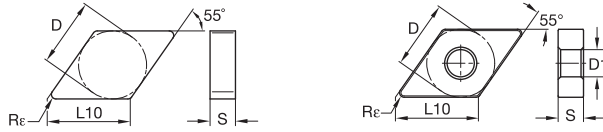


ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
CNMA120408T02020	CNMA432T0820	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203			●
CNMA120412T02020	CNMA433T0820	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203			●
CNMA120416T02020	CNMA434T0820	12,70	1/2	12,90	.508	4,76	3/16	1,6	.063	5,16	.203			●
CNMA160612T02020	CNMA543T0820	15,88	5/8	16,12	.635	6,35	1/4	1,2	.047	6,35	.250			●
CNMA160616T02020	CNMA544T0820	15,88	5/8	16,12	.635	6,35	1/4	1,6	.063	6,35	.250			●

■ CNMX



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
CNMX120712T02020	CNMX453T0820	12,70	1/2	12,90	.508	7,94	5/16	1,2	.047	—	—			●
CNMX120716T02020	CNMX454T0820	12,70	1/2	12,90	.508	7,94	5/16	1,6	.063	—	—			●

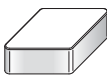


● first choice
○ alternate choice

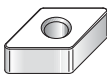
P	■	■	■	■
M	■	■	■	■
K	■	●	●	●
N	■	■	■	■
S	■	■	●	●
H	■	●	■	■

Inserts • Ceramic Inserts

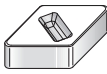
■ DNG

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DNGN150704T02020	DNG451T0820	12,70	1/2	15,50	.610	7,94	5/16	0,4	.016	—	—	●	●	●
DNGN150708T01020	DNG452T0420	12,70	1/2	15,50	.610	7,94	5/16	0,8	.031	—	—	●	●	●
DNGN150708T02020	DNG452T0820	12,70	1/2	15,50	.610	7,94	5/16	0,8	.031	—	—	●	●	●
DNGN150712T01020	DNG453T0420	12,70	1/2	15,50	.610	7,94	5/16	1,2	.047	—	—	●	●	●
DNGN150712T02020	DNG453T0820	12,70	1/2	15,50	.610	7,94	5/16	1,2	.047	—	—	●	●	●
DNGN150716T01020	DNG454T0420	12,70	1/2	15,50	.610	7,94	5/16	1,6	.063	—	—	●	●	●
DNGN150716T02020	DNG454T0820	12,70	1/2	15,50	.610	7,94	5/16	1,6	.063	—	—	●	●	●

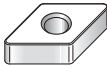
■ DNGA

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DNGA150404T02020	DNGA431T0820	12,70	1/2	15,50	.610	4,76	3/16	0,4	.016	5,16	.203	●	●	●
DNGA150408T02020	DNGA432T0820	12,70	1/2	15,50	.610	4,76	3/16	0,8	.031	5,16	.203	●	●	●
DNGA150412T02020	DNGA433T0820	12,70	1/2	15,50	.610	4,76	3/16	1,2	.047	5,16	.203	●	●	●
DNGA150604T02020	DNGA441T0820	12,70	1/2	15,50	.610	6,35	1/4	0,4	.016	5,16	.203	●	●	●
DNGA150608T02020	DNGA442T0820	12,70	1/2	15,50	.610	6,35	1/4	0,8	.031	5,16	.203	●	●	●
DNGA150612T02020	DNGA443T0820	12,70	1/2	15,50	.610	6,35	1/4	1,2	.047	5,16	.203	●	●	●

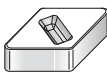
■ DNGX

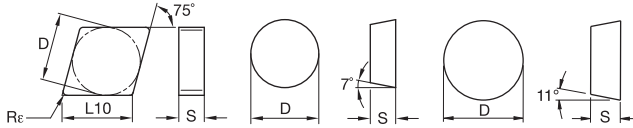
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DNGX120712T02020	DNGX120712T02020	10,00	.3937	12,21	.481	7,94	5/16	1,2	.047	—	—	●	●	●
DNGX120716T02020	DNGX120716T02020	10,00	.3937	12,21	.481	7,94	5/16	1,6	.063	—	—	●	●	●
DNGX150708T02020	DNGX452T0820	12,70	1/2	15,50	.610	7,94	5/16	0,8	.031	—	—	●	●	●
DNGX150712T02020	DNGX453T0820	12,70	1/2	15,50	.610	7,94	5/16	1,2	.047	—	—	●	●	●
DNGX150716T02020	DNGX454T0820	12,70	1/2	15,50	.610	7,94	5/16	1,6	.063	—	—	●	●	●

■ DNMA

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DNMA150412T02020	DNMA433T0820	12,70	1/2	15,50	.610	4,76	3/16	1,2	.047	5,16	.203	●	●	●

■ DNMX

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 DNMX150716T02020	DNMX454T0820	12,70	1/2	15,50	.610	7,94	5/16	1,6	.063	—	—	●	●	●



● first choice
○ alternate choice

P			
M			
K	●	●	●
N			
S		●	
H	●		

Inserts • Ceramic Inserts

■ ENG

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
ENGN130704T02020	ENG451T0820	12,70	1/2	13,15	.518	7,94	5/16	0,4	.016	—	—	●		
ENGN130708T02020	ENG452T0820	12,70	1/2	13,15	.518	7,94	5/16	0,8	.031	—	—	●		
ENGN130712T02020	ENG453T0820	12,70	1/2	13,15	.518	7,94	5/16	1,2	.047	—	—	●		
ENGN130716T02020	ENG454T0820	12,70	1/2	13,15	.518	7,94	5/16	1,6	.063	—	—	●		

■ ENGX

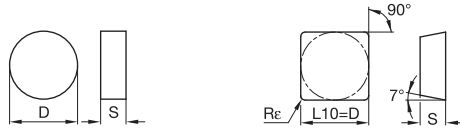
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1				
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in			
ENGX130716T02020	ENGX454T0820	12,70	1/2	13,15	.518	7,94	5/16	1,6	.063	—	—			●

■ RCGV

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1				
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in			
RCGX060400T01020	RCGV23T0420	6,35	1/4	—	—	4,76	3/16	—	—	—	—			●
RCGX090700T01020	RCGV35T0420	9,53	3/8	—	—	7,92	5/16	—	—	—	—	●	●	
RCGX090700T02020	RCGV35T0820	9,53	3/8	—	—	7,92	5/16	—	—	—	—	●		
RCGX090700T07015	RCGV35T2815	9,53	3/8	—	—	7,92	5/16	—	—	—	—	●		
RCGX090700T20015	RCGV35T8015	9,53	3/8	—	—	7,92	5/16	—	—	—	—	●		
RCGX120700T01020	RCGV45T0420	12,70	1/2	—	—	7,92	5/16	—	—	—	—			●
RCGX120700T02020	RCGV45T0820	12,70	1/2	—	—	7,92	5/16	—	—	—	—	●		
RCGX120700T20015	RCGV45T8015	12,70	1/2	—	—	7,92	5/16	—	—	—	—	●		

■ RPGV

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1				
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in			
RPGX060400T01020	RPGV23T0420	6,35	1/4	—	—	4,78	3/16	—	—	—	—			●
RPGX090700T01020	RPGV35T0420	9,53	3/8	—	—	7,92	5/16	—	—	—	—	●		
RPGX120700T01020	RPGV45T0420	12,70	1/2	—	—	7,92	5/16	—	—	—	—	●		



● first choice
○ alternate choice

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

Inserts • Ceramic Inserts

■ **RNG**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
RNGN090300T01020	RNG32T0420	9,53	3/8	—	—	3,18	1/8	—	—	—	—	●	●	●
RNGN090400T02020	RNG33T0820	9,53	3/8	—	—	4,76	3/16	—	—	—	—	●	●	●
RNGN120400T01020	RNG43T0420	12,70	1/2	—	—	4,76	3/16	—	—	—	—	●	●	●
RNGN120400T02020	RNG43T0820	12,70	1/2	—	—	4,76	3/16	—	—	—	—	●	●	●
RNGN120700T01020	RNG45T0420	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●
RNGN120700T02020	RNG45T0820	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●
RNGN120700T10015	RNG45T4015	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●
RNGN120700T15015	RNG45T6015	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●
RNGN120700T20015	RNG45T8015	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●
RNGN150700T02020	RNG55T0820	15,88	5/8	—	—	7,94	5/16	—	—	—	—	●	●	●

■ **RNM**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
RNMN120700T02020	RNM45T0820	12,70	1/2	—	—	7,94	5/16	—	—	—	—	●	●	●

■ **SCG**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SCGN090412T00520	SCG333T0220	9,53	3/8	9,53	.375	4,76	3/16	1,2	.047	—	—	●	●	●

■ **SCG-FW**

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SCGN090408EFW	SCG332EFW	9,53	3/8	9,53	.375	4,76	3/16	0,8	.031	—	—	●	●	●

■ **SCU**

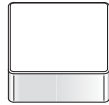
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SCUN120412T00520	SCU433T0220	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	—	—	●	●	●



● first choice
○ alternate choice

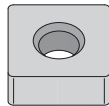
P			
M			
K	●	●	●
N			
S	●		
H	●		

■ SNG



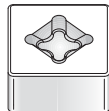
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SNGN090308T02020	SNG322T0820	9,53	3/8	9,53	.375	3,18	1/8	0,8	.031	—	—	●		
SNGN090412T00515	SNG333T0215	9,53	3/8	9,53	.375	4,76	3/16	1,2	.047	—	—	●		
SNGN120408T00520	SNG432T0220	12,70	1/2	12,70	.500	4,76	3/16	0,8	.031	—	—	●		
SNGN120408T02020	SNG432T0820	12,70	1/2	12,70	.500	4,76	3/16	0,8	.031	—	—	●		●
SNGN120412T01020	SNG433T0420	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	—	—	●		
SNGN120412T02020	SNG433T0820	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	—	—	●		●
SNGN120416T01020	SNG434T0420	12,70	1/2	12,70	.500	4,76	3/16	1,6	.063	—	—	●		
SNGN120416T02020	SNG434T0820	12,70	1/2	12,70	.500	4,76	3/16	1,6	.063	—	—	●		●
SNGN120704T02020	SNG451T0820	12,70	1/2	12,70	.500	7,94	5/16	0,4	.016	—	—	●		
SNGN120708T02020	SNG452T0820	12,70	1/2	12,70	.500	7,94	5/16	0,8	.031	—	—	●		
SNGN120712T00520	SNG453T0220	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—	●		
SNGN120712T01020	SNG453T0420	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—	●		●
SNGN120712T02020	SNG453T0820	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—	●		●
SNGN120716T00520	SNG454T0220	12,70	1/2	12,70	.500	7,94	5/16	1,6	.063	—	—	●		
SNGN120716T01020	SNG454T0420	12,70	1/2	12,70	.500	7,94	5/16	1,6	.063	—	—	●		
SNGN120716T02020	SNG454T0820	12,70	1/2	12,70	.500	7,94	5/16	1,6	.063	—	—	●		●
SNGN120720T02020	SNG455T0820	12,70	1/2	12,70	.500	7,94	5/16	2,0	.078	—	—	●		
SNGN120720T10015	SNG455T4015	12,70	1/2	12,70	.500	7,94	5/16	2,0	.078	—	—	●		
SNGN150712T02020	SNG553T0820	15,88	5/8	15,88	.625	7,94	5/16	1,2	.047	—	—	●		
SNGN150716T02020	SNG554T0820	15,88	5/8	15,88	.625	7,94	5/16	1,6	.063	—	—	●		
SNGN190720K20015	SNG655K8015	19,05	3/4	19,05	.750	7,94	5/16	2,0	.079	—	—	●		
SNGN190720T20015	SNG655T8015	19,05	3/4	19,05	.750	7,94	5/16	2,0	.079	—	—	●		

■ SNGA

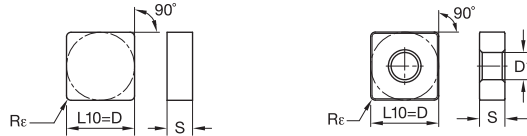


ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SNGA120408T02020	SNGA432T0820	12,70	1/2	12,70	.500	4,76	3/16	0,8	.031	5,16	.203	●		●
SNGA120412T02020	SNGA433T0820	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	5,16	.203	●		●
SNGA120416T02020	SNGA434T0820	12,70	1/2	12,70	.500	4,76	3/16	1,6	.063	5,16	.203	●		●
SNGA150612T02020	SNGA543T0820	15,88	5/8	15,88	.625	6,35	1/4	1,2	.047	6,35	.250	●		●
SNGA150616T02020	SNGA544T0820	15,88	5/8	15,88	.625	6,35	1/4	1,6	.063	6,35	.250	●		●

■ SNGX



ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SNGX120708T02020	SNGX452T0820	12,70	1/2	12,70	.500	7,94	5/16	0,8	.031	—	—	●		
SNGX120712T02020	SNGX453T0820	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—	●		
SNGX120716T02020	SNGX454T0820	12,70	1/2	12,70	.500	7,94	5/16	1,6	.063	—	—	●		
SNGX150716T02020	SNGX554T0820	15,88	5/8	15,88	.625	7,94	5/16	1,6	.063	—	—	●		




● first choice
○ alternate choice


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

Inserts • Ceramic Inserts

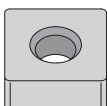
■ SNGX-FW

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 SNGX120712T01020FW	SNGX453T0420FW	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—			●


■ SNM

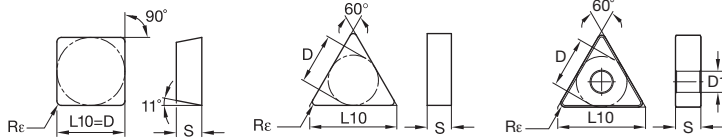
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 SNMN120412T02020	SNM433T0820	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	—	—			●
SNMN120416T02020	SNM434T0820	12,70	1/2	12,70	.500	4,76	3/16	1,6	.063	—	—			●

■ SNMA

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 SNMA120412T02020	SNMA433T0820	12,70	1/2	12,70	.500	4,76	3/16	1,2	.047	5,16	.203			●
SNMA120416T02020	SNMA434T0820	12,70	1/2	12,70	.500	4,76	3/16	1,6	.063	5,16	.203			●
SNMA150616T02020	SNMA544T0820	15,88	5/8	15,88	.625	6,35	1/4	1,6	.063	6,35	.250			●

■ SNMX

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
 SNMX120712T02020	SNMX453T0820	12,70	1/2	12,70	.500	7,94	5/16	1,2	.047	—	—			●
SNMX120716T02020	SNMX454T0820	12,70	1/2	12,70	.500	7,94	5/16	1,6	.063	—	—			●
SNMX150716T02020	SNMX554T0820	15,88	5/8	15,88	.625	7,94	5/16	1,6	.063	—	—			●



● first choice
○ alternate choice

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

Inserts • Ceramic Inserts

■ SPG

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SPGN090308T01020	SPG322T0420	9,53	3/8	9,53	.375	3,18	1/8	0,8	.031	—	—	●		
SPGN120304T01020	SPG421T0420	12,70	1/2	12,70	.500	3,18	1/8	0,4	.016	—	—	●		
SPGN120308T01020	SPG422T0420	12,70	1/2	12,70	.500	3,18	1/8	0,8	.031	—	—	●		

■ SPU

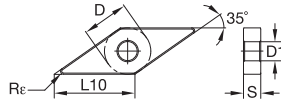
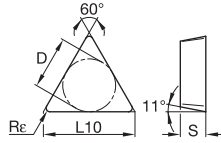
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
SPUN120304T00520	SPU421T0220	12,70	1/2	12,70	.500	3,18	1/8	0,4	.016	—	—	●		
SPUN120308T00520	SPU422T0220	12,70	1/2	12,70	.500	3,18	1/8	0,8	.031	—	—	●		
SPUN120312T00520	SPU423T0220	12,70	1/2	12,70	.500	3,18	1/8	1,2	.047	—	—	●		

■ TNG

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
TNGN110308T02020	TNG222T0820	6,35	1/4	11,00	.433	3,18	1/8	0,8	.031	—	—	●		
TNGN160404T02020	TNG331T0820	9,53	3/8	16,50	.650	4,76	3/16	0,4	.016	—	—	●		
TNGN160408T01020	TNG332T0420	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	—	—	●		
TNGN160408T02020	TNG332T0820	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	—	—	●		
TNGN160412T01020	TNG333T0420	9,53	3/8	16,50	.650	4,76	3/16	1,2	.047	—	—	●		
TNGN160412T02020	TNG333T0820	9,53	3/8	16,50	.650	4,76	3/16	1,2	.047	—	—	●		
TNGN160416T02020	TNG334T0820	9,53	3/8	16,50	.650	4,76	3/16	1,6	.063	—	—	●		
TNGN160708T02020	TNG352T0820	9,53	3/8	16,50	.650	7,94	5/16	0,8	.031	—	—	●		
TNGN160712T02020	TNG353T0820	9,53	3/8	16,50	.650	7,94	5/16	1,2	.047	—	—	●		
TNGN220408T02020	TNG432T0820	12,70	1/2	22,00	.866	4,76	3/16	0,8	.031	—	—	●		
TNGN220416T02020	TNG434T0820	12,70	1/2	22,00	.866	4,76	3/16	1,6	.063	—	—	●		

■ TNGA

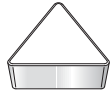
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
TNGA160408T02020	TNGA332T0820	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	3,81	.150	●		●
TNGA160412T02020	TNGA333T0820	9,53	3/8	16,50	.650	4,76	3/16	1,2	.047	3,81	.150	●		●
TNGA160416T02020	TNGA334T0820	9,53	3/8	16,50	.650	4,76	3/16	1,6	.063	3,81	.150	●		●
TNGA220408T02020	TNGA432T0820	12,70	1/2	22,00	.866	4,76	3/16	0,8	.031	5,16	.203	●		●



● first choice
○ alternate choice

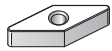
P	■	■	■	■
M	■	■	■	■
K	■	●	■	■
N	■	■	■	■
S	■	■	●	■
H	■	■	■	■

■ TPG



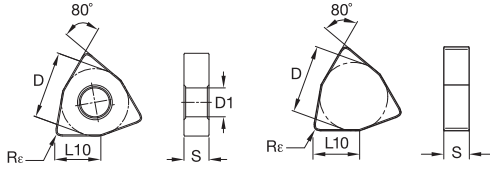
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
TPGN110304T01020	TPG221T0420	6,35	1/4	11,00	.433	3,18	1/8	0,4	.016	—	—	●		
TPGN110308T01020	TPG222T0420	6,35	1/4	11,00	.433	3,18	1/8	0,8	.031	—	—	●		
TPGN110312T01020	TPG223T0420	6,35	1/4	11,00	.433	3,18	1/8	1,2	.047	—	—	●		
TPGN160304T00520	TPG321T0220	9,53	3/8	16,50	.650	3,18	1/8	0,4	.016	—	—	●		
TPGN160304T01020	TPG321T0420	9,53	3/8	16,50	.650	3,18	1/8	0,4	.016	—	—	●		
TPGN160308T00520	TPG322T0220	9,53	3/8	16,50	.650	3,18	1/8	0,8	.031	—	—	●		
TPGN160308T01020	TPG322T0420	9,53	3/8	16,50	.650	3,18	1/8	0,8	.031	—	—	●		
TPGN160308T02020	TPG322T0820	9,53	3/8	16,50	.650	3,18	1/8	0,8	.031	—	—	●		●
TPGN160312T01020	TPG323T0420	9,53	3/8	16,50	.650	3,18	1/8	1,2	.047	—	—	●		
TPGN160312T02020	TPG323T0820	9,53	3/8	16,50	.650	3,18	1/8	1,2	.047	—	—	●		●

■ VNGA



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
VNGA160404T02020	VNGA331T0820	9,53	3/8	16,61	.654	4,76	3/16	0,4	.016	3,81	.150	●		
VNGA160408T02020	VNGA332T0820	9,53	3/8	16,61	.654	4,76	3/16	0,8	.031	3,81	.150	●		●
VNGA160412T02020	VNGA333T0820	9,53	3/8	16,61	.654	4,76	3/16	1,2	.047	3,81	.150	●		
VNGA220408T02020	VNGA432T0820	12,70	1/2	22,14	.872	4,76	3/16	0,8	.031	5,16	.203	●		

Inserts • Ceramic Inserts



● first choice
○ alternate choice

P			
M			
K	●	●	●
N			
S		●	
H	●		

■ WNGA



ISO catalog number	ANSI catalog number	D		L10		S		R _ε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
WNGA080408T02020	WNGA432T0820	12,70	1/2	8,69	.342	4,76	3/16	0,8	.031	5,16	.203			●
WNGA080412T02020	WNGA433T0820	12,70	1/2	8,69	.342	4,76	3/16	1,2	.047	5,16	.203			●
WNGA080416T02020	WNGA434T0820	12,70	1/2	8,69	.342	4,76	3/16	1,6	.063	5,16	.203			●

■ WNGX



ISO catalog number	ANSI catalog number	D		L10		S		R _ε		D1		CW2015	CW3020	CW5025
		mm	in	mm	in	mm	in	mm	in	mm	in			
WNGX080712T02020	WNGX453T0820	12,70	1/2	8,69	.342	7,94	5/16	1,2	.047	—	—			●

Inserts • Ceramic Inserts

On the Web



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WIDIA Products

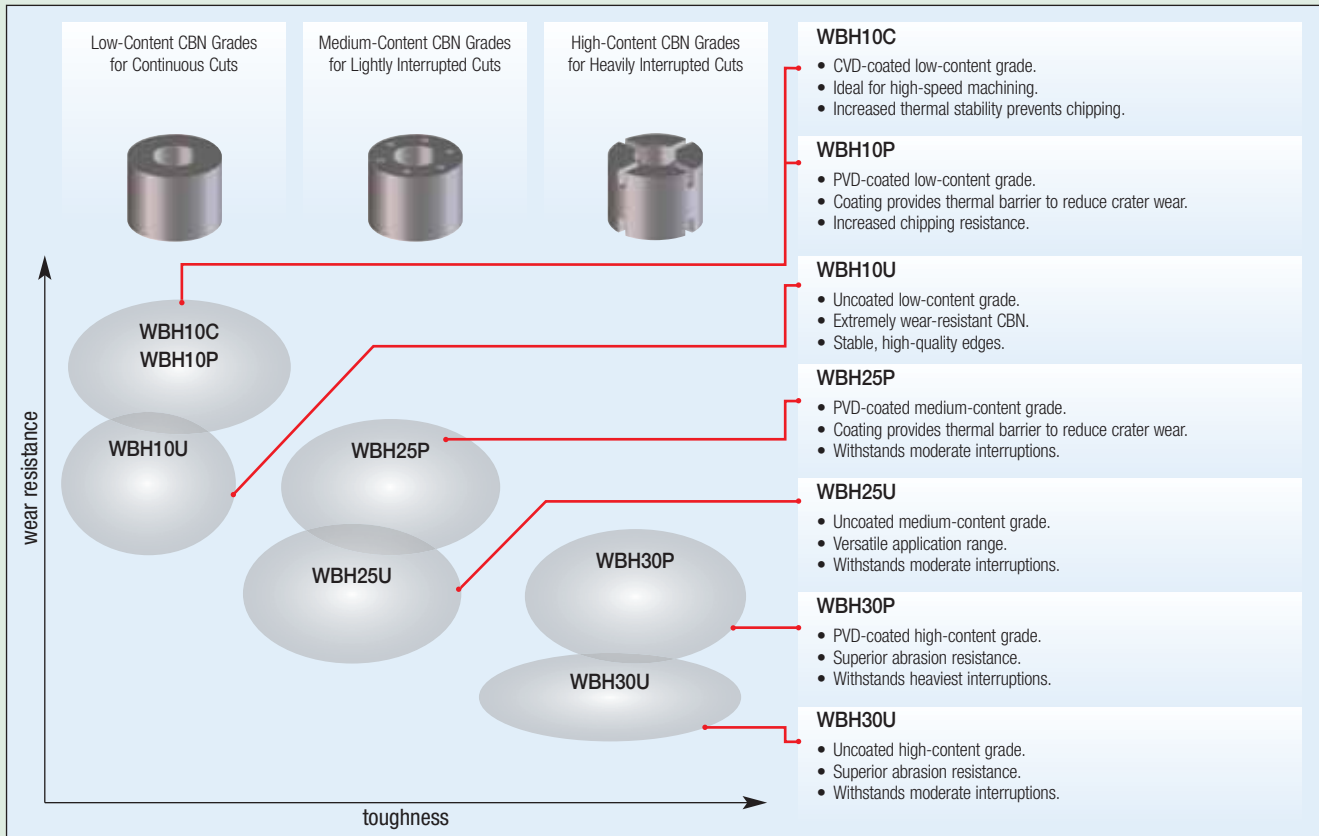
Whether your operation is turning, milling, or holmaking, WIDIA brands are the high-performance tooling you need. We offer standard and custom solutions for the general engineering market.

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

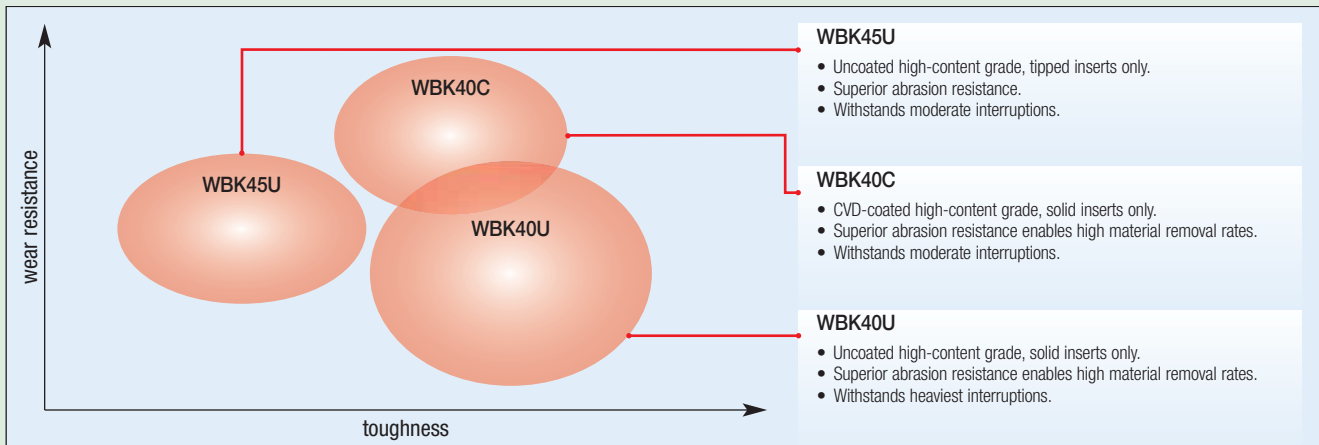


- CVD- and PVD-coated grades are now available.
- Complete range of CBN grades for continuous to heavily interrupted turning.
- Industry-leading grades for gray cast iron machining.
- Full line of grades for hard turning.
- For best performance: solid, full-top, and tipped inserts are available.

Hard Turning Grades



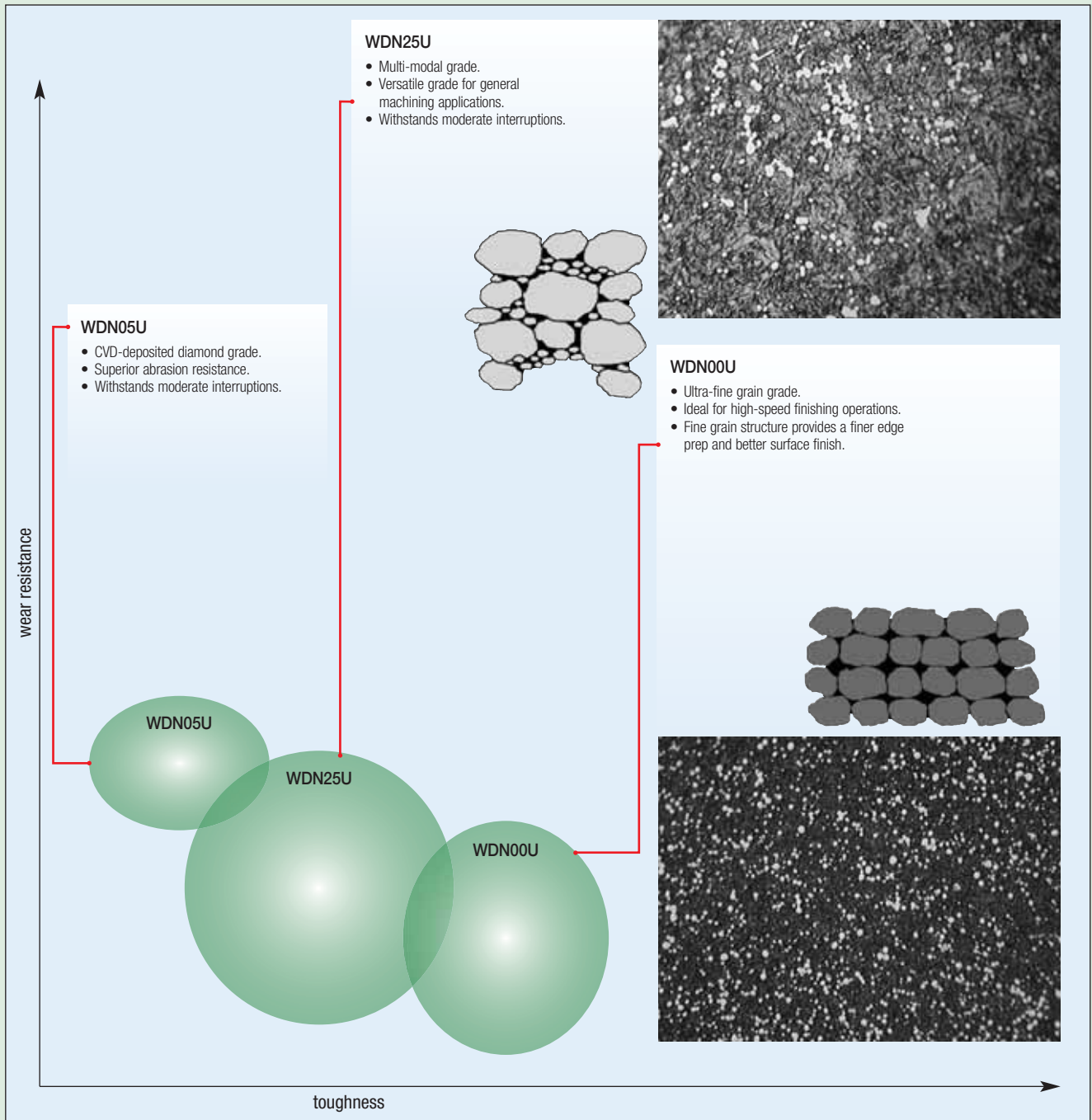
Gray Cast Iron Grades



New PCD Grades for Turning Non-Ferrous Materials



- 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 aluminum alloy with low- and high-silicon content, copper alloys, ceramics, and plastics.
- Suitable for machining highly abrasive materials such as Compacted Graphitic Iron (CGI), titanium, and Metal Matrix Composites (MMC).

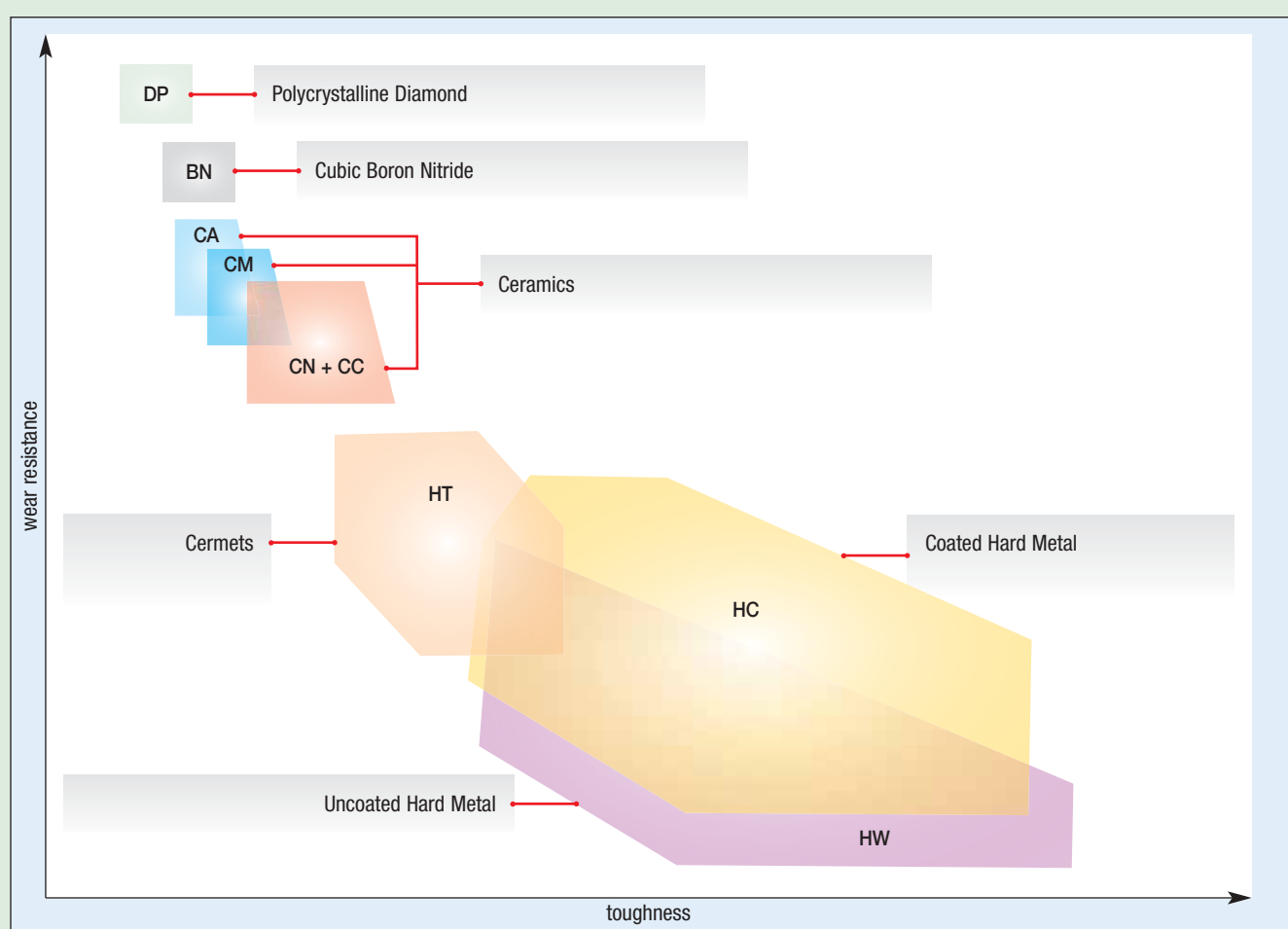


The cutting tool materials developed more than a century ago are classified by the combination of their hardness and wear resistance characteristics.

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.

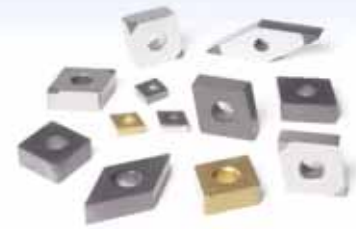
The extended standard DIN ISO 513 also includes ceramic cutting materials, the superhard polycrystalline materials, boron nitride, and diamond, resulting in additional identification symbols for these cutting material groups.



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 ₂ O ₃ -base oxide ceramics
	CM	Composite ceramics Al ₂ O ₃ + metal carbide
	CN	Si ₃ N 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:

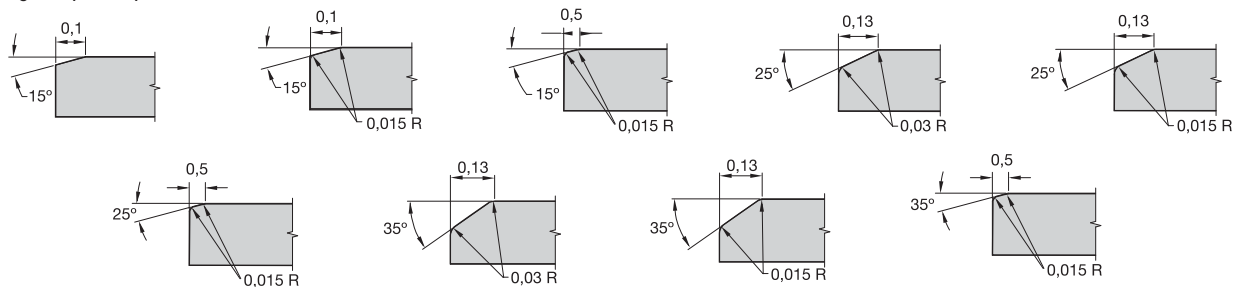
1 Choose Style and Grade from this Table:

style	number of tips	grades					
		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

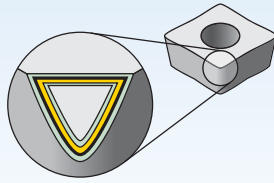
Edge Prep Examples



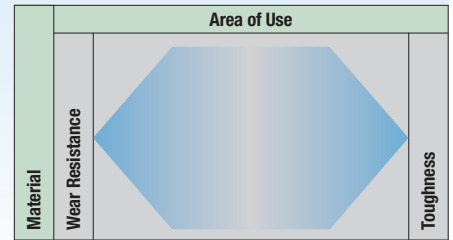
3 Target Lead Time: Uncoated inserts: 2 weeks + shipping.
PVD-coated inserts: 3–4 weeks + shipping.
CVD-coated inserts: Not part of the program.

4 Price: Contact your Local Authorized 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.



Reduce 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 gray cast iron, chilled irons, high-chrome alloyed steels, and sintered powdered metals.										
		K									
		S									
WBH10C BN-H10	A low content CBN grade with a MT-CVD/CVD — TiN-TiCN-Al ₂ O 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, carburized and nitrided irons, and some hard coatings. Do not use on soft steels.										
		K									
		H									
WBH40C BN-H40	A high CBN content, solid CBN with multiple cutting edges and a CVD — Al ₂ O ₃ -TiN-TiCN-Al ₂ O ₃ -TiN alumina coating. Applied in roughing to semi-finishing of fully pearlitic gray 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									
		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 aluminum alloys, non-metallics, copper, brass, and zinc-based alloys. The ultra-fine grained diamond particle size enables superior surface finishes while ensuring the best mechanical shock resistance of any PCD cutting tool.										
		N									
		S									
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									
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 aluminum alloys, bi-metallic (AL/GC) materials, MMC, carbon-fiber reinforced plastics, and other abrasive non-metallic materials.										
		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

Speed and Feed Chart for CBN and PCD

Positive and Negative Inserts



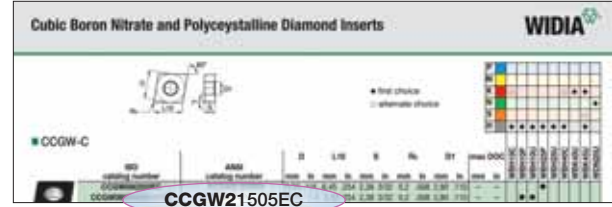
Inserts • Speed and Feed Chart for CBN and PCD

DIN ISO 513	VDI 3323	Continuous Cut									Lightly Interrupted Cut								
Material Group		Cutting Speed • vc SFM																	
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max			
P	ap [inch] f [IPR]																		
	1																		
	2																		
	3																		
	4																		
	5																		
	6																		
	7																		
	8																		
	9																		
	10																		
	11																		
	12																		
13.1																			
13.2																			
M	ap [inch] f [IPR]																		
	14.1																		
	14.2																		
	14.3																		
14.4																			
K	ap [inch] f [IPR]	0.008	—	0.080	0.008	—	0.059	0.051	—	0.400	0.040	—	0.310	0.008	—	0.080	0.006	—	0.059
		0.004	—	0.016	0.004	—	0.012	0.010	—	0.040	0.008	—	0.031	0.004	—	0.012	0.003	—	0.010
		WBK40U/WBK45U		WBK40U/WBK45U		WBK40C		WBK40C		WBK40U/WBK45U		WBK40U/WBK45U							
	15	1320	2310	3630	—	—	—	1650	2310	3960	—	—	—	1320	2310	3630	—	—	—
	16	1320	2310	3630	—	—	—	1650	2310	3960	—	—	—	1320	2310	3630	—	—	—
	17	—	—	—	924	1320	1980	—	—	—	924	1320	2310	—	—	—	924	1320	1980
	18	—	—	—	924	1320	1980	—	—	—	924	1320	2310	—	—	—	924	1320	1980
19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
N	ap [inch] f [IPR]	0.008	—	0.079	0.004	—	0.039	0.008	—	0.079	0.004	—	0.039	0.008	—	0.079	0.008	—	0.079
		0.002	—	0.016	0.002	—	0.008	0.004	—	0.010	0.002	—	0.008	0.004	—	0.010	0.004	—	0.010
		WDN25U		WDN05U		WDN25U		WDN05U		WDN00U		WDN25U							
	21	1650	2475	8250	—	—	—	—	—	—	1650	2475	8250	—	—	—			
	22	1650	2475	8250	—	—	—	—	—	—	1650	2475	8250	—	—	—			
	23	—	—	—	1320	1914	3630	—	—	—	—	—	—	990	1716	3234			
	24	—	—	—	1320	1914	3630	—	—	—	—	—	—	990	1716	3234			
	25	—	—	—	1320	1914	3630	—	—	—	—	—	—	990	1716	3234			
	26	—	—	—	—	—	—	825	1650	2640	—	—	—	—	—	—			
	27	—	—	—	—	—	—	825	1650	2640	—	—	—	—	—	—			
	28	—	—	—	—	—	—	825	1650	2640	—	—	—	—	—	—			
29	—	—	—	—	—	—	—	—	—	1320	1518	2805	—	—	—				
30	—	—	—	—	—	—	—	—	—	1320	1518	2805	—	—	—				
S	ap [inch] f [IPR]																		
	31																		
	32																		
	33																		
	34																		
	35																		
	36																		
37																			
H	ap [inch] f [IPR]	0.004	—	0.020	0.004	—	0.020							0.004	—	0.020	0.004	—	0.020
		0.002	—	0.010	0.002	—	0.010							0.002	—	0.008	0.002	—	0.008
		WBH10U		WBH10P								WBH25U		WBH25P					
	38.1	165	462	759	248	495	858							165	363	660	165	396	759
	38.2	165	462	759	248	495	858							165	363	660	165	396	759
39.1	165	462	759	248	495	858							165	363	660	165	396	759	
39.2	165	462	759	248	495	858							165	363	660	165	396	759	

Lightly Interrupted Cut						Heavily Interrupted Cut												VDI 3323	DIN ISO 513
Cutting Speed • vc SFM																		Material Group	
min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	ap [inch]	f [IPR]
																		1	P
																		2	
																		3	
																		4	
																		5	
																		6	
																		7	
																		8	
																		9	
																		10	
																		11	
																		12	
																		13.1	
																		13.2	
																		14.1	M
																		14.2	
																		14.3	
																		14.4	
0.051	—	0.394	0.039	—	0.315	0.004	—	0.079	0.004	—	0.059							ap [inch]	f IPR
0.010	—	0.039	0.008	—	0.031	0.003	—	0.016	0.003	—	0.008								
WBK40C			WBK40C			WBK40U/WBK45U			WBK40U/WBK45U										
1650	2310	3960	—	—	—	1320	2310	3630	—	—	—								
1650	2310	3960	—	—	—	1320	2310	3630	—	—	—								
—	—	—	924	1320	2310	—	—	—	924	1320	1980								
—	—	—	924	1320	2310	—	—	—	924	1320	1980								
—	—	—	—	—	—	—	—	—	—	—	—								
—	—	—	—	—	—	—	—	—	—	—	—								
—	—	—	—	—	—	—	—	—	—	—	—								
0.004	—	0.039	0.008	—	0.079	0.008	—	0.079	0.008	—	0.079	0.004	—	0.039	0.008	—	0.079	ap [inch]	f [IPR]
0.002	—	0.008	0.004	—	0.012	0.004	—	0.010	0.004	—	0.010	0.002	—	0.008	0.004	—	0.012		
WDN05U			WDN00U			WDN00U			WDN25U			WDN00U			WDN00U				
—	—	—	—	—	—	1650	2475	8250	—	—	—	—	—	—	—	—	—	21	N
—	—	—	—	—	—	1650	2475	8250	—	—	—	—	—	—	—	—	—	22	
—	—	—	—	—	—	—	—	—	990	1716	3234	—	—	—	—	—	—	23	
—	—	—	—	—	—	—	—	—	990	1716	3234	—	—	—	—	—	—	24	
—	—	—	—	—	—	—	—	—	990	1716	3234	—	—	—	—	—	—	25	
990	1716	3300	—	—	—	—	—	—	—	—	—	990	1716	3300	—	—	—	26	
990	1716	3300	—	—	—	—	—	—	—	—	—	990	1716	3300	—	—	—	27	
990	1716	3300	—	—	—	—	—	—	—	—	—	990	1716	3300	—	—	—	28	
—	—	—	1155	1205	2475	—	—	—	—	—	—	—	—	—	1155	1205	2475	29	
—	—	—	1155	1205	2475	—	—	—	—	—	—	—	—	—	1155	1205	2475	30	
																		31	S
																		32	
																		33	
																		34	
																		35	
																		36	
																		37	
0.004	—	0.020	0.004	—	0.020	0.003	—	0.016	0.003	—	0.016							ap [inch]	f [IPR]
0.002	—	0.008	0.002	—	0.008	0.002	—	0.008	0.002	—	0.008								
WBH25U			WBH25P			WBH30U			WBH30P										
50	110	200	50	120	230	149	297	561	165	347	660							38.1	H
50	110	200	50	120	230	149	297	561	165	347	660							38.2	
50	110	200	50	120	230	149	297	561	165	347	660							39.1	
50	110	200	50	120	230	149	297	561	165	347	660							39.2	
50	110	200	50	120	230	149	297	561	165	347	660								

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 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

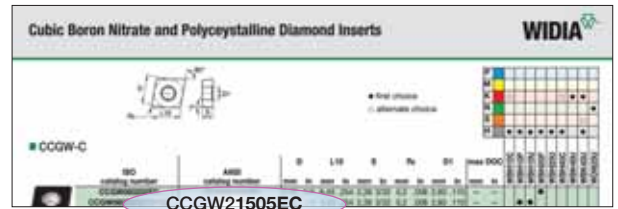
2
Size

		Code for inch cutting edge length "L10"						
"D"		C	D	R	S	T	V	W
inch	inch							
1.2 (5)	5/32	S4	04	03	03	06	—	—
1.5 (6)	3/16	04	05	04	04	08	08	S3
1.8 (7)	7/32	05	06	05	05	09	09	03
—	.236	—	—	06	—	—	—	—
2	1/4	06	07	06	06	11	11	04
2.5	5/16	08	09	07	07	13	13	05
—	.315	—	—	08	—	—	—	—
3	3/8	09	11	09	09	16	16	06
—	.394	—	—	10	—	—	—	—
3.5	7/16	11	13	11	11	19	19	07
—	.472	—	—	12	—	—	—	—
4	1/2	12	15	12	12	22	22	08
4.5	9/16	14	17	14	14	24	24	09
5	5/8	16	19	15	15	27	27	10
—	.630	—	—	16	—	—	—	—
5.5	11/16	17	21	17	17	30	30	11
6	3/4	19	23	19	19	33	33	13
—	.787	—	—	20	—	—	—	—
7	7/8	22	27	22	22	38	38	15
—	.984	—	—	25	—	—	—	—
8	1	25	31	25	25	44	44	17
10	1-1/4	32	38	31	31	54	54	21
—	1.260	—	—	32	—	—	—	—

tolerance class*	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±.0010"	±.0005"	±.001"
H	±.0005"	±.0005"	±.001"
E	±.0010"	±.0010"	±.001"
G	±.0010"	±.0010"	±.005"
M	See tables in size column		±.005
U	See tables in size column		±.005

*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.



1.5

Thickness

symbol	thickness
inch	inch
.5 (1)	1/32
.6	.040
1 (2)	1/16
1.2	5.64
1.5 (3)	3/32
2	1/8
2.5	5/32
3	3/16
3.5	7/32
4	1/4
5	5/16
6	3/8
7	7/16
8	1/2

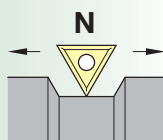
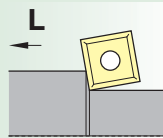
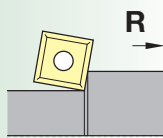
05

Corner Radius "R_c"

symbol	corner radius
inch	inch
X0	.0015
0	.004
.5	.008
1	1/64
2	1/32
3	3/64
4	1/16
5	5/64
6	3/32
7	7/64
8	1/8
—	round insert

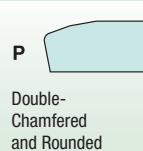
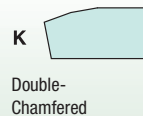
Hand of Insert
(optional)

R = Right hand
L = Left hand
N = Neutral



E

Cutting Edge
(optional)



**Also available in Wiper style.*

T-Land Width
(optional)

symbol	inch
ANSI	size
04	.004
08	.008

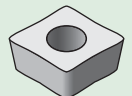
T-Land Angle
(optional)

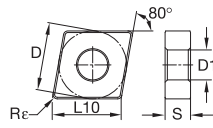
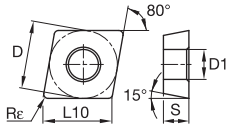
symbol	size
10	10°
15	15°
20	20°
25	25°
30	30°

C

Tip Style
(optional)

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





● first choice
○ alternate choice

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

CDHB-FST



(ST)

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CDHBS4T002FST	CDHB120601FST	3,97	5/32	4,03	.159	1,02	.040	0,1	.002	2,13	.084	1,32	.052										●
CDHBS4T004FST	CDHB120605FST	3,97	5/32	4,03	.159	1,02	.040	0,2	.007	2,13	.084	1,32	.052										●

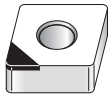
CNGA-EMT



(MT)

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNGA120408EMT	CNGA432EMT	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,60	.063	●			●						
CNGA120412EMT	CNGA433EMT	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203	1,12	.044				●						

CNGA-FST



(ST)

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNGA120404FST	CNGA431FST	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,16	.203	2,40	.094										●
CNGA120408FST	CNGA432FST	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,65	.065										●

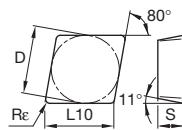
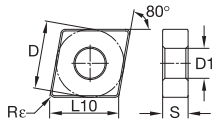
CNGA-FW/MW MT



(MT)

ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNGA120404EFWMT	CNGA431EFWMT	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,15	.203	1,60	.063				●	●					
CNGA120404S01025FWMT	CNGA431S0425FWMT	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,16	.203	1,60	.063	●	●								
CNGA120408EFWMT	CNGA432EFWMT	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,12	.044				●	●					
CNGA120408S01025FWMT	CNGA432S0425FWMT	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,12	.044	●									
CNGA120412EFWMT	CNGA433EFWMT	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203	0,86	.034				●	●					
CNGA120416S02015MWM	CNGA434S0815MWM	12,70	1/2	12,90	.508	4,76	3/16	1,6	.063	5,16	.203	0,64	.025										●

Inserts • CBN and PCD



● first choice
○ alternate choice

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

■ CNMA-MT



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNMA120408S01020MTV	CNMA432S0420MTV	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,12	.044										

■ CNMA-ST



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNMA120404S01020ST	CNMA431S0420ST	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,16	.203	1,60	.063										
CNMA120408S01020ST	CNMA432S0420ST	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,12	.044										
CNMA120412S01020ST	CNMA433S0420ST	12,70	1/2	12,90	.508	4,76	3/16	1,2	.047	5,16	.203	0,86	.034										

■ CNMS-FST



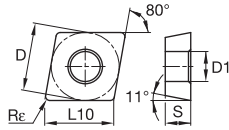
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CNMS120404FST	CNMS431FST	12,70	1/2	12,90	.508	4,76	3/16	0,4	.016	5,16	.203	2,40	.094										
CNMS120408FST	CNMS432FST	12,70	1/2	12,90	.508	4,76	3/16	0,8	.031	5,16	.203	1,65	.065										

■ CPG



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CPGN120304F	CPG421F	12,70	1/2	12,90	.508	3,18	1/8	0,4	.016	—	—	1,60	.063										
CPGN120308F	CPG422F	12,70	1/2	12,90	.508	3,18	1/8	0,8	.031	—	—	1,12	.044										

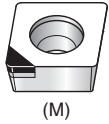
Inserts • CBN and PCD



● first choice
○ alternate choice

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

■ CPGW-M



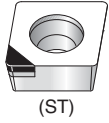
ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CPGW060202EM	CPGW21505EM	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,80	.110	1,60	.063										
CPGW060204EM	CPGW2151EM	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110	1,60	.063	●			●						
CPGW060204S01015M	CPGW2151S0415M	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110	1,60	.063	●			●						
CPGW060208S01015M	CPGW2152S0415M	6,35	1/4	6,45	.254	2,38	3/32	0,8	.031	2,80	.110	1,12	.044				●						
CPGW09T304S01015M	CPGW3251S0415M	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	1,60	.063				●						
CPGW09T308S01015M	CPGW3252S0415M	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173	1,12	.044				●						

■ CPGW-MT



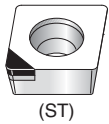
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		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CPGW09T304S01015MT	CPGW3251S0415MT	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	1,60	.063	●	●	●							
CPGW09T308S01015MT	CPGW3252S0415MT	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173	1,12	.044	●	●	●							

■ CPMW-FST

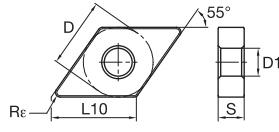
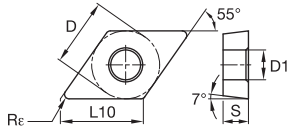


ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CPMW050202FST	CPMW71505FST	5,56	7/32	5,65	.222	2,38	3/32	0,2	.008	2,50	.098	2,40	.094										●
CPMW050204FST	CPMW7151FST	5,56	7/32	5,65	.222	2,38	3/32	0,4	.016	2,50	.098	1,60	.063				●						●
CPMW060202FST	CPMW21505FST	6,35	1/4	6,45	.254	2,38	3/32	0,2	.008	2,80	.110	1,60	.063				●						●
CPMW060204FST	CPMW2151FST	6,35	1/4	6,45	.254	2,38	3/32	0,4	.016	2,80	.110	2,40	.094										●
CPMW09T308FST	CPMW3252FST	9,53	3/8	9,67	.381	3,97	5/32	0,8	.031	4,40	.173	1,65	.065										●

■ CPMW-FWST



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
CPMW09T304FWST	CPMW3251FWST	9,53	3/8	9,67	.381	3,97	5/32	0,4	.016	4,40	.173	2,40	.094										●



● first choice
○ alternate choice

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

■ DCMW-MT

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DCMW070202S01020MT	DCMW21505S0420MT	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	1,80	.071										
DCMW070204S01020MT	DCMW2151S0420MT	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110	1,70	.067					●					
DCMW11T308S01020MT	DCMW3252S0420MT	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	1,50	.059					●					

■ DCMW-ST

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DCMW070202S01020ST	DCMW21505S0420ST	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	1,80	.071										
DCMW11T304S01020ST	DCMW3251S0420ST	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	1,70	.067					●					

■ DNGA-EMT

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DNGA150408EMT	DNGA432EMT	12,70	1/2	15,50	.610	4,76	3/16	0,8	.031	5,16	.203	1,50	.059	●									
DNGA150412EMT	DNGA433EMT	12,70	1/2	15,50	.610	4,76	3/16	1,2	.047	5,16	.203	1,30	.051					●					

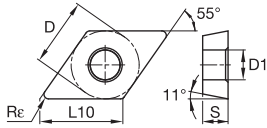
■ DNGA-FST

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DNGA150404FST	DNGA431FST	12,70	1/2	15,50	.610	4,76	3/16	0,4	.016	5,16	.203	2,50	.098										●
DNGA150408FST	DNGA432FST	12,70	1/2	15,50	.610	4,76	3/16	0,8	.031	5,16	.203	2,30	.091										●

■ DNGA-FWMT

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DNGA150404EFWMT	DNGA431EFWMT	12,70	1/2	15,50	.610	4,76	3/16	0,4	.007	5,16	.203	1,70	.067										
DNGA150408EFWMT	DNGA432EFWMT	12,70	1/2	15,50	.610	4,76	3/16	0,8	.016	5,16	.203	1,50	.059	●				●					
DNGA150412EFWMT	DNGA433EFWMT	12,70	1/2	15,50	.610	4,76	3/16	1,2	.032	5,16	.203	1,30	.051					●					

Inserts • CBN and PCD



● first choice
○ alternate choice

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

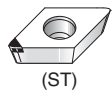
Inserts • CBN and PCD

■ DPGW-EMT



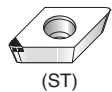
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		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DPGW11T304EMT	DPGW3251EMT	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	1,70	.067									●	

■ DPGW-FST



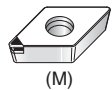
ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DPGW070202FST	DPGW21505FST	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	2,70	.106										●
DPGW070204FST	DPGW2151FST	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110	2,50	.098										●
DPGW11T304FST	DPGW3251FST	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	2,50	.098										●

■ DPGW-FWST



ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DPGW070204FWST	DPGW2151FWST	6,35	1/4	7,75	.305	2,38	3/32	0,2	.007	2,80	.110	2,50	.098										●
DPGW11T304FWST	DPGW3251FWST	9,53	3/8	11,63	.458	3,97	5/32	0,2	.007	4,40	.173	2,50	.098										●

■ DPGW-M



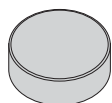
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		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DPGW070202EM	DPGW21505EM	6,35	1/4	7,75	.305	2,38	3/32	0,2	.008	2,80	.110	1,80	.071				●						
DPGW070204S01015M	DPGW2151S0415M	6,35	1/4	7,75	.305	2,38	3/32	0,4	.016	2,80	.110	1,70	.067				●						
DPGW070208S01015M	DPGW2152S0415M	6,35	1/4	7,75	.305	2,38	3/32	0,8	.031	2,80	.110	1,50	.059				●						
DPGW11T304S01015M	DPGW3251S0415M	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	1,70	.067				●						
DPGW11T308S01015M	DPGW3252S0415M	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	1,50	.059				●						

■ DPGW-MT

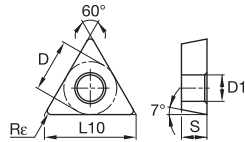


ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
DPGW11T304S01015MT	DPGW3251S0415MT	9,53	3/8	11,63	.458	3,97	5/32	0,4	.016	4,40	.173	1,70	.067				●		●				
DPGW11T308S01015MT	DPGW3252S0415MT	9,53	3/8	11,63	.458	3,97	5/32	0,8	.031	4,40	.173	1,50	.059				●		●				

■ RNM



ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
RNMN090300S02020	RNM32S0820	9,53	3/8	—	—	3,18	1/8	—	—	—	—	—	—										●
RNMN120300S02020	RNM42S0820	12,70	1/2	—	—	3,18	1/8	—	—	—	—	—	—							●	●		
RNMN120400S02020	RNM43S0820	12,70	1/2	—	—	4,76	3/16	—	—	—	—	—	—										●



● first choice
○ alternate choice

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

TCGW-C



(C)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCGW110202EC	TCGW21505EC	6,35	1/4	11,00	.433	2,38	3/32	0,2	.008	2,80	.110	—	—										
TCGW110202S01015C	TCGW21505S0415C	6,35	1/4	11,00	.433	2,38	3/32	0,2	.008	2,80	.110	—	—			●							
TCGW110204S01015C	TCGW2151S0415C	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	—	—			●	●						

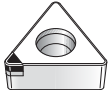
TCGW-FST



(ST)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCGW110204FST	TCGW2151FST	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	2,50	.098										●
TCGW16T304FST	TCGW3251FST	9,53	3/8	16,50	.650	3,97	5/32	0,4	.016	4,40	.173	2,50	.098										●

TCGW-M



(M)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCGW110202EM	TCGW21505EM	6,35	1/4	11,00	.433	2,38	3/32	0,2	.008	2,80	.110	1,70	.067				●						
TCGW110204S01015M	TCGW2151S0415M	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	1,60	.063				●						
TCGW16T304S01015M	TCGW3251S0415M	9,53	3/8	16,50	.650	3,97	5/32	0,4	.016	4,40	.173	1,60	.063				●						
TCGW16T308S01015M	TCGW3252S0415M	9,53	3/8	16,50	.650	3,97	5/32	0,8	.031	4,40	.173	1,50	.059				●						

TCGW-MT



(MT)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCGW16T304S01015MT	TCGW3251S0415MT	9,53	3/8	16,50	.650	3,97	5/32	0,4	.016	4,40	.173	1,60	.063										●

TCMW-FST



(ST)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCMW110204FST	TCMW2151FST	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	1,60	.063										● ●
TCMW16T304FST	TCMW3251FST	9,53	3/8	16,50	.650	3,97	5/32	0,4	.016	4,40	.173	1,60	.063										● ●

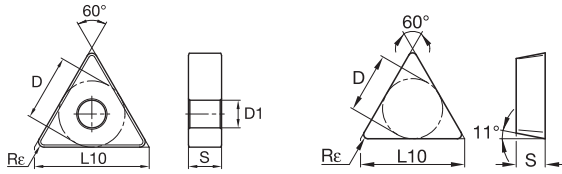
TCMW-ST



(ST)

ISO catalog number	ANSI catalog number	D		L10		S		Rε		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TCMW110202S01020ST	TCMW21505S0420ST	6,35	1/4	11,00	.433	2,38	3/32	0,2	.008	2,80	.110	1,70	.067					●					
TCMW110204S01020ST	TCMW2151S0420ST	6,35	1/4	11,00	.433	2,38	3/32	0,4	.016	2,80	.110	1,60	.063										●
TCMW16T308S01020ST	TCMW3252S0420ST	9,53	3/8	16,50	.650	3,97	5/32	0,8	.031	4,40	.173	1,50	.059					●					

Inserts • CBN and PCN



● first choice
○ alternate choice

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

TNGA-FWMT



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TNGA160408EFWMT	TNGA332EFWMT	9,53	3/8	16,50	.650	4,76	3/16	0,8	.016	3,81	.150	1,50	.059										
TNGA160412EFWMT	TNGA333EFWMT	9,53	3/8	16,50	.650	4,76	3/16	1,2	.032	3,81	.150	1,40	.055				●						

TNGA-MT



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TNGA160404S01025MT	TNGA331S0425MT	9,53	3/8	16,50	.650	4,76	3/16	0,4	.016	3,81	.150	1,60	.063				●	●					
TNGA160408S01020MT	TNGA332S0420MT	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	3,81	.150	1,50	.059										●
TNGA160408S01025MT	TNGA332S0425MT	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	3,81	.150	1,50	.059				●	●	●				
TNGA160412S01025MT	TNGA333S0425MT	9,53	3/8	16,50	.650	4,76	3/16	1,2	.047	3,81	.150	1,40	.055				●	●	●				
TNGA160416S01025MT	TNGA334S0425MT	9,53	3/8	16,50	.650	4,76	3/16	1,6	.063	3,81	.150	1,20	.047										●

TNMS-FST

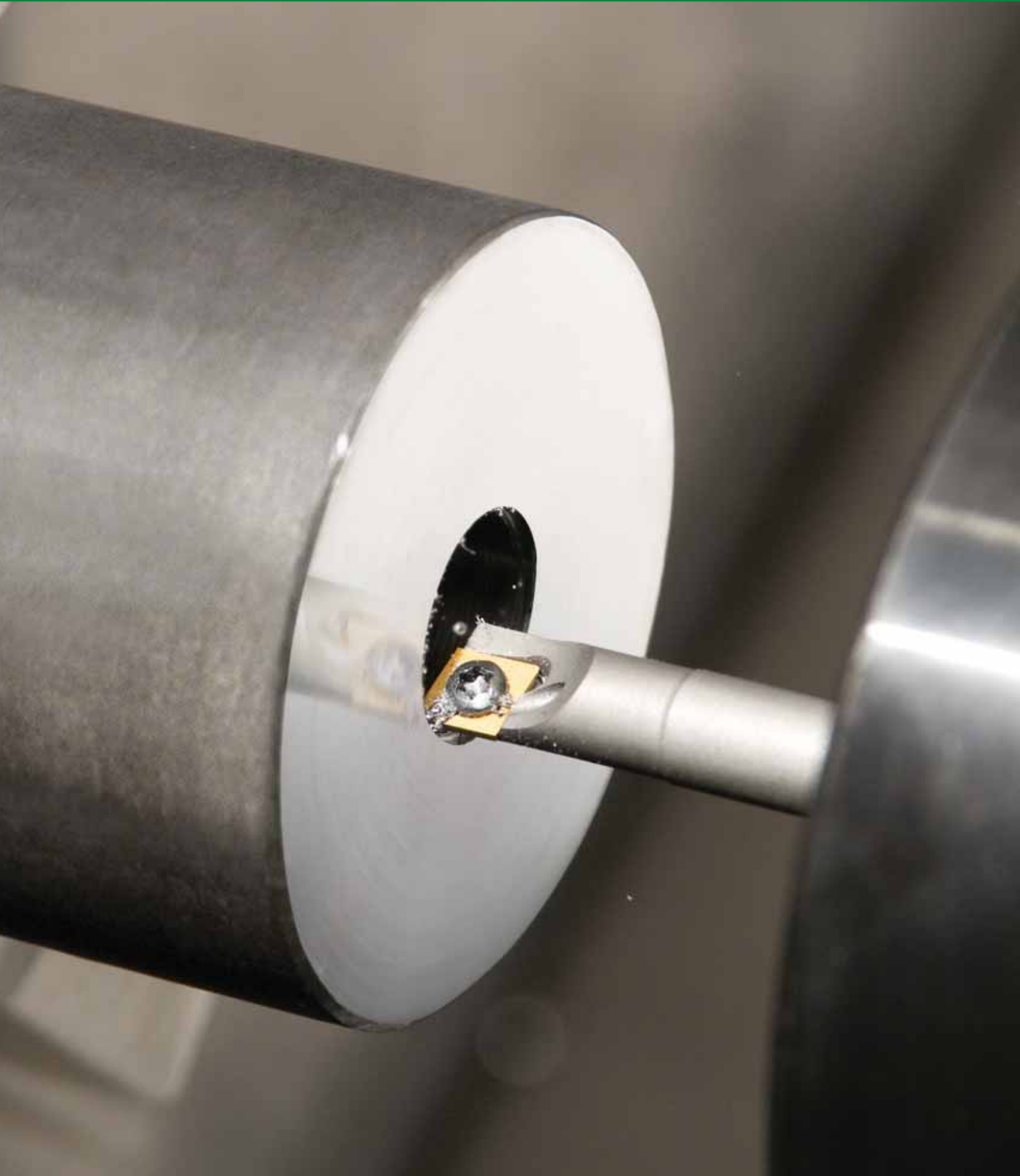


ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TNMS160404FST	TNMS331FST	9,53	3/8	16,50	.650	4,76	3/16	0,4	.016	3,81	.150	2,50	.098										●
TNMS160408FST	TNMS332FST	9,53	3/8	16,50	.650	4,76	3/16	0,8	.031	3,81	.150	2,20	.087										●

TPG



ISO catalog number	ANSI catalog number	D		L10		S		Re		D1		max DOC		WBH10C	WBH10P	WBH10U	WBH25P	WBH25U	WBH40C	WBK40U	WBK45U	WDN25U	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in										
TPGN110304F	TPG221F	6,35	1/4	11,00	.433	3,18	1/8	0,4	.016	—	—	—	—										●
TPGN110308F	TPG222F	6,35	1/4	11,00	.433	3,18	1/8	0,8	.031	—	—	—	—										●
TPGN160304F	TPG321F	9,53	3/8	16,50	.650	3,18	1/8	0,4	.016	—	—	—	—										●
TPGN160308F	TPG322F	9,53	3/8	16,50	.650	3,18	1/8	0,8	.031	—	—	—	—										●
TPGN160312F	TPG323F	9,53	3/8	16,50	.650	3,18	1/8	1,2	.047	—	—	—	—										●
TPGN220404F	TPG431F	12,70	1/2	22,00	.866	4,76	3/16	0,4	.016	—	—	—	—										●
TPGN220408F	TPG432F	12,70	1/2	22,00	.866	4,76	3/16	0,8	.031	—	—	—	—										●



Tools for Small Hole Boring

Small Hole ID Indexable Insert Tooling	C2–C79
Choosing the Correct Small Hole Boring Bar	C4–C7
Catalog Numbering System	C8–C9
Boring Bars for Turning	C10–C42
Boring Bars for Profiling	C43–C48
Boring Bars for Grooving and Threading	C49–C53
Sleeves	C54–C55
Insert Selection Guide	C56–C57
Chipbreaker Geometries • Positive	C58–C59
Grades and Grade Descriptions	C60–C61
Speed and Feed Chart	C62–C63
Catalog Numbering System	C64–C65
Positive Inserts	C66–C77
Cross Reference Chart	C78
Hardware	C79
A/B Series	C80–C93
Quadralock™	C94–C104
Solid Carbide Bars	C106–C158
Technical Information	C160–C163
Custom Solution Worksheet	C164–C165



Small Hole Boring • ID Indexable Insert Tooling

The WIDIA™ line of micro boring bars provides accurate holemaking tooling in diameters as small as .062" (1,57mm). These economical, indexable inserts are available in both steel and carbide shanks and are stocked in both metric and inch sizes. Ideal for a wide range of applications, including precision micro boring.



80° Diamond Insert Boring Bars

- Available in shanks as small as .157" (4,0mm) to bore >.180" (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 .272" (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.

.002" (0,05mm) insert nose radii available; insert repeatability within .0002" (0,005mm).

Choose from high-quality steel or carbide shanks with through tool coolant capabilities.



Triangle Insert Boring Bars

- Designed for less obstruction and greater chip evacuation.
- Positive rake geometry to bore holes $>.275"$ (6,98mm) diameter.
- Stocked in all grades, including diamond-tipped and borazon-tipped styles.
- Stocked in shanks as small as $.24"$ (6,0mm) for $.28"$ (7,06mm) minimum bore diameter.



Tool Selection Guide

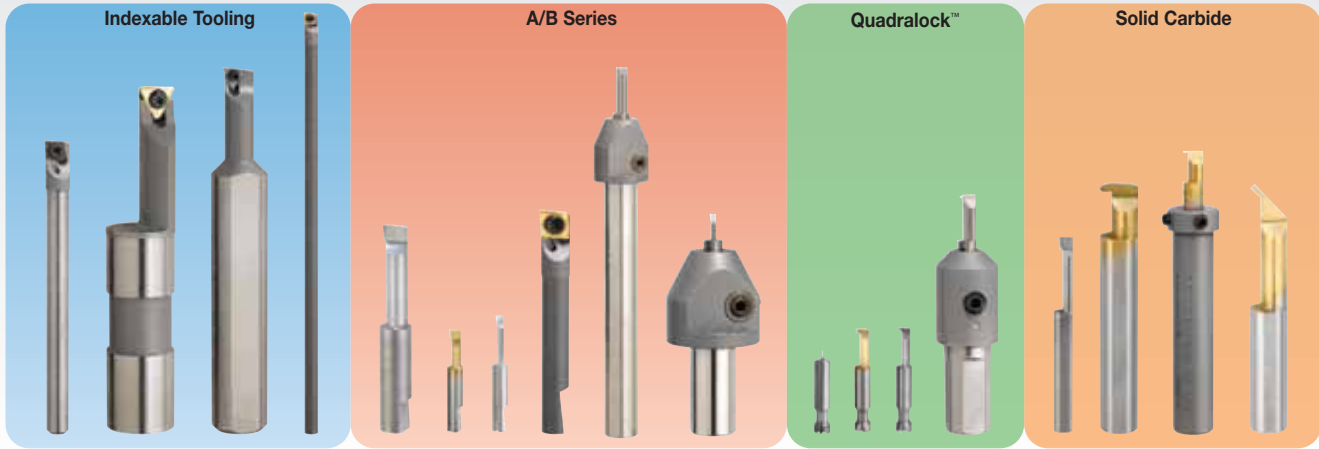
Choosing the Correct Small Hole Boring Bar



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.

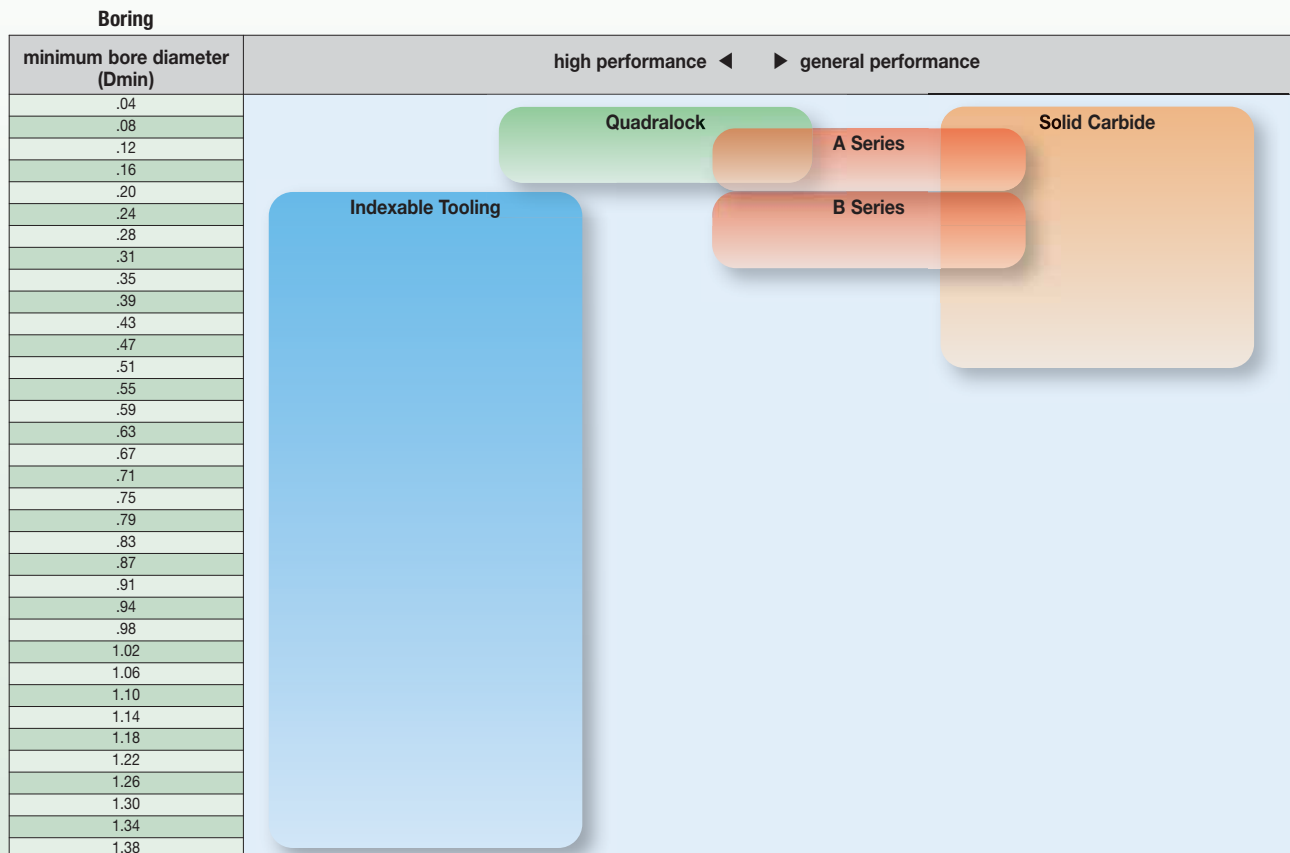


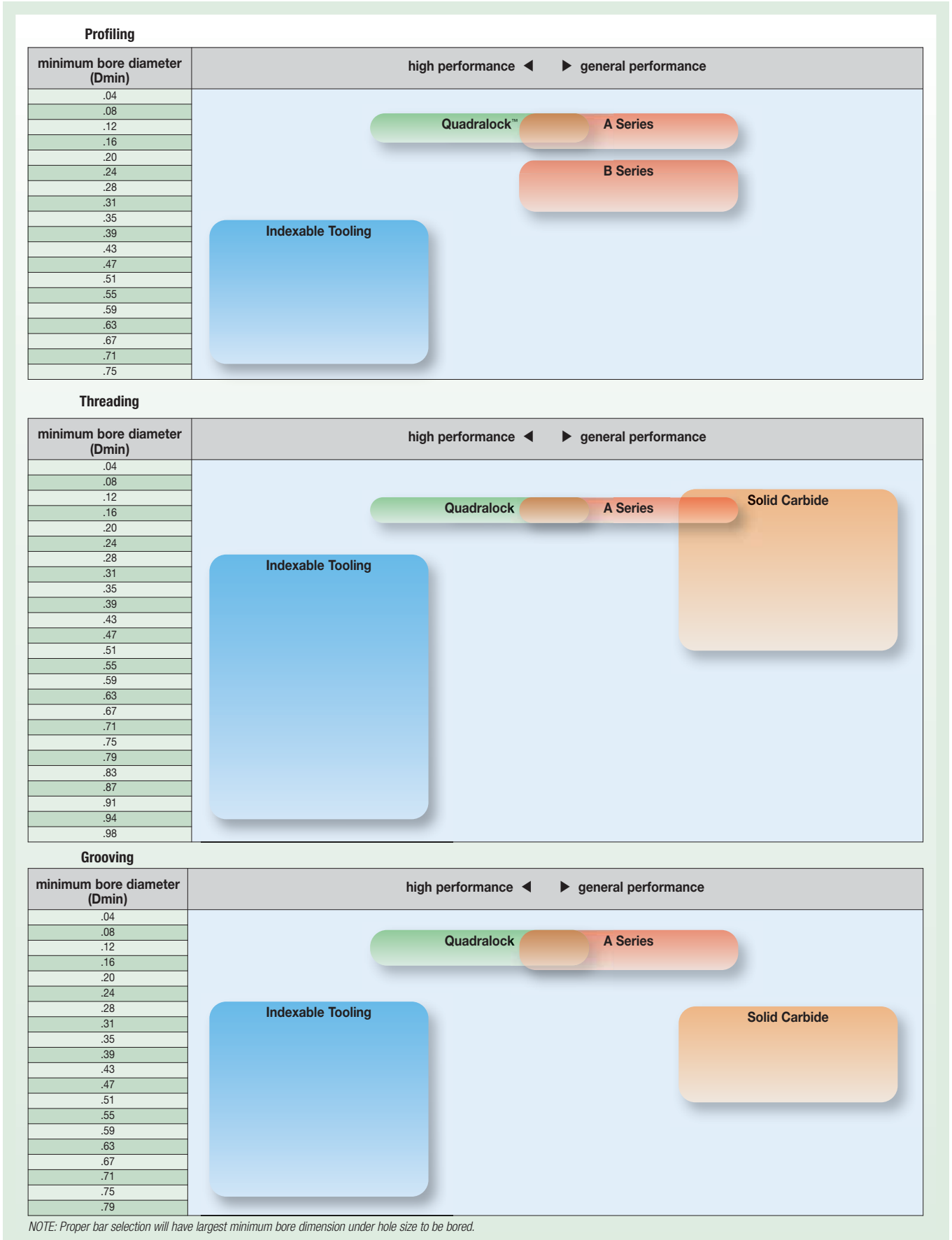
Select the Correct Small Hole Boring Product Platform for Your Application

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





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.

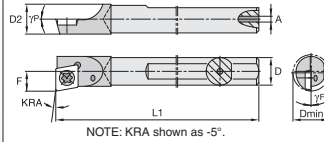
B Determine bore depth (how far the boring bar extends from the holder). Multiply bar diameter by 4. If bore depth is less, use a steel bar. If bore depth exceeds 4:1 ratio, use a carbide bar. Use L1 or L4 depending on bar selected. (See recommended maximum overhang chart on page C160.) For indexable tooling, go to step 3. For all other tooling systems, go directly to step 4.

C Determine lead angle (KRA).

Zero degree lead angle is used when maximum stability is required. Lead angle may vary based on changing conditions, such as boring in a blind hole.

Small Hole Boring Bars for Turning

Clamping System S • Carbide



■ CCBI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
2831949	CCBI16515667R	-7	.156	.180	.166	.095	6.000	.040	0.0	0.0	CD..120605	CC09	T6
2832281	CCBI18018745R	-5	.188	.208	.189	.104	4.000	.040	0.0	5.0	CD..120605	CC09	T6
2832276	CCBI18018765R	-5	.188	.208	.189	.104	6.000	.040	0.0	5.0	CD..120605	CC09	T6
2832183	CCBI18745R	-5	.188	.218	.193	.111	4.000	.040	0.0	5.0	CD..120605	CC11	T6
2832164	CCBI18765R	-5	.188	.218	.193	.111	6.000	.040	0.0	5.0	CD..120605	CC11	T6
2832049	CCBI25045R	-5	.250	.285	.258	.145	4.000	.047	0.0	5.0	CD..120605	CC11	T6
2832029	CCBI25065R	-5	.250	.285	.258	.145	6.000	.047	0.0	5.0	CD..120605	CC11	T6

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

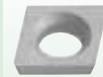
Consult the Small Hole Boring Chipbreaker Geometry charts on pages C58–C59.

Small Hole Boring Chipbreaker Geometries

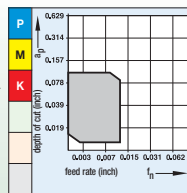


Single-Sided, Positive Inserts

..HB



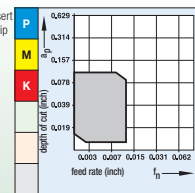
Flat inserts. Peripheral ground for best surface quality and reduced cutting pressure. Very stable cutting edge offers maximum rigidity.



..HT



Peripheral ground insert chipbreaker. Good chip control. Geometry for general-purpose applications.

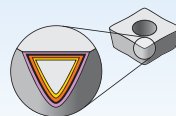


4 Determine which grade is best for the material to be machined.

Consult the Grades and Grade Descriptions Chart on pages C60–C61.

Grades and Grade Descriptions

Small Hole Boring



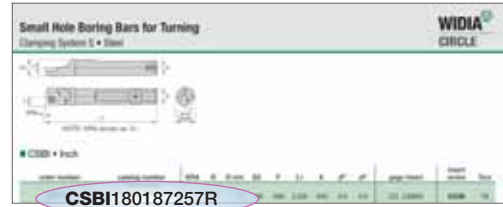
Coatings provide high-speed capability and are engineered for finishing to light roughing.

- 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	Uncoated carbide. A hard, low binder content, unalloyed WC/Co fine-grained grade. General-purpose grade for non-ferrous materials. Has excellent abrasion resistance	S								
		H								

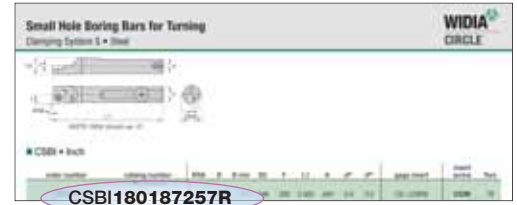
How Do Catalog Numbers Work?

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	S	B	I	
Series Type	Bar Type	Bar Style Designation	Units	Insert Shape (optional)
C 	<p>S = Steel (with coolant)</p> <p>C = Carbide (with coolant)</p>		I = Inch M = Metric	C W
F 				
G 				
L 	B Boring Bar 	O Offset Boring Bar 		
Q 	C External Chamfering Bar 	P Profiling Bar 		
S 	I Internal Threading Bar 	R Reverse Chamfer or Back Chamfer Bar 		
	M Offset Internal Grooving Bar 			

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



180

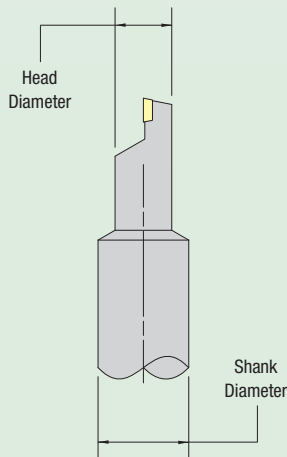
Head Diameter
shown as "D2"

Inch

- 165 = .166"
- 180 = .180"/.189"
- 203 = .203"/.207"/.210"
- 250 = .260"/.258"
- 312 = .313"/.321"/.322"/.323"
- 322 = .322"
- 375 = .375"/.385"/.390"
- 500 = .510"

Metric

- 7 = 6,60mm
- 8 = 8,18mm/8,20mm
- 10 = 9,78mm
- 13 = 12,70mm/12,95mm
- 45 = 4,57mm
- 48 = 4,80mm
- 52 = 5,16mm
- 53 = 5,30mm
- 64 = 6,60mm
- 66 = 6,55mm/6,60mm
- 82 = 8,15mm
- 95 = 9,50mm
- 99 = 9,91mm
- 159 = 15,88mm



NOTE: Only shown on stepped-style bars.

187

Shank Diameter
shown as "D"

Inch

- 156 = .156"
- 187 = .187"/.188"
- 250 = .250"
- 312 = .312"/.313"
- 375 = .375"
- 500 = .500"
- 625 = .625"
- 750 = .750"
- 875 = .875"
- 1000 = 1.000"
- 1250 = 1.250"

Metric

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

25

Length/Depth
shown as "L1/L4"

Bore Length for Step Bars

Thread Depth for Threading Bars

Overall Length for Straight Shank Bars

Inch

- 1 = 1.000"
- 1125 = 1.125"
- 125 = 1.250"
- 15 = 1.500"
- 1875 = 1.875"
- 2 = 2.000"
- 25 = 2.500"
- 3125 = 3.125"
- 35 = 3.500"
- 4 = 4.000"
- 45 = 4.500"
- 5 = .500"/5.000"
- 6 = 6.000"
- 7 = 7.000"/7.085"
- 75 = .750"
- 8 = 8.000"
- 90 = .900"
- 10 = 10.000"
- 12 = 12.000"

Metric

- 12 = 12,70mm
- 19 = 19,05mm
- 22 = 22,23mm
- 25 = 25,40mm
- 32 = 31,75mm
- 38 = 38,10mm
- 48 = 47,63mm
- 51 = 50,80mm
- 63 = 63,50mm
- 64 = 64,00mm
- 76 = 76,00mm
- 79 = 79,38mm
- 100 = 100,58mm/101,50mm/101,60mm
- 102 = 101,60mm
- 127 = 127,00mm
- 152 = 152,00mm
- 152,40mm
- 178 = 177,80mm
- 179,90mm
- 203 = 203,20mm
- 254 = 254,00mm

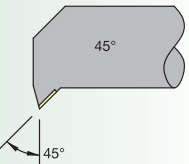
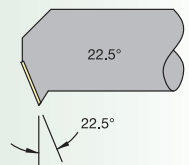
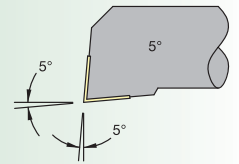
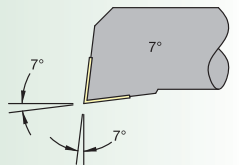
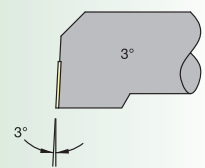
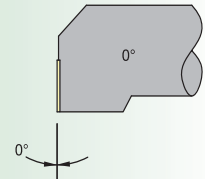
7

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

0 = 0°

Used for Threading/Grooving Bars

- 3 = 3°
- 5 = 5°
- 7 = 7°
- 225 = 22.5°
- 30 = 30°
- 45 = 45°
- 60 = 60°



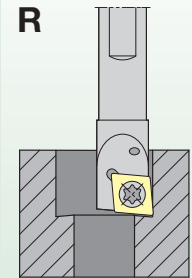
R

Hand of Tool

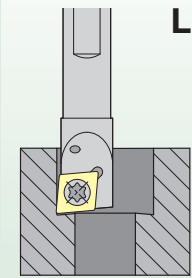
R = Right-hand

L = Left-hand

Right-hand boring bar

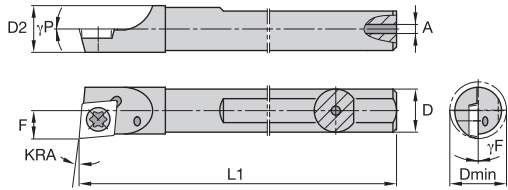


Left-hand boring bar



Small Hole Boring Bars for Turning

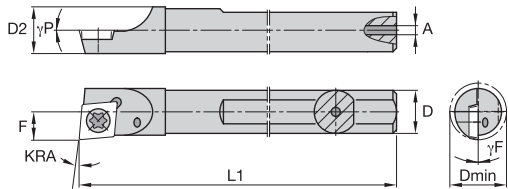
Clamping System S • Steel



NOTE: KRA shown as -5°.

CSBI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2832371	CSBI16518757R	-7	.187	.180	.166	.095	2.500	.040	0.0	0.0	CD..120605	CC09	T6
2832617	CSBI180187255R	-5	.187	.204	.180	.104	2.500	.040	0.0	5.0	CD..120605	CC09	T6
2832553	CSBI187255R	-5	.187	.228	.203	.116	2.500	.040	0.0	5.0	CD..120605	CC11	T6
2832442	CSBI25035R	-5	.250	.234	.260	.145	3.000	.040	0.0	5.0	CD..120605	CC11	T6
2832566	CSBI187250R	0	.187	.244	.203	.122	2.500	.040	0.0	5.0	CD..120605	CC11	T6
2832454	CSBI25030R	0	.250	.292	.260	.152	3.000	.040	0.0	5.0	CD..120605	CC11	T6
	Left hand												
2832365	CSBI16518757L	-7	.187	.180	.166	.095	2.500	.040	0.0	0.0	CD..120605	CC09	T6
2832623	CSBI180187255L	-5	.187	.204	.180	.104	2.500	.040	0.0	5.0	CD..120605	CC09	T6
2832559	CSBI187255L	-5	.187	.228	.203	.116	2.500	.040	0.0	5.0	CD..120605	CC11	T6
2832448	CSBI25035L	-5	.250	.285	.260	.145	3.000	.040	0.0	5.0	CD..120605	CC11	T6
3559639	CSBI187250L	0	.187	.234	.203	.122	2.500	.040	0.0	5.0	CD..120605	CC11	T6
3896203	CSBI25030L	0	.250	.292	.260	.152	3.000	.040	0.0	5.0	CD..120605	CC11	T6

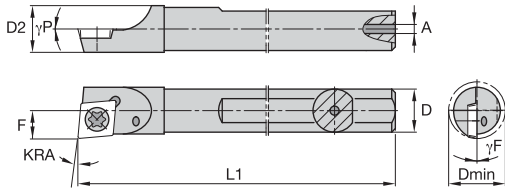


NOTE: KRA shown as -5°.

QSMI • Inch

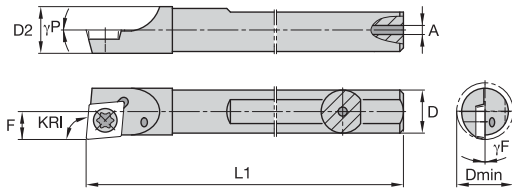
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2825464	QSMI37545R	-5	.375	.481	.385	.278	4.000	.093	0.0	0.0	CP.2....	QC15	T8
2825455	QSMI50055R	-5	.500	.605	.510	.340	5.000	.093	0.0	0.0	CP.2....	QC15	T8
2825394	QSMI62565R	-5	.625	.731	.635	.404	6.000	.098	0.0	0.0	CP.2....	QC15	T8
	Left hand												
2825457	QSMI37545L	-5	.375	.481	.385	.278	4.000	.093	0.0	0.0	CP.2....	QC15	T8
2825449	QSMI50055L	-5	.500	.605	.510	.340	5.000	.093	0.0	0.0	CP.2....	QC15	T8

NOTE: D min and F calculated using the CPG grooving-style insert.



■ **SSBIC • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2822637	SSBIC62575R	-5	.625	.680	.635	.353	7.000	.250	0.0	0.0	CP..3205	STM31	T15
2822626	SSBIC75085R	-5	.750	.805	.760	.415	8.000	.281	0.0	0.0	CP..3205	STM31	T15
	Left hand												
2822643	SSBIC62575L	-5	.625	.680	.635	.353	7.000	.250	0.0	0.0	CP..3205	STM31	T15
2822631	SSBIC75085L	-5	.750	.805	.760	.415	8.000	.281	0.0	0.0	CP..3205	STM31	T15

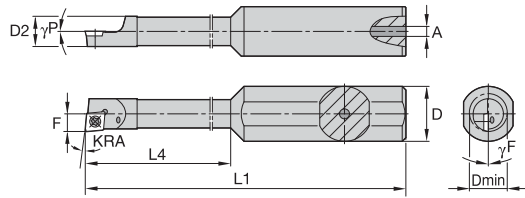


■ **CSBM • Metric**

order number	catalog 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

Small Hole Boring Bars for Turning

Clamping System S • Steel Stepped

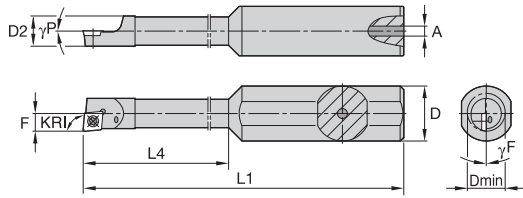


NOTE: KRA shown as -5°.

CSBI • STEPPED • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2832596	CSBI18037555R	-5	.375	.204	.180	.104	2.500	.500	.040	0.0	5.0	CD..120605	CC09	T6
2832607	CSBI18037515R	-5	.375	.204	.180	.104	2.500	1.000	.040	0.0	5.0	CD..120605	CC09	T6
2832535	CSBI20337515R	-5	.375	.228	.203	.116	2.500	1.000	.040	0.0	5.0	CD..120605	CC11	T6
2832518	CSBI20337555R	-5	.375	.230	.203	.116	2.500	.500	.040	0.0	5.0	CD..120605	CC11	T6
2832429	CSBI2503751255R	-5	.375	.280	.260	.145	2.500	1.250	.040	0.0	5.0	CD..120605	CC11	T6
2832414	CSBI250375755R	-5	.375	.285	.260	.145	2.500	.750	.040	0.0	5.0	CD..120605	CC11	T6
2832577	CSBI18050055R	-5	.500	.204	.180	.104	2.750	.500	.040	0.0	5.0	CD..120605	CC09	T6
2832589	CSBI18050015R	-5	.500	.204	.180	.104	2.750	1.000	.040	0.0	5.0	CD..120605	CC09	T6
2832467	CSBI20350055R	-5	.500	.228	.203	.116	2.750	.500	.040	0.0	5.0	CD..120605	CC11	T6
2832488	CSBI20350015R	-5	.500	.228	.203	.116	2.750	1.000	.040	0.0	5.0	CD..120605	CC11	T6
2832374	CSBI250500755R	-5	.500	.285	.260	.145	2.750	.750	.040	0.0	5.0	CD..120605	CC11	T6
2832398	CSBI2505001255R	-5	.500	.285	.260	.145	2.750	1.250	.040	0.0	5.0	CD..120605	CC11	T6
2832529	CSBI20337550R	0	.375	.234	.203	.122	2.500	.500	.040	0.0	5.0	CD..120605	CC11	T6
2832547	CSBI20337510R	0	.375	.234	.203	.122	2.500	1.000	.040	0.0	5.0	CD..120605	CC11	T6
2832503	CSBI20350010R	0	.500	.234	.203	.122	2.750	1.000	.040	0.0	5.0	CD..120605	CC11	T6
2832385	CSBI250500750R	0	.500	.292	.260	.152	2.750	.750	.040	0.0	5.0	CD..120605	CC11	T6
2832409	CSBI2505001250R	0	.500	.292	.260	.152	2.750	1.250	.040	0.0	5.0	CD..120605	CC11	T6
Left hand														
2832602	CSBI18037555L	-5	.375	.204	.180	.104	2.500	.500	.040	0.0	5.0	CD..120605	CC09	T6
2832419	CSBI250375755L	-5	.375	.285	.260	.145	2.500	.750	.040	0.0	5.0	CD..120605	CC11	T6
2832583	CSBI18050055L	-5	.500	.204	.180	.104	2.750	.500	.040	0.0	5.0	CD..120605	CC09	T6
2832472	CSBI20350055L	-5	.500	.228	.203	.116	2.750	.500	.040	0.0	5.0	CD..120605	CC11	T6
2832494	CSBI20350015L	-5	.500	.228	.203	.116	2.750	1.000	.040	0.0	5.0	CD..120605	CC11	T6
2832380	CSBI250500755L	-5	.500	.285	.260	.145	2.750	.750	.040	0.0	5.0	CD..120605	CC11	T6
2832404	CSBI2505001255L	-5	.500	.285	.260	.145	2.750	1.250	.040	0.0	5.0	CD..120605	CC11	T6

Small Hole Boring • Boring Bars for Turning

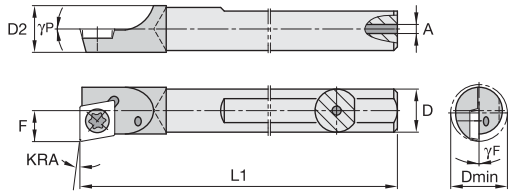


■ CSBM • STEPPED • Metric

order number	catalog 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

Small Hole Boring Bars for Turning

Clamping System S • Carbide

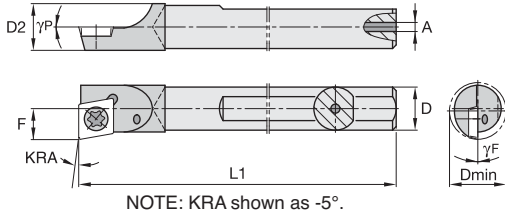


NOTE: KRA shown as -5°.

■ CCBI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2831949	CCBI16515667R	-7	.156	.180	.166	.095	6.000	.040	0.0	0.0	CD..120605	CC09	T6
2832281	CCBI18018745R	-5	.188	.208	.189	.104	4.000	.040	0.0	5.0	CD..120605	CC09	T6
2832276	CCBI18018765R	-5	.188	.208	.189	.104	6.000	.040	0.0	5.0	CD..120605	CC09	T6
2832183	CCBI18745R	-5	.188	.218	.193	.111	4.000	.040	0.0	5.0	CD..120605	CC11	T6
2832164	CCBI18765R	-5	.188	.218	.193	.111	6.000	.040	0.0	5.0	CD..120605	CC11	T6
2832049	CCBI25045R	-5	.250	.285	.258	.145	4.000	.047	0.0	5.0	CD..120605	CC11	T6
2832029	CCBI25065R	-5	.250	.285	.258	.145	6.000	.047	0.0	5.0	CD..120605	CC11	T6
2832270	CCBI31265R	-5	.312	.356	.322	.185	6.000	.093	0.0	5.0	CD..120605	CC11	T6
2832195	CCBI18740R	0	.188	.224	.193	.117	4.000	.040	0.0	5.0	CD..120605	CC11	T6
2832177	CCBI18760R	0	.188	.224	.193	.117	6.000	.040	0.0	5.0	CD..120605	CC11	T6
2832062	CCBI25040R	0	.250	.292	.258	.152	4.000	.047	0.0	5.0	CD..120605	CC11	T6
2832039	CCBI25060R	0	.250	.292	.258	.152	6.000	.047	0.0	5.0	CD..120605	CC11	T6
2832234	CCBI31260R	0	.312	.356	.322	.185	6.000	.093	0.0	5.0	CD..120605	CC11	T6
Left hand													
2831945	CCBI16515667L	-7	.156	.180	.166	.095	6.000	.040	0.0	0.0	CD..120605	CC09	T6
2832287	CCBI18018745L	-5	.188	.208	.189	.104	4.000	.040	0.0	5.0	CD..120605	CC09	T6
2832190	CCBI18745L	-5	.188	.218	.193	.111	4.000	.040	0.0	5.0	CD..120605	CC11	T6
2832172	CCBI18765L	-5	.188	.218	.193	.111	6.000	.040	0.0	5.0	CD..120605	CC11	T6
2832057	CCBI25045L	-5	.250	.285	.258	.145	4.000	.047	0.0	5.0	CD..120605	CC11	T6
2832033	CCBI25065L	-5	.250	.285	.258	.145	6.000	.047	0.0	5.0	CD..120605	CC11	T6
2832265	CCBI31265L	-5	.312	.356	.322	.185	6.000	.093	0.0	5.0	CD..120605	CC11	T6
2832200	CCBI18740L	0	.188	.224	.193	.117	4.000	.040	0.0	5.0	CD..120605	CC11	T6
2832067	CCBI25040L	0	.250	.292	.258	.152	4.000	.047	0.0	5.0	CD..120605	CC11	T6
2832043	CCBI25060L	0	.250	.292	.258	.152	6.000	.047	0.0	5.0	CD..120605	CC11	T6
2832229	CCBI31260L	0	.312	.356	.322	.185	6.000	.093	0.0	5.0	CD..120605	CC11	T6

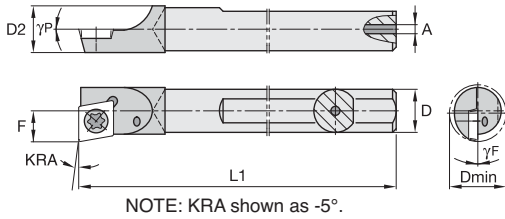
Small Hole Boring • Boring Bars for Turning



■ **QCMI • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2825117	QCMI37565R	-5	.375	.481	.385	.278	6.000	.125	0.0	0.0	CP..2....	QC15	T8
2825105	QCMI50085R	-5	.500	.605	.510	.340	8.000	.187	0.0	0.0	CP..2....	QC15	T8
2825089	QCMI625105R	-5	.625	.731	.635	.404	10.000	.218	0.0	0.0	CP..2....	QC15	T8
	Left hand												
2825112	QCMI37565L	-5	.375	.481	.385	.278	6.000	.125	0.0	0.0	CP..2....	QC15	T8
2825094	QCMI50085L	-5	.500	.605	.510	.340	8.000	.187	0.0	0.0	CP..2....	QC15	T8
2825083	QCMI625105L	-5	.625	.731	.635	.404	10.000	.218	0.0	0.0	CP..2....	QC15	T8

NOTE: F calculated using the CPG grooving-style insert.

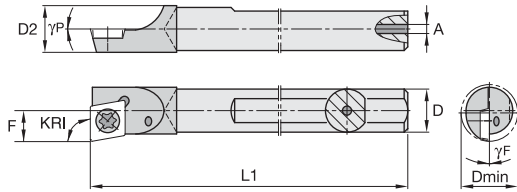


■ **SDBIC • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2822301	SDBIC62565R	-5	.625	.680	.635	.353	6.000	.218	0.0	0.0	CP..3205	STM31	T15
2822289	SDBIC625105R	-5	.625	.680	.635	.353	10.000	.218	0.0	0.0	CP..3205	STM31	T15
2822277	SDBIC75065R	-5	.750	.805	.760	.415	6.000	.281	0.0	0.0	CP..3205	STM31	T15
2822265	SDBIC750105R	-5	.750	.805	.760	.415	10.000	.281	0.0	0.0	CP..3205	STM31	T15
	Left hand												
2822306	SDBIC62565L	-5	.625	.680	.635	.353	6.000	.218	0.0	0.0	CP..3205	STM31	T15
3896009	SDBIC625105L	-5	.625	.680	.635	.353	10.000	.218	0.0	0.0	CP..3205	STM31	T15
2822283	SDBIC75065L	-5	.750	.805	.760	.415	6.000	.281	0.0	0.0	CP..3205	STM31	T15
2822272	SDBIC750105L	-5	.750	.805	.760	.415	10.000	.281	0.0	0.0	CP..3205	STM31	T15

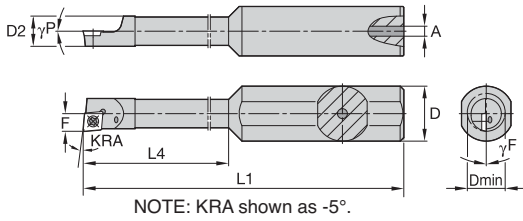
Small Hole Boring Bars for Turning

Clamping System S • Carbide



■ CCBM • Metric

order number	catalog 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



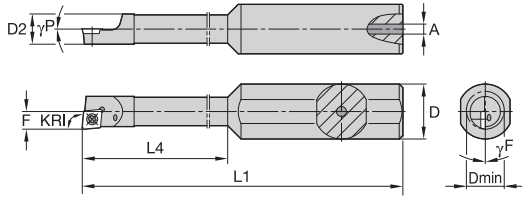
■ **CCBI • STEPPED • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2832241	CCBI1805008755R	-5	.500	.208	.189	.104	2.375	.875	.125	0.0	5.0	CD..120605	CC09	T6
2832254	CCBI18050018755R	-5	.500	.208	.189	.104	3.375	1.875	.125	0.0	5.0	CD..120605	CC09	T6
2832141	CCBI20350015R	-5	.500	.234	.210	.119	2.500	1.000	.125	0.0	5.0	CD..120605	CC11	T6
2832120	CCBI20350025R	-5	.500	.234	.210	.119	3.500	2.000	.125	0.0	5.0	CD..120605	CC11	T6
2832006	CCBI2505001255R	-5	.500	.285	.258	.145	2.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6
2831989	CCBI250500255R	-5	.500	.285	.258	.145	4.000	2.500	.125	0.0	5.0	CD..120605	CC11	T6
2832205	CCBI1806258755R	-5	.625	.208	.189	.104	3.375	.875	.125	0.0	5.0	CD..120605	CC09	T6
2832219	CCBI18062518755R	-5	.625	.208	.189	.104	4.375	1.875	.125	0.0	5.0	CD..120605	CC09	T6
2832101	CCBI20362515R	-5	.625	.234	.210	.119	3.500	1.000	.125	0.0	5.0	CD..120605	CC11	T6
2832076	CCBI20362525R	-5	.625	.234	.210	.119	4.500	2.000	.125	0.0	5.0	CD..120605	CC11	T6
2831976	CCBI2506251255R	-5	.625	.285	.258	.145	3.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6
2832152	CCBI20350010R	0	.500	.240	.210	.125	2.500	1.000	.125	0.0	5.0	CD..120605	CC11	T6
2832135	CCBI20350020R	0	.500	.240	.210	.125	3.500	2.000	.125	0.0	5.0	CD..120605	CC11	T6
3337598	CCBI2505001250R	0	.500	.292	.258	.152	2.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6
2831999	CCBI250500250R	0	.500	.292	.258	.152	4.000	2.500	.125	0.0	5.0	CD..120605	CC11	T6
3789922	CCBI20362520R	0	.625	.240	.210	.125	4.500	2.000	.125	0.0	5.0	CD..120605	CC11	T6
2831987	CCBI2506251250R	0	.625	.292	.258	.152	3.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6
2831964	CCBI250625250R	0	.625	.292	.258	.152	5.000	2.500	.125	0.0	5.0	CD..120605	CC11	T6
Left hand														
2832247	CCBI1805008755L	-5	.500	.208	.189	.104	2.375	.875	.125	0.0	5.0	CD..120605	CC09	T6
2832147	CCBI20350015L	-5	.500	.234	.210	.119	2.500	1.000	.125	0.0	5.0	CD..120605	CC11	T6
2832012	CCBI2505001255L	-5	.500	.285	.258	.145	2.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6
2831995	CCBI250500255L	-5	.500	.285	.258	.145	4.000	2.500	.125	0.0	5.0	CD..120605	CC11	T6
2832211	CCBI1806258755L	-5	.625	.208	.189	.104	3.375	.875	.125	0.0	5.0	CD..120605	CC09	T6
2832107	CCBI20362515L	-5	.625	.234	.210	.119	3.500	1.000	.125	0.0	5.0	CD..120605	CC11	T6
2832082	CCBI20362525L	-5	.625	.234	.210	.119	4.500	2.000	.125	0.0	5.0	CD..120605	CC11	T6
2831982	CCBI2506251255L	-5	.625	.285	.258	.145	3.750	1.250	.125	0.0	5.0	CD..120605	CC11	T6

Small Hole Boring • Boring Bars for Turning

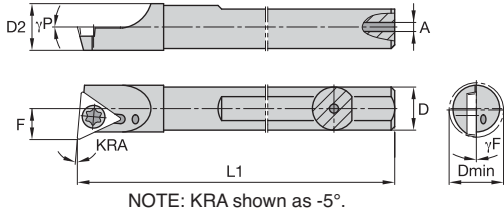
Small Hole Boring Bars for Turning

Clamping System S • Carbide Stepped



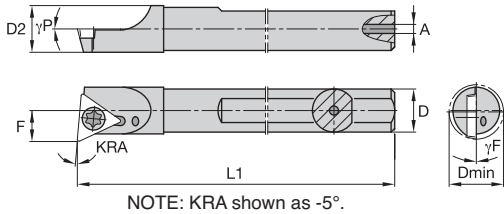
■ CCBM • STEPPED • Metric

order number	catalog 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



■ **FSBI • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2830455	FSBI187355R	-5	.187	.275	.197	.123	3.500	.040	0.0	5.0	TD..130805	FC11	T7
2830358	FSBI25045R	-5	.250	.296	.260	.156	4.000	.040	0.0	5.0	TD..130805	FC14	T7
2830260	FSBI31245R	-5	.312	.358	.322	.187	4.000	.060	0.0	5.0	TD..130805	FC14	T7
2830466	FSBI187350R	0	.187	.275	.197	.123	3.500	.040	0.0	5.0	TD..130805	FC11	T7
2830369	FSBI25040R	0	.250	.296	.260	.156	4.000	.040	0.0	5.0	TD..130805	FC14	T7
2830272	FSBI31240R	0	.312	.358	.322	.187	4.000	.060	0.0	5.0	TD..130805	FC14	T7
	Left hand												
3783152	FSBI187355L	-5	.187	.275	.197	.123	3.500	.040	0.0	5.0	TD..130805	FC11	T7
2830364	FSBI25045L	-5	.250	.296	.260	.156	4.000	.040	0.0	5.0	TD..130805	FC14	T7
2830270	FSBI31245L	-5	.312	.358	.322	.187	4.000	.060	0.0	5.0	TD..130805	FC14	T7
3896210	FSBI25040L	0	.250	.296	.260	.156	4.000	.040	0.0	5.0	TD..130805	FC14	T7



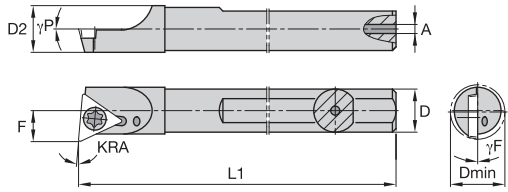
■ **QSBI • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2825910	QSBI37555R	-5	.375	.438	.385	.221	5.000	.080	0.0	5.0	TP..21505	QC21	T9
2825774	QSBI50065R	-5	.500	.563	.510	.296	6.000	.080	0.0	5.0	TP..21505	QC26	T9
2825923	QSBI37550R	0	.375	.438	.385	.221	5.000	.080	0.0	5.0	TP..21505	QC21	T9
2825788	QSBI50060R	0	.500	.563	.510	.296	6.000	.080	0.0	5.0	TP..21505	QC26	T9
	Left hand												
2825917	QSBI37555L	-5	.375	.438	.385	.221	5.000	.080	0.0	5.0	TP..21505	QC21	T9
2825781	QSBI50065L	-5	.500	.563	.510	.296	6.000	.080	0.0	5.0	TP..21505	QC26	T9

Small Hole Boring • Boring Bars for Turning

Small Hole Boring Bars for Turning

Clamping System S • Steel

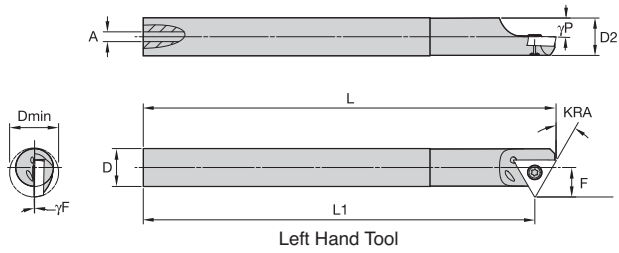


NOTE: KRA shown as -5°.

SSBI • Inch

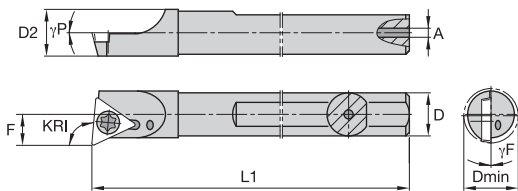
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2823053	SSBI500255R	-5	.500	.668	.572	.339	2.500	.118	0.0	5.0	TP..3205	SC30	T10
2823025	SSBI50065R	-5	.500	.668	.572	.339	6.000	.118	0.0	5.0	TP..3205	SC30	T10
2822980	SSBI62545R	-5	.625	.720	.635	.393	4.000	.250	0.0	5.0	TP..3205	SC30	T10
2822947	SSBI62575R	-5	.625	.720	.635	.393	7.000	.250	0.0	5.0	TP..3205	SC30	T10
2822921	SSBI75045R	-5	.750	.850	.760	.460	4.000	.281	0.0	5.0	TP..3205	SC30	T10
2822898	SSBI75085R	-5	.750	.850	.760	.460	8.000	.281	0.0	5.0	TP..3205	SC30	T10
2823096	SSBI100055R	-5	1.000	1.100	1.010	.585	5.000	.312	0.0	5.0	TP..3205	SC30	T10
2823121	SSBI1000105R	-5	1.000	1.100	1.010	.585	10.000	.312	0.0	5.0	TP..3205	SC30	T10
2823073	SSBI1250125R	-5	1.250	1.350	1.260	.710	12.000	.375	0.0	5.0	TP..3205	SC30	T10
2823067	SSBI500250R	0	.500	.668	.572	.339	2.500	.118	0.0	5.0	TP..3205	SC30	T10
2823039	SSBI50060R	0	.500	.668	.572	.339	6.000	.118	0.0	5.0	TP..3205	SC30	T10
2823009	SSBI62540R	0	.625	.720	.635	.393	4.000	.250	0.0	5.0	TP..3205	SC30	T10
2822959	SSBI62570R	0	.625	.720	.635	.393	7.000	.250	0.0	5.0	TP..3205	SC30	T10
2822935	SSBI75040R	0	.750	.850	.760	.460	4.000	.281	0.0	5.0	TP..3205	SC30	T10
2822907	SSBI75080R	0	.750	.850	.760	.460	8.000	.281	0.0	5.0	TP..3205	SC30	T10
	Left hand												
2823061	SSBI500255L	-5	.500	.668	.572	.339	2.500	.118	0.0	5.0	TP..3205	SC30	T10
2823032	SSBI50065L	-5	.500	.668	.572	.339	6.000	.118	0.0	5.0	TP..3205	SC30	T10
2822987	SSBI62545L	-5	.625	.720	.635	.393	4.000	.250	0.0	5.0	TP..3205	SC30	T10
2822954	SSBI62575L	-5	.625	.720	.635	.393	7.000	.250	0.0	5.0	TP..3205	SC30	T10
2822928	SSBI75045L	-5	.750	.850	.760	.460	4.000	.281	0.0	5.0	TP..3205	SC30	T10
2822901	SSBI75085L	-5	.750	.850	.760	.460	8.000	.281	0.0	5.0	TP..3205	SC30	T10
2823128	SSBI1000105L	-5	1.000	1.100	1.010	.585	10.000	.312	0.0	5.0	TP..3205	SC30	T10
2823081	SSBI1250125L	-5	1.250	1.350	1.260	.710	12.000	.375	0.0	5.0	TP..3205	SC30	T10
2822966	SSBI62570L	0	.625	.720	.635	.393	7.000	.250	0.0	5.0	TP..3205	SC30	T10
3792877	SSBI75080L	0	.750	.850	.760	.460	8.000	.281	0.0	5.0	TP..3205	SC30	T10
3837307	SSBI100050L	0	1.000	1.100	1.010	.585	5.000	.312	0.0	5.0	TP..3205	SC30	T10
2823142	SSBI1000100L	0	1.000	1.100	1.010	.585	10.000	.312	0.0	5.0	TP..3205	SC30	T10

Small Hole Boring • Boring Bars for Turning



■ SSCI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L	A	γF°	γP°	gage insert	insert screw	Torx
	Left hand													
2822888	SSCI625430L	30	.625	.730	.635	.402	3.530	4.085	.118	0.0	0.0	TP..3205	SC30	T10

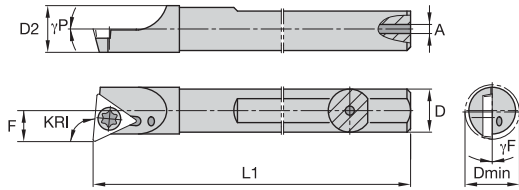


■ FSBM • Metric

order number	catalog 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

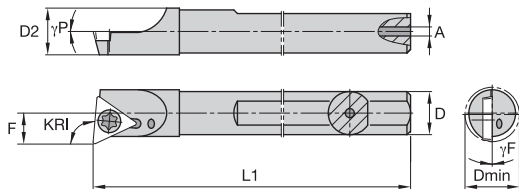
Small Hole Boring Bars for Turning

Clamping System S • Steel



■ QSBM • Metric

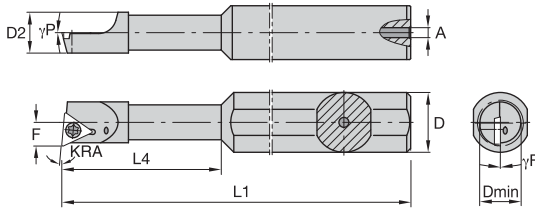
order number	catalog number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2824886	QSBM121520R	90	12,00	13,16	12,19	6,81	152,00	2,03	0.0	5.0	TP..110202	QC26	T9
3886552	QSBM101275R	95	10,00	11,15	10,21	5,79	127,00	2,03	0.0	5.0	TP..110202	QC21	T9
2824898	QSBM121525R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

order number	catalog 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

Small Hole Boring • Boring Bars for Turning



NOTE: KRA shown as -5°.

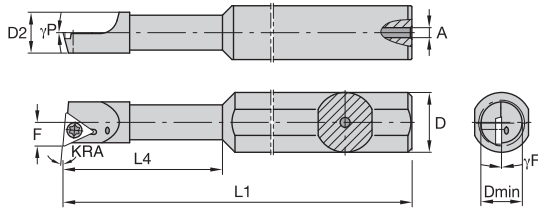
■ **FSBI • STEPPED • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2830405	FSBI20350055R	-5	.500	.275	.203	.126	3.000	.500	.040	0.0	5.0	TD..130805	FC11	T7
2830430	FSBI20350015R	-5	.500	.275	.203	.126	3.000	1.000	.040	0.0	5.0	TD..130805	FC11	T7
2830312	FSBI250500755R	-5	.500	.296	.259	.156	3.000	.750	.040	0.0	5.0	TD..130805	FC14	T7
2830335	FSBI2505001255R	-5	.500	.296	.259	.156	3.000	1.250	.040	0.0	5.0	TD..130805	FC14	T7
2830212	FSBI31250015R	-5	.500	.358	.321	.187	3.000	1.000	.060	0.0	5.0	TD..130805	FC14	T7
2830245	FSBI312500155R	-5	.500	.358	.321	.187	3.000	1.500	.060	0.0	5.0	TD..130805	FC14	T7
2830380	FSBI20362555R	-5	.625	.275	.203	.126	4.000	.500	.040	0.0	5.0	TD..130805	FC11	T7
2830284	FSBI250625755R	-5	.625	.296	.259	.156	4.000	.750	.040	0.0	5.0	TD..130805	FC11	T7
2830296	FSBI2506251255R	-5	.625	.296	.259	.156	4.000	1.250	.040	0.0	5.0	TD..130805	FC11	T7
2830185	FSBI31262515R	-5	.625	.358	.321	.187	4.000	1.000	.060	0.0	5.0	TD..130805	FC11	T7
2830189	FSBI312625155R	-5	.625	.358	.321	.187	4.000	1.500	.060	0.0	5.0	TD..130805	FC11	T7
2830417	FSBI20350050R	0	.500	.275	.203	.134	3.000	.500	.040	0.0	5.0	TD..130805	FC11	T7
2830329	FSBI250500750R	0	.500	.296	.259	.156	3.000	.750	.040	0.0	5.0	TD..130805	FC14	T7
2830347	FSBI2505001250R	0	.500	.296	.259	.156	3.000	1.250	.040	0.0	5.0	TD..130805	FC14	T7
2830227	FSBI31250010R	0	.500	.358	.321	.187	3.000	1.000	.060	0.0	5.0	TD..130805	FC14	T7
Left hand														
2830324	FSBI250500755L	-5	.500	.296	.259	.156	3.000	.750	.040	0.0	5.0	TD..130805	FC14	T7
2830222	FSBI31250015L	-5	.500	.358	.321	.187	3.000	1.000	.060	0.0	5.0	TD..130805	FC14	T7
2830320	FSBI250625755L	-5	.625	.296	.259	.156	4.000	.750	.040	0.0	5.0	TD..130805	FC14	T7
3327103	FSBI250625750L	0	.625	.296	.259	.156	4.000	.750	.040	0.0	5.0	TD..130805	FC14	T7
3383045	FSBI2506251250L	0	.625	.296	.259	.156	4.000	1.250	.040	0.0	5.0	TD..130805	FC14	T7

Small Hole Boring • Boring Bars for Turning

Small Hole Boring Bars for Turning

Clamping System S • Steel Stepped

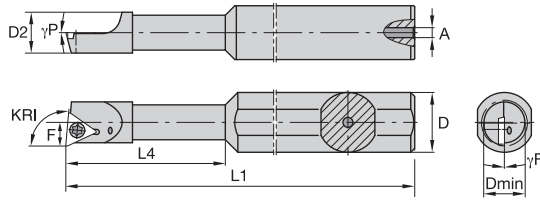


NOTE: KRA shown as -5°.

■ QSBI • STEPPED • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2825884	QSBI37550011255R	-5	.500	.438	.390	.221	3.750	1.125	.080	0.0	5.0	TP..21505	QC21	T9
2825854	QSBI37550018755R	-5	.500	.438	.390	.221	3.750	1.875	.080	0.0	5.0	TP..21505	QC21	T9
2825832	QSBI37562511255R	-5	.625	.438	.390	.221	4.250	1.125	.080	0.0	5.0	TP..21505	QC21	T9
2825816	QSBI37562518755R	-5	.625	.438	.390	.221	4.250	1.875	.080	0.0	5.0	TP..21505	QC21	T9
2825753	QSBI500625155R	-5	.625	.563	.510	.296	4.250	1.500	.080	0.0	5.0	TP..21505	QC26	T9
2825730	QSBI500625255R	-5	.625	.563	.510	.296	4.250	2.500	.080	0.0	5.0	TP..21505	QC26	T9
2825801	QSBI375750155R	-5	.750	.438	.390	.221	4.000	1.500	.080	0.0	5.0	TP..21505	QC21	T9
2825720	QSBI625750255R	-5	.750	.688	.625	.353	4.500	2.500	.098	0.0	5.0	TP..21505	QC26	T9
2825897	QSBI37550011250R	0	.500	.438	.390	.221	3.750	1.125	.080	0.0	5.0	TP..21505	QC21	T9
2825870	QSBI37550018750R	0	.500	.438	.390	.221	3.750	1.875	.080	0.0	5.0	TP..21505	QC21	T9
2825841	QSBI37562511250R	0	.625	.438	.390	.221	4.250	1.125	.080	0.0	5.0	TP..21505	QC21	T9
2825819	QSBI37562518750R	0	.625	.438	.390	.221	4.250	1.875	.080	0.0	5.0	TP..21505	QC21	T9
2825747	QSBI500625250R	0	.625	.563	.510	.296	4.250	2.500	.080	0.0	5.0	TP..21505	QC26	T9
2825727	QSBI625750250R	0	.750	.688	.625	.353	4.500	2.500	.098	0.0	5.0	TP..21505	QC26	T9
Left hand														
2825864	QSBI37550018755L	-5	.500	.438	.390	.221	3.750	1.875	.080	0.0	5.0	TP..21505	QC21	T9
2825838	QSBI37562511255L	-5	.625	.438	.390	.221	4.250	1.125	.080	0.0	5.0	TP..21505	QC21	T9
2825760	QSBI500625155L	-5	.625	.563	.510	.296	4.250	1.500	.080	0.0	5.0	TP..21505	QC26	T9
3783153	QSBI500625255L	-5	.625	.563	.510	.296	4.250	2.500	.080	0.0	5.0	TP..21505	QC26	T9
2825522	QSBI375750155L	-5	.750	.438	.390	.221	4.000	1.500	.080	0.0	5.0	TP..21505	QC21	T9
2954362	QSBI500625150L	0	.625	.563	.510	.296	4.250	1.500	.080	0.0	5.0	TP..21505	QC26	T9

Small Hole Boring • Boring Bars for Turning

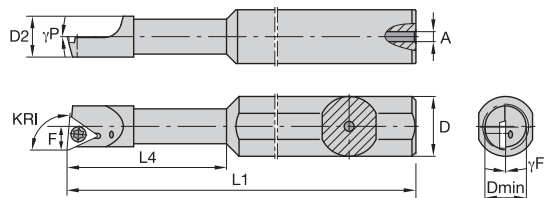


■ **FSBM • STEPPED • Metric**

order number	catalog 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

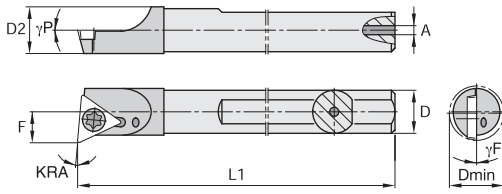
Small Hole Boring Bars for Turning

Clamping System S • Steel Stepped



■ QSBM • STEPPED • Metric

order number	catalog 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



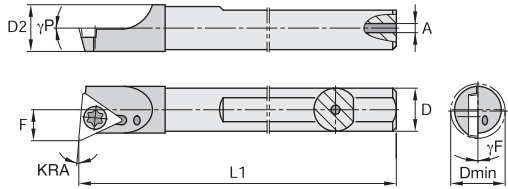
■ **FCBI • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2830020	FCBI18745R	-5	.188	.275	.203	.126	4.000	.040	0.0	5.0	TD..130805	FC11	T7
2829995	FCBI18765R	-5	.188	.275	.203	.126	6.000	.040	0.0	5.0	TD..130805	FC11	T7
2829897	FCBI25045R	-5	.250	.296	.260	.156	4.000	.047	0.0	5.0	TD..130805	FC14	T7
2829881	FCBI25065R	-5	.250	.296	.260	.156	6.000	.047	0.0	5.0	TD..130805	FC14	T7
2829787	FCBI31245R	-5	.313	.358	.322	.187	4.000	.093	0.0	5.0	TD..130805	FC14	T7
2829764	FCBI31265R	-5	.313	.358	.322	.187	6.000	.093	0.0	5.0	TD..130805	FC14	T7
2830032	FCBI18740R	0	.188	.275	.203	.134	4.000	.040	0.0	5.0	TD..130805	FC11	T7
2830007	FCBI18760R	0	.188	.275	.203	.134	6.000	.040	0.0	5.0	TD..130805	FC11	T7
2829908	FCBI25040R	0	.250	.296	.260	.156	4.000	.047	0.0	5.0	TD..130805	FC14	T7
2829892	FCBI25060R	0	.250	.296	.260	.156	6.000	.047	0.0	5.0	TD..130805	FC14	T7
2829799	FCBI31240R	0	.313	.358	.322	.187	4.000	.093	0.0	5.0	TD..130805	FC14	T7
2829777	FCBI31260R	0	.313	.358	.322	.187	6.000	.093	0.0	5.0	TD..130805	FC14	T7
	Left hand												
2830027	FCBI18745L	-5	.188	.275	.203	.126	4.000	.040	0.0	5.0	TD..130805	FC11	T7
2829903	FCBI25045L	-5	.250	.296	.260	.156	4.000	.047	0.0	5.0	TD..130805	FC14	T7
2829885	FCBI25065L	-5	.250	.296	.260	.156	6.000	.047	0.0	5.0	TD..130805	FC14	T7
2829793	FCBI31245L	-5	.313	.358	.322	.187	4.000	.093	0.0	5.0	TD..130805	FC14	T7
2829770	FCBI31265L	-5	.313	.358	.322	.187	6.000	.093	0.0	5.0	TD..130805	FC14	T7
3896029	FCBI25040L	0	.250	.296	.260	.156	4.000	.047	0.0	5.0	TD..130805	FC14	T7
2829804	FCBI31240L	0	.313	.358	.322	.187	4.000	.093	0.0	5.0	TD..130805	FC14	T7

Small Hole Boring • Boring Bars for Turning

Small Hole Boring Bars for Turning

Clamping System S • Carbide

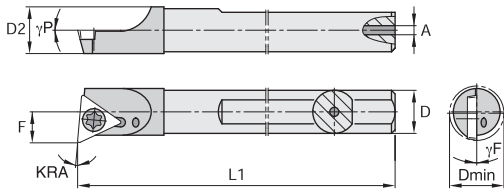


NOTE: KRA shown as -5°.

■ QCBI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2825290	QCBI37565R	-5	.375	.438	.402	.228	6.000	.125	0.0	5.0	TP..21505	QC21	T9
2825265	QCBI375105R	-5	.375	.438	.402	.228	10.000	.125	0.0	5.0	TP..21505	QC21	T9
2825272	QCBI50085R	-5	.500	.563	.510	.296	8.000	.187	0.0	5.0	TP..21505	QC21	T9
2825232	QCBI500105R	-5	.500	.563	.510	.296	10.000	.187	0.0	5.0	TP..21505	QC21	T9
2825304	QCBI37560R	0	.375	.438	.402	.228	6.000	.125	0.0	5.0	TP..21505	QC21	T9
3837881	QCBI375100R	0	.375	.438	.402	.228	10.000	.125	0.0	5.0	TP..21505	QC21	T9
2825285	QCBI50080R	0	.500	.563	.510	.296	8.000	.187	0.0	5.0	TP..21505	QC21	T9
2825238	QCBI500100R	0	.500	.563	.510	.296	10.000	.187	0.0	5.0	TP..21505	QC21	T9
	Left hand												
2825297	QCBI37565L	-5	.375	.438	.402	.228	6.000	.125	0.0	5.0	TP..21505	QC21	T9
2825278	QCBI50085L	-5	.500	.563	.510	.296	8.000	.187	0.0	5.0	TP..21505	QC21	T9
2825311	QCBI37560L	0	.375	.438	.402	.228	6.000	.125	0.0	5.0	TP..21505	QC21	T9
3896041	QCBI375100L	0	.375	.438	.402	.228	10.000	.125	0.0	5.0	TP..21505	QC21	T9
2979612	QCBI50080L	0	.500	.563	.510	.296	8.000	.187	0.0	5.0	TP..21505	QC21	T9

Small Hole Boring • Boring Bars for Turning



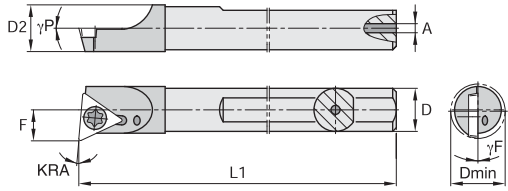
■ **SCBI • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
2822500	SCBI62565R	-5	.625	.720	.635	.393	6.000	.218	0.0	5.0	TP..3205	SC30	T10
2822515	SCBI625105R	-5	.625	.720	.635	.393	10.000	.218	0.0	5.0	TP..3205	SC30	T10
2822454	SCBI75065R	-5	.750	.850	.760	.460	6.000	.250	0.0	5.0	TP..3205	SC30	T10
2822479	SCBI750105R	-5	.750	.850	.760	.460	10.000	.250	0.0	5.0	TP..3205	SC30	T10
2822327	SCBI875125R	-5	.875	.953	.885	.500	12.000	.281	0.0	5.0	TP..3205	SC30	T10
2822540	SCBI100065R	-5	1.000	1.100	1.010	.585	6.000	.312	0.0	5.0	TP..3205	SC30	T10
2822561	SCBI1000125R	-5	1.000	1.100	1.010	.585	12.000	.312	0.0	5.0	TP..3205	SC30	T10
2822510	SCBI62560R	0	.625	.720	.635	.393	6.000	.218	0.0	5.0	TP..3205	SC30	T10
2822527	SCBI625100R	0	.625	.720	.635	.393	10.000	.218	0.0	5.0	TP..3205	SC30	T10
2822467	SCBI75060R	0	.750	.850	.760	.460	6.000	.250	0.0	5.0	TP..3205	SC30	T10
2822492	SCBI750100R	0	.750	.850	.760	.460	10.000	.281	0.0	5.0	TP..3205	SC30	T10
2822554	SCBI100060R	0	1.000	1.100	1.010	.585	6.000	.312	0.0	5.0	TP..3205	SC30	T10
2822574	SCBI1000120R	0	1.000	1.100	1.010	.585	12.000	.312	0.0	5.0	TP..3205	SC30	T10
	Left hand												
2822503	SCBI62565L	-5	.625	.720	.635	.393	6.000	.218	0.0	5.0	TP..3205	SC30	T10
2822522	SCBI625105L	-5	.625	.720	.635	.393	10.000	.218	0.0	5.0	TP..3205	SC30	T10
2822460	SCBI75065L	-5	.750	.850	.760	.460	6.000	.250	0.0	5.0	TP..3205	SC30	T10
2822485	SCBI750105L	-5	.750	.850	.760	.460	10.000	.250	0.0	5.0	TP..3205	SC30	T10
2822547	SCBI100065L	-5	1.000	1.100	1.010	.585	6.000	.312	0.0	5.0	TP..3205	SC30	T10
2822567	SCBI1000125L	-5	1.000	1.100	1.010	.585	12.000	.312	0.0	5.0	TP..3205	SC30	T10
3784482	SCBI100060L	0	1.000	1.100	1.010	.585	6.000	.312	0.0	5.0	TP..3205	SC30	T10
2822576	SCBI1000120L	0	1.000	1.100	1.010	.585	12.000	.312	0.0	5.0	TP..3205	SC30	T10

Small Hole Boring • Boring Bars for Turning

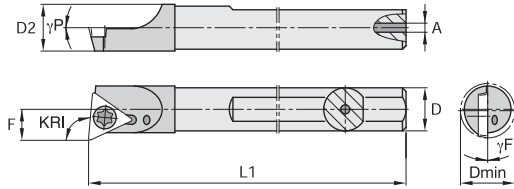
Small Hole Boring Bars for Turning

Clamping System S • Carbide



SDBI • Inch

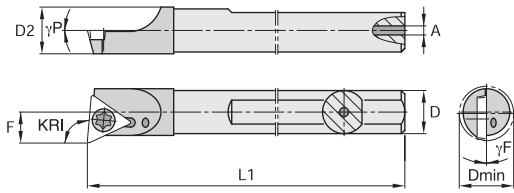
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3896007	SDBI1000125R	-5	1.000	1.100	1.010	.585	12.000	.312	0.0	5.0	TP..3205	SC30	T10
3896008	SDBI625100R	0	.625	.731	.635	.393	10.000	.218	0.0	5.0	TP..3205	SC30	T10
	Left hand												
2822433	SDBI62560L	0	.625	.731	.635	.393	6.000	.218	0.0	5.0	TP..3205	SC30	T10



FCBM • Metric

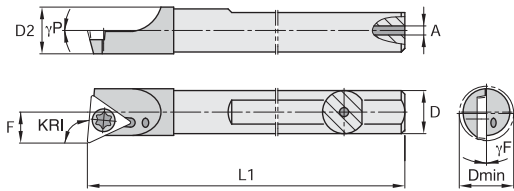
order number	catalog number	KRI	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand												
3896036	FCBM51000R	90	5,00	6,98	5,30	3,40	100,58	1,02	0.0	5.0	TD..07S102	FC11	T7
3896031	FCBM61520R	90	6,00	7,06	6,20	3,70	152,40	1,19	0.0	5.0	TD..07S102	FC11	T7
2829356	FCBM81520R	90	8,00	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

Small Hole Boring • Boring Bars for Turning



■ **QCBM • Metric**

order number	catalog 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

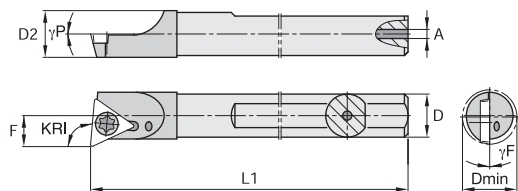


■ **SCBM • Metric**

order number	catalog 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

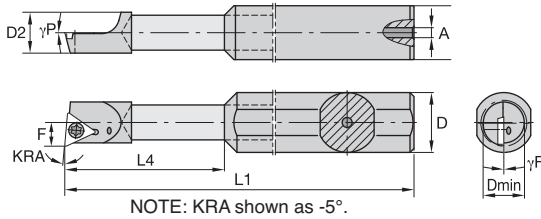
Small Hole Boring Bars for Turning

Clamping System S • Carbide



■ SDBM • Metric

order number	catalog 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

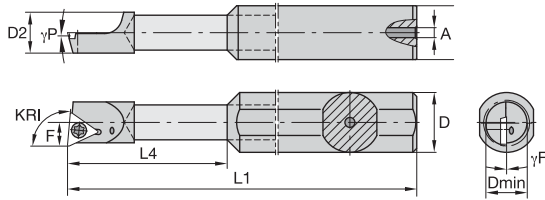


■ **FCBI • STEPPED • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2829979	FCBI20350015R	-5	.500	.275	.207	.126	2.500	1.000	.125	0.0	5.0	TD..130805	FC11	T7
2829962	FCBI20350025R	-5	.500	.275	.207	.126	3.500	2.000	.125	0.0	5.0	TD..130805	FC14	T7
2829857	FCBI2505001255R	-5	.500	.296	.260	.156	2.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829847	FCBI250500255R	-5	.500	.296	.260	.156	4.000	2.500	.125	0.0	5.0	TD..130805	FC14	T7
2829740	FCBI312500155R	-5	.500	.358	.322	.187	3.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7
2829722	FCBI31250031255R	-5	.500	.358	.322	.187	4.625	3.125	.125	0.0	5.0	TD..130805	FC14	T7
2829942	FCBI20362515R	-5	.625	.275	.207	.126	3.500	1.000	.125	0.0	5.0	TD..130805	FC14	T7
2829920	FCBI20362525R	-5	.625	.275	.207	.126	4.500	2.000	.125	0.0	5.0	TD..130805	FC14	T7
2829828	FCBI2506251255R	-5	.625	.296	.260	.156	3.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829811	FCBI250625255R	-5	.625	.296	.260	.156	5.000	2.500	.125	0.0	5.0	TD..130805	FC14	T7
2829704	FCBI312625155R	-5	.625	.358	.322	.187	4.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7
2829686	FCBI31262531255R	-5	.625	.358	.322	.187	5.625	3.125	.125	0.0	5.0	TD..130805	FC14	T7
2829990	FCBI20350010R	0	.500	.275	.207	.134	2.500	1.000	.125	0.0	5.0	TD..130805	FC11	T7
2829967	FCBI20350020R	0	.500	.275	.207	.134	3.500	2.000	.125	0.0	5.0	TD..130805	FC11	T7
2829869	FCBI2505001250R	0	.500	.296	.260	.156	2.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829851	FCBI250500250R	0	.500	.296	.260	.156	4.000	2.500	.125	0.0	5.0	TD..130805	FC14	T7
2829751	FCBI312500150R	0	.500	.358	.322	.187	3.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7
2829736	FCBI31250031250R	0	.500	.358	.322	.187	4.625	3.125	.125	0.0	5.0	TD..130805	FC14	T7
3896065	FCBI20362510R	0	.625	.275	.207	.134	3.500	1.000	.125	0.0	5.0	TD..130805	FC11	T7
2829930	FCBI20362520R	0	.625	.275	.207	.134	4.500	2.000	.125	0.0	5.0	TD..130805	FC11	T7
2829841	FCBI2506251250R	0	.625	.296	.260	.156	3.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829817	FCBI250625250R	0	.625	.296	.260	.156	5.000	2.500	.125	0.0	5.0	TD..130805	FC14	T7
2829716	FCBI312625150R	0	.625	.358	.322	.187	4.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7
2829698	FCBI31262531250R	0	.625	.358	.322	.187	5.625	3.125	.125	0.0	5.0	TD..130805	FC14	T7
Left hand														
2829985	FCBI20350015L	-5	.500	.275	.207	.126	2.500	1.000	.125	0.0	5.0	TD..130805	FC14	T7
2829863	FCBI2505001255L	-5	.500	.296	.260	.156	2.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829745	FCBI312500155L	-5	.500	.358	.322	.187	3.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7
3896066	FCBI20362515L	-5	.625	.275	.207	.126	3.500	1.000	.125	0.0	5.0	TD..130805	FC11	T7
2829835	FCBI2506251255L	-5	.625	.296	.260	.156	3.750	1.250	.125	0.0	5.0	TD..130805	FC14	T7
2829709	FCBI312625155L	-5	.625	.358	.322	.187	4.000	1.500	.125	0.0	5.0	TD..130805	FC14	T7

Small Hole Boring Bars for Turning

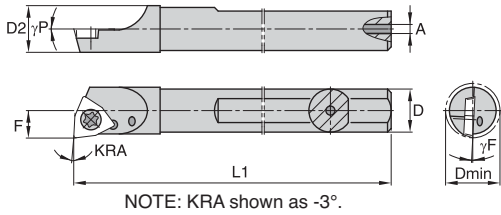
Clamping System S • Carbide Stepped



FCBM • STEPPED • Metric

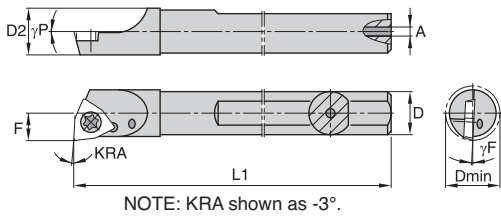
order number	catalog number	KRI	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2829339	FCBM5312250R	90	12,00	6,98	5,30	3,40	63,50	25,40	3,18	0,0	5,0	TD..07S102	FC11	T7
2829309	FCBM6612320R	90	12,00	7,52	6,60	3,96	69,85	31,75	3,18	0,0	5,0	TD..07S102	FC14	T7
3896072	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

Small Hole Boring • Boring Bars for Turning



■ **G SBIW • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2828170	G SBIW18743R	-3	.187	.260	.225	.126	4.000	.040	-3.0	0.0	WP..1511	CT11	T6
2828161	G SBIW25043R	-3	.250	.285	.260	.143	4.000	.040	-3.0	0.0	WP..1511	CT11	T6
2828145	G SBIW31243R	-3	.312	.347	.322	.176	4.000	.040	-3.0	0.0	WP..1511	CT15	T6
Left hand													
2828167	G SBIW18743L	-3	.187	.260	.225	.126	4.000	.040	-3.0	0.0	WP..1511	CT11	T6
2828151	G SBIW25043L	-3	.250	.285	.260	.143	4.000	.040	-3.0	0.0	WP..1511	CT11	T6
2828139	G SBIW31243L	-3	.312	.347	.322	.176	4.000	.040	-3.0	0.0	WP..1511	CT15	T6

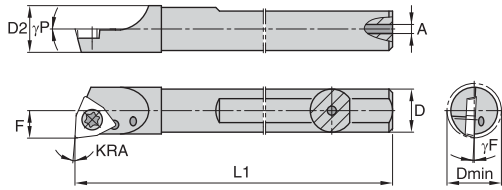


■ **Q SBIW • Inch**

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2825364	Q SBIW37553R	-3	.375	.413	.385	.211	5.000	.093	-3.0	0.0	WP..2151	QTM20	T7
2825351	Q SBIW50063R	-3	.500	.538	.510	.272	6.000	.093	-3.0	0.0	WP..2151	QTM26	T7
Left hand													
2825357	Q SBIW37553L	-3	.375	.413	.385	.211	5.000	.093	-3.0	0.0	WP..2151	QTM20	T7
2825345	Q SBIW50063L	-3	.500	.538	.510	.272	6.000	.093	-3.0	0.0	WP..2151	QTM26	T7

Small Hole Boring Bars for Turning

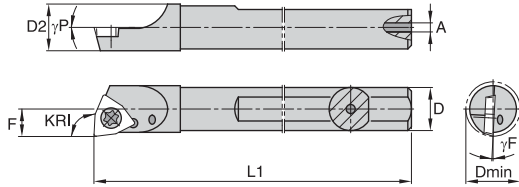
Clamping System S • Steel



NOTE: KRA shown as -3°.

SSBIW • Inch

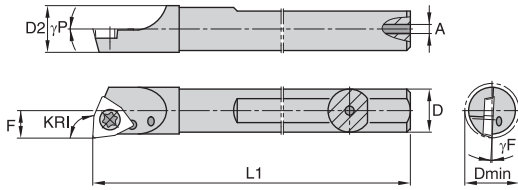
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2823167	SSBIW62573R	-3	.625	.673	.635	.345	7.000	.250	-3.0	0.0	WP..321	STM31	T15
2823155	SSBIW75083R	-3	.750	.797	.760	.407	8.000	.281	-3.0	0.0	WP..321	STM31	T15
Left hand													
2823161	SSBIW62573L	-3	.625	.673	.635	.345	7.000	.250	-3.0	0.0	WP..321	STM31	T15
2823149	SSBIW75083L	-3	.750	.797	.760	.407	8.000	.281	-3.0	0.0	WP..321	STM31	T15



GSBMW • Metric

order number	catalog 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

Small Hole Boring • Boring Bars for Turning

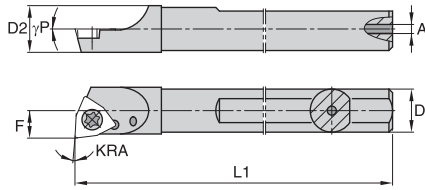


■ **QSBMW • Metric**

order number	catalog 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

Small Hole Boring Bars for Turning

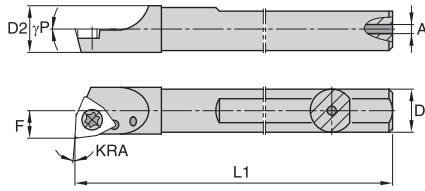
Clamping System S • Carbide



NOTE: KRA shown as -3°.

■ GCBIW • Inch

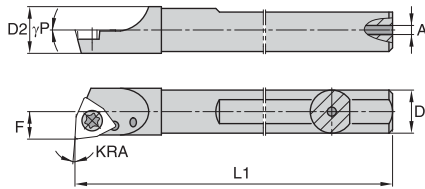
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2827756	GCBIW18763R	-3	.188	.260	.198	.126	6.000	.040	-3.0	0.0	WP..1511	CT11	T6
2827743	GCBIW25063R	-3	.250	.285	.260	.143	6.000	.047	-3.0	0.0	WP..1511	CT11	T6
2827734	GCBIW31263R	-3	.312	.347	.322	.174	6.000	.093	-3.0	0.0	WP..1511	CT15	T6
Left hand													
2827749	GCBIW18763L	-3	.188	.260	.198	.126	6.000	.040	-3.0	0.0	WP..1511	CT11	T6
2827740	GCBIW25063L	-3	.250	.285	.260	.143	6.000	.047	-3.0	0.0	WP..1511	CT11	T6
2827727	GCBIW31263L	-3	.312	.347	.322	.174	6.000	.093	-3.0	0.0	WP..1511	CT15	T6



NOTE: KRA shown as -3°.

■ QCBIW • Inch

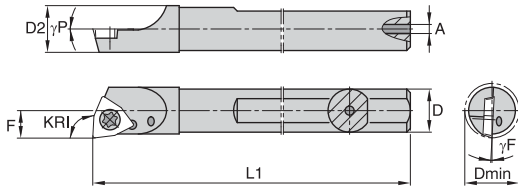
order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2825335	QCBIW37563R	-3	.375	.413	.385	.211	6.000	.125	-3.0	0.0	WP..2151	QTM20	T7
2825324	QCBIW50083R	-3	.500	.538	.510	.273	8.000	.187	-3.0	0.0	WP..2151	QTM26	T7
Left hand													
2825327	QCBIW37563L	-3	.375	.413	.385	.211	6.000	.125	-3.0	0.0	WP..2151	QTM20	T7
2825318	QCBIW50083L	-3	.500	.538	.510	.273	8.000	.187	-3.0	0.0	WP..2151	QTM26	T7



NOTE: KRA shown as -3°.

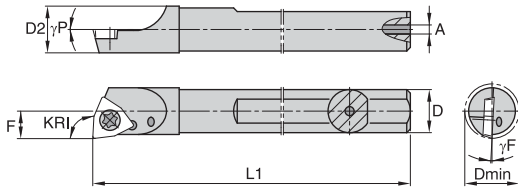
■ SCBIW • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand													
2822603	SCBIW625103R	-3	.625	.673	.635	.345	10.000	.218	-3.0	0.0	WP..321	STM31	T15
2822591	SCBIW750103R	-3	.750	.797	.760	.407	10.000	.218	-3.0	0.0	WP..321	STM31	T15
Left hand													
2822595	SCBIW625103L	-3	.625	.673	.635	.345	10.000	.218	-3.0	0.0	WP..321	STM31	T15
2822583	SCBIW750103L	-3	.750	.797	.760	.407	10.000	.218	-3.0	0.0	WP..321	STM31	T15



■ GCBMW • Metric

order number	catalog 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

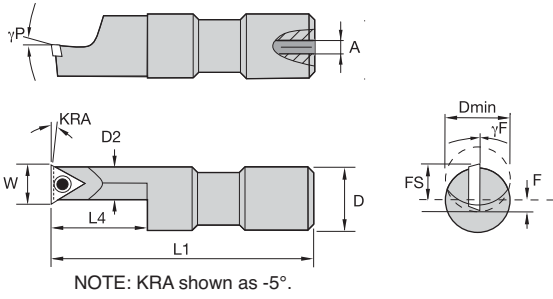


■ QCBMW • Metric

order number	catalog 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

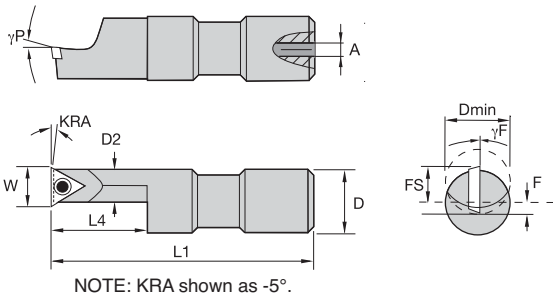
Small Hole Boring Bars for Turning

Clamping System S • Steel



■ QSOI • Inch

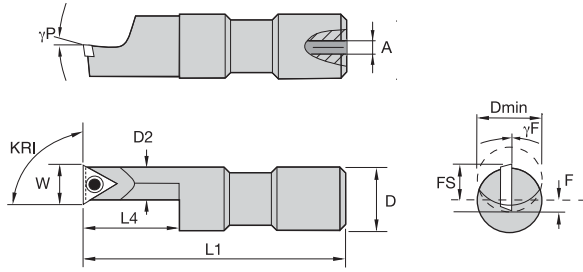
order number	catalog number	KRA	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
Right hand																
2825654	QSOI3126251255R	-5	.625	.606	.313	.055	3.125	1.250	.366	.421	.060	0.0	5.0	TP..21505	QC26	T9
2825640	QSOI375750155R	-5	.750	.727	.375	.023	3.750	1.500	.391	.421	.080	0.0	5.0	TP..21505	QC26	T9
2825660	QSOI3126251250R	0	.625	.606	.313	.055	3.125	1.250	.368	.423	.060	0.0	5.0	TP..21505	QC26	T9
2825647	QSOI375750150R	0	.750	.727	.375	.024	3.750	1.500	.399	.423	.080	0.0	5.0	TP..21505	QC26	T9



■ SSOI • Inch

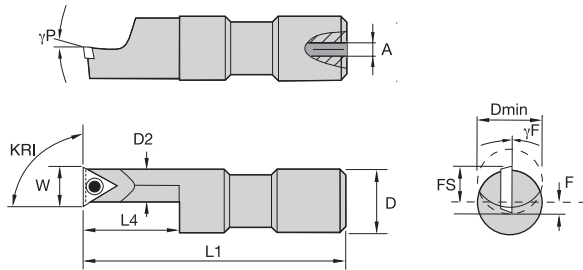
order number	catalog number	KRA	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
Right hand																
2822857	SSOI5001000150R	0	1.000	.969	.500	.070	3.750	1.500	.569	.638	.118	0.0	5.0	TP..3205	SC30	T10
2822850	SSOI5001000250R	0	1.000	.969	.500	.070	4.750	2.500	.569	.638	.118	0.0	5.0	TP..3205	SC30	T10
2822843	SSOI5001000255R	-5	1.000	.969	.500	.070	4.750	2.500	.566	.638	.118	0.0	5.0	TP..3205	SC30	T10

Small Hole Boring • Boring Bars for Turning



■ **QSOM • Metric**

order number	catalog 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

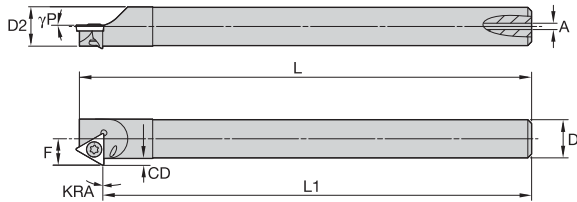


■ **SSOM • Metric**

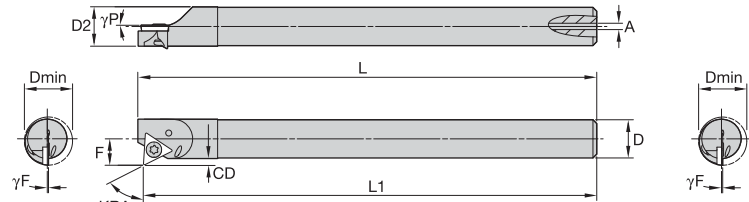
order number	catalog number	KRI	D	D min	D2	F	L1	L4	FS	W	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand															
3896090	SSOM1325380R	90	24,99	24,61	12,70	1,78	95,25	38,10	14,46	16,24	3,00	0.0	5.0	TP..160302	SC30	T10
3890867	SSOM1325630R	90	24,99	24,61	12,70	1,78	120,65	63,50	14,46	16,24	3,00	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

Small Hole Boring Bars for Turning

Clamping System S • Steel



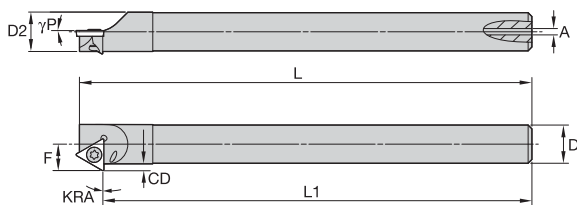
NOTE: KRA shown as 0°.



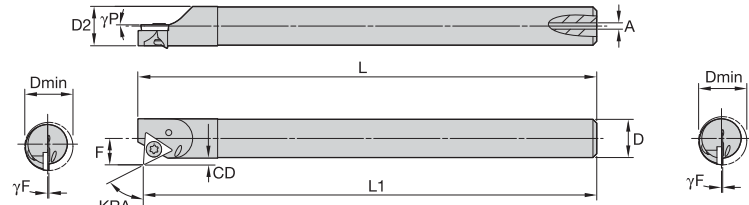
NOTE: KRA shown as 60°.

■ FSRI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L	CD	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand														
2830138	FSRI312350R	0	.312	.394	.322	.223	3.500	3.700	.062	.040	0.0	0.0	TD..130805	FC14	T7
2830120	FSRI3123560R	30	.312	.407	.322	.236	3.500	3.630	.075	.040	0.0	0.0	TD..130805	FC14	T7
2830126	FSRI3123545R	45	.312	.407	.322	.236	3.500	3.635	.075	.040	0.0	0.0	TD..130805	FC14	T7
3896214	FSRI3123530R	60	.312	.407	.322	.236	3.500	3.575	.075	.040	0.0	0.0	TD..130805	FC14	T7



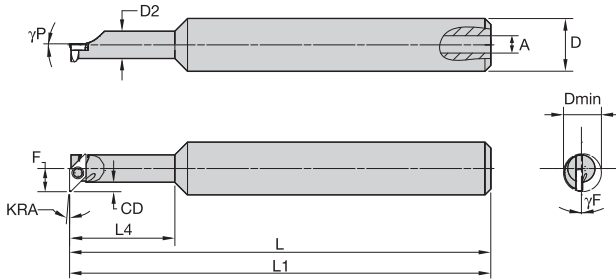
NOTE: KRA shown as 0°.



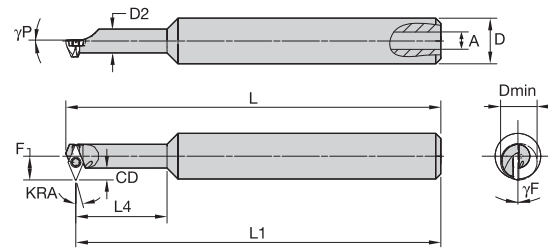
NOTE: KRA shown as 60°.

■ QSRI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L	CD	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand														
2825633	QSRI375450R	0	.375	.492	.370	.287	4.500	4.860	.100	.080	0.0	0.0	TP..21505	QC21	T9
2825605	QSRI50050R	0	.500	.645	.510	.380	5.000	5.374	.125	.080	0.0	0.0	TP..21505	QC21	T9
2825614	QSRI375560R	30	.375	.525	.390	.320	5.000	5.210	.125	.080	0.0	0.0	TP..21505	QC21	T9
2825587	QSRI500660R	30	.500	.645	.510	.380	6.000	6.188	.125	.080	0.0	0.0	TP..21505	QC21	T9
2825621	QSRI375545R	45	.375	.525	.390	.320	5.000	5.244	.125	.080	0.0	0.0	TP..21505	QC21	T9
2825594	QSRI500645R	45	.500	.645	.510	.380	6.000	6.244	.125	.080	0.0	0.0	TP..21505	QC21	T9
3896088	QSRI375530R	60	.375	.525	.390	.320	5.000	5.135	.125	.080	0.0	0.0	TP..21505	QC21	T9



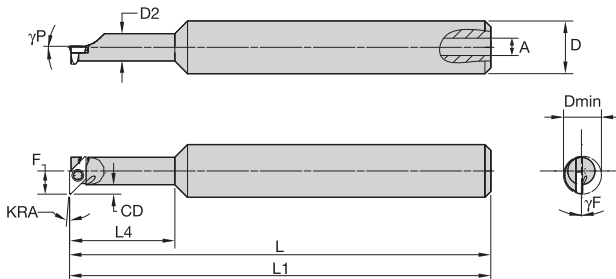
NOTE: KRA shown as -5°.



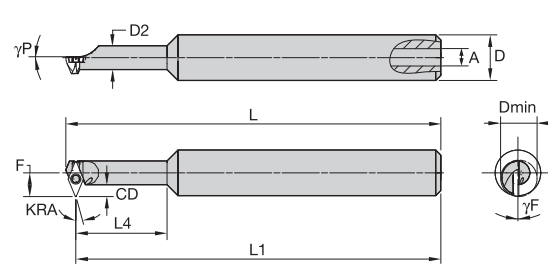
NOTE: KRA shown as 22.5°.

■ CSPI • Inch

order number	catalog number	KRA	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand																
2832344	CSPI25050015R	-5.0	.500	.360	.260	.220	.090	4.000	4.000	1.000	.040	0.0	0.0	GC..12105	CT15	T6
2832334	CSPI3125001255R	-5.0	.500	.423	.323	.251	.090	4.000	4.000	1.250	.040	0.0	0.0	GC..12105	CT15	T6
2832297	CSPI25050010R	0.0	.500	.360	.260	.220	.090	4.000	4.000	1.000	.040	0.0	0.0	GC..12105	CT15	T6
2832291	CSPI3125001250R	0.0	.500	.423	.323	.251	.090	4.000	4.000	1.250	.040	0.0	0.0	GC..12105	CT15	T6
2832319	CSPI2505001225R	22.5	.500	.400	.260	.260	.130	4.120	4.000	1.000	.040	0.0	0.0	GC..12105	CT15	T6
Left hand																
2832337	CSPI25050015L	-5.0	.500	.360	.260	.220	.090	4.000	4.000	1.000	.040	0.0	0.0	GC..12105	CT15	T6
2832326	CSPI3125001255L	-5.0	.500	.423	.323	.251	.090	4.000	4.000	1.250	.040	0.0	0.0	GC..12105	CT15	T6



NOTE: KRA shown as -5°.



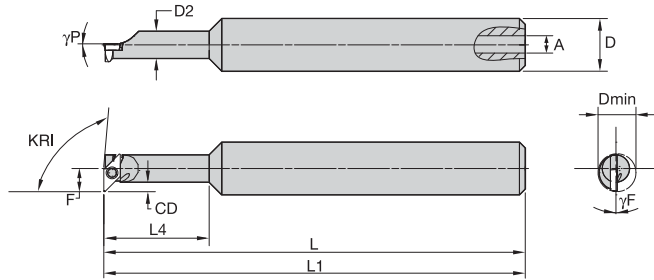
NOTE: KRA shown as 22.5°.

■ GSPI • Inch

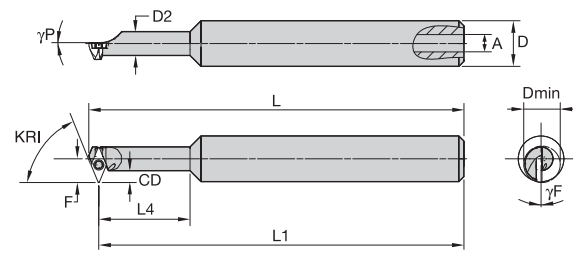
order number	catalog number	KRA	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand																
2828281	GSPI375625155R	-5.0	.625	.515	.385	.312	.120	4.500	4.500	1.500	.098	0.0	0.0	GC..151505	GT21	T7
2828269	GSPI50075025R	-5.0	.750	.630	.510	.374	.119	5.000	5.000	2.000	.098	0.0	0.0	GC..151505	GT21	T7
2828196	GSPI375625150R	0.0	.625	.515	.385	.312	.120	4.500	4.500	1.500	.098	0.0	0.0	GC..151505	GT21	T7
2828203	GSPI50075020R	0.0	.750	.630	.510	.374	.119	5.000	5.000	2.000	.098	0.0	0.0	GC..151505	GT21	T7
2828310	GSPI37562515225R	22.5	.625	.540	.385	.338	.146	4.176	4.000	1.500	.098	0.0	0.0	GC..151505	GT21	T7
2828295	GSPI5007502225R	22.5	.750	.665	.510	.400	.145	5.158	5.000	2.000	.098	0.0	0.0	GC..151505	GT21	T7
Left hand																
2828275	GSPI375625155L	-5.0	.625	.515	.385	.312	.120	4.500	4.500	1.500	.098	0.0	0.0	GC..151505	GT21	T7

Small Hole Boring Bars for Profiling

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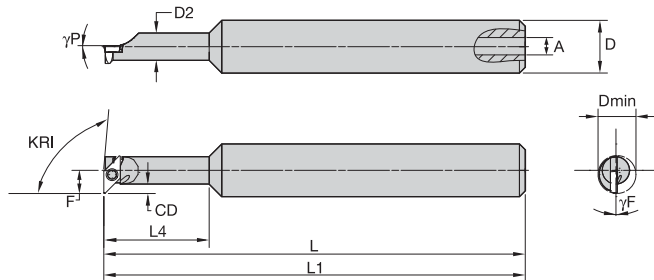
NOTE: KRI shown as 95°.



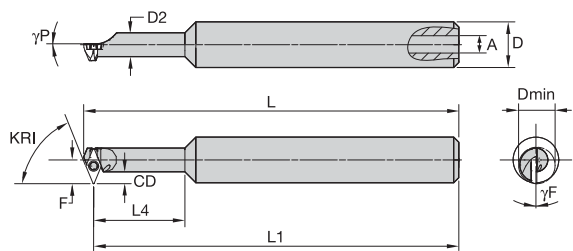
NOTE: KRI shown as 67.5°.

■ CSPM • Metric

order number	catalog 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
Left hand																
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
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



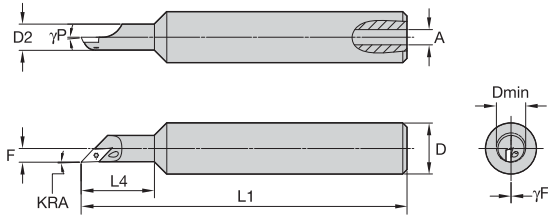
NOTE: KRI shown as 95°.



NOTE: KRI shown as 67.5°.

■ GSPM • Metric

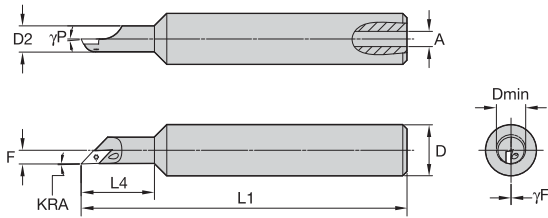
order number	catalog number	KRI	D	D min	D2	F	CD	L	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
Right hand																
2827688	GSPM101638225R	67.5	16,00	13,72	9,78	8,59	3,70	106,07	101,60	38,10	2,49	0.0	0.0	GC..060202	GT21	T7
3897897	GSPM131651225R	67.5	16,00	16,89	12,95	10,16	3,68	131,01	127,00	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
Left hand																
3518694	GSPM1316515R	95.0	16,00	16,00	12,95	9,50	3,02	127,00	127,00	50,80	2,49	0.0	0.0	GC..060202	GT21	T7
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: KRA shown as -2°.

■ CTPI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2828101	CTPI32262590647R	-2.0	.625	.339	.322	.168	4.000	.900	.187	0.0	-3.0	GC..12105	CT15	T6



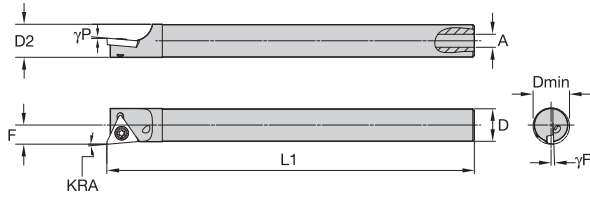
NOTE: KRA shown as -2°.

■ GTPI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	L4	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2828184	GTPI37562590647R	-2.0	.625	.625	.375	.236	4.000	.900	.187	0.0	-3.0	GC..151505	GT21	T7

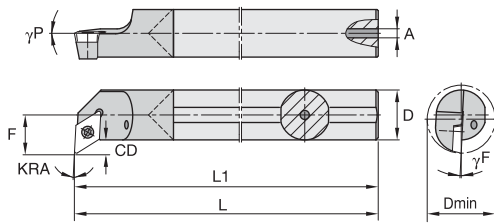
Small Hole Boring Bars for Profiling

Clamping System S • Steel

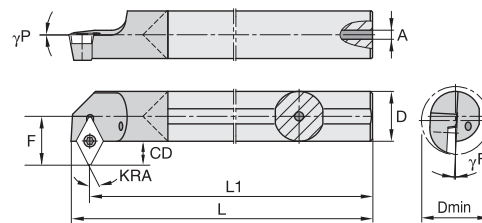


SSPI • Inch

order number	catalog number	KRA	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
2822826	Right hand SSPI62575R	-5.0	.625	.700	.635	.372	7.085	.250	0.0	5.0	TP..3205	SC30	T10



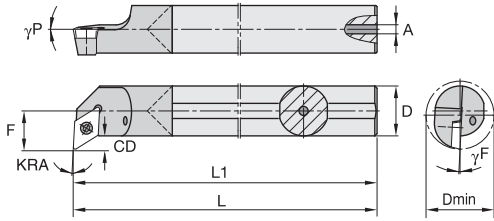
NOTE: KRA shown as -5°.



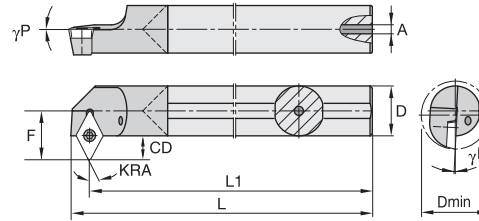
NOTE: KRA shown as 22.5°.

CCPI • Inch

order number	catalog number	KRA	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	insert screw	Torx
2831774	Right hand CCPI25065R	-5.0	.250	.360	.220	.090	6.000	6.000	.047	0.0	0.0	GP..12105	CT15	T6
2831762	CCPI31265R	-5.0	.313	.423	.251	.090	6.000	6.000	.093	0.0	0.0	GP..12105	CT15	T6
2831727	CCPI25060R	0.0	.250	.360	.220	.090	6.000	6.000	.047	0.0	0.0	GP..12105	CT15	T6
2831714	CCPI31260R	0.0	.313	.423	.251	.090	6.000	6.000	.093	0.0	0.0	GP..12105	CT15	T6
2831751	CCPI2506225R	22.5	.250	.400	.260	.130	6.120	6.000	.047	0.0	0.0	GP..12105	CT15	T6
2831739	CCPI3126225R	22.5	.313	.448	.276	.115	6.140	6.000	.093	0.0	0.0	GP..12105	CT15	T6
2831767	Left hand CCPI25065L	-5.0	.250	.360	.220	.090	6.000	6.000	.047	0.0	0.0	GP..12105	CT15	T6
2831755	CCPI31265L	-5.0	.313	.423	.251	.090	6.000	6.000	.093	0.0	0.0	GP..12105	CT15	T6
2831721	CCPI25060L	0.0	.250	.360	.220	.090	6.000	6.000	.047	0.0	0.0	GP..12105	CT15	T6
3849913	CCPI31260L	0.0	.313	.423	.251	.090	6.000	6.000	.093	0.0	0.0	GP..12105	CT15	T6
3897898	CCPI2506225L	22.5	.250	.400	.260	.130	6.120	6.000	.047	0.0	0.0	GP..12105	CT15	T6
2831733	CCPI3126225L	22.5	.313	.448	.276	.115	6.140	6.000	.093	0.0	0.0	GP..12105	CT15	T6



NOTE: KRA shown as -5°.



NOTE: KRA shown as 22.5°.

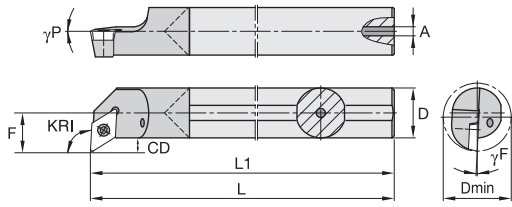
■ GCPI • Inch

order number	catalog number	KRA	D	D min	F	CD	L	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand													
2827825	GCPI37565R	-5.0	.375	.515	.312	.120	6.000	6.000	.125	0.0	0.0	GC..151505	GT21	T7
2827811	GCPI50085R	-5.0	.500	.640	.374	.119	8.000	8.000	.187	0.0	0.0	GC..151505	GT21	T7
2827800	GCPI625105R	-5.0	.625	.765	.437	.120	10.000	10.000	.218	0.0	0.0	GC..151505	GT21	T7
2827775	GCPI37560R	0.0	.375	.515	.312	.120	6.000	6.000	.125	0.0	0.0	GC..151505	GT21	T7
2827767	GCPI50080R	0.0	.500	.640	.374	.119	8.000	8.000	.187	0.0	0.0	GC..151505	GT21	T7
3897902	GCPI625100R	0.0	.625	.765	.437	.120	10.000	10.000	.218	0.0	0.0	GC..151505	GT21	T7
2827845	GCPI3756225R	22.5	.375	.540	.338	.146	6.176	6.000	.125	0.0	0.0	GC..151505	GT21	T7
2827833	GCPI5008225R	22.5	.500	.665	.400	.145	8.158	8.000	.187	0.0	0.0	GC..151505	GT21	T7
3830761	GCPI62510225R	22.5	.625	.791	.463	.146	10.158	10.000	.218	0.0	0.0	GC..151505	GT21	T7
	Left hand													
2827819	GCPI37565L	-5.0	.375	.515	.312	.120	6.000	6.000	.125	0.0	0.0	GC..151505	GT21	T7
3897901	GCPI50085L	-5.0	.500	.640	.374	.119	8.000	8.000	.187	0.0	0.0	GC..151505	GT21	T7
2827794	GCPI625105L	-5.0	.625	.765	.437	.120	10.000	10.000	.218	0.0	0.0	GC..151505	GT21	T7
2827769	GCPI37560L	0.0	.375	.515	.312	.120	6.000	6.000	.125	0.0	0.0	GC..151505	GT21	T7
3897900	GCPI50080L	0.0	.500	.640	.374	.119	8.000	8.000	.187	0.0	0.0	GC..151505	GT21	T7
3608832	GCPI625100L	0.0	.625	.765	.437	.120	10.000	10.000	.218	0.0	0.0	GC..151505	GT21	T7
2827839	GCPI3756225L	22.5	.375	.540	.338	.146	6.176	6.000	.125	0.0	0.0	GC..151505	GT21	T7
2827829	GCPI5008225L	22.5	.500	.665	.400	.145	8.158	8.000	.187	0.0	0.0	GC..151505	GT21	T7
3838856	GCPI62510225L	22.5	.625	.791	.463	.146	10.158	10.000	.218	0.0	0.0	GC..151505	GT21	T7

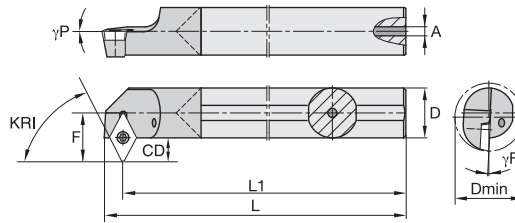
Small Hole Boring • Boring Bars for Profiling

Small Hole Boring Bars for Profiling

Clamping System S • Carbide



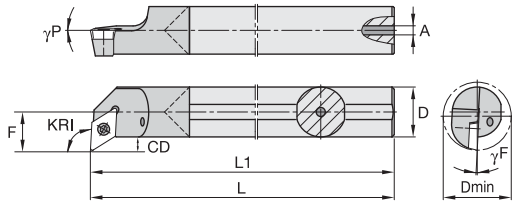
NOTE: KRI shown as 95°.



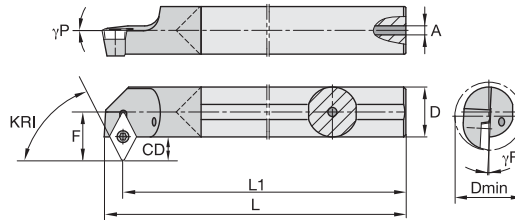
NOTE: KRI shown as 67.5°.

CCPM • Metric

order number	catalog number	KRI	D	D min	F	CD	L	L1	A	γ_F°	γ_P°	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



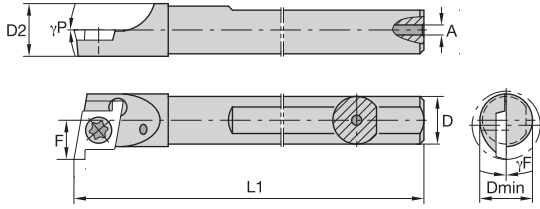
NOTE: KRI shown as 95°.



NOTE: KRI shown as 67.5°.

GCPM • Metric

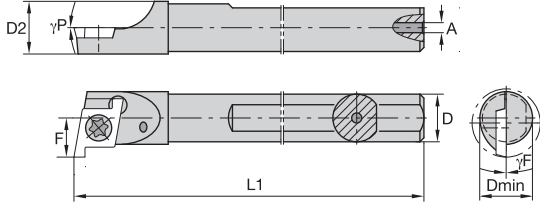
order number	catalog number	KRI	D	D min	F	CD	L	L1	A	γ_F°	γ_P°	gage insert	insert screw	Torx
Right hand														
2827656	GCPM10254225R	67.5	10,00	14,20	8,81	3,68	258,47	254,00	3,20	0.0	0.0	GC..060202	GT21	T7
3897906	GCPM12254225R	67.5	12,00	16,18	9,80	3,68	257,89	254,00	4,70	0.0	0.0	GC..060202	GT21	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



■ **CSMI • Inch**

order number	catalog number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
2832353	CSMI187250R	.188	.272	.219	.154	2.500	.040	0.0	0.0	CD.5..	CC11	T6
2832348	CSMI25030R	.250	.312	.260	.175	3.000	.040	0.0	0.0	CD.5..	CC11	T6

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



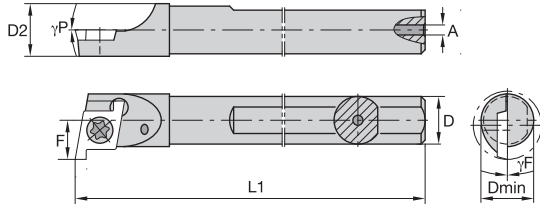
■ **QSMI • Inch**

order number	catalog number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
2825464	QSMI37545R	.375	.481	.385	.278	4.000	.093	0.0	0.0	CP..2....	QC15	T8
2825455	QSMI50055R	.500	.605	.510	.340	5.000	.093	0.0	0.0	CP..2....	QC15	T8
2825394	QSMI62565R	.625	.731	.635	.404	6.000	.098	0.0	0.0	CP..2....	QC15	T8
	Left hand											
2825457	QSMI37545L	.375	.481	.385	.278	4.000	.093	0.0	0.0	CP..2....	QC15	T8
2825449	QSMI50055L	.500	.605	.510	.340	5.000	.093	0.0	0.0	CP..2....	QC15	T8

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

Small Hole Boring Bars for Grooving and Threading

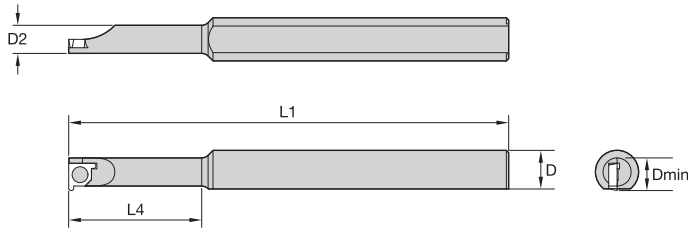
Clamping System S • Steel



■ CSMM • Metric

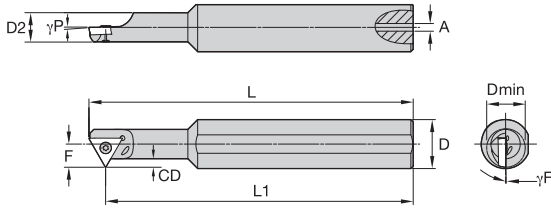
order number	catalog number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
	Right hand											
2831054	CSMM5640R	5,00	6,91	5,56	3,91	64,00	1,02	0.0	0.0	CD.5..	CC11	T6
2831048	CSMM6760R	6,00	7,92	6,60	4,45	76,00	1,02	0.0	0.0	CD.5..	CC11	T6

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



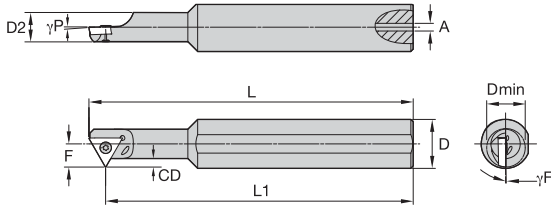
■ LSMI • Inch

order number	catalog number	D	D min	D2	L1	L4	gage insert	insert screw	Torx
	Right hand								
2820948	LSMI24437511870R	.375	.315	.244	3.819	1.187	FN..1.5..	LTM16	T5
2820954	LSMI2443758280R	.375	.315	.244	3.425	.828	FN..1.5..	LTM16	T5
2820937	LSMI24450011870R	.500	.315	.244	3.819	1.187	FN..1.5..	LTM16	T5
2820944	LSMI2445008280R	.500	.315	.244	3.425	.828	FN..1.5..	LTM16	T5



■ FSII • Inch

order number	catalog number	D	D min	D2	F	L1	L	CD	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2830177	FSII25062512560R	.625	.322	.250	.155	4.000	4.125	.060	.040	0.0	-2.0	TB..1308X0	FC11	T7
2830171	FSII2506257560R	.625	.322	.250	.155	4.000	4.125	.060	.040	0.0	-2.0	TB..1308X0	FC11	T7
2830155	FSII31262593760R	.625	.382	.312	.186	4.000	4.125	.060	.040	0.0	-2.0	TB..1308X0	FC11	T7
2830161	FSII3126251560R	.625	.382	.312	.186	4.000	4.125	.060	.040	0.0	-2.0	TB..1308X0	FC11	T7
2830143	FSII625460R	.625	.695	.635	.377	4.000	4.138	.060	.118	0.0	-2.0	TB..1308X0	FC14	T7

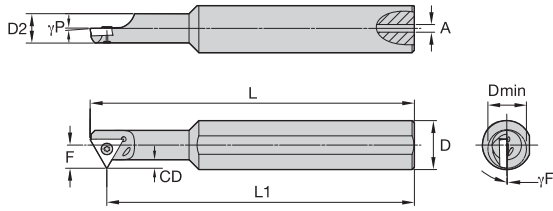


■ QSII • Inch

order number	catalog number	D	D min	D2	F	L1	L	CD	A	γF°	γP°	gage insert	insert screw	Torx
Right hand														
2825707	QSII375625187560R	.625	.468	.375	.234	4.000	4.188	.093	.098	0.0	-2.0	TB..2150	QC21	T9
2825693	QSII375625112560R	.625	.468	.375	.234	4.000	4.188	.093	.098	0.0	-2.0	TB..2150	QC21	T9
2825700	QSII375625112560L	.625	.478	.375	.234	4.000	4.188	.093	.098	0.0	-2.0	TB..2150	QC21	T9
2825679	QSII5006251560R	.625	.603	.500	.297	4.000	4.188	.093	.098	0.0	-2.0	TB..2150	QC21	T9
2825670	QSII625460R	.625	.738	.635	.410	4.000	4.188	.093	.118	0.0	-2.0	TB..2150	QTM26	T9

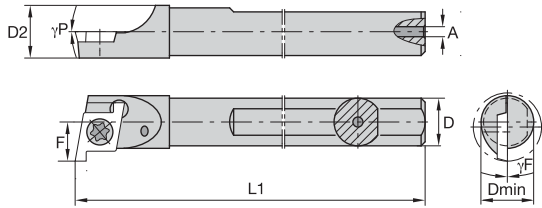
Small Hole Boring Bars for Grooving and Threading

Clamping System S • Steel



■ SSII • Inch

order number	catalog number	D	D min	D2	F	L1	L	CD	A	γF°	γP°	gage insert	insert screw	Torx
2822864	Right hand SSII750860R	.750	.935	.760	.548	8.000	8.305	.168	.281	0.0	-2.0	TB..3205	SC30	T10

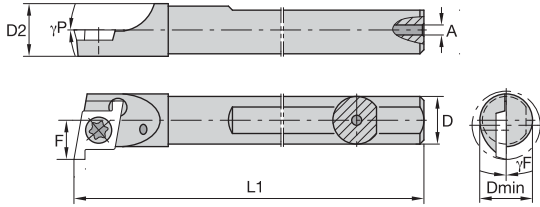


■ CCMI • Inch

order number	catalog number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
2831841	Right hand CCMI18740R	.188	.272	.219	.154	4.000	.040	0.0	0.0	CD.5..	CC11	T6
2831838	CCMI25040R	.250	.312	.260	.175	4.000	.047	0.0	0.0	CD.5..	CC11	T6

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

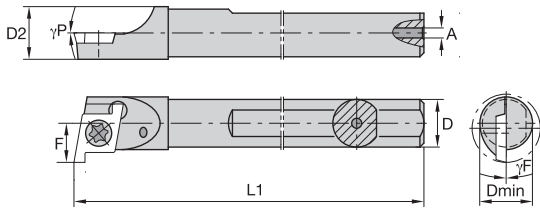
Small Hole Boring • Boring Bars for Grooving and Threading



■ **QCMI • Inch**

order number	catalog number	D	D min	D2	F	L1	A	γF°	γP°	gage insert	insert screw	Torx
Right hand												
2825117	QCMI37565R	.375	.481	.385	.278	6.000	.125	0.0	0.0	CP..2....	QC15	T8
2825105	QCMI50085R	.500	.605	.510	.340	8.000	.187	0.0	0.0	CP..2....	QC15	T8
2825089	QCMI625105R	.625	.731	.635	.404	10.000	.218	0.0	0.0	CP..2....	QC15	T8
Left hand												
2825112	QCMI37565L	.375	.481	.385	.278	6.000	.125	0.0	0.0	CP..2....	QC15	T8
2825094	QCMI50085L	.500	.605	.510	.340	8.000	.187	0.0	0.0	CP..2....	QC15	T8
2825083	QCMI625105L	.625	.731	.635	.404	10.000	.218	0.0	0.0	CP..2....	QC15	T8

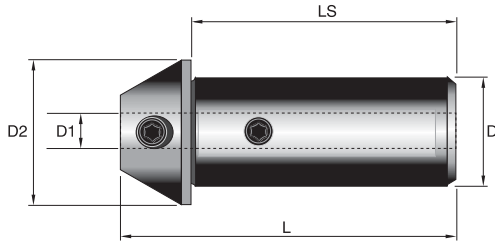
NOTE: Refer to insert design for cutting depth, cutting width, and blind hole limitations.



■ **CCMM • Metric**

order number	catalog 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

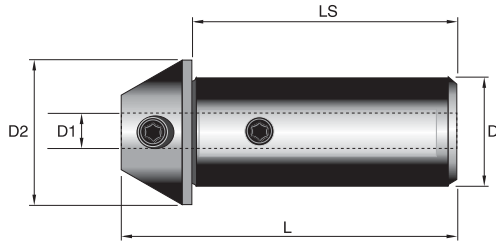
NOTE: Refer to insert design for cutting depth, cutting width, and blind hole limitations.



Small Hole Boring • Sleeves

■ CSI • Inch

order number	catalog number	D1	D	D2	LS	L
2832868	CSI625156	.156	.625	1.100	2.000	2.500
2832905	CSI750156	.156	.750	1.100	2.000	2.500
2832801	CSI1000156	.156	1.000	1.100	2.000	2.500
3493266	CSI625187	.187	.625	1.100	2.000	2.500
2832898	CSI750187	.187	.750	1.100	2.000	2.500
2832795	CSI1000187	.187	1.000	1.100	2.000	2.500
2832856	CSI625250	.250	.625	1.100	2.000	2.500
2832893	CSI750250	.250	.750	1.100	2.000	2.500
2832790	CSI1000250	.250	1.000	1.100	2.000	2.500
2832851	CSI625312	.312	.625	1.100	2.000	2.500
2832885	CSI750312	.312	.750	1.100	2.000	2.500
2832785	CSI1000312	.312	1.000	1.100	2.000	2.500
2832844	CSI625375	.375	.625	1.100	2.000	2.500
2832879	CSI750375	.375	.750	1.100	2.000	2.500
2832780	CSI1000375	.375	1.000	1.100	2.000	2.500
2832932	CSI1250375	.375	1.250	3.630	3.000	3.630
2832957	CSI1500375	.375	1.500	3.630	3.000	3.630
2832874	CSI750500	.500	.750	1.100	2.000	2.500
2832775	CSI1000500	.500	1.000	1.100	2.000	2.500
2832926	CSI1250500	.500	1.250	3.630	3.000	3.630
2832953	CSI1500500	.500	1.500	3.630	3.000	3.630
2832920	CSI1250625	.625	1.250	3.630	3.000	3.630
2832947	CSI1500625	.625	1.500	3.630	3.000	3.630
2832914	CSI1250750	.750	1.250	3.630	3.000	3.630
2832941	CSI1500750	.750	1.500	3.630	3.000	3.630
2832910	CSI12501000	1.000	1.250	3.630	3.000	3.630
2832935	CSI15001000	1.000	1.500	3.630	3.000	3.630



■ CSM • Metric

order number	catalog 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

ISO 513	P				
	01	10	20	30	40
Hard Metal Coated					

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

ISO 513	M				
	01	10	20	30	40
Hard Metal Coated					

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

ISO 513	K				
	01	10	20	30	40
Hard Metal Coated					
		TN7			
		ALO			
		CG6			
		CG55			
		C3 and C25			
		C2			
				CG5	
				CM1	

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

ISO 513	S				
	01	10	20	30	40
Hard Metal Coated					
		C3 and C25			
		C2			
				CG5	
				CM1	

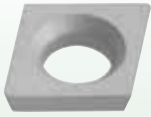
wear resistance = harder

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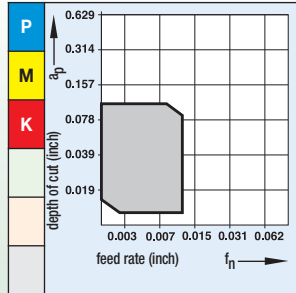
toughness = softer

Single-Sided, Positive Inserts

..HB



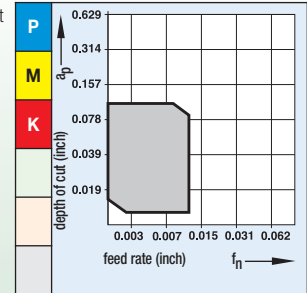
Flat inserts. Peripheral ground for best surface quality and reduced cutting pressure. Very stable cutting edge offers maximum rigidity.



..HT



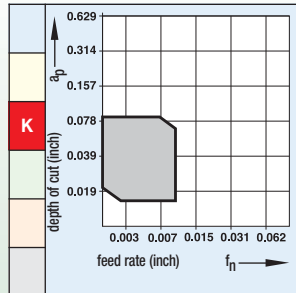
Peripheral ground insert chipbreaker. Good chip control. Geometry for general-purpose applications.



..HB-M



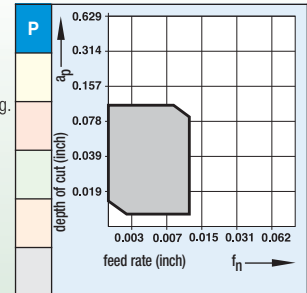
Cubic Boron Nitride (CBN) or Polycrystalline Diamond (PCD) tip for high-temp alloys and non-ferrous machining. Very stable cutting edge offers maximum rigidity.



..LF



Geometry for general-purpose applications. Very good chip control. Recommended for general finish machining.



Geometry Selection Criteria

Flat Top-Type Inserts

Chipbreaker geometry ..HB, ..HB-M, ..HW

- Suitable for interrupted cuts.
- Use when chip control is not critical.

Pressed Chipbreaker-Type Inserts

Chipbreaker geometry ..LF

- Suitable for moderate interruption of cuts.
- Use when chip control is a concern.

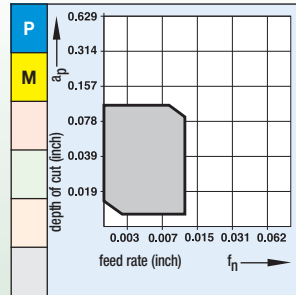
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Single-Sided, Positive Inserts

..HH



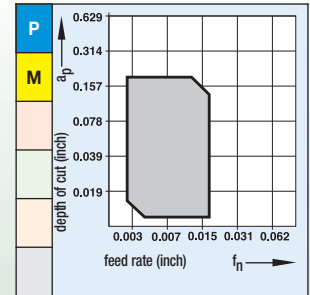
Peripheral ground for best surface quality and reduced cutting pressure. For fine to medium finishes.



HP



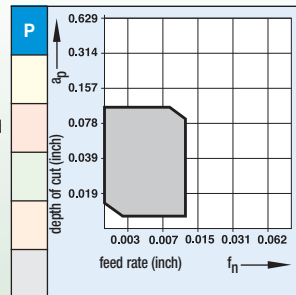
High positive-type chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure. Recommended for high-temp alloys and non-ferrous machining.



..HH-R/L



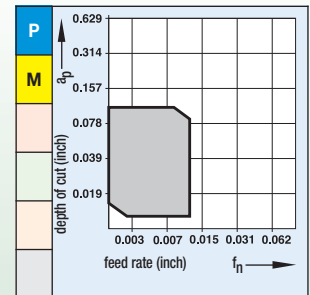
Ground-in chipbreaker. Peripheral ground for best surface quality and reduced cutting pressure. *Right-hand inserts used in left-hand bars ONLY. Left-hand inserts used in right-hand bars ONLY.



..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.
- 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

Speed and Feed Chart

Positive Inserts • Inch



Small Hole Boring • Speed and Feed Chart

ANSI ISO 513		VDI 3323			Cutting Speed • vc SFM											
Material Group		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [inch]										0.002	—	0.012	0.002	—	0.012
	f [inch]										0.012	—	0.001	0.012	—	0.001
		C2			C25			C3			CG5			CG55		
	1										305	380	460	340	420	505
	2										225	280	340	250	310	375
	3										175	215	260	195	240	290
	4										200	245	295	220	270	325
	5										145	180	220	160	200	240
	6										240	300	360	265	330	400
	7										160	195	235	175	215	260
	8										145	180	220	160	200	240
	9										125	155	190	140	175	210
	10										220	270	325	240	300	360
	11										135	165	200	150	185	225
12										220	270	325	240	300	360	
13.1										180	225	270	200	250	300	
13.2										135	165	200	150	185	225	
M	ap [inch]	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012
	f [inch]	0.012	—	0.001	0.012	—	0.001	0.012	—	0.001	0.012	—	0.001	0.012	—	0.001
		C2			C25			C3			CG5			CG55**		
	14.1	180	225	270	195	240	290	205	255	310	240	300	360	265	330	400
	14.2	145	180	220	155	190	230	160	200	240	190	235	285	210	260	315
14.3	165	205	250	180	220	265	185	230	280	220	270	325	240	300	360	
14.4	100	125	150	110	135	165	120	145	175	135	165	200	150	185	225	
K	ap [inch]	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012
	f [inch]	0.010	—	0.001	0.010	—	0.001	0.010	—	0.001	0.010	—	0.001	0.010	—	0.001
		C2			C25**			C3**			CG5			CG55		
	15	200	250	300	220	275	330	220	275	330	230	285	345	255	315	380
	16	140	175	210	160	195	235	160	195	235	160	200	240	180	220	265
	17	230	285	345	250	310	375	250	310	375	260	325	390	290	360	435
	18	145	180	220	160	200	240	160	200	240	170	210	255	190	235	285
19	280	350	420	310	385	465	310	385	465	320	395	475	350	435	525	
20	160	200	240	180	220	265	180	220	265	180	225	270	200	250	300	
N	ap [inch]	0.002	—	0.020	0.002	—	0.020	0.002	—	0.020	0.002	—	0.020	0.002	—	0.020
	f [inch]	0.008	—	0.001	0.008	—	0.001	0.008	—	0.001	0.008	—	0.001	0.008	—	0.001
		C2**			C25**			C3**			CG5			CG55		
	21	1320	1650	1980	1320	1650	1980	1320	1650	1980	1320	1650	1980	1455	1815	2180
	22	795	990	1190	795	990	1190	795	990	1190	795	990	1190	875	1090	1310
	23	1320	1650	1980	1320	1650	1980	1320	1650	1980	1320	1650	1980	1455	1815	2180
	24	800	1000	1200	800	1000	1200	800	1000	1200	800	1000	1200	880	1100	1320
	25	225	280	340	225	280	340	225	280	340	275	340	410	300	375	450
	26	1040	1300	1560	1040	1300	1560	1040	1300	1560	465	580	700	515	640	770
	27	960	1200	1440	960	1200	1440	960	1200	1440	440	550	660	485	605	730
	28	1040	1300	1560	1040	1300	1560	1040	1300	1560	465	580	700	515	640	770
29	480	600	720	480	600	720	480	600	720	580	720	865	640	795	955	
30	440	550	660	440	550	660	440	550	660	530	660	795	585	730	880	
S	ap [inch]	0.001	—	0.020	0.001	—	0.020	0.001	—	0.020	0.001	—	0.020	0.001	—	0.020
	f [inch]	0.005	—	0.001	0.005	—	0.001	0.005	—	0.001	0.005	—	0.001	0.005	—	0.001
		C2			C25			C3			CG5**			CG55		
	31	115	140	170	115	140	170	115	140	170	115	140	170	125	155	190
	32	80	100	120	80	100	120	80	100	120	80	100	120	90	110	135
	33	95	115	140	95	115	140	95	115	140	95	115	140	105	130	160
	34	65	80	100	65	80	100	65	80	100	65	80	100	75	90	110
	35	75	90	110	75	90	110	75	90	110	75	90	110	80	100	120
36	—	—	—	—	—	—	—	—	—	105	130	160	120	145	175	
37	—	—	—	—	—	—	—	—	—	80	100	120	90	110	135	
H	ap [inch]															
	f [inch]															
		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.
 NOTE: 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.

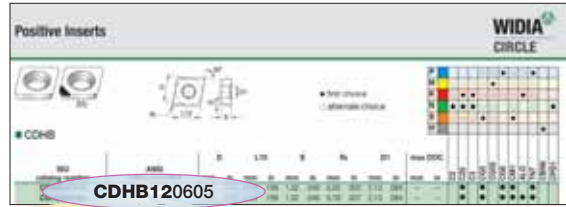
Cutting Speed • vc SFM															VDI 3323	ANSI ISO 513		
															Material Group			
min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	
0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012			ap [inch]		P		
0.012	—	0.001	0.012	—	0.001	0.012	—	0.001	0.012	—	0.001			f [inch]				
CG6**			CM1			ALO			TN7**			CBN6		CPD1				
415	515	620	180	220	265	540	675	810	650	810	975						1	
305	380	460	130	160	195	400	500	600	480	600	720						2	
235	290	350	100	125	150	305	380	460	370	460	555						3	
265	330	400	115	140	170	350	435	525	420	520	625						4	
200	245	295	85	105	130	260	320	385	305	380	460						5	
325	405	490	140	170	205	425	530	640	510	635	765						6	
215	265	320	95	115	140	280	350	420	335	415	500						7	
200	245	295	85	105	130	260	320	385	305	380	460						8	
170	210	255	75	90	110	220	275	330	265	330	400						9	
295	365	440	125	155	190	380	475	570	460	570	685						10	
180	225	270	80	95	115	240	295	355	285	355	430					11		
295	365	440	125	155	190	380	475	570	460	570	685					12		
245	305	370	105	130	160	320	400	480	380	475	570					13.1		
180	220	265	80	95	115	235	290	350	280	350	420					13.2		
0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012			ap [inch]		M		
0.012	—	0.001	0.012	—	0.001	0.012	—	0.001	0.012	—	0.001			f [inch]				
CG6			CM1			ALO			TN7			CBN6		CPD1				
305	380	460	180	220	265	345	430	520	340	420	505						14.1	
240	300	360	140	175	210	275	340	410	265	330	400						14.2	
280	345	415	160	200	240	315	390	470	305	380	460					14.3		
170	210	255	100	120	145	200	245	295	185	230	280					14.4		
0.002	—	0.012	0.002	—	0.012	0.002	—	0.012	0.002	—	0.012			ap [inch]		K		
0.010	—	0.001	0.010	—	0.001	0.010	—	0.001	0.010	—	0.001			f [inch]				
CG6			CM1			ALO**			TN7			CBN6		CPD1				
280	350	420	180	220	265	480	600	720	320	400	480						15	
200	245	295	125	155	190	340	420	505	225	280	340						16	
320	400	480	200	250	300	540	675	810	360	450	540						17	
210	260	315	130	160	195	350	435	525	235	290	350						18	
385	480	580	245	305	370	670	835	1005	445	555	670					19		
220	275	330	140	175	210	380	470	565	255	315	380					20		
			0.002	—	0.020				0.002	—	0.020			ap [inch]		N		
			0.008	—	0.001				0.008	—	0.001			f [inch]				
CG6			CM1			ALO			TN7			CBN6		CPD1**				
			1320	1650	1980				1320	1650	1980			2800	3500		4200	21
			795	990	1190				795	990	1190			2400	3000		3600	22
			1320	1650	1980				1320	1650	1980			2240	2800		3360	23
			800	1000	1200				800	1000	1200			1760	2200		2640	24
			225	280	340				265	330	400			1200	1500		1800	25
			330	410	495				640	800	960			1080	1350		1620	26
			320	400	480				625	780	940			1040	1300		1560	27
			330	410	495				640	800	960			1080	1350		1620	28
			480	600	720				640	800	960			1120	1400		1680	29
			440	550	660				520	650	780			1080	1350		1620	30
			0.001	—	0.020									ap [inch]		S		
			0.005	—	0.001									f [inch]				
CG6			CM1			ALO			TN7			CBN6		CPD1				
			100	120	145												31	
			75	90	110												32	
			80	100	120												33	
			60	70	85												34	
			60	75	90											35		
			90	110	135											36		
			75	90	110											37		
												0.001	—	0.020	ap [inch]		H	
												0.005	—	0.001	f [inch]			
CG6			CM1			ALO			TN7			CBN6**		CPD1				
												360	450	540	38.1			
												340	420	505	38.2			
												320	400	480	39.1			
												290	360	435	39.2			
												—	—	—	40.1			
												—	—	—	40.2			
												—	—	—	41.1			
												—	—	—	41.2			

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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

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

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	

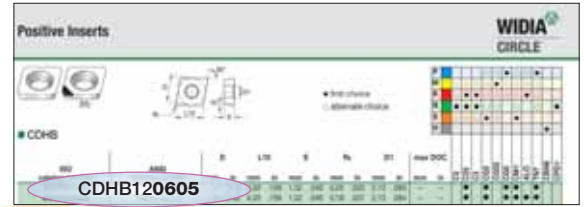
12

Size

"D"	Code for metric cutting edge length "L10"			
inch	C	G	T	W
5/32	12	12	—	—
.160	—	—	13	—
3/16	—	15	—	15
1/4	2	—	2	2
3/8	3	—	3	3
.386	—	—	31	—

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
H	±.0005"	±.0005"	±.001"
G	±.0010"	±0.010"	±.005"
M	See table in size column		±.005"

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



06

Thickness

symbol inch	thickness inch
06	.040
1	.0625
12	.0781
15	.0938
2	.1250
25	.1563

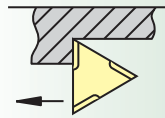
05

Corner Radius "Rε"

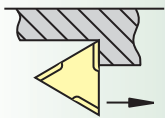
symbol inch	corner radius inch
X0	.0015
0	.004
05	.008
1	.0156
13	.021
2	.0313
24	.037
3	.0469
4	.0625

Hand of Insert
(optional)

R = Right hand
L = Left hand



R



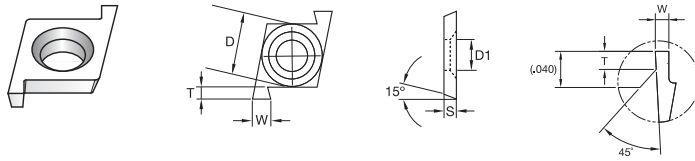
L

Cutting Edge Condition
or Chip Control Features
(optional)

HP High positive
LF Light finishing

Tip Style
(optional)

Symbol
M
Usage
Mini tip



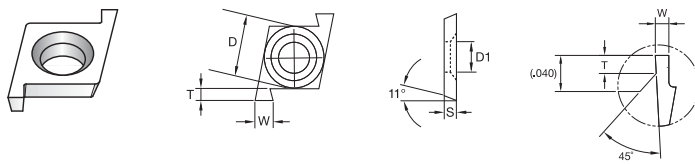
Detail of .015" (0,38mm) insert.

● first choice
○ alternate choice

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

■ **CDG-R/L**

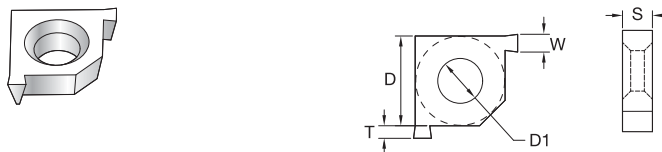
ISO catalog number	ANSI catalog number	D		S		T		W		D1		C25	CG5	CG6	CM1
		mm	in	mm	in	mm	in	mm	in	mm	in				
CDG50152R	Right hand CDG50152R	3,97	5/32	1,27	.050	0,51	.020	0,38	.015	2,13	.084		●		●
CDG50252R	CDG50252R	3,97	5/32	1,27	.050	1,02	.040	0,64	.025	2,13	.084		●		●
CDG50302R	CDG50302R	3,97	5/32	1,27	.050	1,02	.040	0,76	.030	2,13	.084		●		●



Detail of .015" (0,38mm) insert.

■ **CPG-R/L**

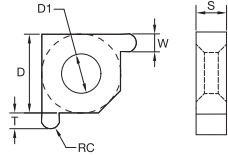
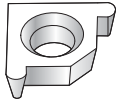
ISO catalog number	ANSI catalog number	D		S		T		W		D1		C25	CG5	CG6	CM1
		mm	in	mm	in	mm	in	mm	in	mm	in				
CPG2032R	Right hand CPG2032R	6,35	1/4	1,91	.075	1,65	.065	0,76	.030	2,79	.110		●		●
CPG2062R	CPG2062R	6,35	1/4	1,91	.075	1,65	.065	1,52	.060	2,79	.110		●		●
CPG2032L	Left hand CPG2032L	6,35	1/4	1,91	.075	1,65	.065	0,76	.030	2,79	.110		●		●
CPG2062L	CPG2062L	6,35	1/4	1,91	.075	1,65	.065	1,52	.060	2,79	.110		●		●



■ **FNG-R/L**

ISO catalog number	ANSI catalog number	D		S		T		W		D1		C25	CG5	CG6	CM1
		mm	in	mm	in	mm	in	mm	in	mm	in				
FNG150392R	Right hand FNG150392R	5,00	.197	1,85	.073	0,70	.028	0,99	.039	2,50	.098		●		
FNG150472R	FNG150472R	5,00	.197	1,85	.073	1,00	.039	1,19	.047	2,50	.098		●		
FNG150552R	FNG150552R	5,00	.197	1,85	.073	1,50	.051	1,39	.055	2,50	.098		●		

Small Hole Boring • Positive Inserts

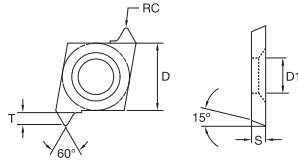


● first choice
○ alternate choice

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

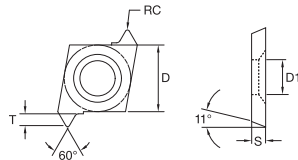
FNR-R/L

ISO catalog number	ANSI catalog number	D		S		T		W		RC		D1		C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in					
FNR150312R	Right hand FNR150312R	5,00	.197	1,85	.073	0,80	.031	0,80	.031	0,40	.016	2,50	.098					●
FNR150472R	FNR150472R	5,00	.197	1,85	.073	1,00	.039	1,20	.047	0,60	.024	2,50	.098					●



CDT-R/L

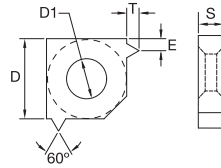
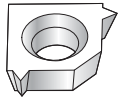
ISO catalog number	ANSI catalog number	D		S		T		RC		D1		TPI min	TPI max	TP min	TP max	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in									
CDT50022R	Right hand CDT50022R	3,97	5/32	1,27	.050	0,76	.030	0,05	.002	2,11	.083	24	48	0,5	1,0					●



CPT-R/L

ISO catalog number	ANSI catalog number	D		S		T		RC		D1		TPI min	TPI max	TP min	TP max	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in									
CPT20052R	Right hand CPT20052R	6,35	1/4	1,91	.075	1,65	.065	0,13	.005	2,79	.110	10	24	1,0	2,5					●
CPT20052L	Left hand CPT20052L	6,35	1/4	1,91	.075	1,65	.065	0,13	.005	2,79	.110	10	24	1,0	2,5					●

Small Hole Boring • Positive Inserts

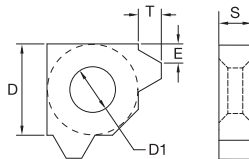
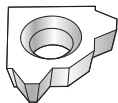


● first choice
○ alternate choice

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

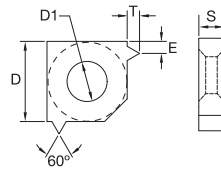
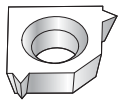
■ **FNT-R/L**

ISO catalog number	ANSI catalog number	D		S		T		E		D1		TPI min	TPI max	TP min	TP max	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in									
FNT150022R	Right hand FNT150022R	5,00	.197	2,15	.085	1,35	.053	0,90	.035	2,50	.098	16	48	0,5	1,6		●			



■ **FNT-ACME-R/L**

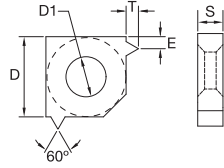
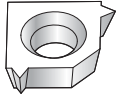
ISO catalog number	ANSI catalog number	D		S		T		E		D1		TPI	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in						
FNT1512ACME2R	Right hand FNT1512ACME2R	5,00	.197	2,35	.093	1,26	.049	1,05	.041	2,50	.098	12		●			



■ **FNT-NPT-R/L**

ISO catalog number	ANSI catalog number	D		S		T		E		D1		TPI	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in						
FNT1514NPT2R	Right hand FNT1514NPT2R	5,00	.197	2,35	.093	1,50	.059	1,00	.039	2,50	.098	14		●			
FNT1527NPT2R	FNT1527NPT2R	5,00	.197	1,85	.073	0,77	.030	0,75	.030	2,50	.098	27		●			

Small Hole Boring • Positive Inserts

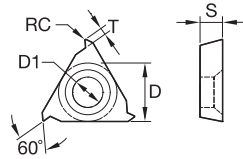


● first choice
○ alternate choice

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

FNT-UN-R/L

ISO catalog number	ANSI catalog number	D		S		T		E		D1		TPI	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in						
FNT1518UN2R	Right hand FNT1518UN2R	5,00	.197	2,21	.087	0,95	.037	1,00	.039	2,50	.098	18		●			
FNT1520UN2R	FNT1520UN2R	5,00	.197	2,19	.086	0,85	.033	0,90	.035	2,50	.098	20		●			
FNT1524UN2R	FNT1524UN2R	5,00	.197	1,85	.073	0,71	.028	0,75	.030	2,50	.098	24		●			
FNT1528UN2R	FNT1528UN2R	5,00	.197	1,85	.073	0,61	.024	0,65	.026	2,50	.098	28		●			
FNT1540UN2R	FNT1540UN2R	5,00	.197	1,85	.073	0,42	.016	0,60	.024	2,50	.098	40		●			



TPT-R/L

ISO catalog number	ANSI catalog number	D		S		T		RC		D1		TPI min	TPI max	TP min	TP max	C25	CG5	CG6	CM1	
		mm	in	mm	in	mm	in	mm	in	mm	in									
TPT20033R	Right hand TPT20033R	6,35	1/4	2,44	.096	0,76	.030	0,08	.003	3,30	.130	18	36	0,7	1,3				●	●
TPT30053R	TPT30053R	9,53	3/8	3,23	.127	1,42	.056	0,13	.005	3,30	.130	10	24	1,1	2,5				●	●
TPT30053L	Left hand TPT30053L	9,53	3/8	3,23	.127	1,42	.056	0,13	.005	3,30	.130	10	24	1,1	2,5				●	●

Small Hole Boring • Positive Inserts

WIDIA-CIRCLE™ catalog number	New ISO catalog number	New ANSI catalog number
CDCD	CDHB	CDHB
CDCG	CDHH	CDHH
CDCT	CDHH	CDHH
CPCA	CPHB	CPHB
CPCM	CPHH	CPHH
GCCD	GCHW	GCHW
GCCT	GCHT	GCHT
GPCD	GPHW	GPHW
GPCT	GPHT	GPHT
TD6P	TPHB	TPHB
TDAB	TDHB	TDHB
TDAT	TDHH	TDHH
TDCG	TDHH	TDHH
TPCB	TPHB	TPHB
TPCG	TPHH	TPHH
TPCH	TPHH	TPHH
TPGH	TPHH	TPHH
TPMT	TPMT	TPMT
WPGT	WPHT	WPHT



■ Insert Screws

order number	ISO catalog number	ANSI catalog number	Torx/hex	internal thread
2840098	MSM46	MSM46	2mm	M4 x 0.7
2892513	BS832	BS832	5/64	#8-32
2840186	AS832	AS832	5/64	#8-32
2823227	SC30	SC30	T10	#4-40
2823203	STM31	STM31	T15	M3.5 x 0.6
2832641	CT15	CT15	T16	#1-72
2820981	LTM16	LTM16	T5	M2 x 0.4
2832647	CC11	CC11	T6	#1-72
2832635	CT11	CT11	T6	#1-72
2832655	CC09	CC09	T6	#1-72
2825948	QTM26	QTM26	T7	M2.5 x 0.45
2825941	QTM20	QTM20	T7	M2.5 x 0.45
2830477	FC11	FC11	T7	#2-56
2828337	GT21	GT21	T7	#2-56
2830471	FC14	FC14	T7	#2-56
2826005	QC15	QC15	T8	#3-48
2826031	QC26	QC26	T9	#4-40
2826038	QC21	QC21	T9	#4-40

■ Wrenches

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840174	AKEY	AKEY	5/64
2840094	MKEY	MKEY	2mm
2823182	SKEY	SKEY	T10
2823189	STKEY	STKEY	T15
2828318	GTKEY	GTKEY	T5
2832628	CKEY	CKEY	T6
2830492	FKEY	FKEY	T7
2825952	QTKEY	QTKEY	T7
2825973	Q8KEY	Q8KEY	T8
2825982	QKEY	QKEY	T9

■ Drive Bits

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840089	MBIT	MBIT	2mm
2823236	SBIT	SBIT	T10
2823196	STBIT	STBIT	T15
2828324	GTBIT	GTBIT	T5
2832661	CBIT	CBIT	T6
2825963	QTBIT	QTBIT	T7
2830497	FBIT	FBIT	T7
2825964	Q8BIT	Q8BIT	T8
2826045	QBIT	QBIT	T9

■ Wedges

order number	ISO catalog number	ANSI catalog number
2840192	AW250	AW250
2836024	BW312	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 — manufactured in the Aerospace, Heavy Equipment, and Automotive industries.

A/B Series Micro Boring Bar

Features:

- .062"–.156" (1,57mm–3,96mm) diameter boring range.
- Unique locking system enables quick, accurate insert changes.
- Insert repeatability guaranteed within $\pm 0.0005"$ ($\pm 0,013\text{mm}$).

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.

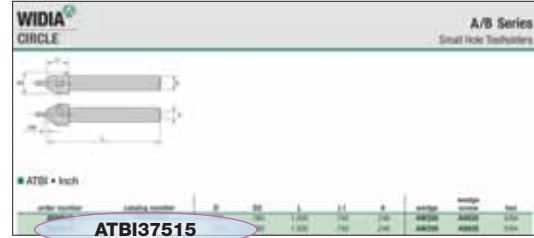


A/B Series Small Hole Tooling

Small Hole Toolholders .....	.C80–C85
Catalog Numbering System .....	.C82
Boring Bars .....	.C83–C85
Grades and Grade Descriptions .....	.C86
Solid Carbide Inserts .....	.C86–C93
Speed and Feed Charts .....	.C87
Catalog Numbering System .....	.C88–C89
Inserts .....	.C90–C92
Hardware .....	.C93



A/B Series Boring Bar Identification System



AT

Series Style and Bar Type
Construction Features of the Boring Bar

>.187" (4,75mm) Bore Diameter

AT = Through Coolant

BS = No Coolant

B

Boring Bar

I

Type

I = Inch

M = Metric

375

Shank Diameter
shown as "D"

Inch

375 = .375"
500 = .500"
625 = .625"
750 = .750"
1000 = 1.000"

Metric

8 = 8,00mm
10 = 10,00mm
12 = 12,00mm
16 = 16,00mm
20 = 20,00mm

15

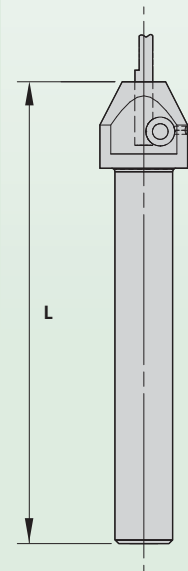
Length
shown as "L"

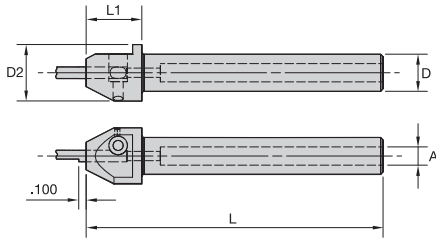
Inch

15 = 1.50"
4 = 4.00"
6 = 6.00"

Metric

38 = 38,0mm
100 = 100,0mm
102 = 102,0mm
152 = 152,0mm

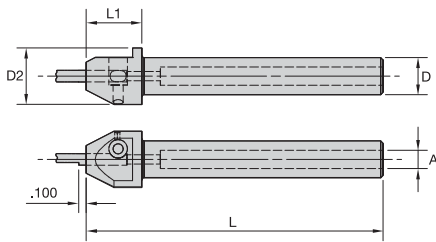




■ **ATBI • Inch**

order number	catalog number	D	D2	L	L1	A	wedge	wedge screw	hex
2839848	ATBI37515	.375	.760	1.500	.750	.246	AW250	AS832	5/64
2839842	ATBI50015	.500	.760	1.500	.750	.246	AW250	AS832	5/64
3896119	ATBI5004	.500	.760	4.000	.750	.246	AW250	AS832	5/64
2839830	ATBI6254	.625	.760	4.000	.750	.246	AW250	AS832	5/64
2839826	ATBI7504	.750	.760	4.000	.750	.246	AW250	AS832	5/64
2839821	ATBI10004	1.000	.760	4.000	.750	.246	AW250	AS832	5/64

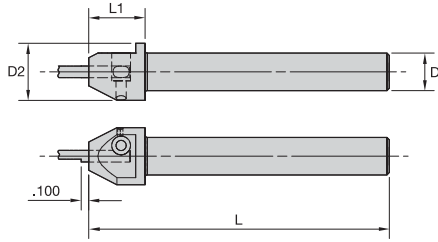
NOTE: These tools will accept any A-Series Solid Carbide Insert (ABD, ABD-M, AGD, APD, and ATD).



■ **ATBM • Metric**

order number	catalog 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

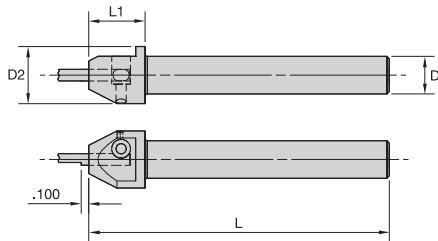
NOTE: These tools will accept any A-Series Solid Carbide Insert (ABD, ABD-M, AGD, APD, and ATD).



■ **BSBI • Inch**

order number	catalog number	D	D2	L	L1	wedge	wedge screw	hex
2832989	BSBI5006	.500	1.010	6.000	1.150	BW312	BS832	5/64
2832984	BSBI6256	.625	1.010	6.000	1.150	BW312	BS832	5/64
2832980	BSBI7506	.750	1.010	6.000	1.150	BW312	BS832	5/64
2832974	BSBI10006	1.000	1.010	6.000	1.150	BW312	BS832	5/64

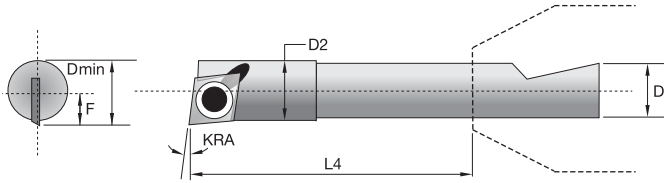
NOTE: These tools will accept any B-Series Solid Carbide Insert (BB and BP).



■ **BSBM • Metric**

order number	catalog number	D	D2	L	L1	wedge	wedge screw	hex
3896196	BSBM20152	20,00	25,65	152	29	BW312	BS832	5/64

NOTE: These tools will accept any B-Series Solid Carbide Insert (BB and BP).



■ ABC • Inch

order number	catalog number	KRA	D	D min	D2	F	L4	gage insert	insert screw	Torx
2836645	Right hand ABC1500R	-7	.156	.180	.166	.097	1.500	CD..120605	CC09	T6
2836651	ABC1250R	-7	.156	.180	.166	.097	1.250	CD..120605	CC09	T6
2836660	ABC750R	-7	.156	.180	.166	.097	.750	CD..120605	CC09	T6
2836667	ABC500R	-7	.156	.180	.166	.097	.500	CD..120605	CC09	T6
2836656	ABC1000R	-7	.156	.180	.166	.097	1.000	CD..120605	CC09	T6

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM											
Material Group		Cutting Speed • vc SFM											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	DOC [inch]	0.001	—	0.008	0.001	—	0.008						
	f [inch]	0.007	—	0.0005	0.007	—	0.0005						
			CG5		CM1			CBN6			CPD1		
	1	305	380	460	180	220	265						
	2	225	280	340	130	160	195						
	3	175	215	260	100	125	150						
	4	200	245	295	115	140	170						
	5	145	180	220	85	105	130						
	6	240	300	360	140	170	205						
	7	160	195	235	95	115	140						
	8	145	180	220	85	105	130						
	9	125	155	190	75	90	110						
	10	220	270	325	125	155	190						
	11	135	165	200	80	95	115						
12	220	270	325	125	155	190							
13.1	180	225	270	105	130	160							
13.2	135	165	200	80	95	115							
M	DOC [inch]	0.001	—	0.008	0.001	—	0.008						
	f [inch]	0.007	—	0.0005	0.007	—	0.0005						
			CG5		CM1			CBN6			CPD1		
	14.1	240	300	360	180	220	265						
	14.2	190	235	285	140	175	210						
14.3	220	270	325	160	200	240							
14.4	135	165	200	100	120	145							
K	DOC [inch]	0.001	—	0.010	0.001	—	0.010						
	f [inch]	0.007	—	0.0005	0.007	—	0.0005						
			CG5		CM1			CBN6			CPD1		
	15	230	285	345	180	220	265						
	16	160	200	240	125	155	190						
	17	260	325	390	200	250	300						
18	170	210	255	130	160	195							
19	320	395	475	245	305	370							
20	180	225	270	140	175	210							
N	DOC [inch]	0.001	—	0.025	0.001	—	0.025				0.0005	—	0.003
	f [inch]	0.007	—	0.0005	0.007	—	0.0005				0.005	—	0.0005
			CG5		CM1			CBN6			CPD1		
	21	1320	1650	1980	1320	1650	1980				2800	3500	4200
	22	795	990	1190	795	990	1190				2400	3000	3600
	23	1320	1650	1980	1320	1650	1980				2240	2800	3360
	24	800	1000	1200	800	1000	1200				1760	2200	2640
	25	—	—	—	225	280	340				1200	1500	1800
	26	465	580	700	330	410	495				1080	1350	1620
	27	440	550	660	320	400	480				1040	1300	1560
	28	465	580	700	330	410	495				1080	1350	1620
29	—	—	—	—	—	—				1120	1400	1680	
30	—	—	—	—	—	—				1080	1350	1620	
S	DOC [inch]	0.001	—	0.008	0.001	—	0.008						
	f [inch]	0.007	—	0.0005	0.007	—	0.0005						
			CG5		CM1			CBN6			CPD1		
	31	100	120	145	200	250	300						
	32	75	90	110	145	180	220						
	33	80	100	120	160	200	240						
	34	60	70	85	120	145	175						
	35	60	75	90	130	160	195						
36	105	130	160	90	110	135							
37	80	100	120	75	90	110							
H	DOC [inch]							0.0005	—	0.003			
	f [inch]							0.004	—	0.0005			
			CG5		CM1			CBN6			CPD1		
	38.1							360	450	540			
	38.2							340	420	505			
	39.1							320	400	480			
	39.2							290	360	435			
	40.1							—	—	—			
	40.2							—	—	—			
	41.1							—	—	—			
41.2							—	—	—				

**A/B Series Boring Bar
Identification System • Inch**



ABD

Insert Style

A Series = with coolant

- ABC** = Indexable Boring
- ABD** = Boring
- AGD** = Grooving
- APD** = Profiling
- ATD** = Threading

B Series = without coolant

- BB** = Boring
- BP** = Profiling

125

Minimum Bore
shown as "D min"

A Series

- 06 = .062"
- 09 = .094"
- 125 = .125"
- 156 = .156"

(AGD style only)

- 095 = .110"
- 125 = .140"
- 156 = .175"

(ATD style only)

- 095 = .100"
- 125 = .130"
- 156 = .160"

B Series

- 187 = .187"
- 250 = .250"
- 312 = .312"

375

Bore Depth, Groove Width,
Flat on Thread
shown as "L4, W"

Bore Depth

- 187 = .187"
- 281 = .281"
- 312 = .312"
- 375 = .375"
- 500 = .500"
- 600 = .600"
- 625 = .625"
- 750 = .750"
- 825 = .825"
- 875 = .875"
- 1000 = 1.000"
- 1250 = 1.250"
- 1500 = 1.500"
- 1750 = 1.750"
- 2125 = 2.125"

A Series

- Groove Width
(AGD style only)**
- 03 = .030"
 - 04 = .040"
 - 05 = .050"

**Thread
(ATD style only)**

- F2 = .002"
- Flat on thread

R

Hand
of Tool

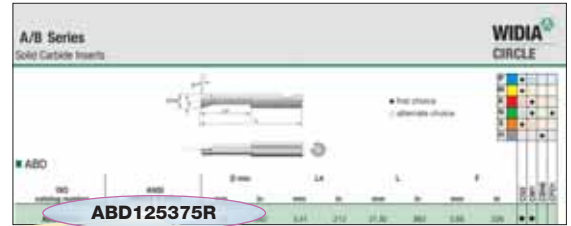
- R** = Right hand
- L** = Left hand

Tip Style
(optional)

Symbol

- M**
- Usage**
- Mini tip

**A/B Series Boring Bar
Identification System • Metric**



ABD

Insert Style

A Series = with coolant

- ABC** = Indexable Boring
- ABD** = Boring
- AGD** = Grooving
- APD** = Profiling
- ATD** = Threading

B Series = without coolant

- BB** = Boring
- BP** = Profiling

125

Minimum Bore
shown as "D min"

A Series

- 06 = 1,58mm
- 09 = 2,39mm
- 125 = 3,18mm
- 156 = 3,96mm

(AGD style only)

- 095 = 2,79mm
- 125 = 3,56mm
- 156 = 4,45mm

(ATD style only)

- 095 = 2,79mm
- 125 = 3,56mm
- 156 = 4,45mm

B Series

- 187 = 4,75mm
- 250 = 6,35mm
- 312 = 7,93mm

375

Bore Depth, Groove Width,
Flat on Thread
shown as "L4, W"

Bore Depth

- 187 = 4,75mm
- 281 = 7,14mm
- 312 = 7,93mm
- 375 = 9,53mm
- 500 = 12,70mm
- 600 = 15,24mm
- 625 = 15,88mm
- 750 = 19,05mm
- 825 = 20,96mm
- 875 = 22,23mm
- 1000 = 25,40mm
- 1250 = 31,75mm
- 1500 = 38,10mm
- 1750 = 44,45mm
- 2125 = 53,98mm

A Series

**Groove Width
(AGD style only)**

- 03 = 0,76mm
- 04 = 1,02mm
- 05 = 1,27mm

**Thread
(ATD style only)**

- F2 = 0,05mm
- Flat on thread

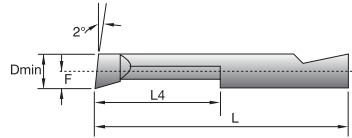
R

Hand
of Tool

- R** = Right hand
- L** = Left hand

Tip Style
(optional)

- Symbol**
M
- Usage**
Mini tip

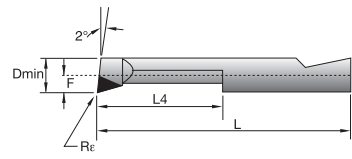


● first choice
○ alternate choice

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

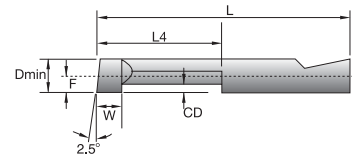
■ **ABD**

ISO catalog number	ANSI catalog number	D min		L4		L		F		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in				
ABD06187R	Right hand ABD06187R	1,58	.062	5,41	.213	21,92	.863	0,66	.026	●	●		
ABD06312R	ABD06312R	1,58	.062	7,93	.312	24,44	.962	0,66	.026	●	●		
ABD09281R	ABD09281R	2,39	.094	7,14	.281	23,65	.931	1,04	.041	●	●		
ABD09500R	ABD09500R	2,39	.094	12,70	.500	29,21	1.150	1,04	.041	●	●		
ABD125375R	ABD125375R	3,18	.125	9,53	.375	26,04	1.025	1,45	.057	●	●		
ABD125625R	ABD125625R	3,18	.125	15,88	.625	32,39	1.275	1,45	.057	●	●		
ABD156500R	ABD156500R	3,96	.156	12,70	.500	29,21	1.150	1,85	.073	●	●		
ABD156875R	ABD156875R	3,96	.156	22,23	.875	38,74	1.525	1,85	.073	●	●		



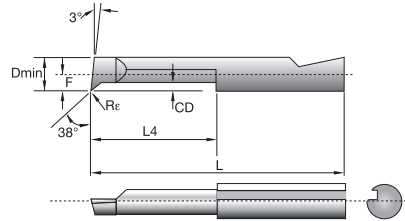
■ **ABD-M**

ISO catalog number	ANSI catalog number	D min		L4		L		F		Re		CG5	CM1	CBNG	CPD1	
		mm	in	mm	in	mm	in	mm	in	mm	in					
ABD09500RM	Right hand ABD09500RM	2,39	.094	12,70	.500	29,21	1.150	1,04	.041	0,18	.007				●	●
ABD125625RM	ABD125625RM	3,18	.125	15,88	.625	32,39	1.275	1,45	.057	0,18	.007				●	
ABD156875RM	ABD156875RM	3,96	.156	22,23	.875	38,74	1.525	1,85	.073	0,18	.007				●	



■ **AGD**

ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		W		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
AGD09503	Right hand AGD09503	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,76	.030	0,76	.030	●	●		
AGD12504	AGD12504	3,56	.140	9,53	.375	26,04	1.025	1,55	.061	0,89	.035	1,02	.040	●	●		
AGD15605	AGD15605	4,45	.175	12,70	.500	29,21	1.150	1,93	.076	1,27	.050	1,27	.050	●	●		

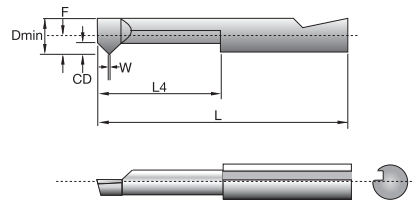


● first choice
○ alternate choice

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

■ APD

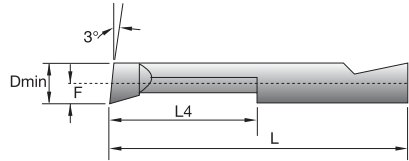
ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		Re		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
APD06187R	Right hand APD06187R	1,58	.062	4,75	.187	21,26	.837	0,66	.026	0,43	.017	0,18	.007	●			
APD09281R APD125375R	APD09281R APD125375R	2,39	.094	7,14	.281	23,65	.931	1,07	.042	0,71	.028	0,18	.007	●	●		
APD156500R	APD156500R	3,18	.125	9,53	.375	26,04	1,025	1,45	.057	1,02	.040	0,18	.007	●	●		
		3,96	.156	12,70	.500	29,21	1,150	1,85	.073	1,27	.050	0,18	.007	●	●		



■ ATD

ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		W		TP min	TP max	TPI min	TPI max	CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in								
ATD09560F2	Right hand ATD09560F2	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,56	.022	0,05	.002	0,80	0,53	32	48	●	●		
ATD12560F2 ATD15660F2	ATD12560F2 ATD15660F2	3,56	.140	9,53	.375	26,04	1,025	1,55	.061	0,69	.027	0,05	.002	1,06	0,53	24	48	●	●		
		4,45	.175	12,70	.500	29,21	1,150	1,93	.076	0,81	.032	0,05	.002	1,27	0,53	20	48	●	●		

Small Hole Boring • A/B Series

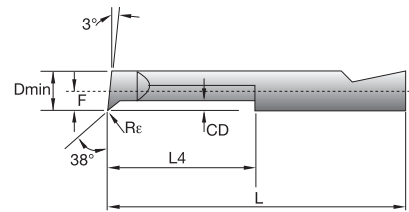


● first choice
○ alternate choice

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

■ **BB**

ISO catalog number	ANSI catalog number	D min		L4		L		F		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in				
BB187750R	Right hand BB187750R	4,75	.187	19,05	.750	45,72	1.800	2,24	.088	●	●		
BB1871250R	BB1871250R	4,75	.187	31,75	1.250	58,42	2.300	2,24	.088	●	●		
BB2501000R	BB2501000R	6,35	.250	25,40	1.000	52,07	2.050	3,05	.120	●	●		
BB2501750R	BB2501750R	6,35	.250	44,45	1.750	71,12	2.800	3,05	.120	●	●		
BB3121250R	BB3121250R	7,93	.312	53,98	2.125	80,65	3.175	3,84	.151	●	●		



■ **BP**

ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		Re		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
BP187600R	Right hand BP187600R	4,75	.187	15,24	.600	41,91	1.650	2,24	.088	1,58	.062	0,18	.007	●	●		
BP250825R	BP250825R	6,35	.250	20,96	.825	47,63	1.875	3,05	.120	1,98	.078	0,18	.007	●	●		
BP3121000R	BP3121000R	7,93	.312	25,40	1.000	52,07	2.050	3,84	.151	2,39	.094	0,18	.007	●	●		

Small Hole Boring • A/B Series

■ Insert Screws

order number	ISO catalog number	ANSI catalog number	Torx/hex	internal thread
2840098	MSM46	MSM46	2mm	M4 x 0.7
2892513	BS832	BS832	5/64	#8-32
2840186	AS832	AS832	5/64	#8-32
2823227	SC30	SC30	T10	#4-40
2823203	STM31	STM31	T15	M3.5 x 0.6
2832641	CT15	CT15	T16	#1-72
2820981	LTM16	LTM16	T5	M2 x 0.4
2832647	CC11	CC11	T6	#1-72
2832635	CT11	CT11	T6	#1-72
2832655	CC09	CC09	T6	#1-72
2825948	QTM26	QTM26	T7	M2.5 x 0.45
2825941	QTM20	QTM20	T7	M2.5 x 0.45
2830477	FC11	FC11	T7	#2-56
2828337	GT21	GT21	T7	#2-56
2830471	FC14	FC14	T7	#2-56
2826005	QC15	QC15	T8	#3-48
2826031	QC26	QC26	T9	#4-40
2826038	QC21	QC21	T9	#4-40

■ Wrenches

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840174	AKEY	AKEY	5/64
2840094	MKEY	MKEY	2mm
2823182	SKEY	SKEY	T10
2823189	STKEY	STKEY	T15
2828318	GTKEY	GTKEY	T5
2832628	CKEY	CKEY	T6
2830492	FKEY	FKEY	T7
2825952	QTKEY	QTKEY	T7
2825973	Q8KEY	Q8KEY	T8
2825982	QKEY	QKEY	T9

■ Drive Bits

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840089	MBIT	MBIT	2mm
2823236	SBIT	SBIT	T10
2823196	STBIT	STBIT	T15
2828324	GTBIT	GTBIT	T5
2832661	CBIT	CBIT	T6
2825963	QTBIT	QTBIT	T7
2830497	FBIT	FBIT	T7
2825964	Q8BIT	Q8BIT	T8
2826045	QBIT	QBIT	T9

■ Wedges

order number	ISO catalog number	ANSI catalog number
2840192	AW250	AW250
2836024	BW312	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 $\pm 0.0005"$ ($\pm 0,013\text{mm}$) 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 .010" (0,25mm).



Grooving

Groove in a .110" (2,79mm) diameter hole.



Profiling

Profile in diameters as small as .062" (1,57mm).



Threading

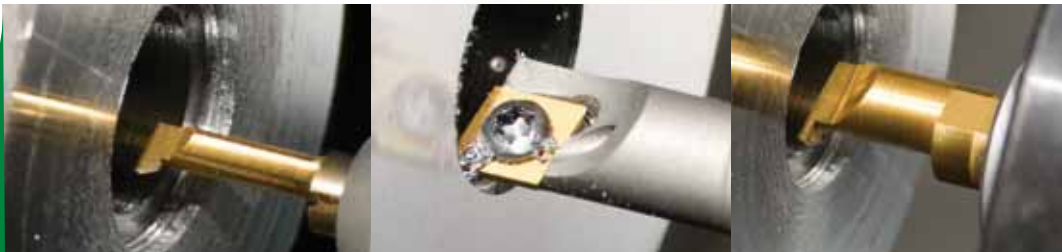
Thread down to a No. 5; .100" (2,54mm).

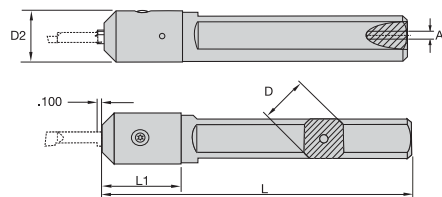


Quadralock™ Small Hole Tooling

- Quadralock Small Hole ToolholdersC94–C97**
 - Catalog Numbering SystemC96
 - ToolholdersC97

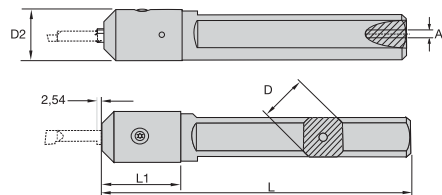
- Quadralock Small Hole InsertsC98–C104**
 - Grades and Grade DescriptionsC98
 - Speed and Feed ChartC99
 - Catalog Numbering SystemC100
 - InsertsC101–C103
 - HardwareC104





■ **MTMI • Inch**

order number	catalog number	D	D2	L	L1	A	insert screw	hex
2839815	MTMI37515	.375	.510	1.500	.750	.118	MSM46	2mm
2839803	MTMI50015	.500	.510	1.500	.750	.118	MSM46	2mm
2839797	MTMI5004	.500	.510	4.000	.750	.118	MSM46	2mm
2839792	MTMI62515	.625	.510	1.500	.760	.118	MSM46	2mm
2839785	MTMI6254	.625	.510	4.000	.760	.118	MSM46	2mm
2839779	MTMI75015	.750	.510	1.500	.760	.118	MSM46	2mm
2839774	MTMI7504	.750	.510	4.000	.760	.118	MSM46	2mm
3896197	MTMI10005	1.000	.510	5.000	.760	.118	MSM46	2mm

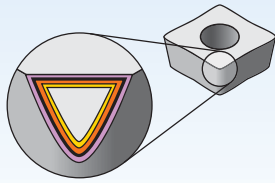


■ **MTMM • Metric**

order number	catalog 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

Grades and Grade Descriptions

Quadralock™ Inserts



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
Grade CM1		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								
	HW-S25		M								
			K								
			N								
			S								
Grade CG5		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								
	HC-S25		M								
			K								
			N								
			S								



ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM																	
Material Group		min			Start			max			min			Start			max		
P	DOC [inch]	0.0008	—	0.008	0.0008	—	0.008												
	f [inch]	0.0028	—	0.0008	0.0028	—	0.0008												
			CG5			CM1			CBN6			CPD1							
	1	340	420	505	210	260	315												
	2	260	320	385	160	200	240												
	3	200	245	295	125	155	190												
	4	225	280	340	140	175	210												
	5	165	205	250	105	130	160												
	6	275	340	410	175	215	260												
	7	180	225	270	115	140	170												
	8	165	205	250	105	130	160												
	9	140	175	210	90	110	135												
	10	245	305	370	155	190	230												
	11	155	190	230	100	120	145												
12	245	305	370	155	190	230													
13.1	205	255	310	130	160	195													
13.2	150	185	225	100	120	145													
M	DOC [inch]	0.0008	—	0.008	0.0008	—	0.008												
	f [inch]	0.0028	—	0.0008	0.0028	—	0.0008												
			CG5			CM1			CBN6			CPD1							
	14.1	240	300	360	180	220	265												
	14.2	190	235	285	140	175	210												
14.3	220	270	325	160	200	240													
14.4	135	165	200	100	120	145													
K	DOC [inch]	0.0008	—	0.008	0.0008	—	0.008												
	f [inch]	0.0028	—	0.0008	0.0028	—	0.0008												
			CG5			CM1			CBN6			CPD1							
	15	230	285	345	180	220	265												
	16	160	200	240	125	155	190												
	17	260	325	390	200	250	300												
18	170	210	255	130	160	195													
19	320	395	475	245	305	370													
20	180	225	270	140	175	210													
N	DOC [inch]	0.0008	—	0.02	0.0008	—	0.02				0.0008	—	0.02						
	f [inch]	0.0035	—	0.0004	0.0035	—	0.0004				0.0035	—	0.0004						
			CG5			CM1			CBN6			CPD1							
	21	1320	1650	1980	1320	1650	1980				2800	3500	4200						
	22	795	990	1190	795	990	1190				2400	3000	3600						
	23	1320	1650	1980	1320	1650	1980				2240	2800	3360						
	24	800	1000	1200	800	1000	1200				1760	2200	2640						
	25				225	280	340				1200	1500	1800						
	26	465	580	700	330	410	495				1080	1350	1620						
	27	440	550	660	320	400	480				1040	1300	1560						
	28	465	580	700	330	410	495				1080	1350	1620						
	29	—	—	—	—	—	—				1120	1400	1680						
	30	—	—	—	—	—	—				1080	1350	1620						
S	DOC [inch]	0.0008	—	0.008	0.0008	—	0.008												
	f [inch]	0.0024	—	0.0008	0.0024	—	0.0008												
			CG5			CM1			CBN6			CPD1							
	31	100	120	145	200	250	300												
	32	75	90	110	145	180	220												
	33	80	100	120	160	200	240												
	34	60	70	85	120	145	175												
	35	60	75	90	130	160	195												
36	105	130	160	90	110	135													
37	80	100	120	75	90	110													
H	DOC [inch]							0.0008	—	0.008									
	f [inch]							0.0024	—	0.0008									
			CG5			CM1			CBN6			CPD1							
	38.1							360	450	540									
	38.2							340	420	505									
	39.1							320	400	480									
	39.2							290	360	435									
	40.1							—	—	—									
40.2							—	—	—										
41.1							—	—	—										
41.2							—	—	—										

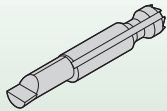
**Quadralock Boring Bar
Insert Identification System**



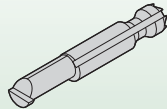
MB

Insert Style

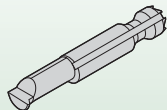
MB = Boring



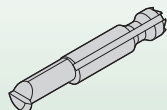
MG = Grooving



MP = Profiling



MT = Threading



125

Minimum Bore
shown as "D min"

Inch

- 010 = .010"
- 030 = .030"
- 062 = .062"
- 094 = .094"
- 125 = .125"
- 156 = .156"

(for MG and MT style only)

- 095 = .110"
- 125 = .140"
- 156 = .175"

Metric

- 010 = 0,25mm
- 030 = 0,76mm
- 062 = 1,58mm
- 094 = 2,39mm
- 125 = 3,18mm
- 156 = 3,96mm

(for MG and MT style only)

- 095 = 2,79mm
- 125 = 3,56mm
- 156 = 4,45mm

625

Bore Depth, Groove Width,
Flat on Thread
shown as "L4, W"

Inch

Bore Depth

- 062 = .062"
- 187 = .187"
- 281 = .281"
- 312 = .312"
- 375 = .375"
- 500 = .500"
- 625 = .625"
- 875 = .875"

Groove Width

(for MG style only)

- 030 = .030"
- 040 = .040"
- 050 = .050"

Thread

(for MT style only)

- 60F2 = .002"
- flat on 60° thread

Metric

Bore Depth

- 062 = 1,58mm
- 187 = 4,75mm
- 281 = 7,14mm
- 312 = 7,93mm
- 375 = 9,53mm
- 500 = 12,70mm
- 625 = 15,88mm
- 875 = 22,23mm

Groove Width

(for MG style only)

- 030 = 0,76mm
- 040 = 1,02mm
- 050 = 1,27mm

Thread

(for MT style only)

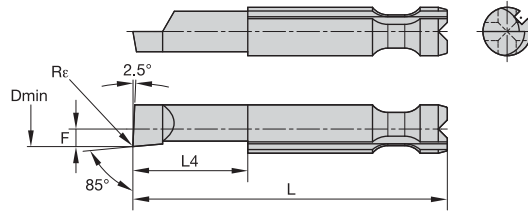
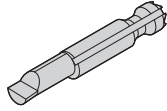
- 60F2 = 0,05mm
- flat on 60° thread

R

Hand of Tool

R = Right hand

L = Left hand



● first choice
○ alternate choice

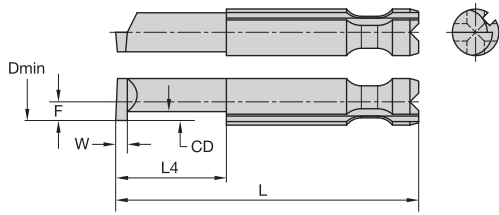
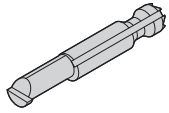
P	●	○			
M	●	○			
K	●	○			
N	●	○			
S	●	○			
H	●	○			

■ MB

ISO catalog number	ANSI catalog number	D min		L4		L		F		Re		CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in				
MB010062R	Right hand MB010062R	0,25	.010	1,58	.062	20,57	.810	0,09	.004	0,03	.001	●	●		
MB030187R	MB030187R	0,76	.030	4,75	.187	21,26	.837	0,34	.014	0,03	.001	●	●		
MB062187R	MB062187R	1,58	.062	5,41	.213	21,92	.863	0,66	.026	0,05	.002	●	●		
MB062312R	MB062312R	1,58	.062	7,93	.312	24,44	.962	0,66	.026	0,05	.002	●	●		
MB094281R	MB094281R	2,39	.094	7,14	.281	23,65	.931	1,04	.041	0,05	.002	●	●		
MB094500R	MB094500R	2,39	.094	12,70	.500	29,21	1.150	1,04	.041	0,05	.002	●	●		
MB125375R	MB125375R	3,18	.125	9,53	.375	26,04	1.025	1,45	.057	0,10	.004	●	●		
MB125625R	MB125625R	3,18	.125	15,88	.625	32,39	1.275	1,45	.057	0,10	.004	●	●		
MB156500R	MB156500R	3,96	.156	12,70	.500	29,21	1.150	1,85	.073	0,10	.004	●	●		
MB156875R	MB156875R	3,96	.156	22,23	.875	38,74	1.525	1,85	.073	0,10	.004	●	●		
	Left hand														
MB010062L	MB010062L	0,25	.010	1,58	.062	20,57	.810	0,09	.004	0,03	.001	●	●		
MB030187L	MB030187L	0,76	.030	4,75	.187	21,26	.837	0,34	.014	0,03	.001	●	●		
MB062187L	MB062187L	1,58	.062	5,41	.213	21,92	.863	0,66	.026	0,05	.002	●	●		
MB062312L	MB062312L	1,58	.062	7,93	.312	24,44	.962	0,66	.026	0,05	.002	●	●		
MB094281L	MB094281L	2,39	.094	7,14	.281	23,65	.931	1,04	.041	0,05	.002	●	●		
MB094500L	MB094500L	2,39	.094	12,70	.500	29,21	1.150	1,04	.041	0,05	.002	●	●		
MB125375L	MB125375L	3,18	.125	9,53	.375	26,04	1.025	1,45	.057	0,10	.004	●	●		
MB125625L	MB125625L	3,18	.125	15,88	.625	32,39	1.275	1,45	.057	0,10	.004	●	●		
MB156500L	MB156500L	3,96	.156	12,70	.500	29,21	1.150	1,85	.073	0,10	.004	●	●		
MB156875L	MB156875L	3,96	.156	22,23	.875	38,74	1.525	1,85	.073	0,10	.004	●	●		

NOTE: Actual bore depth for MB062187R and MB062187L equals 5,41mm.

Small Hole Boring • Quadralock

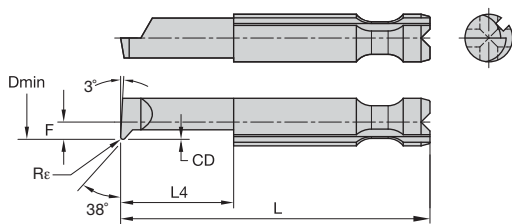
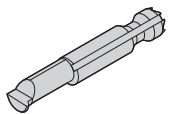


● first choice
○ alternate choice

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

■ MG

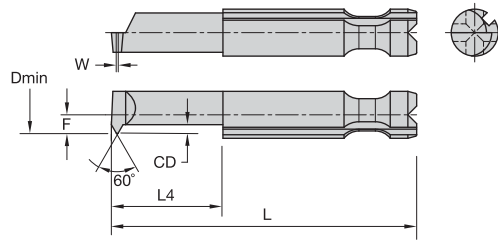
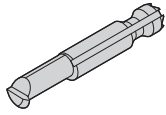
ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		W		CG5	CM1	CBN6	CPD1	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in					
	Right hand																	
MG095030R	MG095030R	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,76	.030	0,76	.030	●	●			
MG125040R	MG125040R	3,56	.140	9,53	.375	26,04	1.025	1,55	.061	0,89	.035	1,02	.040	●	●			
MG156050R	MG156050R	4,45	.175	12,70	.500	29,21	1.150	1,93	.076	1,27	.050	1,27	.050	●	●			
	Left hand																	
MG095030L	MG095030L	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,76	.030	0,76	.030	●	●			
MG125040L	MG125040L	3,56	.140	9,53	.375	26,04	1.025	1,55	.061	0,89	.035	1,02	.040	●	●			
MG156050L	MG156050L	4,45	.175	12,70	.500	29,21	1.150	1,93	.076	1,27	.050	1,27	.050	●	●			



■ MP

ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		Re		CG5	CM1	CBN6	CPD1	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in					
	Right hand																	
MP062187R	MP062187R	1,58	.062	4,75	.187	21,26	.837	0,66	.026	0,43	.017	0,10	.004	●	●			
MP094281R	MP094281R	2,39	.094	7,14	.281	23,65	.931	1,07	.042	0,71	.028	0,10	.004	●	●			
MP125375R	MP125375R	3,18	.125	9,53	.375	26,04	1.025	1,45	.057	1,02	.040	0,20	.008	●	●			
MP156500R	MP156500R	3,96	.156	12,70	.500	29,21	1.150	1,85	.073	1,27	.050	0,20	.008	●	●			
	Left hand																	
MP062187L	MP062187L	1,58	.062	4,75	.187	21,26	.837	0,66	.026	0,43	.017	0,10	.004	●	●			
MP094281L	MP094281L	2,39	.094	7,14	.281	23,65	.931	1,07	.042	0,71	.028	0,10	.004	●	●			
MP125375L	MP125375L	3,18	.125	9,53	.375	26,04	1.025	1,45	.057	1,02	.040	0,20	.008	●	●			
MP156500L	MP156500L	3,96	.156	12,70	.500	29,21	1.150	1,85	.073	1,27	.050	0,20	.008	●	●			

Small Hole Boring • Quadralock



● first choice
○ alternate choice

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

■ MT

ISO catalog number	ANSI catalog number	D min		L4		L		F		CD		W		TP min	TP max	TPI min	TPI max	CG5	CMT	CBN6	CPD1	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in									
	Right hand																					
MT09560F2R	MT09560F2R	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,56	.022	0,05	.002	0,5	0,80	32	50	●	●			
MT12560F2R	MT12560F2R	3,56	.140	9,53	.375	26,04	1.025	1,55	.061	0,69	.027	0,05	.002	0,5	1,05	24	50	●	●			
MT15660F2R	MT15660F2R	4,45	.175	12,70	.500	29,21	1.150	1,93	.076	0,81	.032	0,05	.002	0,5	1,27	20	50	●	●			
	Left hand																					
MT09560F2L	MT09560F2L	2,79	.110	7,93	.312	24,44	.962	1,17	.046	0,56	.022	0,05	.002	0,5	0,80	32	50	●	●			
MT12560F2L	MT12560F2L	3,56	.140	9,53	.375	26,04	1.025	1,55	.061	0,69	.027	0,05	.002	0,5	1,05	24	50	●	●			
MT15660F2L	MT15660F2L	4,45	.175	12,70	.500	29,21	1.150	1,93	.076	0,81	.032	0,05	.002	0,5	1,27	20	50	●	●			

Small Hole Boring • Quadralock

■ Insert Screws

order number	ISO catalog number	ANSI catalog number	Torx/hex	internal thread
2840098	MSM46	MSM46	2mm	M4 x 0.7
2892513	BS832	BS832	5/64	#8-32
2840186	AS832	AS832	5/64	#8-32
2823227	SC30	SC30	T10	#4-40
2823203	STM31	STM31	T15	M3.5 x 0.6
2832641	CT15	CT15	T16	#1-72
2820981	LTM16	LTM16	T5	M2 x 0.4
2832647	CC11	CC11	T6	#1-72
2832635	CT11	CT11	T6	#1-72
2832655	CC09	CC09	T6	#1-72
2825948	QTM26	QTM26	T7	M2.5 x 0.45
2825941	QTM20	QTM20	T7	M2.5 x 0.45
2830477	FC11	FC11	T7	#2-56
2828337	GT21	GT21	T7	#2-56
2830471	FC14	FC14	T7	#2-56
2826005	QC15	QC15	T8	#3-48
2826031	QC26	QC26	T9	#4-40
2826038	QC21	QC21	T9	#4-40

■ Wrenches

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840174	AKEY	AKEY	5/64
2840094	MKEY	MKEY	2mm
2823182	SKEY	SKEY	T10
2823189	STKEY	STKEY	T15
2828318	GTKEY	GTKEY	T5
2832628	CKEY	CKEY	T6
2830492	FKEY	FKEY	T7
2825952	QTKEY	QTKEY	T7
2825973	Q8KEY	Q8KEY	T8
2825982	QKEY	QKEY	T9

■ Drive Bits

order number	ISO catalog number	ANSI catalog number	Torx/hex
2840089	MBIT	MBIT	2mm
2823236	SBIT	SBIT	T10
2823196	STBIT	STBIT	T15
2828324	GTBIT	GTBIT	T5
2832661	CBIT	CBIT	T6
2825963	QTBIT	QTBIT	T7
2830497	FBIT	FBIT	T7
2825964	Q8BIT	Q8BIT	T8
2826045	QBIT	QBIT	T9

■ Wedges

order number	ISO catalog number	ANSI catalog number
2840192	AW250	AW250
2836024	BW312	BW312

Small Hole Boring • Hardware

WIN WITH WIDIA™

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 Authorized Distributor or visit www.widia.com.

WIDIA™

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.

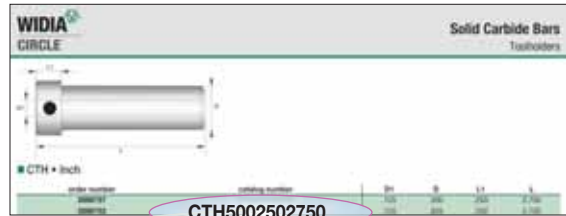


Solid Carbide Bars

Solid Carbide Toolholders	C108–C109
Catalog Numbering System	C108
Toolholders	C109
Solid Carbide Inserts	C110–C158
Grades and Grade Descriptions	C110
Speed and Feed Chart	C111
Catalog Numbering System	C112–C113
Carbide Boring Inserts	C114–C134
Carbide Helical Boring Inserts	C135
Tool Selection Guide	C136
Catalog Numbering System	C138–C139
Carbide Face Groove Inserts	C140
Carbide Full Radius Inserts	C141–C143
Carbide O-Ring Inserts	C144
Carbide Retaining Ring Inserts	C145–C147
Carbide Undercut Groove Inserts	C148
Carbide Undercut Profile Groove Inserts	C149
Catalog Numbering System	C150–C151
Carbide Acme Threading Inserts	C152
Carbide Stub Acme Threading Inserts	C153
Carbide 60° Single Point Threading Inserts	C154–C157
Carbide Thread Relief Inserts	C158



**Solid Carbide Bar
Identification System**



CTH

Micro Boring System

Type

I = Inch
M = Metric

500

Shank Diameter
shown as "D"

Inch
500 = .500"
625 = .625"
750 = .750"

Metric
12 = 12,00mm
16 = 16,00mm
20 = 20,00mm

250

Insert Bore Diameter
shown as "D1"

Inch
125 = .125"
187 = .188"
250 = .250"
312 = .313"
375 = .375"
500 = .500"

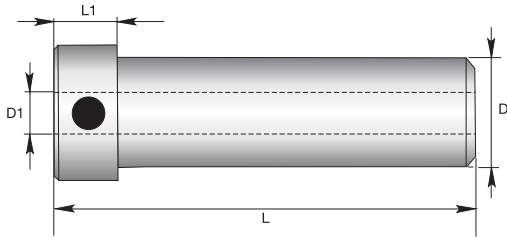
Metric
32 = 3,18mm
47 = 4,76mm
64 = 6,35mm
79 = 7,94mm
95 = 9,53mm
127 = 12,70mm

2750

Length of Tool
shown as "L"

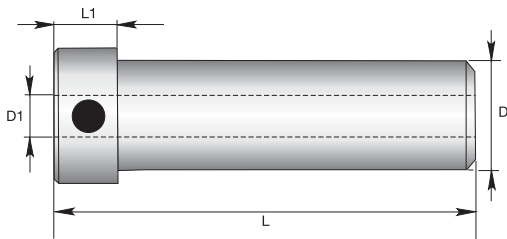
Inch
2750 = 2.750"

Metric
70 = 70,00mm



■ CTH • Inch

order number	catalog number	D1	D	L1	L
2898757	CTH5001252750	.125	.500	.250	2.750
2898752	CTH6251252750	.125	.625	.250	2.750
2898747	CTH7501252750	.125	.750	.250	2.750
2898756	CTH5001872750	.188	.500	.250	2.750
2898751	CTH6251872750	.188	.625	.250	2.750
2898746	CTH7501872750	.188	.750	.250	2.750
2898755	CTH5002502750	.250	.500	.250	2.750
2898750	CTH6252502750	.250	.625	.250	2.750
2898745	CTH7502502750	.250	.750	.250	2.750
2898754	CTH5003122750	.313	.500	.250	2.750
2898749	CTH6253122750	.313	.625	.250	2.750
2898744	CTH7503122750	.313	.750	.250	2.750
2898753	CTH5003752750	.375	.500	.250	2.750
2898748	CTH6253752750	.375	.625	.250	2.750
2898743	CTH7503752750	.375	.750	.250	2.750
2898742	CTH7505002750	.500	.750	.250	2.750



■ CTHM • Metric

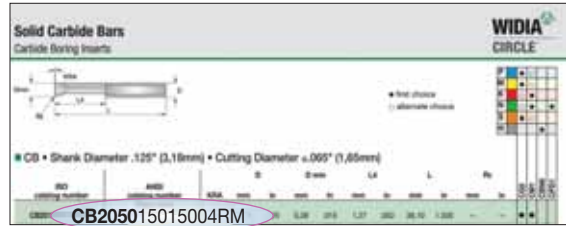
order number	catalog number	D1	D	L1	L
3897868	CTHM123270	3,18	12	6,35	70
3897883	CTHM163270	3,18	16	6,35	70
3897889	CTHM203270	3,18	20	6,35	70
3897869	CTHM124770	4,76	12	6,35	70
3897884	CTHM164770	4,76	16	6,35	70
3897890	CTHM204770	4,76	20	6,35	70
3897870	CTHM126470	6,35	12	6,35	70
3897885	CTHM166470	6,35	16	6,35	70
3897891	CTHM206470	6,35	20	6,35	70
3897871	CTHM127970	7,94	12	6,35	70
3897886	CTHM167970	7,94	16	6,35	70
3897892	CTHM207970	7,94	20	6,35	70
3897872	CTHM129570	9,53	12	6,35	70
3897887	CTHM169570	9,53	16	6,35	70
3897893	CTHM209570	9,53	20	6,35	70
3897888	CTHM2012770	12,70	20	6,35	70

Small Hole Boring • Solid Carbide Bars

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM									
Material Group		min	Start	max	min	Start	max	min	Start	max	
P	DOC [inch]	0.001	—	0.012	0.001	—	0.012				
	f [inch]	0.001	—	0.005	0.001	—	0.005				
		CG5			CM1			CBN6		CPD1	
	1	340	420	505	210	260	315				
	2	260	320	385	160	200	240				
	3	200	245	295	125	155	190				
	4	225	280	340	140	175	210				
	5	165	205	250	105	130	160				
	6	275	340	410	175	215	260				
	7	180	225	270	115	140	170				
	8	165	205	250	105	130	160				
	9	140	175	210	90	110	135				
	10	245	305	370	155	190	230				
	11	155	190	230	100	120	145				
	12	245	305	370	155	190	230				
13.1	205	255	310	130	160	195					
13.2	150	185	225	100	120	145					
M	DOC [inch]	0.001	—	0.012	0.001	—	0.012				
	f [inch]	0.001	—	0.005	0.001	—	0.005				
		CG5			CM1			CBN6		CPD1	
	14.1	240	300	360	180	220	265				
	14.2	190	235	285	140	175	210				
K	DOC [inch]	0.001	—	0.012	0.001	—	0.012				
	f [inch]	0.001	—	0.005	0.001	—	0.005				
		CG5			CM1			CBN6		CPD1	
	15	230	285	345	180	220	265				
	16	160	200	240	125	155	190				
N	DOC [inch]	0.001	—	0.012	0.001	—	0.012	0.001	—	0.012	
	f [inch]	0.001	—	0.005	0.001	—	0.005	0.001	—	0.005	
		CG5			CM1			CBN6		CPD1	
	21	1440	1800	2160	1320	1650	1980	2800	3500	4200	
	22	1440	1800	2160	795	990	1190	2400	3000	3600	
	23	1360	1700	2040	1320	1650	1980	2240	2800	3360	
	24	1360	1700	2040	800	1000	1200	1760	2200	2640	
	25	—	—	—	225	280	340	1200	1500	1800	
	26	600	750	900	330	410	495	1080	1350	1620	
	27	640	800	960	320	400	480	1040	1300	1560	
28	640	800	960	330	410	495	1080	1350	1620		
29	—	—	—	—	—	—	1120	1400	1680		
30	—	—	—	—	—	—	1080	1350	1620		
S	DOC [inch]	0.001	—	0.012	0.001	—	0.012				
	f [inch]	0.001	—	0.005	0.001	—	0.005				
		CG5			CM1			CBN6		CPD1	
	31	100	120	145	200	250	300				
	32	75	90	110	145	180	220				
	33	80	100	120	160	200	240				
	34	60	70	85	120	145	175				
	35	60	75	90	130	160	195				
36	105	130	160	90	110	135					
37	80	100	120	75	90	110					
H	DOC [inch]						0.001	—	0.012		
	f [inch]						0.001	—	0.005		
		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 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

Material

C = Carbide

B

Application

B = Boring

H = Helical Boring

2

Shank Diameter
shown as "D"

Inch

- 2 = .125"
- 3 = .188"
- 4 = .250"
- 5 = .313"
- 6 = .375"
- 8 = .500"

Metric

- 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"

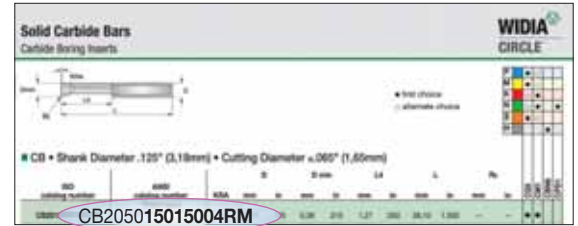
Inch

- 015 = .015"
- 020 = .020"
- 025 = .025"
- 030 = .030"
- 035 = .035"
- 040 = .040"
- 045 = .045"
- 050 = .050"
- 060 = .060"
- 070 = .070"
- 080 = .080"
- 090 = .090"
- 100 = .100"
- 110 = .110"
- 120 = .120"
- 135 = .135"
- 140 = .140"
- 150 = .150"
- 160 = .160"
- 180 = .180"
- 200 = .200"
- 210 = .210"
- 230 = .230"
- 240 = .240"
- 290 = .290"
- 300 = .300"
- 320 = .320"
- 360 = .360"
- 480 = .480"
- 490 = .490"

Metric

- 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"

Inch	Metric
050 = .050"	050 = 1,27mm
075 = .075"	075 = 1,91mm
100 = .100"	100 = 2,54mm
150 = .150"	150 = 3,81mm
200 = .200"	200 = 5,08mm
250 = .250"	250 = 6,35mm
300 = .300"	300 = 7,62mm
350 = .350"	350 = 8,89mm
400 = .400"	400 = 10,16mm
500 = .500"	500 = 12,70mm
600 = .600"	600 = 15,24mm
700 = .700"	700 = 17,78mm
750 = .750"	750 = 19,05mm
800 = .800"	800 = 20,32mm
900 = .900"	900 = 22,86mm
1000 = 1.000"	1000 = 25,40mm
1100 = 1.100"	1100 = 27,94mm
1150 = 1.150"	1150 = 29,21mm
1200 = 1.200"	1200 = 30,48mm
1250 = 1.250"	1250 = 31,75mm
1300 = 1.300"	1300 = 33,02mm
1350 = 1.350"	1350 = 34,29mm
1400 = 1.400"	1400 = 35,56mm
1500 = 1.500"	1500 = 38,10mm
1600 = 1.600"	1600 = 40,64mm
1750 = 1.750"	1750 = 44,45mm
1800 = 1.800"	1800 = 45,72mm
2000 = 2.000"	2000 = 50,80mm
2500 = 2.500"	2500 = 63,50mm
2600 = 2.600"	2600 = 66,04mm
2750 = 2.750"	2750 = 69,85mm
3000 = 3.000"	3000 = 76,20mm
4000 = 4.000"	4000 = 101,60mm
4500 = 4.500"	4500 = 114,30mm

1500

Overall Length
shown as "L"

Inch	Metric
1500 = 1.500"	1500 = 38,10mm
2000 = 2.000"	2000 = 50,80mm
2500 = 2.500"	2500 = 63,50mm
3000 = 3.000"	3000 = 76,20mm
4000 = 4.000"	4000 = 101,60mm
6000 = 6.000"	6000 = 387,09mm

4

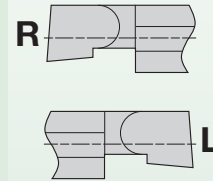
Tool Radius
shown as "Rε"

Inch	Metric
0 = .000"	0 = 0,00mm
4 = .004"	4 = 0,10mm
6 = .006"	6 = 0,15mm

R

Hand of Insert

R = Right hand
L = Left hand

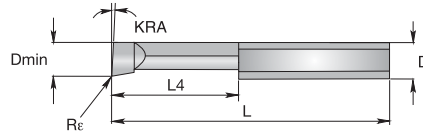


M

Tip Designation

M = Mini tip

(continued)



● first choice
○ alternate choice

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

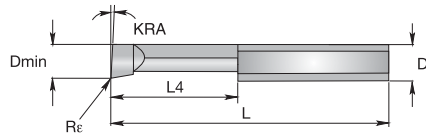
■ CB • Shank Diameter .125" (3,18mm) • Cutting Diameter ≤.065" (1,65mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB201505015000L	CB201505015000L	-5	3,18	.125	0,38	.015	1,27	.050	38,10	1.500	—	—	●	●		
CB202007515000L	CB202007515000L	-5	3,18	.125	0,51	.020	1,91	.075	38,10	1.500	—	—	●	●		
CB202510015000L	CB202510015000L	-5	3,18	.125	0,64	.025	2,54	.100	38,10	1.500	—	—	●	●		
CB203010015000L	CB203010015000L	-5	3,18	.125	0,76	.030	2,54	.100	38,10	1.500	—	—	●	●		
CB203510015000L	CB203510015000L	-5	3,18	.125	0,89	.035	2,54	.100	38,10	1.500	—	—	●	●		
CB204010015000L	CB204010015000L	-5	3,18	.125	1,02	.040	2,54	.100	38,10	1.500	—	—	●	●		
CB204510015000L	CB204510015000L	-5	3,18	.125	1,14	.045	2,54	.100	38,10	1.500	—	—	●	●		
CB205015015004L	CB205015015004L	-3	3,18	.125	1,27	.050	3,81	.150	38,10	1.500	0,10	.004	●	●		
CB205020015004L	CB205020015004L	-3	3,18	.125	1,27	.050	5,08	.200	38,10	1.500	0,10	.004	●	●		
CB205030015000L	CB205030015000L	-3	3,18	.125	1,27	.050	7,62	.300	38,10	1.500	—	—	●	●		
CB205040015004L	CB205040015004L	-3	3,18	.125	1,27	.050	10,16	.400	38,10	1.500	0,10	.004	●	●		
CB206015015004L	CB206015015004L	-3	3,18	.125	1,52	.060	3,81	.150	38,10	1.500	0,10	.004	●	●		
CB206020015004L	CB206020015004L	-3	3,18	.125	1,52	.060	5,08	.200	38,10	1.500	0,10	.004	●	●		
CB206030015004L	CB206030015004L	-3	3,18	.125	1,52	.060	7,62	.300	38,10	1.500	0,10	.004	●	●		
CB206040015004L	CB206040015004L	-3	3,18	.125	1,52	.060	10,16	.400	38,10	1.500	0,10	.004	●	●		
CB206050015004L	CB206050015004L	-3	3,18	.125	1,52	.060	12,70	.500	38,10	1.500	0,10	.004	●	●		

Small Hole Boring • Solid Carbide Bars

Solid Carbide Bars

Carbide Boring Inserts



● first choice
○ alternate choice

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

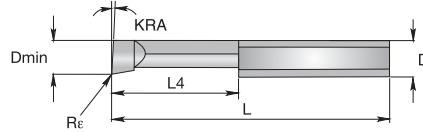
■ CB • Shank Diameter .125" (3,18mm) • Cutting Diameter >.065" (1,65mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB208015015004R	Right hand CB208015015004R	-3	3,18	.125	2,03	.080	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB208015015000R	CB208015015000R	-3	3,18	.125	2,03	.080	3,81	.150	38,10	1,500	—	—	●	●		
CB208020015004R	CB208020015004R	-3	3,18	.125	2,03	.080	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB208020015000R	CB208020015000R	-3	3,18	.125	2,03	.080	5,08	.200	38,10	1,500	—	—	●	●		
CB208030015004R	CB208030015004R	-3	3,18	.125	2,03	.080	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB208030015000R	CB208030015000R	-3	3,18	.125	2,03	.080	7,62	.300	38,10	1,500	—	—	●	●		
CB208040015004R	CB208040015004R	-3	3,18	.125	2,03	.080	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB208040015000R	CB208040015000R	-3	3,18	.125	2,03	.080	10,16	.400	38,10	1,500	—	—	●	●		
CB208050015004R	CB208050015004R	-3	3,18	.125	2,03	.080	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB208050015000R	CB208050015000R	-3	3,18	.125	2,03	.080	12,70	.500	38,10	1,500	—	—	●	●		
CB208060015004R	CB208060015004R	-3	3,18	.125	2,03	.080	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB208060015000R	CB208060015000R	-3	3,18	.125	2,03	.080	15,24	.600	38,10	1,500	—	—	●	●		
CB210015015004R	CB210015015004R	-3	3,18	.125	2,54	.100	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB210015015000R	CB210015015000R	-3	3,18	.125	2,54	.100	3,81	.150	38,10	1,500	—	—	●	●		
CB210020015004R	CB210020015004R	-3	3,18	.125	2,54	.100	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB210020015000R	CB210020015000R	-3	3,18	.125	2,54	.100	5,08	.200	38,10	1,500	—	—	●	●		
CB210030015004R	CB210030015004R	-3	3,18	.125	2,54	.100	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB210030015000R	CB210030015000R	-3	3,18	.125	2,54	.100	7,62	.300	38,10	1,500	—	—	●	●		
CB210040015004R	CB210040015004R	-3	3,18	.125	2,54	.100	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB210040015000R	CB210040015000R	-3	3,18	.125	2,54	.100	10,16	.400	38,10	1,500	—	—	●	●		
CB210050015004R	CB210050015004R	-3	3,18	.125	2,54	.100	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB210050015000R	CB210050015000R	-3	3,18	.125	2,54	.100	12,70	.500	38,10	1,500	—	—	●	●		
CB210060015004R	CB210060015004R	-3	3,18	.125	2,54	.100	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB210060015000R	CB210060015000R	-3	3,18	.125	2,54	.100	15,24	.600	38,10	1,500	—	—	●	●		
CB210070015004R	CB210070015004R	-3	3,18	.125	2,54	.100	17,78	.700	38,10	1,500	0,10	.004	●	●		
CB210070015000R	CB210070015000R	-3	3,18	.125	2,54	.100	17,78	.700	38,10	1,500	—	—	●	●		
CB211015015004R	CB211015015004R	-3	3,18	.125	2,79	.110	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB211015015000R	CB211015015000R	-3	3,18	.125	2,79	.110	3,81	.150	38,10	1,500	—	—	●	●		
CB211020015004R	CB211020015004R	-3	3,18	.125	2,79	.110	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB211020015000R	CB211020015000R	-3	3,18	.125	2,79	.110	5,08	.200	38,10	1,500	—	—	●	●		
CB211030015004R	CB211030015004R	-3	3,18	.125	2,79	.110	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB211030015000R	CB211030015000R	-3	3,18	.125	2,79	.110	7,62	.300	38,10	1,500	—	—	●	●		
CB211040015004R	CB211040015004R	-3	3,18	.125	2,79	.110	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB211040015000R	CB211040015000R	-3	3,18	.125	2,79	.110	10,16	.400	38,10	1,500	—	—	●	●		
CB211050015004R	CB211050015004R	-3	3,18	.125	2,79	.110	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB211050015000R	CB211050015000R	-3	3,18	.125	2,79	.110	12,70	.500	38,10	1,500	—	—	●	●		
CB211060015004R	CB211060015004R	-3	3,18	.125	2,79	.110	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB211060015000R	CB211060015000R	-3	3,18	.125	2,79	.110	15,24	.600	38,10	1,500	—	—	●	●		
CB211070015004R	CB211070015004R	-3	3,18	.125	2,79	.110	17,78	.700	38,10	1,500	0,10	.004	●	●		
CB211070015000R	CB211070015000R	-3	3,18	.125	2,79	.110	17,78	.700	38,10	1,500	—	—	●	●		

(continued)

Small Hole Boring • Solid Carbide Bars

(continued)



● first choice
○ alternate choice

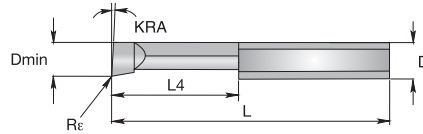
P	●	○		
M	●	○		
K	●	○		
N	●	○		
S	●	○		
H	●	○		

■ CB • Shank Diameter .125" (3,18mm) • Cutting Diameter >.065" (1,65mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
Left hand																
CB208015015004L	CB208015015004L	-3	3,18	.125	2,03	.080	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB208015015000L	CB208015015000L	-3	3,18	.125	2,03	.080	3,81	.150	38,10	1,500	—	—	●	●		
CB208020015004L	CB208020015004L	-3	3,18	.125	2,03	.080	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB208020015000L	CB208020015000L	-3	3,18	.125	2,03	.080	5,08	.200	38,10	1,500	—	—	●	●		
CB208030015004L	CB208030015004L	-3	3,18	.125	2,03	.080	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB208030015000L	CB208030015000L	-3	3,18	.125	2,03	.080	7,62	.300	38,10	1,500	—	—	●	●		
CB208040015004L	CB208040015004L	-3	3,18	.125	2,03	.080	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB208040015000L	CB208040015000L	-3	3,18	.125	2,03	.080	10,16	.400	38,10	1,500	—	—	●	●		
CB208050015004L	CB208050015004L	-3	3,18	.125	2,03	.080	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB208050015000L	CB208050015000L	-3	3,18	.125	2,03	.080	12,70	.500	38,10	1,500	—	—	●	●		
CB208060015004L	CB208060015004L	-3	3,18	.125	2,03	.080	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB208060015000L	CB208060015000L	-3	3,18	.125	2,03	.080	15,24	.600	38,10	1,500	—	—	●	●		
CB210015015004L	CB210015015004L	-3	3,18	.125	2,54	.100	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB210015015000L	CB210015015000L	-3	3,18	.125	2,54	.100	3,81	.150	38,10	1,500	—	—	●	●		
CB210020015004L	CB210020015004L	-3	3,18	.125	2,54	.100	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB210020015000L	CB210020015000L	-3	3,18	.125	2,54	.100	5,08	.200	38,10	1,500	—	—	●	●		
CB210030015004L	CB210030015004L	-3	3,18	.125	2,54	.100	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB210030015000L	CB210030015000L	-3	3,18	.125	2,54	.100	7,62	.300	38,10	1,500	—	—	●	●		
CB210040015004L	CB210040015004L	-3	3,18	.125	2,54	.100	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB210040015000L	CB210040015000L	-3	3,18	.125	2,54	.100	10,16	.400	38,10	1,500	—	—	●	●		
CB210050015004L	CB210050015004L	-3	3,18	.125	2,54	.100	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB210050015000L	CB210050015000L	-3	3,18	.125	2,54	.100	12,70	.500	38,10	1,500	—	—	●	●		
CB210060015004L	CB210060015004L	-3	3,18	.125	2,54	.100	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB210060015000L	CB210060015000L	-3	3,18	.125	2,54	.100	15,24	.600	38,10	1,500	—	—	●	●		
CB210070015004L	CB210070015004L	-3	3,18	.125	2,54	.100	17,78	.700	38,10	1,500	0,10	.004	●	●		
CB210070015000L	CB210070015000L	-3	3,18	.125	2,54	.100	17,78	.700	38,10	1,500	—	—	●	●		
CB211015015004L	CB211015015004L	-3	3,18	.125	2,79	.110	3,81	.150	38,10	1,500	0,10	.004	●	●		
CB211015015000L	CB211015015000L	-3	3,18	.125	2,79	.110	3,81	.150	38,10	1,500	—	—	●	●		
CB211020015004L	CB211020015004L	-3	3,18	.125	2,79	.110	5,08	.200	38,10	1,500	0,10	.004	●	●		
CB211020015000L	CB211020015000L	-3	3,18	.125	2,79	.110	5,08	.200	38,10	1,500	—	—	●	●		
CB211030015004L	CB211030015004L	-3	3,18	.125	2,79	.110	7,62	.300	38,10	1,500	0,10	.004	●	●		
CB211030015000L	CB211030015000L	-3	3,18	.125	2,79	.110	7,62	.300	38,10	1,500	—	—	●	●		
CB211040015004L	CB211040015004L	-3	3,18	.125	2,79	.110	10,16	.400	38,10	1,500	0,10	.004	●	●		
CB211040015000L	CB211040015000L	-3	3,18	.125	2,79	.110	10,16	.400	38,10	1,500	—	—	●	●		
CB211050015004L	CB211050015004L	-3	3,18	.125	2,79	.110	12,70	.500	38,10	1,500	0,10	.004	●	●		
CB211050015000L	CB211050015000L	-3	3,18	.125	2,79	.110	12,70	.500	38,10	1,500	—	—	●	●		
CB211060015004L	CB211060015004L	-3	3,18	.125	2,79	.110	15,24	.600	38,10	1,500	0,10	.004	●	●		
CB211060015000L	CB211060015000L	-3	3,18	.125	2,79	.110	15,24	.600	38,10	1,500	—	—	●	●		
CB211070015004L	CB211070015004L	-3	3,18	.125	2,79	.110	17,78	.700	38,10	1,500	0,10	.004	●	●		
CB211070015000L	CB211070015000L	-3	3,18	.125	2,79	.110	17,78	.700	38,10	1,500	—	—	●	●		

Small Hole Boring • Solid Carbide Bars

(continued)



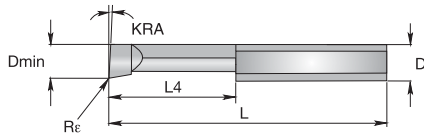
● first choice
○ alternate choice

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■ CB • Shank Diameter .188" (4,76mm) • Cutting Diameter ≤.140" (3,56mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in						
CB312025020006L	CB312025020006L	-3	4,76	.188	3,05	.120	6,35	.250	50,80	2,000	0,15	.006	●	●		
CB312025020000L	CB312025020000L	-3	4,76	.188	3,05	.120	6,35	.250	50,80	2,000	—	—	●	●		
CB312035020006L	CB312035020006L	-3	4,76	.188	3,05	.120	8,89	.350	50,80	2,000	0,15	.006	●	●		
CB312035020000L	CB312035020000L	-3	4,76	.188	3,05	.120	8,89	.350	50,80	2,000	—	—	●	●		
CB312050020006L	CB312050020006L	-3	4,76	.188	3,05	.120	12,70	.500	50,80	2,000	0,15	.006	●	●		
CB312050020000L	CB312050020000L	-3	4,76	.188	3,05	.120	12,70	.500	50,80	2,000	—	—	●	●		
CB312060020006L	CB312060020006L	-3	4,76	.188	3,05	.120	15,24	.600	50,80	2,000	0,15	.006	●	●		
CB312060020000L	CB312060020000L	-3	4,76	.188	3,05	.120	15,24	.600	50,80	2,000	—	—	●	●		
CB312070020006L	CB312070020006L	-3	4,76	.188	3,05	.120	17,78	.700	50,80	2,000	0,15	.006	●	●		
CB312070020000L	CB312070020000L	-3	4,76	.188	3,05	.120	17,78	.700	50,80	2,000	—	—	●	●		
CB312080020006L	CB312080020006L	-3	4,76	.188	3,05	.120	20,32	.800	50,80	2,000	0,15	.006	●	●		
CB312080020000L	CB312080020000L	-3	4,76	.188	3,05	.120	20,32	.800	50,80	2,000	—	—	●	●		
CB314025020006L	CB314025020006L	-3	4,76	.188	3,56	.140	6,35	.250	50,80	2,000	0,15	.006	●	●		
CB314025020000L	CB314025020000L	-3	4,76	.188	3,56	.140	6,35	.250	50,80	2,000	—	—	●	●		
CB314040020006L	CB314040020006L	-3	4,76	.188	3,56	.140	10,16	.400	50,80	2,000	0,15	.006	●	●		
CB314040020000L	CB314040020000L	-3	4,76	.188	3,56	.140	10,16	.400	50,80	2,000	—	—	●	●		
CB314050020006L	CB314050020006L	-3	4,76	.188	3,56	.140	12,70	.500	50,80	2,000	0,15	.006	●	●		
CB314050020000L	CB314050020000L	-3	4,76	.188	3,56	.140	12,70	.500	50,80	2,000	—	—	●	●		
CB314060020006L	CB314060020006L	-3	4,76	.188	3,56	.140	15,24	.600	50,80	2,000	0,15	.006	●	●		
CB314060020000L	CB314060020000L	-3	4,76	.188	3,56	.140	15,24	.600	50,80	2,000	—	—	●	●		
CB314070020006L	CB314070020006L	-3	4,76	.188	3,56	.140	17,78	.700	50,80	2,000	0,15	.006	●	●		
CB314070020000L	CB314070020000L	-3	4,76	.188	3,56	.140	17,78	.700	50,80	2,000	—	—	●	●		
CB314075020006L	CB314075020006L	-3	4,76	.188	3,56	.140	19,05	.750	50,80	2,000	0,15	.006	●	●		
CB314075020000L	CB314075020000L	-3	4,76	.188	3,56	.140	19,05	.750	50,80	2,000	—	—	●	●		
CB314080020006L	CB314080020006L	-3	4,76	.188	3,56	.140	20,32	.800	50,80	2,000	0,15	.006	●	●		
CB314080020000L	CB314080020000L	-3	4,76	.188	3,56	.140	20,32	.800	50,80	2,000	—	—	●	●		

Small Hole Boring • Solid Carbide Bars



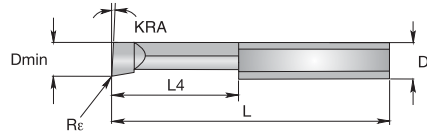
● first choice
○ alternate choice

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N	○	○	○	○	○
S	○	○	○	○	○
H	○	○	○	○	○

■ CB • Shank Diameter .188" (4,76mm) • Cutting Diameter >.159" (3,81mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		R _ε		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
Right hand																
CB316025020006R	CB316025020006R	-3	4,76	.188	4,06	.160	6,35	.250	50,80	2,000	0,15	.006	●	●		
CB316025020000R	CB316025020000R	-3	4,76	.188	4,06	.160	6,35	.250	50,80	2,000	—	—	●	●		
CB316040020006R	CB316040020006R	-3	4,76	.188	4,06	.160	10,16	.400	50,80	2,000	0,15	.006	●	●		
CB316040020000R	CB316040020000R	-3	4,76	.188	4,06	.160	10,16	.400	50,80	2,000	—	—	●	●		
CB316050020006R	CB316050020006R	-3	4,76	.188	4,06	.160	12,70	.500	50,80	2,000	0,15	.006	●	●		
CB316050020000R	CB316050020000R	-3	4,76	.188	4,06	.160	12,70	.500	50,80	2,000	—	—	●	●		
CB316060020006R	CB316060020006R	-3	4,76	.188	4,06	.160	15,24	.600	50,80	2,000	0,15	.006	●	●		
CB316060020000R	CB316060020000R	-3	4,76	.188	4,06	.160	15,24	.600	50,80	2,000	—	—	●	●		
CB316075020006R	CB316075020006R	-3	4,76	.188	4,06	.160	19,05	.750	50,80	2,000	0,15	.006	●	●		
CB316075020000R	CB316075020000R	-3	4,76	.188	4,06	.160	19,05	.750	50,80	2,000	—	—	●	●		
CB316090020006R	CB316090020006R	-3	4,76	.188	4,06	.160	22,86	.900	50,80	2,000	0,15	.006	●	●		
CB316090020000R	CB316090020000R	-3	4,76	.188	4,06	.160	22,86	.900	50,80	2,000	—	—	●	●		
CB3160100020006R	CB3160100020006R	-3	4,76	.188	4,06	.160	25,40	1.000	50,80	2,000	0,15	.006	●	●		
CB3160100020000R	CB3160100020000R	-3	4,76	.188	4,06	.160	25,40	1.000	50,80	2,000	—	—	●	●		
Left hand																
CB316025020006L	CB316025020006L	-3	4,76	.188	4,06	.160	6,35	.250	50,80	2,000	0,15	.006	●	●		
CB316025020000L	CB316025020000L	-3	4,76	.188	4,06	.160	6,35	.250	50,80	2,000	—	—	●	●		
CB316040020006L	CB316040020006L	-3	4,76	.188	4,06	.160	10,16	.400	50,80	2,000	0,15	.006	●	●		
CB316040020000L	CB316040020000L	-3	4,76	.188	4,06	.160	10,16	.400	50,80	2,000	—	—	●	●		
CB316050020006L	CB316050020006L	-3	4,76	.188	4,06	.160	12,70	.500	50,80	2,000	0,15	.006	●	●		
CB316050020000L	CB316050020000L	-3	4,76	.188	4,06	.160	12,70	.500	50,80	2,000	—	—	●	●		
CB316060020006L	CB316060020006L	-3	4,76	.188	4,06	.160	15,24	.600	50,80	2,000	0,15	.006	●	●		
CB316060020000L	CB316060020000L	-3	4,76	.188	4,06	.160	15,24	.600	50,80	2,000	—	—	●	●		
CB316075020006L	CB316075020006L	-3	4,76	.188	4,06	.160	19,05	.750	50,80	2,000	0,15	.006	●	●		
CB316075020000L	CB316075020000L	-3	4,76	.188	4,06	.160	19,05	.750	50,80	2,000	—	—	●	●		
CB316090020006L	CB316090020006L	-3	4,76	.188	4,06	.160	22,86	.900	50,80	2,000	0,15	.006	●	●		
CB316090020000L	CB316090020000L	-3	4,76	.188	4,06	.160	22,86	.900	50,80	2,000	—	—	●	●		
CB3160100020006L	CB3160100020006L	-3	4,76	.188	4,06	.160	25,40	1.000	50,80	2,000	0,15	.006	●	●		
CB3160100020000L	CB3160100020000L	-3	4,76	.188	4,06	.160	25,40	1.000	50,80	2,000	—	—	●	●		

Small Hole Boring • Solid Carbide Bars



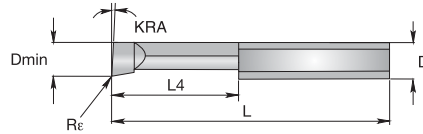
● first choice
○ alternate choice

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■ CB • Shank Diameter .250" (6,35mm) • Cutting Diameter ≤.180" (4,57mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB418035025006R	CB418035025006R	-3	6,35	.250	4,57	.180	8,89	.350	63,50	2,500	0,15	.006	●	●		
CB418035025000R	CB418035025000R	-3	6,35	.250	4,57	.180	8,89	.350	63,50	2,500	—	—	●	●		
CB418050025006R	CB418050025006R	-3	6,35	.250	4,57	.180	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB418050025000R	CB418050025000R	-3	6,35	.250	4,57	.180	12,70	.500	63,50	2,500	—	—	●	●		
CB418060025006R	CB418060025006R	-3	6,35	.250	4,57	.180	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB418060025000R	CB418060025000R	-3	6,35	.250	4,57	.180	15,24	.600	63,50	2,500	—	—	●	●		
CB418075025006R	CB418075025006R	-3	6,35	.250	4,57	.180	19,05	.750	63,50	2,500	0,15	.006	●	●		
CB418075025000R	CB418075025000R	-3	6,35	.250	4,57	.180	19,05	.750	63,50	2,500	—	—	●	●		
CB418090025006R	CB418090025006R	-3	6,35	.250	4,57	.180	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB418090025000R	CB418090025000R	-3	6,35	.250	4,57	.180	22,86	.900	63,50	2,500	—	—	●	●		
CB4180100025006R	CB4180100025006R	-3	6,35	.250	4,57	.180	25,40	1,000	63,50	2,500	0,15	.006	●	●		
CB4180100025000R	CB4180100025000R	-3	6,35	.250	4,57	.180	25,40	1,000	63,50	2,500	—	—	●	●		
CB4180110025006R	CB4180110025006R	-3	6,35	.250	4,57	.180	27,94	1,100	63,50	2,500	0,15	.006	●	●		
CB4180110025000R	CB4180110025000R	-3	6,35	.250	4,57	.180	27,94	1,100	63,50	2,500	—	—	●	●		
CB418035025006L	CB418035025006L	-3	6,35	.250	4,57	.180	8,89	.350	63,50	2,500	0,15	.006	●	●		
CB418035025000L	CB418035025000L	-3	6,35	.250	4,57	.180	8,89	.350	63,50	2,500	—	—	●	●		
CB418050025006L	CB418050025006L	-3	6,35	.250	4,57	.180	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB418050025000L	CB418050025000L	-3	6,35	.250	4,57	.180	12,70	.500	63,50	2,500	—	—	●	●		
CB418060025006L	CB418060025006L	-3	6,35	.250	4,57	.180	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB418060025000L	CB418060025000L	-3	6,35	.250	4,57	.180	15,24	.600	63,50	2,500	—	—	●	●		
CB418075025006L	CB418075025006L	-3	6,35	.250	4,57	.180	19,05	.750	63,50	2,500	0,15	.006	●	●		
CB418075025000L	CB418075025000L	-3	6,35	.250	4,57	.180	19,05	.750	63,50	2,500	—	—	●	●		
CB418090025006L	CB418090025006L	-3	6,35	.250	4,57	.180	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB418090025000L	CB418090025000L	-3	6,35	.250	4,57	.180	22,86	.900	63,50	2,500	—	—	●	●		
CB4180100025006L	CB4180100025006L	-3	6,35	.250	4,57	.180	25,40	1,000	63,50	2,500	0,15	.006	●	●		
CB4180100025000L	CB4180100025000L	-3	6,35	.250	4,57	.180	25,40	1,000	63,50	2,500	—	—	●	●		
CB4180110025006L	CB4180110025006L	-3	6,35	.250	4,57	.180	27,94	1,100	63,50	2,500	0,15	.006	●	●		
CB4180110025000L	CB4180110025000L	-3	6,35	.250	4,57	.180	27,94	1,100	63,50	2,500	—	—	●	●		

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

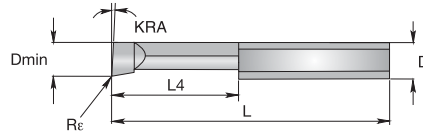
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H	●	○		

■ CB • Shank Diameter .312" (7,94mm) • Cutting Diameter ≤.230" (5,84mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB523040025006R	CB523040025006R	-3	7,94	.313	5,84	.230	10,16	.400	63,50	2,500	0,15	.006	●	●		
CB523040025000R	CB523040025000R	-3	7,94	.313	5,84	.230	10,16	.400	63,50	2,500	—	—	●	●		
CB523050025006R	CB523050025006R	-3	7,94	.313	5,84	.230	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB523050025000R	CB523050025000R	-3	7,94	.313	5,84	.230	12,70	.500	63,50	2,500	—	—	●	●		
CB523060025006R	CB523060025006R	-3	7,94	.313	5,84	.230	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB523060025000R	CB523060025000R	-3	7,94	.313	5,84	.230	15,24	.600	63,50	2,500	—	—	●	●		
CB523070025006R	CB523070025006R	-3	7,94	.313	5,84	.230	17,78	.700	63,50	2,500	0,15	.006	●	●		
CB523070025000R	CB523070025000R	-3	7,94	.313	5,84	.230	17,78	.700	63,50	2,500	—	—	●	●		
CB523080025006R	CB523080025006R	-3	7,94	.313	5,84	.230	20,32	.800	63,50	2,500	0,15	.006	●	●		
CB523080025000R	CB523080025000R	-3	7,94	.313	5,84	.230	20,32	.800	63,50	2,500	—	—	●	●		
CB523090025006R	CB523090025006R	-3	7,94	.313	5,84	.230	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB523090025000R	CB523090025000R	-3	7,94	.313	5,84	.230	22,86	.900	63,50	2,500	—	—	●	●		
CB5230100025006R	CB5230100025006R	-3	7,94	.313	5,84	.230	25,40	1.000	63,50	2,500	0,15	.006	●	●		
CB5230100025000R	CB5230100025000R	-3	7,94	.313	5,84	.230	25,40	1.000	63,50	2,500	—	—	●	●		
CB5230115025006R	CB5230115025006R	-3	7,94	.313	5,84	.230	29,21	1.150	63,50	2,500	0,15	.006	●	●		
CB5230115025000R	CB5230115025000R	-3	7,94	.313	5,84	.230	29,21	1.150	63,50	2,500	—	—	●	●		
CB5230120025006R	CB5230120025006R	-3	7,94	.313	5,84	.230	30,48	1.200	63,50	2,500	0,15	.006	●	●		
CB5230120025000R	CB5230120025000R	-3	7,94	.313	5,84	.230	30,48	1.200	63,50	2,500	—	—	●	●		
CB5230125025006R	CB5230125025006R	-3	7,94	.313	5,84	.230	31,75	1.250	63,50	2,500	0,15	.006	●	●		
CB5230125025000R	CB5230125025000R	-3	7,94	.313	5,84	.230	31,75	1.250	63,50	2,500	—	—	●	●		
CB5230140025006R	CB5230140025006R	-3	7,94	.313	5,84	.230	35,56	1.400	63,50	2,500	0,15	.006	●	●		
CB5230140025000R	CB5230140025000R	-3	7,94	.313	5,84	.230	35,56	1.400	63,50	2,500	—	—	●	●		
CB5230150025006R	CB5230150025006R	-3	7,94	.313	5,84	.230	38,10	1.500	63,50	2,500	0,15	.006	●	●		
CB5230150025000R	CB5230150025000R	-3	7,94	.313	5,84	.230	38,10	1.500	63,50	2,500	—	—	●	●		
CB5230160025006R	CB5230160025006R	-3	7,94	.313	5,84	.230	40,64	1.600	63,50	2,500	0,15	.006	●	●		
CB5230160025000R	CB5230160025000R	-3	7,94	.313	5,84	.230	40,64	1.600	63,50	2,500	—	—	●	●		

(continued)

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

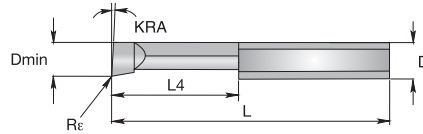
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M	●	○	○	○	○
K	●	○	○	○	○
N	●	○	○	○	○
S	●	○	○	○	○
H	●	○	○	○	○

■ CB • Shank Diameter .312" (7,94mm) • Cutting Diameter ≥.290" (7,37mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB529050025006R	CB529050025006R	-3	7,94	.313	7,37	.290	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB529050025000R	CB529050025000R	-3	7,94	.313	7,37	.290	12,70	.500	63,50	2,500	—	—	●	●		
CB529060025006R	CB529060025006R	-3	7,94	.313	7,37	.290	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB529060025000R	CB529060025000R	-3	7,94	.313	7,37	.290	15,24	.600	63,50	2,500	—	—	●	●		
CB529075025006R	CB529075025006R	-3	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	0,15	.006	●	●		
CB529075025000R	CB529075025000R	-3	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	—	—	●	●		
CB529090025006R	CB529090025006R	-3	7,94	.313	7,37	.290	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB529090025000R	CB529090025000R	-3	7,94	.313	7,37	.290	22,86	.900	63,50	2,500	—	—	●	●		
CB5290100025006R	CB5290100025006R	-3	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	0,15	.006	●	●		
CB5290100025000R	CB5290100025000R	-3	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	—	—	●	●		
CB5290110025006R	CB5290110025006R	-3	7,94	.313	7,37	.290	27,94	1,100	63,50	2,500	0,15	.006	●	●		
CB5290110025000R	CB5290110025000R	-3	7,94	.313	7,37	.290	27,94	1,100	63,50	2,500	—	—	●	●		
CB5290125025006R	CB5290125025006R	-3	7,94	.313	7,37	.290	31,75	1,250	63,50	2,500	0,15	.006	●	●		
CB5290125025000R	CB5290125025000R	-3	7,94	.313	7,37	.290	31,75	1,250	63,50	2,500	—	—	●	●		
CB5290135025006R	CB5290135025006R	-3	7,94	.313	7,37	.290	34,29	1,350	63,50	2,500	0,15	.006	●	●		
CB5290135025000R	CB5290135025000R	-3	7,94	.313	7,37	.290	34,29	1,350	63,50	2,500	—	—	●	●		
CB5290150025006R	CB5290150025006R	-3	7,94	.313	7,37	.290	38,10	1,500	63,50	2,500	0,15	.006	●	●		
CB5290150025000R	CB5290150025000R	-3	7,94	.313	7,37	.290	38,10	1,500	63,50	2,500	—	—	●	●		
CB5290160025006R	CB5290160025006R	-3	7,94	.313	7,37	.290	40,64	1,600	63,50	2,500	0,15	.006	●	●		
CB5290160025000R	CB5290160025000R	-3	7,94	.313	7,37	.290	40,64	1,600	63,50	2,500	—	—	●	●		
CB5290175025006R	CB5290175025006R	-3	7,94	.313	7,37	.290	44,45	1,750	63,50	2,500	0,15	.006	●	●		
CB5290175025000R	CB5290175025000R	-3	7,94	.313	7,37	.290	44,45	1,750	63,50	2,500	—	—	●	●		
CB529050025006L	CB529050025006L	-3	7,94	.313	7,37	.290	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB529050025000L	CB529050025000L	-3	7,94	.313	7,37	.290	12,70	.500	63,50	2,500	—	—	●	●		
CB529060025006L	CB529060025006L	-3	7,94	.313	7,37	.290	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB529060025000L	CB529060025000L	-3	7,94	.313	7,37	.290	15,24	.600	63,50	2,500	—	—	●	●		
CB529075025006L	CB529075025006L	-3	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	0,15	.006	●	●		
CB529075025000L	CB529075025000L	-3	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	—	—	●	●		
CB529090025006L	CB529090025006L	-3	7,94	.313	7,37	.290	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB529090025000L	CB529090025000L	-3	7,94	.313	7,37	.290	22,86	.900	63,50	2,500	—	—	●	●		
CB5290100025006L	CB5290100025006L	-3	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	0,15	.006	●	●		
CB5290100025000L	CB5290100025000L	-3	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	—	—	●	●		
CB5290110025006L	CB5290110025006L	-3	7,94	.313	7,37	.290	27,94	1,100	63,50	2,500	0,15	.006	●	●		
CB5290110025000L	CB5290110025000L	-3	7,94	.313	7,37	.290	27,94	1,100	63,50	2,500	—	—	●	●		
CB5290125025006L	CB5290125025006L	-3	7,94	.313	7,37	.290	31,75	1,250	63,50	2,500	0,15	.006	●	●		
CB5290125025000L	CB5290125025000L	-3	7,94	.313	7,37	.290	31,75	1,250	63,50	2,500	—	—	●	●		
CB5290135025006L	CB5290135025006L	-3	7,94	.313	7,37	.290	34,29	1,350	63,50	2,500	0,15	.006	●	●		
CB5290135025000L	CB5290135025000L	-3	7,94	.313	7,37	.290	34,29	1,350	63,50	2,500	—	—	●	●		
CB5290150025006L	CB5290150025006L	-3	7,94	.313	7,37	.290	38,10	1,500	63,50	2,500	0,15	.006	●	●		
CB5290150025000L	CB5290150025000L	-3	7,94	.313	7,37	.290	38,10	1,500	63,50	2,500	—	—	●	●		
CB5290160025006L	CB5290160025006L	-3	7,94	.313	7,37	.290	40,64	1,600	63,50	2,500	0,15	.006	●	●		
CB5290160025000L	CB5290160025000L	-3	7,94	.313	7,37	.290	40,64	1,600	63,50	2,500	—	—	●	●		
CB5290175025006L	CB5290175025006L	-3	7,94	.313	7,37	.290	44,45	1,750	63,50	2,500	0,15	.006	●	●		
CB5290175025000L	CB5290175025000L	-3	7,94	.313	7,37	.290	44,45	1,750	63,50	2,500	—	—	●	●		

Small Hole Boring • Solid Carbide Bars

(continued)



● first choice
○ alternate choice

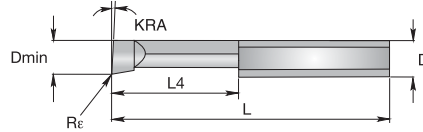
P	●	○		
M	●	○		
K	●	○		
N	●	○		
S	●	○		
H	●	○		

■ CB • Shank Diameter .375" (9,53mm) • Cutting Diameter ≤.320" (8,13mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB632050025006L	CB632050025006L	-3	9,53	.375	8,13	.320	12,70	.500	63,50	2.500	0,15	.006	●	●		
CB632050025000L	CB632050025000L	-3	9,53	.375	8,13	.320	12,70	.500	63,50	2.500	—	—	●	●		
CB632060025006L	CB632060025006L	-3	9,53	.375	8,13	.320	15,24	.600	63,50	2.500	0,15	.006	●	●		
CB632060025000L	CB632060025000L	-3	9,53	.375	8,13	.320	15,24	.600	63,50	2.500	—	—	●	●		
CB632075025006L	CB632075025006L	-3	9,53	.375	8,13	.320	19,05	.750	63,50	2.500	0,15	.006	●	●		
CB632075025000L	CB632075025000L	-3	9,53	.375	8,13	.320	19,05	.750	63,50	2.500	—	—	●	●		
CB632090025006L	CB632090025006L	-3	9,53	.375	8,13	.320	22,86	.900	63,50	2.500	0,15	.006	●	●		
CB632090025000L	CB632090025000L	-3	9,53	.375	8,13	.320	22,86	.900	63,50	2.500	—	—	●	●		
CB6320100025006L	CB6320100025006L	-3	9,53	.375	8,13	.320	25,40	1.000	63,50	2.500	0,15	.006	●	●		
CB6320100025000L	CB6320100025000L	-3	9,53	.375	8,13	.320	25,40	1.000	63,50	2.500	—	—	●	●		
CB6320110025006L	CB6320110025006L	-3	9,53	.375	8,13	.320	27,94	1.100	63,50	2.500	0,15	.006	●	●		
CB6320110025000L	CB6320110025000L	-3	9,53	.375	8,13	.320	27,94	1.100	63,50	2.500	—	—	●	●		
CB6320125025006L	CB6320125025006L	-3	9,53	.375	8,13	.320	31,75	1.250	63,50	2.500	0,15	.006	●	●		
CB6320125025000L	CB6320125025000L	-3	9,53	.375	8,13	.320	31,75	1.250	63,50	2.500	—	—	●	●		
CB6320150025006L	CB6320150025006L	-3	9,53	.375	8,13	.320	38,10	1.500	63,50	2.500	0,15	.006	●	●		
CB6320150025000L	CB6320150025000L	-3	9,53	.375	8,13	.320	38,10	1.500	63,50	2.500	—	—	●	●		
CB6320160025006L	CB6320160025006L	-3	9,53	.375	8,13	.320	40,64	1.600	63,50	2.500	0,15	.006	●	●		
CB6320160025000L	CB6320160025000L	-3	9,53	.375	8,13	.320	40,64	1.600	63,50	2.500	—	—	●	●		
CB6320180025006L	CB6320180025006L	-3	9,53	.375	8,13	.320	45,72	1.800	63,50	2.500	0,15	.006	●	●		
CB6320180025000L	CB6320180025000L	-3	9,53	.375	8,13	.320	45,72	1.800	63,50	2.500	—	—	●	●		
CB6320200040006L	CB6320200040006L	-3	9,53	.375	8,13	.320	50,80	2.000	101,60	4.000	0,15	.006	●	●		
CB6320200040000L	CB6320200040000L	-3	9,53	.375	8,13	.320	50,80	2.000	101,60	4.000	—	—	●	●		
CB6320250040006L	CB6320250040006L	-3	9,53	.375	8,13	.320	63,50	2.500	101,60	4.000	0,15	.006	●	●		
CB6320250040000L	CB6320250040000L	-3	9,53	.375	8,13	.320	63,50	2.500	101,60	4.000	—	—	●	●		
CB6320300040006L	CB6320300040006L	-3	9,53	.375	8,13	.320	76,20	3.000	101,60	4.000	0,15	.006	●	●		
CB6320300040000L	CB6320300040000L	-3	9,53	.375	8,13	.320	76,20	3.000	101,60	4.000	—	—	●	●		

Small Hole Boring • Solid Carbide Bars

(continued)



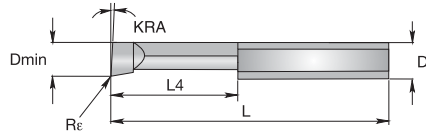
● first choice
○ alternate choice

P	●	○		
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S	○	●		
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■ CB • Shank Diameter .375" (9,53mm) • Cutting Diameter ≥.360" (9,14mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB636050025006L	CB636050025006L	-3	9,53	.375	9,14	.360	12,70	.500	63,50	2,500	0,15	.006	●	●		
CB636050025000L	CB636050025000L	-3	9,53	.375	9,14	.360	12,70	.500	63,50	2,500	—	—	●	●		
CB636060025006L	CB636060025006L	-3	9,53	.375	9,14	.360	15,24	.600	63,50	2,500	0,15	.006	●	●		
CB636060025000L	CB636060025000L	-3	9,53	.375	9,14	.360	15,24	.600	63,50	2,500	—	—	●	●		
CB636075025006L	CB636075025006L	-3	9,53	.375	9,14	.360	19,05	.750	63,50	2,500	0,15	.006	●	●		
CB636075025000L	CB636075025000L	-3	9,53	.375	9,14	.360	19,05	.750	63,50	2,500	—	—	●	●		
CB636090025006L	CB636090025006L	-3	9,53	.375	9,14	.360	22,86	.900	63,50	2,500	0,15	.006	●	●		
CB636090025000L	CB636090025000L	-3	9,53	.375	9,14	.360	22,86	.900	63,50	2,500	—	—	●	●		
CB6360100025006L	CB6360100025006L	-3	9,53	.375	9,14	.360	25,40	1.000	63,50	2,500	0,15	.006	●	●		
CB6360100025000L	CB6360100025000L	-3	9,53	.375	9,14	.360	25,40	1.000	63,50	2,500	—	—	●	●		
CB6360115025006L	CB6360115025006L	-3	9,53	.375	9,14	.360	29,21	1.150	63,50	2,500	0,15	.006	●	●		
CB6360115025000L	CB6360115025000L	-3	9,53	.375	9,14	.360	29,21	1.150	63,50	2,500	—	—	●	●		
CB6360125025006L	CB6360125025006L	-3	9,53	.375	9,14	.360	31,75	1.250	63,50	2,500	0,15	.006	●	●		
CB6360125025000L	CB6360125025000L	-3	9,53	.375	9,14	.360	31,75	1.250	63,50	2,500	—	—	●	●		
CB6360150025006L	CB6360150025006L	-3	9,53	.375	9,14	.360	38,10	1.500	63,50	2,500	0,15	.006	●	●		
CB6360150025000L	CB6360150025000L	-3	9,53	.375	9,14	.360	38,10	1.500	63,50	2,500	—	—	●	●		
CB6360160025006L	CB6360160025006L	-3	9,53	.375	9,14	.360	40,64	1.600	63,50	2,500	0,15	.006	●	●		
CB6360160025000L	CB6360160025000L	-3	9,53	.375	9,14	.360	40,64	1.600	63,50	2,500	—	—	●	●		
CB6360180025006L	CB6360180025006L	-3	9,53	.375	9,14	.360	45,72	1.800	63,50	2,500	0,15	.006	●	●		
CB6360180025000L	CB6360180025000L	-3	9,53	.375	9,14	.360	45,72	1.800	63,50	2,500	—	—	●	●		
CB6360200040006L	CB6360200040006L	-3	9,53	.375	9,14	.360	50,80	2.000	101,60	4.000	0,15	.006	●	●		
CB6360200040000L	CB6360200040000L	-3	9,53	.375	9,14	.360	50,80	2.000	101,60	4.000	—	—	●	●		
CB6360250040006L	CB6360250040006L	-3	9,53	.375	9,14	.360	63,50	2.500	101,60	4.000	0,15	.006	●	●		
CB6360250040000L	CB6360250040000L	-3	9,53	.375	9,14	.360	63,50	2.500	101,60	4.000	—	—	●	●		
CB6360300040006L	CB6360300040006L	-3	9,53	.375	9,14	.360	76,20	3.000	101,60	4.000	0,15	.006	●	●		
CB6360300040000L	CB6360300040000L	-3	9,53	.375	9,14	.360	76,20	3.000	101,60	4.000	—	—	●	●		

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

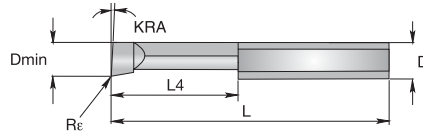
■ CB • Shank Diameter .500" (12,70mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Rε		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB849075030006R	CB849075030006R	-3	12,70	.500	12,45	.490	19,05	.750	76,20	3.000	0,15	.006	●	●		
CB849075030000R	CB849075030000R	-3	12,70	.500	12,45	.490	19,05	.750	76,20	3.000	—	—	●	●		
CB8490100030006R	CB8490100030006R	-3	12,70	.500	12,45	.490	25,40	1.000	76,20	3.000	0,15	.006	●	●		
CB8490100030000R	CB8490100030000R	-3	12,70	.500	12,45	.490	25,40	1.000	76,20	3.000	—	—	●	●		
CB8490125030006R	CB8490125030006R	-3	12,70	.500	12,45	.490	31,75	1.250	76,20	3.000	0,15	.006	●	●		
CB8490125030000R	CB8490125030000R	-3	12,70	.500	12,45	.490	31,75	1.250	76,20	3.000	—	—	●	●		
CB8490150030006R	CB8490150030006R	-3	12,70	.500	12,45	.490	38,10	1.500	76,20	3.000	0,15	.006	●	●		
CB8490150030000R	CB8490150030000R	-3	12,70	.500	12,45	.490	38,10	1.500	76,20	3.000	—	—	●	●		
CB8490200040006R	CB8490200040006R	-3	12,70	.500	12,45	.490	50,80	2.000	101,60	4.000	0,15	.006	●	●		
CB8490200040000R	CB8490200040000R	-3	12,70	.500	12,45	.490	50,80	2.000	101,60	4.000	—	—	●	●		
CB8490250040006R	CB8490250040006R	-3	12,70	.500	12,45	.490	63,50	2.500	101,60	4.000	0,15	.006	●	●		
CB8490250040000R	CB8490250040000R	-3	12,70	.500	12,45	.490	63,50	2.500	101,60	4.000	—	—	●	●		
CB8490260040006R	CB8490260040006R	-3	12,70	.500	12,45	.490	66,04	2.600	101,60	4.000	0,15	.006	●	●		
CB8490260040000R	CB8490260040000R	-3	12,70	.500	12,45	.490	66,04	2.600	101,60	4.000	—	—	●	●		
CB8490275040006R	CB8490275040006R	-3	12,70	.500	12,45	.490	69,85	2.750	101,60	4.000	0,15	.006	●	●		
CB8490275040000R	CB8490275040000R	-3	12,70	.500	12,45	.490	69,85	2.750	101,60	4.000	—	—	●	●		
CB8490300060006R	CB8490300060006R	-3	12,70	.500	12,45	.490	76,20	3.000	152,40	6.000	0,15	.006	●	●		
CB8490300060000R	CB8490300060000R	-3	12,70	.500	12,45	.490	76,20	3.000	152,40	6.000	—	—	●	●		
CB8490350060006R	CB8490350060006R	-3	12,70	.500	12,45	.490	88,90	3.500	152,40	6.000	0,15	.006	●	●		
CB8490350060000R	CB8490350060000R	-3	12,70	.500	12,45	.490	88,90	3.500	152,40	6.000	—	—	●	●		
CB8490400060006R	CB8490400060006R	-3	12,70	.500	12,45	.490	101,60	4.000	152,40	6.000	0,15	.006	●	●		
CB8490400060000R	CB8490400060000R	-3	12,70	.500	12,45	.490	101,60	4.000	152,40	6.000	—	—	●	●		
CB8490450060006R	CB8490450060006R	-3	12,70	.500	12,45	.490	114,30	4.500	152,40	6.000	0,15	.006	●	●		
CB8490450060000R	CB8490450060000R	-3	12,70	.500	12,45	.490	114,30	4.500	152,40	6.000	—	—	●	●		

(continued)

Small Hole Boring • Solid Carbide Bars

(continued)



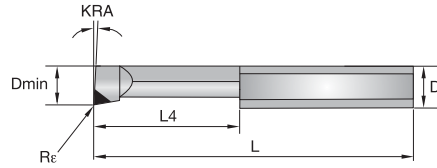
● first choice
○ alternate choice

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

■ CB • Shank Diameter .500" (12,70mm)

ISO catalog number	ANSI catalog number Left hand	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB849075030006L	CB849075030006L	-3	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	0,15	.006	●	●		
CB849075030000L	CB849075030000L	-3	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	—	—	●	●		
CB8490100030006L	CB8490100030006L	-3	12,70	.500	12,45	.490	25,40	1,000	76,20	3,000	0,15	.006	●	●		
CB8490100030000L	CB8490100030000L	-3	12,70	.500	12,45	.490	25,40	1,000	76,20	3,000	—	—	●	●		
CB8490125030006L	CB8490125030006L	-3	12,70	.500	12,45	.490	31,75	1,250	76,20	3,000	0,15	.006	●	●		
CB8490125030000L	CB8490125030000L	-3	12,70	.500	12,45	.490	31,75	1,250	76,20	3,000	—	—	●	●		
CB8490150030006L	CB8490150030006L	-3	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	0,15	.006	●	●		
CB8490150030000L	CB8490150030000L	-3	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	—	—	●	●		
CB8490200040006L	CB8490200040006L	-3	12,70	.500	12,45	.490	50,80	2,000	101,60	4,000	0,15	.006	●	●		
CB8490200040000L	CB8490200040000L	-3	12,70	.500	12,45	.490	50,80	2,000	101,60	4,000	—	—	●	●		
CB8490250040006L	CB8490250040006L	-3	12,70	.500	12,45	.490	63,50	2,500	101,60	4,000	0,15	.006	●	●		
CB8490250040000L	CB8490250040000L	-3	12,70	.500	12,45	.490	63,50	2,500	101,60	4,000	—	—	●	●		
CB8490260040006L	CB8490260040006L	-3	12,70	.500	12,45	.490	66,04	2,600	101,60	4,000	0,15	.006	●	●		
CB8490260040000L	CB8490260040000L	-3	12,70	.500	12,45	.490	66,04	2,600	101,60	4,000	—	—	●	●		
CB8490275040006L	CB8490275040006L	-3	12,70	.500	12,45	.490	69,85	2,750	101,60	4,000	0,15	.006	●	●		
CB8490275040000L	CB8490275040000L	-3	12,70	.500	12,45	.490	69,85	2,750	101,60	4,000	—	—	●	●		
CB8490300060006L	CB8490300060006L	-3	12,70	.500	12,45	.490	76,20	3,000	152,40	6,000	0,15	.006	●	●		
CB8490300060000L	CB8490300060000L	-3	12,70	.500	12,45	.490	76,20	3,000	152,40	6,000	—	—	●	●		
CB8490350060006L	CB8490350060006L	-3	12,70	.500	12,45	.490	88,90	3,500	152,40	6,000	0,15	.006	●	●		
CB8490350060000L	CB8490350060000L	-3	12,70	.500	12,45	.490	88,90	3,500	152,40	6,000	—	—	●	●		
CB8490400060006L	CB8490400060006L	-3	12,70	.500	12,45	.490	101,60	4,000	152,40	6,000	0,15	.006	●	●		
CB8490400060000L	CB8490400060000L	-3	12,70	.500	12,45	.490	101,60	4,000	152,40	6,000	—	—	●	●		
CB8490450060006L	CB8490450060006L	-3	12,70	.500	12,45	.490	114,30	4,500	152,40	6,000	0,15	.006	●	●		
CB8490450060000L	CB8490450060000L	-3	12,70	.500	12,45	.490	114,30	4,500	152,40	6,000	—	—	●	●		

Small Hole Boring • Solid Carbide Bars



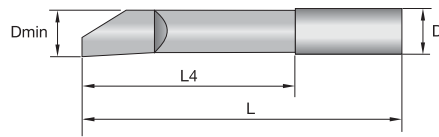
● first choice
○ alternate choice

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

■ CB-M • Shank Diameter .250"–.313" (6,35mm–7,94mm)

ISO catalog number	ANSI catalog number	KRA	D		D min		L4		L		Re		CG5	CM1	CBN6	CPD1
			mm	in	mm	in	mm	in	mm	in	mm	in				
CB418035025006RM	CB418035025006RM	-3	6,35	.250	4,57	.180	8,89	.350	63,50	2,500	0,15	.006			●	●
CB418050025006RM	CB418050025006RM	-3	6,35	.250	4,57	.180	12,70	.500	63,50	2,500	0,15	.006			●	●
CB418060025006RM	CB418060025006RM	-3	6,35	.250	4,57	.180	15,24	.600	63,50	2,500	0,15	.006			●	●
CB418075025006RM	CB418075025006RM	-3	6,35	.250	4,57	.180	19,05	.750	63,50	2,500	0,15	.006			●	●
CB418090025006RM	CB418090025006RM	-3	6,35	.250	4,57	.180	22,86	.900	63,50	2,500	0,15	.006			●	●
CB4180100025006RM	CB4180100025006RM	-3	6,35	.250	4,57	.180	25,40	1,000	63,50	2,500	0,15	.006			●	●
CB4180110025006RM	CB4180110025006RM	-3	6,35	.250	4,57	.180	27,94	1,100	63,50	2,500	0,15	.006			●	●
CB420040025006RM	CB420040025006RM	-3	6,35	.250	5,08	.200	10,16	.400	63,50	2,500	0,15	.006			●	●
CB420050025006RM	CB420050025006RM	-3	6,35	.250	5,08	.200	12,70	.500	63,50	2,500	0,15	.006			●	●
CB420060025006RM	CB420060025006RM	-3	6,35	.250	5,08	.200	15,24	.600	63,50	2,500	0,15	.006			●	●
CB420070025006RM	CB420070025006RM	-3	6,35	.250	5,08	.200	17,78	.700	63,50	2,500	0,15	.006			●	●
CB420080025006RM	CB420080025006RM	-3	6,35	.250	5,08	.200	20,32	.800	63,50	2,500	0,15	.006			●	●
CB420090025006RM	CB420090025006RM	-3	6,35	.250	5,08	.200	22,86	.900	63,50	2,500	0,15	.006			●	●
CB4200100025006RM	CB4200100025006RM	-3	6,35	.250	5,08	.200	25,40	1,000	63,50	2,500	0,15	.006			●	●
CB4200110025006RM	CB4200110025006RM	-3	6,35	.250	5,08	.200	27,94	1,100	63,50	2,500	0,15	.006			●	●
CB4200120025006RM	CB4200120025006RM	-3	6,35	.250	5,08	.200	30,48	1,200	63,50	2,500	0,15	.006			●	●
CB4200130025006RM	CB4200130025006RM	-3	6,35	.250	5,08	.200	33,02	1,300	63,50	2,500	0,15	.006			●	●
CB523040025006RM	CB523040025006RM	-3	7,94	.313	5,84	.230	10,16	.400	63,50	2,500	0,15	.006			●	●
CB523050025006RM	CB523050025006RM	-3	7,94	.313	5,84	.230	12,70	.500	63,50	2,500	0,15	.006			●	●
CB523060025006RM	CB523060025006RM	-3	7,94	.313	5,84	.230	15,24	.600	63,50	2,500	0,15	.006			●	●
CB523070025006RM	CB523070025006RM	-3	7,94	.313	5,84	.230	17,78	.700	63,50	2,500	0,15	.006			●	●
CB523080025006RM	CB523080025006RM	-3	7,94	.313	5,84	.230	20,32	.800	63,50	2,500	0,15	.006			●	●
CB523090025006RM	CB523090025006RM	-3	7,94	.313	5,84	.230	22,86	.900	63,50	2,500	0,15	.006			●	●
CB5230100025006RM	CB5230100025006RM	-3	7,94	.313	5,84	.230	25,40	1,000	63,50	2,500	0,15	.006			●	●
CB5230115025006RM	CB5230115025006RM	-3	7,94	.313	5,84	.230	29,21	1,150	63,50	2,500	0,15	.006			●	●
CB5230120025006RM	CB5230120025006RM	-3	7,94	.313	5,84	.230	30,48	1,200	63,50	2,500	0,15	.006			●	●
CB5230125025006RM	CB5230125025006RM	-3	7,94	.313	5,84	.230	31,75	1,250	63,50	2,500	0,15	.006			●	●
CB5230140025006RM	CB5230140025006RM	-3	7,94	.313	5,84	.230	35,56	1,400	63,50	2,500	0,15	.006			●	●
CB5230150025006RM	CB5230150025006RM	-3	7,94	.313	5,84	.230	38,10	1,500	63,50	2,500	0,15	.006			●	●
CB5230160025006RM	CB5230160025006RM	-3	7,94	.313	5,84	.230	40,64	1,600	63,50	2,500	0,15	.006			●	●
CB529050025006RM	CB529050025006RM	-3	7,94	.313	7,37	.290	12,70	.500	63,50	2,500	0,15	.006			●	●
CB529060025006RM	CB529060025006RM	-3	7,94	.313	7,37	.290	15,24	.600	63,50	2,500	0,15	.006			●	●
CB529075025006RM	CB529075025006RM	-3	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	0,15	.006			●	●
CB529090025006RM	CB529090025006RM	-3	7,94	.313	7,37	.290	22,86	.900	63,50	2,500	0,15	.006			●	●
CB5290100025006RM	CB5290100025006RM	-3	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	0,15	.006			●	●
CB5290110025006RM	CB5290110025006RM	-3	7,94	.313	7,37	.290	27,94	1,100	63,50	2,500	0,15	.006			●	●
CB5290125025006RM	CB5290125025006RM	-3	7,94	.313	7,37	.290	31,75	1,250	63,50	2,500	0,15	.006			●	●
CB5290135025006RM	CB5290135025006RM	-3	7,94	.313	7,37	.290	34,29	1,350	63,50	2,500	0,15	.006			●	●
CB5290150025006RM	CB5290150025006RM	-3	7,94	.313	7,37	.290	38,10	1,500	63,50	2,500	0,15	.006			●	●
CB5290160025006RM	CB5290160025006RM	-3	7,94	.313	7,37	.290	40,64	1,600	63,50	2,500	0,15	.006			●	●
CB5290175025006RM	CB5290175025006RM	-3	7,94	.313	7,37	.290	44,45	1,750	63,50	2,500	0,15	.006			●	●

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

■ CHB

ISO catalog number	ANSI catalog number	D		D min		L4		L		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in				
CHB20200621500R	Right hand CHB20200621500R	3,18	.125	0,51	.020	1,59	.063	38,10	1.500	●	●		
CHB20250621500R	CHB20250621500R	3,18	.125	0,64	.025	1,59	.063	38,10	1.500	●	●		
CHB20251251500R	CHB20251251500R	3,18	.125	0,64	.025	3,18	.125	38,10	1.500	●	●		
CHB20301251500R	CHB20301251500R	3,18	.125	0,76	.030	3,18	.125	38,10	1.500	●	●		
CHB20301871500R	CHB20301871500R	3,18	.125	0,76	.030	4,76	.188	38,10	1.500	●	●		
CHB20351251500R	CHB20351251500R	3,18	.125	0,89	.035	3,18	.125	38,10	1.500	●	●		
CHB20351871500R	CHB20351871500R	3,18	.125	0,89	.035	4,76	.188	38,10	1.500	●	●		
CHB20401871500R	CHB20401871500R	3,18	.125	1,02	.040	4,76	.188	38,10	1.500	●	●		
CHB20402501500R	CHB20402501500R	3,18	.125	1,02	.040	6,35	.250	38,10	1.500	●	●		
CHB20503121500R	CHB20503121500R	3,18	.125	1,27	.050	7,94	.313	38,10	1.500	●	●		
CHB20603751500R	CHB20603751500R	3,18	.125	1,52	.060	9,53	.375	38,10	1.500	●	●		
CHB20704371500R	CHB20704371500R	3,18	.125	1,78	.070	11,10	.437	38,10	1.500	●	●		
CHB20805001500R	CHB20805001500R	3,18	.125	2,03	.080	12,70	.500	38,10	1.500	●	●		
CHB20905001500R	CHB20905001500R	3,18	.125	2,29	.090	12,70	.500	38,10	1.500	●	●		
CHB21005621500R	CHB21005621500R	3,18	.125	2,54	.100	14,29	.563	38,10	1.500	●	●		
CHB21206251500R	CHB21206251500R	3,18	.125	3,05	.120	15,88	.625	38,10	1.500	●	●		
CHB212010001500R	CHB212010001500R	3,18	.125	3,05	.120	25,40	1.000	38,10	1.500	●	●		
CHB31357502000R	CHB31357502000R	4,76	.188	3,43	.135	19,05	.750	50,80	2.000	●	●		
CHB313510002000R	CHB313510002000R	4,76	.188	3,43	.135	25,40	1.000	50,80	2.000	●	●		
CHB315010002000R	CHB315010002000R	4,76	.188	3,81	.150	25,40	1.000	50,80	2.000	●	●		
CHB315012502000R	CHB315012502000R	4,76	.188	3,81	.150	31,75	1.250	50,80	2.000	●	●		
CHB318010002000R	CHB318010002000R	4,76	.188	4,57	.180	25,40	1.000	50,80	2.000	●	●		
CHB318012502000R	CHB318012502000R	4,76	.188	4,57	.180	31,75	1.250	50,80	2.000	●	●		
CHB318015002000R	CHB318015002000R	4,76	.188	4,57	.180	38,10	1.500	50,80	2.000	●	●		
CHB421010002500R	CHB421010002500R	6,35	.250	5,33	.210	25,40	1.000	63,50	2.500	●	●		
CHB421012502500R	CHB421012502500R	6,35	.250	5,33	.210	31,75	1.250	63,50	2.500	●	●		
CHB421015002500R	CHB421015002500R	6,35	.250	5,33	.210	38,10	1.500	63,50	2.500	●	●		
CHB424010002500R	CHB424010002500R	6,35	.250	6,10	.240	25,40	1.000	63,50	2.500	●	●		
CHB424015002500R	CHB424015002500R	6,35	.250	6,10	.240	38,10	1.500	63,50	2.500	●	●		
CHB424017502500R	CHB424017502500R	6,35	.250	6,10	.240	44,45	1.750	63,50	2.500	●	●		
CHB530010002500R	CHB530010002500R	7,94	.313	7,62	.300	25,40	1.000	63,50	2.500	●	●		
CHB530015002500R	CHB530015002500R	7,94	.313	7,62	.300	38,10	1.500	63,50	2.500	●	●		
CHB530017502500R	CHB530017502500R	7,94	.313	7,62	.300	44,45	1.750	63,50	2.500	●	●		
CHB636010002500R	CHB636010002500R	9,53	.375	9,14	.360	25,40	1.000	63,50	2.500	●	●		
CHB636015002500R	CHB636015002500R	9,53	.375	9,14	.360	38,10	1.500	63,50	2.500	●	●		
CHB636017502500R	CHB636017502500R	9,53	.375	9,14	.360	44,45	1.750	63,50	2.500	●	●		
CHB636020004000R	CHB636020004000R	9,53	.375	9,14	.360	50,80	2.000	101,60	4.000	●	●		
CHB636022504000R	CHB636022504000R	9,53	.375	9,14	.360	57,15	2.250	101,60	4.000	●	●		
CHB636025004000R	CHB636025004000R	9,53	.375	9,14	.360	63,50	2.500	101,60	4.000	●	●		
CHB848015003000R	CHB848015003000R	12,70	.500	12,19	.480	38,10	1.500	76,20	3.000	●	●		
CHB848020003000R	CHB848020003000R	12,70	.500	12,19	.480	50,80	2.000	76,20	3.000	●	●		
CHB848025004000R	CHB848025004000R	12,70	.500	12,19	.480	63,50	2.500	101,60	4.000	●	●		
CHB848030004000R	CHB848030004000R	12,70	.500	12,19	.480	76,20	3.000	101,60	4.000	●	●		
CHB848035006000R	CHB848035006000R	12,70	.500	12,19	.480	88,90	3.500	152,40	6.000	●	●		
CHB848040006000R	CHB848040006000R	12,70	.500	12,19	.480	101,60	4.000	152,40	6.000	●	●		
CHB848045006000R	CHB848045006000R	12,70	.500	12,19	.480	114,30	4.500	152,40	6.000	●	●		

Small Hole Boring • Solid Carbide Bars

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).
- 4 Select appropriate grade using grade descriptions on page C110.

Solid Carbide Bars
Carbide Full Radius Inserts

first choice
 alternate choice

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		RC	CNS	CNS	CNS	CPDT	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in						
CFR604020200R	CFR6040202500R	9.53	.375	9.53	.375	8.35	.250	63.50	2.500	2.79	.110	1.00	.040	0.51	.020	●	●	●	●
CFR60472502500R	CFR60472502500R	9.53	.375	9.53	.375	8.35	.250	63.50	2.500	2.79	.110	1.19	.047	0.60	.024	●	●	●	●
CFR6062502500R	CFR6062502500R	9.53	.375	9.53	.375	8.35	.250	63.50	2.500	2.79	.110	1.42	.056	0.71	.026	●	●	●	●
CFR60632502500R	CFR60632502500R	9.53	.375	9.53	.375	8.35	.250	63.50	2.500	2.79	.110	1.60	.063	0.80	.023	●	●	●	●
CFR60702502500R	CFR60702502500R	9.53	.375	9.53	.375	8.35	.250	63.50	2.500	2.79	.110	1.78	.070	0.89	.035	●	●	●	●

- 5 Select the cutting conditions using speed and feed chart on page C111.

WIN WITH WIDIA™

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

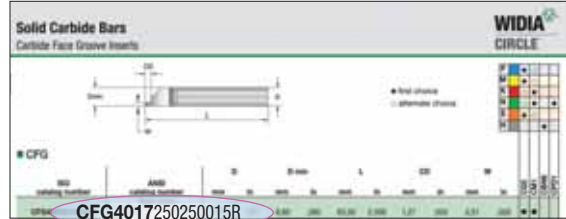
- Accurate, quick-change tooling and toolholders are ideal for small parts machining applications.

To learn more about our innovations, contact your local Authorized Distributor or visit www.widia.com.

WIDIA™

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

Material

C = Carbide

FG

Groove Style

- FG** = Face Groove
- FR** = Full Radius
- OR** = O-Ring
- RR** = Retaining Ring
- UG** = Undercut
- UPG** = Undercut/Profile

4

Shank Diameter
shown as "D"

Inch

- 4 = .250"
- 5 = .313"
- 6 = .375"
- 8 = .500"
- 10 = .625"
- 12 = .750"

Metric

- 4 = 6,35mm
- 5 = 7,94mm
- 6 = 9,53mm
- 8 = 12,70mm
- 10 = 15,88mm
- 12 = 19,05mm

017

Groove Width
shown as "W"

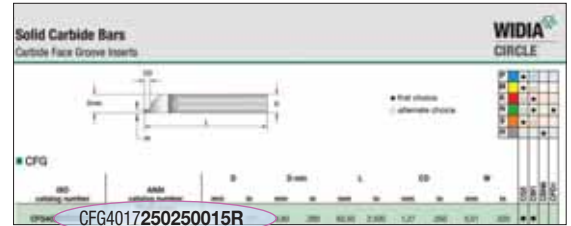
Inch

- 017 = .017"/.018"
- 020 = .020"
- 025 = .025"/.026"
- 030 = .030"/.031"
- 033 = .033"/.034"
- 038 = .038"/.039"
- 040 = .040"
- 047 = .047"
- 050 = .050"
- 056 = .056"
- 062 = .062"
- 063 = .063"
- 070 = .070"
- 088 = .088"
- 093 = .093"
- 094 = .094"
- 097 = .097"
- 125 = .125"
- 126 = .126"
- 142 = .142"
- 145 = .145"
- 157 = .157"
- 175 = .175"
- 187 = .187"
- 188 = .188"
- 209 = .209"
- 242 = .242"
- 250 = .250"

Metric

- 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"

Inch

050	=	.050"
075	=	.070"
100	=	.100"
150	=	.150"
250	=	.250"
375	=	.375"
500	=	.500"
563	=	.563"
625	=	.625"
750	=	.750"
813	=	.813"
938	=	.938"
1000	=	1.000"
1250	=	1.250"
1500	=	1.500"

Metric

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"

Inch

2500	=	2.500"
3000	=	3.000"
4000	=	4.000"

Metric

2500	=	63,50mm
3000	=	76,20mm
4000	=	101,60mm

15

Tool Radius
shown as "Re"

Blank

Inch

15	=	.015"
40	=	.040"

Metric

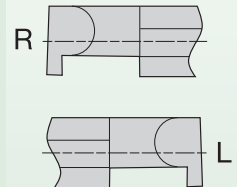
15	=	0,38mm
40	=	1,02mm

R

Hand of Insert

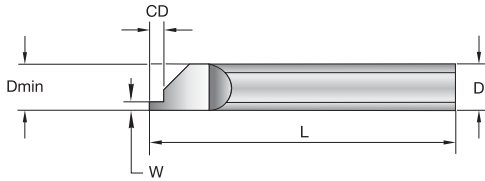
R = Right hand

L = Left hand



Solid Carbide Bars

Carbide Face Groove Inserts



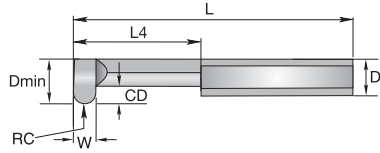
● first choice
○ alternate choice

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

■ CFG

ISO catalog number	ANSI catalog number	D		D min		L		CD		W		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in				
	Right hand														
CFG40200502500R	CFG40200502500R	6,35	.250	6,60	.260	63,50	2.500	1,27	.050	0,51	.020	●	●		
CFG40300502500R	CFG40300502500R	6,35	.250	6,60	.260	63,50	2.500	1,27	.050	0,76	.030	●	●		
CFG40400502500R	CFG40400502500R	6,35	.250	6,60	.260	63,50	2.500	1,27	.050	1,02	.040	●	●		
CFG40500502500R	CFG40500502500R	6,35	.250	6,60	.260	63,50	2.500	1,27	.050	1,27	.050	●	●		
CFG50300502500R	CFG50300502500R	7,94	.313	8,13	.320	63,50	2.500	1,27	.050	0,76	.030	●	●		
CFG50400502500R	CFG50400502500R	7,94	.313	8,13	.320	63,50	2.500	1,27	.050	1,02	.040	●	●		
CFG50500502500R	CFG50500502500R	7,94	.313	8,13	.320	63,50	2.500	1,27	.050	1,27	.050	●	●		
CFG50620752500R	CFG50620752500R	7,94	.313	8,13	.320	63,50	2.500	1,91	.075	1,58	.062	●	●		
CFG60300502500R	CFG60300502500R	9,53	.375	9,78	.385	63,50	2.500	1,27	.050	0,76	.030	●	●		
CFG60620752500R	CFG60620752500R	9,53	.375	9,78	.385	63,50	2.500	1,91	.075	1,58	.062	●	●		
CFG60931002500R	CFG60931002500R	9,53	.375	9,78	.385	63,50	2.500	2,54	.100	2,36	.093	●	●		
CFG61251002500R	CFG61251002500R	9,53	.375	9,78	.385	63,50	2.500	2,54	.100	3,18	.125	●	●		
CFG80620753000R	CFG80620753000R	12,70	.500	12,95	.510	76,20	3.000	1,91	.075	1,58	.062	●	●		
CFG80931003000R	CFG80931003000R	12,70	.500	12,95	.510	76,20	3.000	2,54	.100	2,36	.093	●	●		
CFG81251003000R	CFG81251003000R	12,70	.500	12,95	.510	76,20	3.000	2,54	.100	3,18	.125	●	●		
CFG81561003000R	CFG81561003000R	12,70	.500	12,95	.510	76,20	3.000	2,54	.100	3,96	.156	●	●		
CFG100620753500R	CFG100620753500R	15,88	.625	16,13	.635	88,90	3.500	1,91	.075	1,58	.062	●	●		
CFG100931003500R	CFG100931003500R	15,88	.625	16,13	.635	88,90	3.500	2,54	.100	2,36	.093	●	●		
CFG101251003500R	CFG101251003500R	15,88	.625	16,13	.635	88,90	3.500	2,54	.100	3,18	.125	●	●		
CFG101561003500R	CFG101561003500R	15,88	.625	16,13	.635	88,90	3.500	2,54	.100	3,96	.156	●	●		
CFG101871503500R	CFG101871503500R	15,88	.625	16,13	.635	88,90	3.500	3,81	.150	4,75	.187	●	●		
CFG120620754000R	CFG120620754000R	19,05	.750	19,30	.760	101,60	4.000	1,91	.075	1,58	.062	●	●		
CFG120931004000R	CFG120931004000R	19,05	.750	19,30	.760	101,60	4.000	2,54	.100	2,36	.093	●	●		
CFG121251004000R	CFG121251004000R	19,05	.750	19,30	.760	101,60	4.000	2,54	.100	3,18	.125	●	●		
CFG121561004000R	CFG121561004000R	19,05	.750	19,30	.760	101,60	4.000	2,54	.100	3,96	.156	●	●		
CFG121871504000R	CFG121871504000R	19,05	.750	19,30	.760	101,60	4.000	3,81	.150	4,75	.187	●	●		
CFG122502504000R	CFG122502504000R	19,05	.750	19,30	.760	101,60	4.000	6,35	.250	6,35	.250	●	●		

Small Hole Boring • Solid Carbide Bars



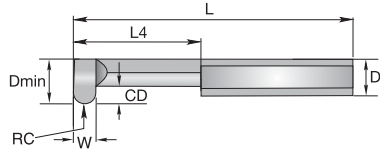
● first choice
○ alternate choice

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

■ CFR • Shank Diameter .250"–.313" (6,35mm–7,95mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		RC		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
CFR40172502500R	CFR40172502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,45	.018	0,22	.009	●	●		
CFR40252502500R	CFR40252502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,65	.026	0,32	.013	●	●		
CFR40302502500R	CFR40302502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,78	.031	0,39	.015	●	●		
CFR40173752500R	CFR40173752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,45	.018	0,22	.009	●	●		
CFR40253752500R	CFR40253752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,65	.026	0,32	.013	●	●		
CFR40303752500R	CFR40303752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,78	.031	0,39	.015	●	●		
CFR40175002500R	CFR40175002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,45	.018	0,22	.009	●	●		
CFR40255002500R	CFR40255002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,65	.026	0,32	.013	●	●		
CFR40305002500R	CFR40305002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,78	.031	0,39	.015	●	●		
CFR40176252500R	CFR40176252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,45	.018	0,22	.009	●	●		
CFR40256252500R	CFR40256252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,65	.026	0,32	.013	●	●		
CFR40306252500R	CFR40306252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,78	.031	0,39	.015	●	●		
CFR50332502500R	CFR50332502500R	7,94	.313	7,93	.312	6,35	.250	63,50	2,500	2,79	.110	0,85	.034	0,43	.017	●	●		
CFR50382502500R	CFR50382502500R	7,94	.313	7,93	.312	6,35	.250	63,50	2,500	2,79	.110	0,98	.039	0,49	.019	●	●		
CFR50333752500R	CFR50333752500R	7,94	.313	7,93	.312	9,53	.375	63,50	2,500	2,79	.110	0,85	.034	0,43	.017	●	●		
CFR50335002500R	CFR50335002500R	7,94	.313	7,93	.312	12,70	.500	63,50	2,500	2,79	.110	0,85	.034	0,43	.017	●	●		
CFR50385002500R	CFR50385002500R	7,94	.313	7,93	.312	12,70	.500	63,50	2,500	2,79	.110	0,98	.039	0,49	.019	●	●		
CFR50383752500R	CFR50383752500R	7,94	.313	7,93	.312	9,53	.375	63,50	2,500	2,79	.110	0,98	.039	0,49	.019	●	●		
CFR50337502500R	CFR50337502500R	7,94	.313	7,93	.312	19,05	.750	63,50	2,500	2,79	.110	0,85	.034	0,43	.017	●	●		
CFR50387502500R	CFR50387502500R	7,94	.313	7,93	.312	19,05	.750	63,50	2,500	2,79	.110	0,98	.039	0,49	.019	●	●		

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

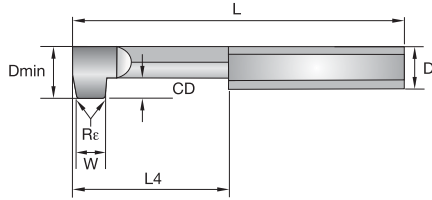
■ CFR • Shank Diameter .500" (12,70mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		RC		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
CFR80945003000R	CFR80945003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	2,39	.094	1,19	.047	●	●		
CFR81265003000R	CFR81265003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	3,20	.126	1,60	.063	●	●		
CFR81575003000R	CFR81575003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	3,99	.157	1,99	.079	●	●		
CFR81885003000R	CFR81885003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	4,78	.188	2,39	.094	●	●		
CFR82505003000R	CFR82505003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	6,35	.250	3,18	.125	●	●		
CFR80947503000R	CFR80947503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	2,39	.094	1,19	.047	●	●		
CFR81267503000R	CFR81267503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	3,20	.126	1,60	.063	●	●		
CFR81577503000R	CFR81577503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	3,99	.157	1,99	.079	●	●		
CFR81887503000R	CFR81887503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	4,78	.188	2,39	.094	●	●		
CFR82507503000R	CFR82507503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	6,35	.250	3,18	.125	●	●		
CFR809410003000R	CFR809410003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	2,39	.094	1,19	.047	●	●		
CFR812610003000R	CFR812610003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	3,20	.126	1,60	.063	●	●		
CFR815710003000R	CFR815710003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	3,99	.157	1,99	.079	●	●		
CFR818810003000R	CFR818810003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	4,78	.188	2,39	.094	●	●		
CFR825010003000R	CFR825010003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	6,35	.250	3,18	.125	●	●		
CFR809412503000R	CFR809412503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	2,39	.094	1,19	.047	●	●		
CFR812612503000R	CFR812612503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	3,20	.126	1,60	.063	●	●		
CFR815712503000R	CFR815712503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	3,99	.157	1,99	.079	●	●		
CFR818812503000R	CFR818812503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	4,78	.188	2,39	.094	●	●		
CFR825012503000R	CFR825012503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	6,35	.250	3,18	.125	●	●		
CFR809415003000R	CFR809415003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	2,39	.094	1,19	.047	●	●		
CFR812615003000R	CFR812615003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	3,20	.126	1,60	.063	●	●		
CFR815715003000R	CFR815715003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	3,99	.157	1,99	.079	●	●		
CFR818815003000R	CFR818815003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	4,78	.188	2,39	.094	●	●		
CFR825015003000R	CFR825015003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	6,35	.250	3,18	.125	●	●		

Small Hole Boring • Solid Carbide Bars

Solid Carbide Bars

Carbide O-Ring Inserts



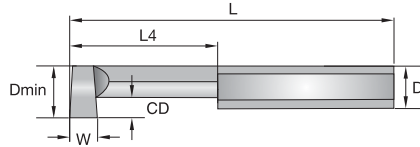
● first choice
○ alternate choice

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

■ COR

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		Re		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
	Right hand																		
COR4097500250015R	COR4097500250015R	6,35	.250	6,35	.250	12,70	.500	63,50	2.500	2,79	.110	2,46	.097	0,38	.015	●	●		
COR4142563250040R	COR4142563250040R	6,35	.250	6,35	.250	14,30	.563	63,50	2.500	2,79	.110	3,61	.142	1,02	.040	●	●		
COR4145625250040R	COR4145625250040R	6,35	.250	6,35	.250	15,88	.625	63,50	2.500	2,79	.110	3,68	.145	1,02	.040	●	●		
COR6175750250015R	COR6175750250015R	9,53	.375	9,53	.375	19,05	.750	63,50	2.500	3,18	.125	4,45	.175	0,38	.015	●	●		
COR6209813250040R	COR6209813250040R	9,53	.375	9,53	.375	20,65	.813	63,50	2.500	3,18	.125	5,31	.209	1,02	.040	●	●		
COR6242938250040R	COR6242938250040R	9,53	.375	9,53	.375	23,83	.938	63,50	2.500	3,18	.125	6,15	.242	1,02	.040	●	●		

Small Hole Boring • Solid Carbide Bars



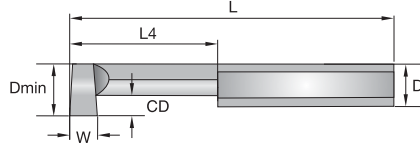
● first choice
○ alternate choice

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

■ CRR • Shank Diameter .250"-.313" (6,35mm-7,95mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
CRR40172502500R	CRR40172502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,43	.017	●	●		
CRR40252502500R	CRR40252502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,64	.025	●	●		
CRR40302502500R	CRR40302502500R	6,35	.250	6,35	.250	6,35	.250	63,50	2,500	1,52	.060	0,76	.030	●	●		
CRR40173752500R	CRR40173752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,43	.017	●	●		
CRR40253752500R	CRR40253752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,64	.025	●	●		
CRR40303752500R	CRR40303752500R	6,35	.250	6,35	.250	9,53	.375	63,50	2,500	1,52	.060	0,76	.030	●	●		
CRR40175002500R	CRR40175002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,43	.017	●	●		
CRR40255002500R	CRR40255002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,64	.025	●	●		
CRR40305002500R	CRR40305002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2,500	1,52	.060	0,76	.030	●	●		
CRR40176252500R	CRR40176252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,43	.017	●	●		
CRR40256252500R	CRR40256252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,64	.025	●	●		
CRR40306252500R	CRR40306252500R	6,35	.250	6,35	.250	15,88	.625	63,50	2,500	1,52	.060	0,76	.030	●	●		
CRR50332502500R	CRR50332502500R	7,94	.313	7,94	.313	6,35	.250	63,50	2,500	2,79	.110	0,84	.033	●	●		
CRR50382502500R	CRR50382502500R	7,94	.313	7,94	.313	6,35	.250	63,50	2,500	2,79	.110	0,97	.038	●	●		
CRR50333752500R	CRR50333752500R	7,94	.313	7,94	.313	9,53	.375	63,50	2,500	2,79	.110	0,84	.033	●	●		
CRR50383752500R	CRR50383752500R	7,94	.313	7,94	.313	9,53	.375	63,50	2,500	2,79	.110	0,97	.038	●	●		
CRR50335002500R	CRR50335002500R	7,94	.313	7,94	.313	12,70	.500	63,50	2,500	2,79	.110	0,84	.033	●	●		
CRR50385002500R	CRR50385002500R	7,94	.313	7,94	.313	12,70	.500	63,50	2,500	2,79	.110	0,97	.038	●	●		
CRR50337502500R	CRR50337502500R	7,94	.313	7,94	.313	19,05	.750	63,50	2,500	2,79	.110	0,84	.033	●	●		
CRR50387502500R	CRR50387502500R	7,94	.313	7,94	.313	19,05	.750	63,50	2,500	2,79	.110	0,97	.038	●	●		

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

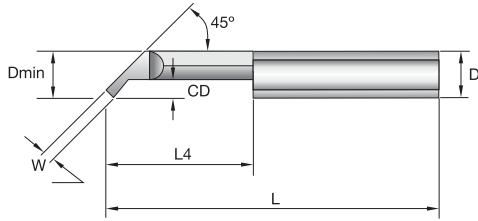
■ CRR • Shank Diameter .500" (12,70mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
CRR80945003000R	Right hand CRR80945003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	2,39	.094	●	●		
CRR81265003000R	CRR81265003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	3,20	.126	●	●		
CRR81575003000R	CRR81575003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	3,99	.157	●	●		
CRR81885003000R	CRR81885003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	4,78	.188	●	●		
CRR82505003000R	CRR82505003000R	12,70	.500	12,70	.500	12,70	.500	76,20	3.000	4,06	.160	6,35	.250	●	●		
CRR80947503000R	CRR80947503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	2,39	.094	●	●		
CRR81267503000R	CRR81267503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	3,20	.126	●	●		
CRR81577503000R	CRR81577503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	3,99	.157	●	●		
CRR81887503000R	CRR81887503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	4,78	.188	●	●		
CRR82507503000R	CRR82507503000R	12,70	.500	12,70	.500	19,05	.750	76,20	3.000	4,06	.160	6,35	.250	●	●		
CRR809410003000R	CRR809410003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	2,39	.094	●	●		
CRR812610003000R	CRR812610003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	3,20	.126	●	●		
CRR815710003000R	CRR815710003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	3,99	.157	●	●		
CRR818810003000R	CRR818810003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	4,78	.188	●	●		
CRR825010003000R	CRR825010003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	4,06	.160	6,35	.250	●	●		
CRR809412503000R	CRR809412503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	2,39	.094	●	●		
CRR812612503000R	CRR812612503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	3,20	.126	●	●		
CRR815712503000R	CRR815712503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	3,99	.157	●	●		
CRR818812503000R	CRR818812503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	4,78	.188	●	●		
CRR825012503000R	CRR825012503000R	12,70	.500	12,70	.500	31,75	1.250	76,20	3.000	4,06	.160	6,35	.250	●	●		
CRR809415003000R	CRR809415003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	2,39	.094	●	●		
CRR812615003000R	CRR812615003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	3,20	.126	●	●		
CRR815715003000R	CRR815715003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	3,99	.157	●	●		
CRR818815003000R	CRR818815003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	4,78	.188	●	●		
CRR825015003000R	CRR825015003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	4,06	.160	6,35	.250	●	●		

Small Hole Boring • Solid Carbide Bars

Solid Carbide Bars

Carbide Undercut Groove Inserts



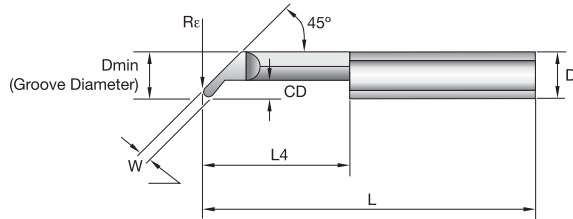
● first choice
○ alternate choice

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

■ CUG

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
	Right hand																
CUG40205002500R	CUG40205002500R	6,35	.250	6,60	.260	12,70	.500	63,50	2.500	1,02	.040	0,51	.020	●	●		
CUG40305002500R	CUG40305002500R	6,35	.250	6,60	.260	12,70	.500	63,50	2.500	1,27	.050	0,76	.030	●	●		
CUG402010002500R	CUG402010002500R	6,35	.250	6,60	.260	25,40	1.000	63,50	2.500	1,02	.040	0,51	.020	●	●		
CUG403010002500R	CUG403010002500R	6,35	.250	6,60	.260	25,40	1.000	63,50	2.500	1,27	.050	0,76	.030	●	●		
CUG50505002500R	CUG50505002500R	7,94	.313	8,26	.325	12,70	.500	63,50	2.500	2,54	.100	1,27	.050	●	●		
CUG505010002500R	CUG505010002500R	7,94	.313	8,26	.325	25,40	1.000	63,50	2.500	2,54	.100	1,27	.050	●	●		
CUG506210002500R	CUG506210002500R	7,94	.313	8,26	.325	25,40	1.000	63,50	2.500	2,54	.100	1,58	.062	●	●		
CUG506212502500R	CUG506212502500R	7,94	.313	8,26	.325	31,75	1.250	63,50	2.500	2,54	.100	1,58	.062	●	●		
CUG606210002500R	CUG606210002500R	9,53	.375	9,78	.385	25,40	1.000	63,50	2.500	2,54	.100	1,58	.062	●	●		
CUG609310002500R	CUG609310002500R	9,53	.375	9,78	.385	25,40	1.000	63,50	2.500	2,54	.100	2,36	.093	●	●		
CUG612510002500R	CUG612510002500R	9,53	.375	9,78	.385	25,40	1.000	63,50	2.500	2,54	.100	3,18	.125	●	●		
CUG606212502500R	CUG606212502500R	9,53	.375	9,78	.385	31,75	1.250	63,50	2.500	2,54	.100	1,58	.062	●	●		
CUG609312502500R	CUG609312502500R	9,53	.375	9,78	.385	31,75	1.250	63,50	2.500	2,54	.100	2,36	.093	●	●		
CUG612512502500R	CUG612512502500R	9,53	.375	9,78	.385	31,75	1.250	63,50	2.500	2,54	.100	3,18	.125	●	●		
CUG806210003000R	CUG806210003000R	12,70	.500	12,95	.510	25,40	1.000	76,20	3.000	3,81	.150	1,58	.062	●	●		
CUG809310003000R	CUG809310003000R	12,70	.500	12,95	.510	25,40	1.000	76,20	3.000	3,81	.150	2,36	.093	●	●		
CUG812510003000R	CUG812510003000R	12,70	.500	12,95	.510	25,40	1.000	76,20	3.000	3,81	.150	3,18	.125	●	●		
CUG806215003000R	CUG806215003000R	12,70	.500	12,95	.510	38,10	1.500	76,20	3.000	3,81	.150	1,58	.062	●	●		
CUG809315003000R	CUG809315003000R	12,70	.500	12,95	.510	38,10	1.500	76,20	3.000	3,81	.150	2,36	.093	●	●		
CUG812515003000R	CUG812515003000R	12,70	.500	12,95	.510	38,10	1.500	76,20	3.000	3,81	.150	3,18	.125	●	●		

Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

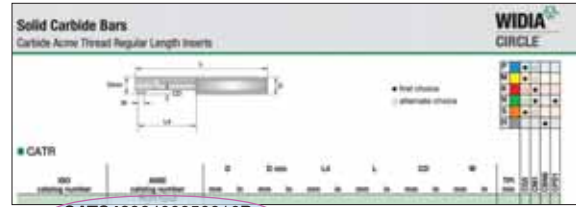
■ CUPG

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		Re		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
CUPG40205002500R	Right hand CUPG40205002500R	6,35	.250	6,60	.260	12,70	.500	63,50	2,500	1,02	.040	0,51	.020	0,25	.010	●	●		
CUPG40305002500R	CUPG40305002500R	6,35	.250	6,60	.260	12,70	.500	63,50	2,500	1,27	.050	0,76	.030	0,38	.015	●	●		
CUPG402010002500R	CUPG402010002500R	6,35	.250	6,60	.260	25,40	1,000	63,50	2,500	1,02	.040	0,51	.020	0,25	.010	●	●		
CUPG403010002500R	CUPG403010002500R	6,35	.250	6,60	.260	25,40	1,000	63,50	2,500	1,27	.050	0,76	.030	0,38	.015	●	●		
CUPG50505002500R	CUPG50505002500R	7,94	.313	8,26	.325	12,70	.500	63,50	2,500	2,54	.100	1,27	.050	0,64	.025	●	●		
CUPG505010002500R	CUPG505010002500R	7,94	.313	8,26	.325	25,40	1,000	63,50	2,500	2,54	.100	1,27	.050	0,64	.025	●	●		
CUPG506210002500R	CUPG506210002500R	7,94	.313	8,26	.325	25,40	1,000	63,50	2,500	2,54	.100	1,58	.062	0,79	.031	●	●		
CUPG506212502500R	CUPG506212502500R	7,94	.313	8,26	.325	31,75	1,250	63,50	2,500	2,54	.100	1,58	.062	0,79	.031	●	●		
CUPG606210002500R	CUPG606210002500R	9,53	.375	9,78	.385	25,40	1,000	63,50	2,500	2,54	.100	1,58	.062	0,79	.031	●	●		
CUPG609310002500R	CUPG609310002500R	9,53	.375	9,78	.385	25,40	1,000	63,50	2,500	2,54	.100	2,36	.093	1,18	.047	●	●		
CUPG612510002500R	CUPG612510002500R	9,53	.375	9,78	.385	25,40	1,000	63,50	2,500	2,54	.100	3,18	.125	1,59	.063	●	●		
CUPG606212502500R	CUPG606212502500R	9,53	.375	9,78	.385	31,75	1,250	63,50	2,500	2,54	.100	1,58	.062	0,79	.031	●	●		
CUPG609312502500R	CUPG609312502500R	9,53	.375	9,78	.385	31,75	1,250	63,50	2,500	2,54	.100	2,36	.093	1,18	.047	●	●		
CUPG612512502500R	CUPG612512502500R	9,53	.375	9,78	.385	31,75	1,250	63,50	2,500	2,54	.100	3,18	.125	1,59	.063	●	●		
CUPG806210003000R	CUPG806210003000R	12,70	.500	12,95	.510	25,40	1,000	76,20	3,000	3,81	.150	1,58	.062	0,79	.031	●	●		
CUPG809310003000R	CUPG809310003000R	12,70	.500	12,95	.510	25,40	1,000	76,20	3,000	3,81	.150	2,36	.093	1,18	.047	●	●		
CUPG812510003000R	CUPG812510003000R	12,70	.500	12,95	.510	25,40	1,000	76,20	3,000	3,81	.150	3,18	.125	1,59	.063	●	●		
CUPG806215003000R	CUPG806215003000R	12,70	.500	12,95	.510	38,10	1,500	76,20	3,000	3,81	.150	1,58	.062	0,79	.031	●	●		
CUPG809315003000R	CUPG809315003000R	12,70	.500	12,95	.510	38,10	1,500	76,20	3,000	3,81	.150	2,36	.093	1,18	.047	●	●		
CUPG812515003000R	CUPG812515003000R	12,70	.500	12,95	.510	38,10	1,500	76,20	3,000	3,81	.150	3,18	.125	1,59	.063	●	●		

Small Hole Boring • Solid Carbide Bars

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.



CATS4200400250016R

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"

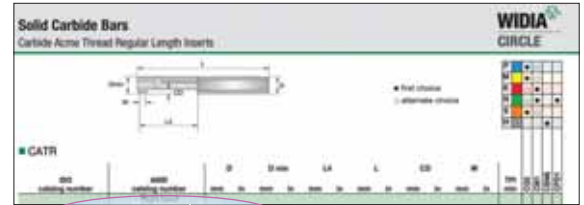
Inch	
2	= .125"
3	= .188"
4	= .250"
5	= .313"
6	= .375"
8	= .500"
Metric	
2	= 3,18mm
3	= 4,76mm
4	= 6,35mm
5	= 7,94mm
6	= 9,53mm
8	= 12,70mm

200

Minimum Bore
shown as "D min"

Inch		Metric	
040	= .040"	040	= 1,02mm
050	= .050"	050	= 1,27mm
060	= .060"	060	= 1,52mm
080	= .080"	080	= 2,03mm
100	= .100"	100	= 2,54mm
120	= .120"	120	= 3,05mm
125	= .125"	125	= 3,18mm
140	= .140"	140	= 3,56mm
160	= .160"	160	= 4,06mm
180	= .180"	180	= 4,57mm
187	= .187"	187	= 4,75mm
200	= .200"	200	= 5,08mm
230	= .230"	230	= 5,84mm
235	= .235"	235	= 5,97mm
250	= .250"	250	= 6,35mm
290	= .290"	290	= 7,37mm
312	= .312"	312	= 7,93mm
320	= .320"	320	= 8,13mm
360	= .360"	360	= 9,14mm
375	= .375"	375	= 9,53mm
490	= .490"	490	= 12,45mm
500	= .500"	500	= 12,70mm

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



CATS4200400250016R

400

Bore Depth
shown as "L4"

Inch	Metric
075 = .075"	075 = 1,91mm
100 = .100"	100 = 2,54mm
150 = .150"	150 = 3,81mm
200 = .200"	200 = 5,08mm
250 = .250"	250 = 6,35mm
300 = .300"	300 = 7,62mm
350 = .350"	350 = 8,89mm
375 = .375"	375 = 9,53mm
400 = .400"	400 = 10,16mm
500 = .500"	500 = 12,70mm
600 = .600"	600 = 15,24mm
750 = .750"	750 = 19,05mm
1000 = 1.000"	1000 = 25,40mm
1250 = 1.250"	1250 = 31,75mm
1500 = 1.500"	1500 = 38,10mm
1750 = 1.750"	1750 = 44,45mm
1800 = 1.800"	1800 = 45,72mm
2000 = 2.000"	2000 = 50,80mm

2500

Overall Length
shown as "L"

Inch	Metric
1500 = 1.500"	1500 = 38,10mm
2000 = 2.000"	2000 = 50,80mm
2500 = 2.500"	2500 = 63,50mm
3000 = 3.000"	3000 = 76,20mm

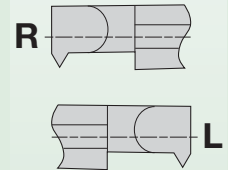
16

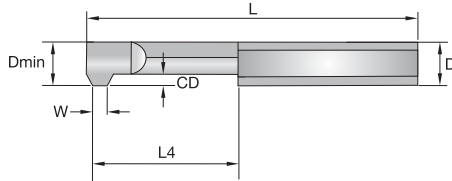
Threads
shown as "TP" Pitch or
"TPI" Threads per Inch

R

Hand of Insert

R = Right hand
L = Left hand





● first choice
○ alternate choice

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

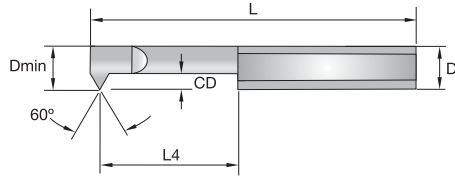
■ CATS

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		TPI min	CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in					
CATS4200400250016R	Right hand CATS4200400250016R	6,35	.250	5,08	.200	10,16	.400	63,50	2,500	1,14	.045	0,61	.024	16	●	●		
CATS4200600250016R	CATS4200600250016R	6,35	.250	5,08	.200	15,24	.600	63,50	2,500	1,14	.045	0,61	.024	16	●	●		
CATS4200750250016R	CATS4200750250016R	6,35	.250	5,08	.200	19,05	.750	63,50	2,500	1,14	.045	0,61	.024	16	●	●		
CATS42001000250016R	CATS42001000250016R	6,35	.250	5,08	.200	25,40	1,000	63,50	2,500	1,14	.045	0,61	.024	16	●	●		
CATS5235500250014R	CATS5235500250014R	7,94	.313	5,97	.235	12,70	.500	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS5235750250014R	CATS5235750250014R	7,94	.313	5,97	.235	19,05	.750	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS52351000250014R	CATS52351000250014R	7,94	.313	5,97	.235	25,40	1,000	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS52351250250014R	CATS52351250250014R	7,94	.313	5,97	.235	31,75	1,250	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS52351750250014R	CATS52351750250014R	7,94	.313	5,97	.235	44,45	1,750	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS5290750250014R	CATS5290750250014R	7,94	.313	7,37	.290	19,05	.750	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS52901000250014R	CATS52901000250014R	7,94	.313	7,37	.290	25,40	1,000	63,50	2,500	1,78	.070	0,71	.028	14	●	●		
CATS6360500250012R	CATS6360500250012R	9,53	.375	9,14	.360	12,70	.500	63,50	2,500	2,16	.085	0,84	.033	12	●	●		
CATS6360750250012R	CATS6360750250012R	9,53	.375	9,14	.360	19,05	.750	63,50	2,500	2,16	.085	0,84	.033	12	●	●		
CATS63601000250012R	CATS63601000250012R	9,53	.375	9,14	.360	25,40	1,000	63,50	2,500	2,16	.085	0,84	.033	12	●	●		
CATS63601250250012R	CATS63601250250012R	9,53	.375	9,14	.360	31,75	1,250	63,50	2,500	2,16	.085	0,84	.033	12	●	●		
CATS63601800250012R	CATS63601800250012R	9,53	.375	9,14	.360	45,72	1,800	63,50	2,500	2,16	.085	0,84	.033	12	●	●		
CATS8490750300010R	CATS8490750300010R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	0,94	.037	10	●	●		
CATS849075030009R	CATS849075030009R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	1,07	.042	9	●	●		
CATS849075030008R	CATS849075030008R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	1,22	.048	8	●	●		
CATS849075030007R	CATS849075030007R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	1,40	.055	7	●	●		
CATS849075030006R	CATS849075030006R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	1,65	.065	6	●	●		
CATS849075030005R	CATS849075030005R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	2,01	.079	5	●	●		
CATS84901500300010R	CATS84901500300010R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	0,94	.037	10	●	●		
CATS8490150030009R	CATS8490150030009R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	1,07	.042	9	●	●		
CATS8490150030008R	CATS8490150030008R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	1,22	.048	8	●	●		
CATS8490150030007R	CATS8490150030007R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	1,40	.055	7	●	●		
CATS8490150030006R	CATS8490150030006R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	1,65	.065	6	●	●		
CATS8490150030005R	CATS8490150030005R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	2,01	.079	5	●	●		
CATS84902000300010R	CATS84902000300010R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	0,94	.037	10	●	●		
CATS8490200030009R	CATS8490200030009R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	1,07	.042	9	●	●		
CATS8490200030008R	CATS8490200030008R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	1,22	.048	8	●	●		
CATS8490200030007R	CATS8490200030007R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	1,40	.055	7	●	●		
CATS8490200030006R	CATS8490200030006R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	1,65	.065	6	●	●		
CATS8490200030005R	CATS8490200030005R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	2,01	.079	5	●	●		

Small Hole Boring • Solid Carbide Bars

Solid Carbide Bars

Carbide 60° Single Point Threading Inserts



● first choice
○ alternate choice

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

■ CIT • Shank Diameter .125"-.188" (3,18mm-4,78mm)

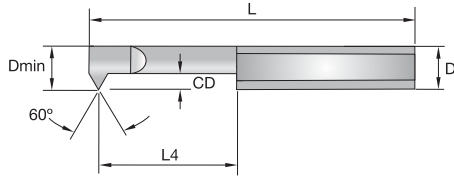
ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		TPI max	TPI min	TP max	TP min	CG5	CM1	CBNG	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in								
Right hand																			
CIT20400751500R	CIT20400751500R	3,18	.125	1,02	.040	1,91	.075	38,10	1.500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20401001500R	CIT20401001500R	3,18	.125	1,02	.040	2,54	.100	38,10	1.500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20401501500R	CIT20401501500R	3,18	.125	1,02	.040	3,81	.150	38,10	1.500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20501001500R	CIT20501001500R	3,18	.125	1,27	.050	2,54	.100	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20501501500R	CIT20501501500R	3,18	.125	1,27	.050	3,81	.150	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20502001500R	CIT20502001500R	3,18	.125	1,27	.050	5,08	.200	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20602001500R	CIT20602001500R	3,18	.125	1,52	.060	5,08	.200	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20602501500R	CIT20602501500R	3,18	.125	1,52	.060	6,35	.250	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20603001500R	CIT20603001500R	3,18	.125	1,52	.060	7,62	.300	38,10	1.500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20802501500R	CIT20802501500R	3,18	.125	2,03	.080	6,35	.250	38,10	1.500	0,51	.020	76	32	0,3	0,8	●	●		
CIT20803501500R	CIT20803501500R	3,18	.125	2,03	.080	8,89	.350	38,10	1.500	0,51	.020	76	32	0,3	0,8	●	●		
CIT20805001500R	CIT20805001500R	3,18	.125	2,03	.080	12,70	.500	38,10	1.500	0,51	.020	76	32	0,3	0,8	●	●		
CIT21002501500R	CIT21002501500R	3,18	.125	2,54	.100	6,35	.250	38,10	1.500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21003501500R	CIT21003501500R	3,18	.125	2,54	.100	8,89	.350	38,10	1.500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21005001500R	CIT21005001500R	3,18	.125	2,54	.100	12,70	.500	38,10	1.500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21006001500R	CIT21006001500R	3,18	.125	2,54	.100	15,24	.600	38,10	1.500	0,64	.025	64	32	0,4	0,8	●	●		
CIT31202502000R	CIT31202502000R	4,76	.188	3,05	.120	6,35	.250	50,80	2.000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31204002000R	CIT31204002000R	4,76	.188	3,05	.120	10,16	.400	50,80	2.000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31205002000R	CIT31205002000R	4,76	.188	3,05	.120	12,70	.500	50,80	2.000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31206002000R	CIT31206002000R	4,76	.188	3,05	.120	15,24	.600	50,80	2.000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31207502000R	CIT31207502000R	4,76	.188	3,05	.120	19,05	.750	50,80	2.000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31402502000R	CIT31402502000R	4,76	.188	3,56	.140	6,35	.250	50,80	2.000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31404002000R	CIT31404002000R	4,76	.188	3,56	.140	10,16	.400	50,80	2.000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31405002000R	CIT31405002000R	4,76	.188	3,56	.140	12,70	.500	50,80	2.000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31407502000R	CIT31407502000R	4,76	.188	3,56	.140	19,05	.750	50,80	2.000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31602502000R	CIT31602502000R	4,76	.188	4,06	.160	6,35	.250	50,80	2.000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31604002000R	CIT31604002000R	4,76	.188	4,06	.160	10,16	.400	50,80	2.000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31605002000R	CIT31605002000R	4,76	.188	4,06	.160	12,70	.500	50,80	2.000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31607502000R	CIT31607502000R	4,76	.188	4,06	.160	19,05	.750	50,80	2.000	1,02	.040	56	18	0,5	1,4	●	●		
CIT316010002000R	CIT316010002000R	4,76	.188	4,06	.160	25,40	1.000	50,80	2.000	1,02	.040	56	18	0,5	1,4	●	●		

(continued)

Small Hole Boring • Solid Carbide Bars



(continued)



● first choice
○ alternate choice

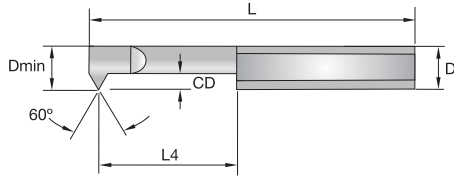
P	●	○	○	○
M	●	○	○	○
K	●	○	○	○
N	○	○	○	○
S	○	○	○	○
H	○	○	○	○

■ CIT • Shank Diameter .125"-.188" (3,18mm-4,78mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		TPI max	TPI min	TP max	TP min	CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in								
		Left hand																	
CIT20400751500L	CIT20400751500L	3,18	.125	1,02	.040	1,91	.075	38,10	1,500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20401001500L	CIT20401001500L	3,18	.125	1,02	.040	2,54	.100	38,10	1,500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20401501500L	CIT20401501500L	3,18	.125	1,02	.040	3,81	.150	38,10	1,500	0,38	.015	80	40	0,3	0,6	●	●		
CIT20501001500L	CIT20501001500L	3,18	.125	1,27	.050	2,54	.100	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20501501500L	CIT20501501500L	3,18	.125	1,27	.050	3,81	.150	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20502001500L	CIT20502001500L	3,18	.125	1,27	.050	5,08	.200	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20602001500L	CIT20602001500L	3,18	.125	1,52	.060	5,08	.200	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20602501500L	CIT20602501500L	3,18	.125	1,52	.060	6,35	.250	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20603001500L	CIT20603001500L	3,18	.125	1,52	.060	7,62	.300	38,10	1,500	0,51	.020	80	40	0,3	0,6	●	●		
CIT20802501500L	CIT20802501500L	3,18	.125	2,03	.080	6,35	.250	38,10	1,500	0,51	.020	76	32	0,3	0,8	●	●		
CIT20803501500L	CIT20803501500L	3,18	.125	2,03	.080	8,89	.350	38,10	1,500	0,51	.020	76	32	0,3	0,8	●	●		
CIT20805001500L	CIT20805001500L	3,18	.125	2,03	.080	12,70	.500	38,10	1,500	0,51	.020	76	32	0,3	0,8	●	●		
CIT21002501500L	CIT21002501500L	3,18	.125	2,54	.100	6,35	.250	38,10	1,500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21003501500L	CIT21003501500L	3,18	.125	2,54	.100	8,89	.350	38,10	1,500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21005001500L	CIT21005001500L	3,18	.125	2,54	.100	12,70	.500	38,10	1,500	0,64	.025	64	32	0,4	0,8	●	●		
CIT21006001500L	CIT21006001500L	3,18	.125	2,54	.100	15,24	.600	38,10	1,500	0,64	.025	64	32	0,4	0,8	●	●		
CIT31202502000L	CIT31202502000L	4,76	.188	3,05	.120	6,35	.250	50,80	2,000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31204002000L	CIT31204002000L	4,76	.188	3,05	.120	10,16	.400	50,80	2,000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31205002000L	CIT31205002000L	4,76	.188	3,05	.120	12,70	.500	50,80	2,000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31206002000L	CIT31206002000L	4,76	.188	3,05	.120	15,24	.600	50,80	2,000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31207502000L	CIT31207502000L	4,76	.188	3,05	.120	19,05	.750	50,80	2,000	0,76	.030	56	24	0,5	1,1	●	●		
CIT31402502000L	CIT31402502000L	4,76	.188	3,56	.140	6,35	.250	50,80	2,000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31404002000L	CIT31404002000L	4,76	.188	3,56	.140	10,16	.400	50,80	2,000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31405002000L	CIT31405002000L	4,76	.188	3,56	.140	12,70	.500	50,80	2,000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31407502000L	CIT31407502000L	4,76	.188	3,56	.140	19,05	.750	50,80	2,000	0,89	.035	56	20	0,5	1,3	●	●		
CIT31602502000L	CIT31602502000L	4,76	.188	4,06	.160	6,35	.250	50,80	2,000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31604002000L	CIT31604002000L	4,76	.188	4,06	.160	10,16	.400	50,80	2,000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31605002000L	CIT31605002000L	4,76	.188	4,06	.160	12,70	.500	50,80	2,000	1,02	.040	56	18	0,5	1,4	●	●		
CIT31607502000L	CIT31607502000L	4,76	.188	4,06	.160	19,05	.750	50,80	2,000	1,02	.040	56	18	0,5	1,4	●	●		
CIT316010002000L	CIT316010002000L	4,76	.188	4,06	.160	25,40	1,000	50,80	2,000	1,02	.040	56	18	0,5	1,4	●	●		



Small Hole Boring • Solid Carbide Bars



● first choice
○ alternate choice

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

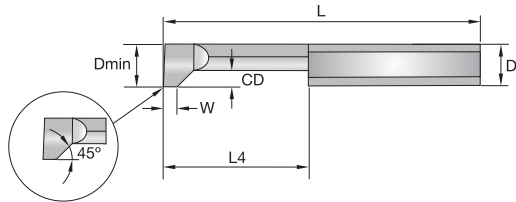
■ CIT • Shank Diameter .375"-.500" (9,53mm-12,70mm)

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		TPI max	TPI min	TP max	TP min	CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in								
	Right hand																		
CIT63205002500R	CIT63205002500R	9,53	.375	8,13	.320	12,70	.500	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT63207502500R	CIT63207502500R	9,53	.375	8,13	.320	19,05	.750	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632010002500R	CIT632010002500R	9,53	.375	8,13	.320	25,40	1,000	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632012502500R	CIT632012502500R	9,53	.375	8,13	.320	31,75	1,250	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632018002500R	CIT632018002500R	9,53	.375	8,13	.320	45,72	1,800	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT63605002500R	CIT63605002500R	9,53	.375	9,14	.360	12,70	.500	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT63607502500R	CIT63607502500R	9,53	.375	9,14	.360	19,05	.750	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636010002500R	CIT636010002500R	9,53	.375	9,14	.360	25,40	1,000	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636012502500R	CIT636012502500R	9,53	.375	9,14	.360	31,75	1,250	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636018002500R	CIT636018002500R	9,53	.375	9,14	.360	45,72	1,800	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT84907503000R	CIT84907503000R	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		
CIT849015003000R	CIT849015003000R	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		
CIT849020003000R	CIT849020003000R	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		
	Left hand																		
CIT63205002500L	CIT63205002500L	9,53	.375	8,13	.320	12,70	.500	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT63207502500L	CIT63207502500L	9,53	.375	8,13	.320	19,05	.750	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632010002500L	CIT632010002500L	9,53	.375	8,13	.320	25,40	1,000	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632012502500L	CIT632012502500L	9,53	.375	8,13	.320	31,75	1,250	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT632018002500L	CIT632018002500L	9,53	.375	8,13	.320	45,72	1,800	63,50	2,500	1,91	.075	32	10	0,8	2,5	●	●		
CIT63605002500L	CIT63605002500L	9,53	.375	9,14	.360	12,70	.500	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT63607502500L	CIT63607502500L	9,53	.375	9,14	.360	19,05	.750	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636010002500L	CIT636010002500L	9,53	.375	9,14	.360	25,40	1,000	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636012502500L	CIT636012502500L	9,53	.375	9,14	.360	31,75	1,250	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT636018002500L	CIT636018002500L	9,53	.375	9,14	.360	45,72	1,800	63,50	2,500	2,16	.085	32	10	0,8	2,5	●	●		
CIT84907503000L	CIT84907503000L	12,70	.500	12,45	.490	19,05	.750	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		
CIT849015003000L	CIT849015003000L	12,70	.500	12,45	.490	38,10	1,500	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		
CIT849020003000L	CIT849020003000L	12,70	.500	12,45	.490	50,80	2,000	76,20	3,000	3,05	.120	32	8	0,8	3,2	●	●		

Small Hole Boring • Solid Carbide Bars

Solid Carbide Bars

Carbide Thread Relief Inserts



● first choice
○ alternate choice

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

■ CTR

ISO catalog number	ANSI catalog number	D		D min		L4		L		CD		W		CG5	CM1	CBN6	CPD1
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in				
	Right hand																
CTR21253751500R	CTR21253751500R	3,18	.125	3,18	.125	9,53	.375	38,10	1.500	1,27	.050	1,58	.062	●	●		
CTR31873752000R	CTR31873752000R	4,76	.188	4,75	.187	9,53	.375	50,80	2.000	1,27	.050	1,98	.078	●	●		
CTR31877502000R	CTR31877502000R	4,76	.188	4,75	.187	19,05	.750	50,80	2.000	1,27	.050	1,98	.078	●	●		
CTR42505002500R	CTR42505002500R	6,35	.250	6,35	.250	12,70	.500	63,50	2.500	1,52	.060	2,39	.094	●	●		
CTR425010002500R	CTR425010002500R	6,35	.250	6,35	.250	25,40	1.000	63,50	2.500	1,52	.060	2,39	.094	●	●		
CTR53127502500R	CTR53127502500R	7,94	.313	7,93	.312	19,05	.750	63,50	2.500	2,16	.085	2,39	.094	●	●		
CTR531212502500R	CTR531212502500R	7,94	.313	7,93	.312	31,75	1.250	63,50	2.500	2,16	.085	2,39	.094	●	●		
CTR63757502500R	CTR63757502500R	9,53	.375	9,53	.375	19,05	.750	63,50	2.500	2,79	.110	3,18	.125	●	●		
CTR637512502500R	CTR637512502500R	9,53	.375	9,53	.375	31,75	1.250	63,50	2.500	2,79	.110	3,18	.125	●	●		
CTR850010003000R	CTR850010003000R	12,70	.500	12,70	.500	25,40	1.000	76,20	3.000	3,43	.135	3,96	.156	●	●		
CTR850015003000R	CTR850015003000R	12,70	.500	12,70	.500	38,10	1.500	76,20	3.000	3,43	.135	3,96	.156	●	●		

Small Hole Boring • Solid Carbide Bars

On the Web



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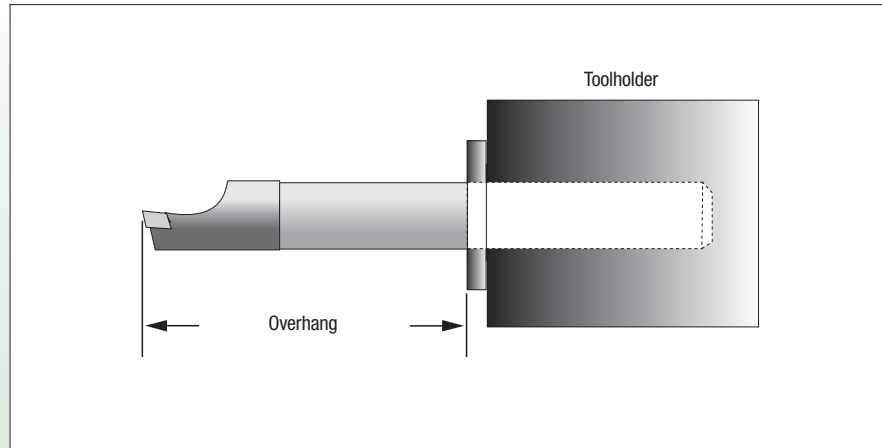
WIDIA Products

Whether your operation is turning, milling, or holmaking, 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 more than 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 material(s) being machined.
- Depth of cut(s).
- Feed rate(s).

Recommended conditions may still be unsatisfactory because of chatter. Chatter can be induced by non-rigid setups or harmonics from the machine or machining conditions. In many cases, changing the RPM of the machine can reduce chatter.

shank diameter	steel shank (ratio 4:1)	carbide shank (ratio 10:1)
0.156" (4,00mm)	0.625" (16,00mm)	1.560" (40,00mm)
0.187" (5,00mm)	0.748" (20,00mm)	1.187" (50,00mm)
0.250" (6,00mm)	1.000" (24,00mm)	2.500" (60,00mm)
0.375" (8,00mm)	1.500" (32,00mm)	3.750" (80,00mm)
0.500" (10,00mm)	2.000" (40,00mm)	5.000" (100,00mm)
0.625" (12,00mm)	2.500" (48,00mm)	6.250" (120,00mm)
0.750" (16,00mm)	3.000" (64,00mm)	7.500" (160,00mm)
0.875" (20,00mm)	3.500" (80,00mm)	8.750" (200,00mm)
1.000" (25,00mm)	4.000" (100,00mm)	10.000" (250,00mm)
1.250" (32,00mm)	5.000" (128,00mm)	12.500" (320,00mm)

Set-Up Information and Recommendations

Tool "D" (above centerline)

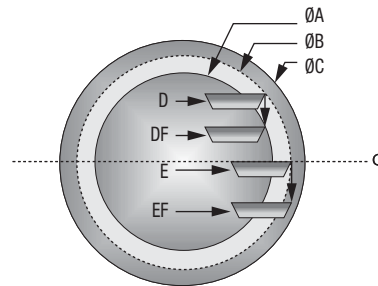
Set $\varnothing B$ is deflected to position "DF," relieving the load by deflecting to a smaller bore, $\varnothing A$. Tool "D" cannot "dig in" because the cut (load) becomes lighter as it deflects.

Tool "E" (on centerline or below)

Set $\varnothing B$ "digs in" and is deflected toward position "EF" and bore $\varnothing C$. 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.

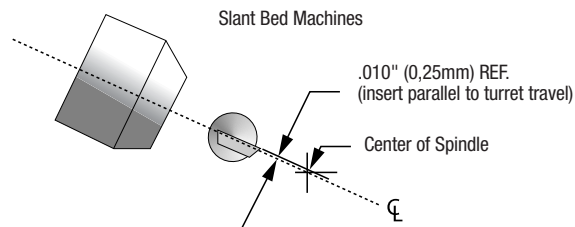
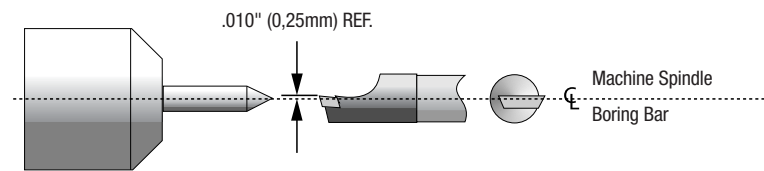


Built-in geometries of WIDIA-CIRCLE™ precision boring bars are based on the concept that the boring bar shank will always be positioned on the machine spindle centerline. The cutting point will be slightly high (against direction of rotation) except when facing to centerline or cutting on outside diameters.

Use WIDIA-CIRCLE precision set-up level or:

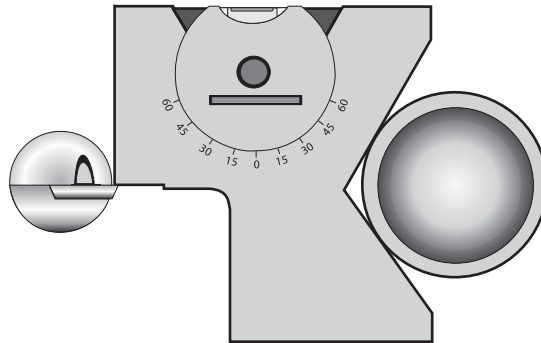
1. Use center height gage and position insert as shown in illustration.
2. If center point is unavailable, mark the center of the bar stock with a centering punch or square. Position the insert as shown in illustration.
3. Lay a straight edge on the insert to help position the insert parallel to the travel or centerline.

NOTE: In some cases, to help reduce chatter or taper, the insert may need to be rotated less than .010" (0,25mm) but more than .002" (0,05mm) above center.

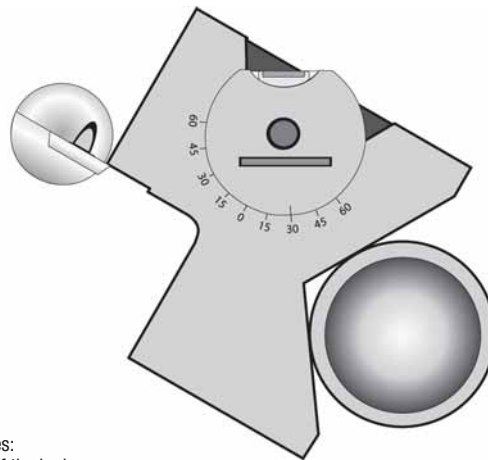




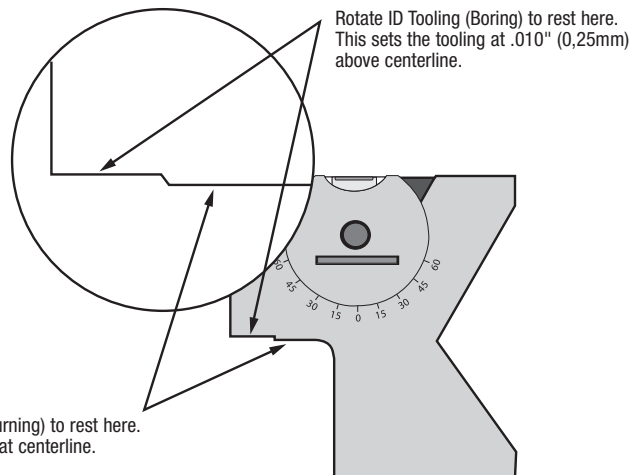
Uni-Level Precision Set-Up Level



For most machines:
Set the dial to the 0° mark.



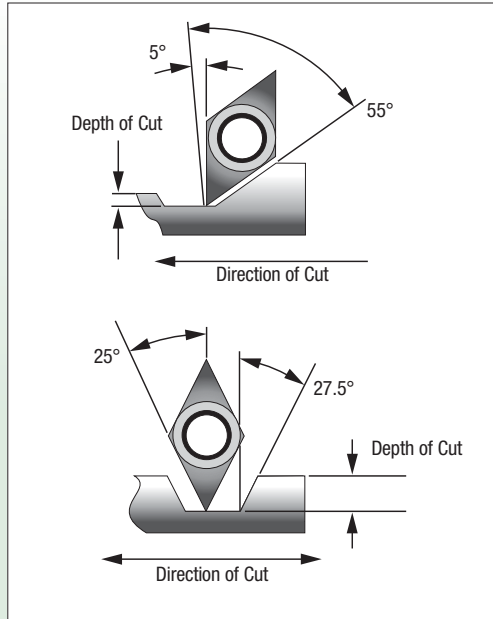
For slant bed-type machines:
Set the dial to the degree of the bed.



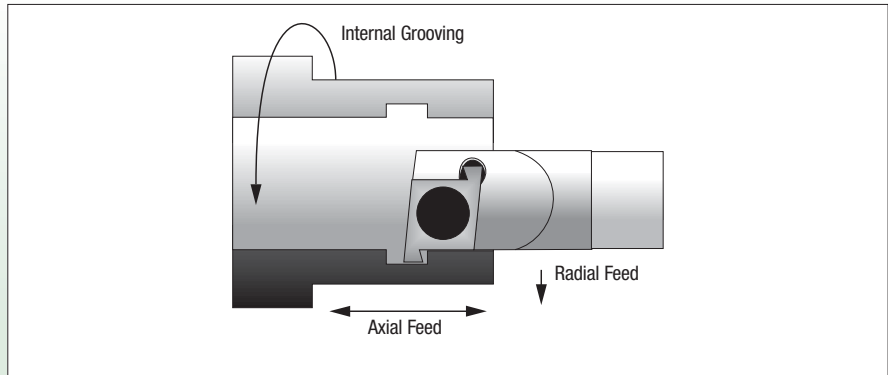
Rotate ID Tooling (Boring) to rest here.
This sets the tooling at .010" (0,25mm)
above centerline.

Rotate OD Tooling (Turning) to rest here.
This sets the tooling at centerline.

Set-Up Information and Recommendations for Boring and Profiling



Set-Up Information and Recommendations for Grooving

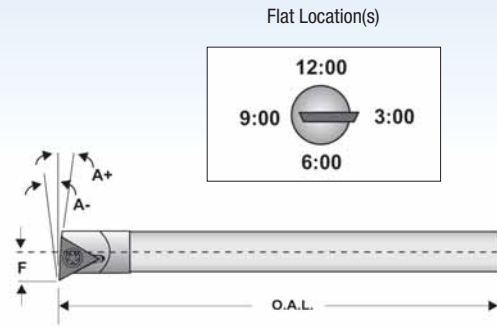


CDG Indexable-Type Grooving Inserts

safe overhang conditions:	steel (ratio 4:1)	carbide (ratio 10:1)
surface footage(s):	see pages C62–C63	
radial feeds:	C-Series = .0003"–.001" (0,008mm–0,025mm) Q-Series = .0003"–.002" (0,008mm–0,051mm)	
axial feeds:	C-Series = .0005"–.002" (0,013mm–0,051mm) Q-Series = .0005"–.005" (0,013mm–0,127mm)	

For more than 50 years, WIDIA-CIRCLE™ has offered the most reliable, highest-quality small hole boring bars available.

Although our extensive product line covers most machining applications, we understand that a custom solution tool may be required.



Straight Shank-Type Boring Bars

Steel or Carbide

Date

Customer-Specified Dimensions

<input type="text"/>	= O.A.L. (Overall Length)	From 3x bar diameter to catalog length.
<input type="text"/>	= "F" Dimension	±.010" (0,254mm) from basic dimension shown in catalog triangle insert bars only.
<input type="text"/>	= "A" Dimension	+10° to -10° triangle insert bars only.
<input type="text"/>	= 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 Catalog Standard

Customer

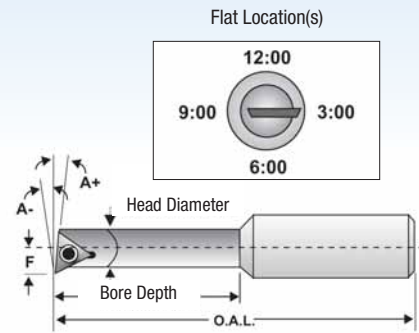
Distributor

Shipping Requirements

Attention Distributors: Use this worksheet to collect information for your customer.

Ground
 Next Day Air
 2nd Day Air
 3rd Day Air

Use this worksheet to modify any of our existing products to meet your own specifications. If your special requirements do not fit any of these categories, contact us directly.



Step-Down Shank-Type Boring Bars

Steel or Carbide

Date / /

Customer-Specified Dimensions

<input type="text"/>	= Bore Depth	.750" (19,05mm) to 6x diameter steel; .750" (19,05mm) to 10x diameter carbide.
<input type="text"/>	= O.A.L. (Overall Length)	Steel; smaller than O.A.L. listed in catalog carbide, bore depth, and standard sleeve length.
<input type="text"/>	= "F" Dimension	±.010" (0,254mm) from basic dimension shown in catalog triangle insert bars only.
<input type="text"/>	= "A" Dimension	+10° to -10° triangle insert bars only.
<input type="text"/>	= 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 Catalog 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

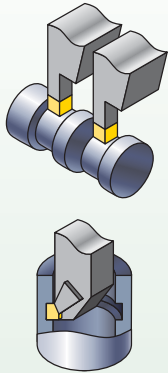


Grooving, Cut-Off, and Turning

Grooving Application Guide	D2-D3
WMT™ Grooving, Cut-Off, and Turning	D4-D29
TopGroove™	D30-D71
ProGroove™	D72-D85
Separator™	D86-D107
Ranger™ Face Grooving	D108-D115
S-LOC™ Grooving	D116-D121
Chipmaker™	D122-D135



Grooving



WMT™

- Insert cutting widths: .079"–.315" (2,0mm–8,0mm).
- OD cutting depths: .65"–1.0" (16,5mm–25,4mm).
- ID boring bar minimum bore diameter: 2.25" (57,15mm).
- Screw-clamping integral shank/cartridge toolholders available.
- Geometry for deep grooving.

Pages:
D4–D29



TopGroove™

- Insert cutting widths: .02"–.25" (0,5mm–6,35mm).
- Insert cutting depths: .025"–.50" (0,64mm–12,7mm).
- ID boring bar minimum bore diameter: .440" (11,2mm).
- Integral shank toolholders available.

Pages:
D30–D71



ProGroove™

- Insert cutting depths: .394"–1.58" (10,0mm–40,0mm).
- Inserts enable precision sintered execution, good tolerances, and repeatability.
- Screw-clamping integral shank toolholders available.
- Grooving and OD turning.

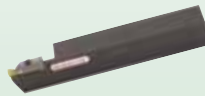
Pages:
D72–D84



Chipmaker™

- Insert cutting widths: .118"–.376" (3,0mm–9,53mm).
- OD cutting depths: .312"–1.5" (7,9mm–38,1mm).
- Screw-clamping integral shank/cartridge toolholders available.
- Multiple insert geometries for deep grooving.

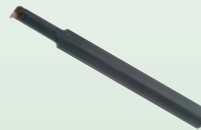
Pages:
D122–D135



S-LOC™

- Insert cutting widths: .041"–.108" (1,04mm–3,81mm).
- Maximum cutting depth: .094" (2,4mm).
- ID boring bar minimum bore diameter: 14,2mm (.560").
- Inserts for boring or threading available.
- Screw-clamping integral shank holder for ID applications.

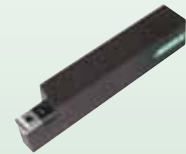
Pages:
D116–D121



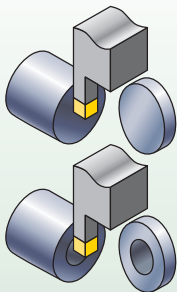
LG

- Insert cutting widths: .315"–.630" (8,0mm–16,0mm).
- OD cutting depths: .787"–1.26" (20,0mm–32,0mm).
- Wedge-clamping integral shanks tooling available.

Pages:
D75–D84



Cut-Off



WMT

- Cut-off widths: .059"–.157" (1,5mm–4,0mm);
- Maximum cutting depth: .857" (22,2mm).
- Screw-clamping integral shank/cartridge toolholders available.
- Economical double-sided inserts for rigidity and dimensional accuracy.
- Right-/left-hand styles: 5° and 12° lead angles.

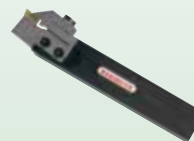
Pages:
D4–D29



Separator™

- Cut-off widths: .079"–.157" (2,0mm–4,0mm).
- Positive mechanical, self-clamping blades.
- Right-/left-hand style toolholders available.
- Single-edge inserts for maximum depth capacity.

Pages:
D86–D103



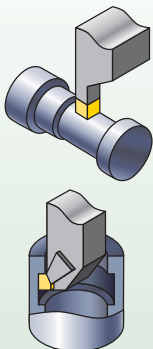
ProGroove

- Cut-off widths: .079"–.315" (2,0mm–8,0mm).
- Single-edge inserts for maximum depth capacity.
- Right-/left-hand styles with 6° lead angles.
- Self-clamping blades/screw-clamping integral shank toolholders available.

Pages:
D72–D84



Plunge and Turn



WMT

Heavy Stock Removal in Turning Applications

- Double-sided inserts, cutting widths: .079"–.315" (2,0mm–8,0mm).
- OD cutting depths: .650"–1.0" (16,5mm–25,4mm).
- ID boring bar minimum bore diameter: 2.25" (57,15mm).
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D4–D29

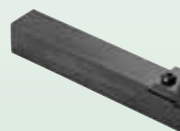


ProGroove

For Light-Cutting Inserts

- Cutting widths: .079"–.315" (2,0mm–8,0mm).
- OD cutting depths: .394"–1.58" (10,0mm–40,0mm).
- Single-edge inserts for maximum depth capacity.
- Screw-clamping integral shank toolholders available.

Pages:
D72–D84

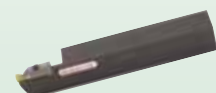


Chipmaker

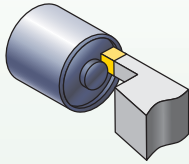
Heavy Stock Removal in Plunge Mode Applications

- Insert cutting widths: .118"–.376" (3,0mm–9,53mm).
- OD cutting depths: .312"–1.5" (7,9mm–38,1mm).
- ID boring bar minimum bore diameter: .984" (25,0mm).
- Variety of geometries for deep grooving.
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D122–D135



Face Grooving



WMT

- Cutting widths: .118"–.250" (3,0mm–6,35mm).
- Cutting depths: .5"–1.0" (13,0mm–25,4mm).
- Minimum face groove diameter: 1.5"–8.0" (38,0mm–205,0mm).

Pages:
D4–D29



Ranger™

- Cutting widths: .126"–.25" (3,18mm–6,35mm).
- Cutting depths: .75"–1.00" (19,0mm–25,4mm).
- Minimum face groove OD diameter: 2.25"–16" (57,0mm–400,0mm).
- Square right-angle shank and round shank toolholders available.
- Screw-clamping, adjustable cartridge toolholders with different widths and spindle rotations.

Pages:
D108–D114



S-LOC

- Cutting widths: .041"–.108" (1,04mm–3,81mm).
- Maximum cutting depth: .094" (2,4mm).
- Minimum face groove diameter: .500" (12,7mm) or larger.
- Screw-clamping integral toolholder.

Pages:
D116–D121



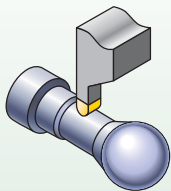
TopGroove

- NF/NFD face groove insert range: .94"–2.25" (24,0mm–57,0mm).
- Cutting width range for standard inserts: .079"–.156" (0,8mm–9,5mm).
- Cutting depth range for standard inserts: .070"–.500" (1,27mm–12,70mm).
- Cutting width range for NF/NFD face grooving inserts: .079"–.25" (2,0mm–6,35mm).
- Standard insert minimum face groove diameter range: 2.125"–13" (54,0mm–330,0mm).
- Cutting depth range for NF/NFD face grooving inserts: .060"–.500" (1,52mm–12,70mm).
- Cutting depth range for NF: .060"–.150" (1,52mm–3,81mm).
- Cutting depth range for NFD: .250"–.500" (6,35mm–12,7mm).

Pages:
D30–D71



Profiling



WMT

For Heavy Stock Removal

- Full radius insert cutting widths: .118"–.315" (3,0mm–8,0mm).
- OD cutting depths: .650"–1.0" (16,5mm–25,4mm)
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D4–D29



TopGroove

Moderate/Heavy Stock Removal at Shallow Profile Depths

- Full-radius insert cutting widths: .062"–.250" (1,57mm–6,35mm).
- Insert cutting depths: .094"–.250" (2,39mm–6,35mm).
- Integral shank toolholders and Erickson™ heads available.

Pages:
D30–D71

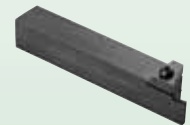


ProGroove

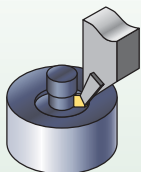
For Light Cutting

- Full-radius insert cutting widths: .118"–.236" (3,0mm–6,0mm).
- OD cutting depths: .394"–1.26" (10,0mm–32,0mm).
- Screw-clamping integral shank/cartridge toolholders available.

Pages:
D72–D84



Undercutting



TopGroove

- Undercutting insert widths: .094"–.157" (2,4mm–4,0mm).
- Economical double-ended inserts.

Pages:
D30–D71



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.

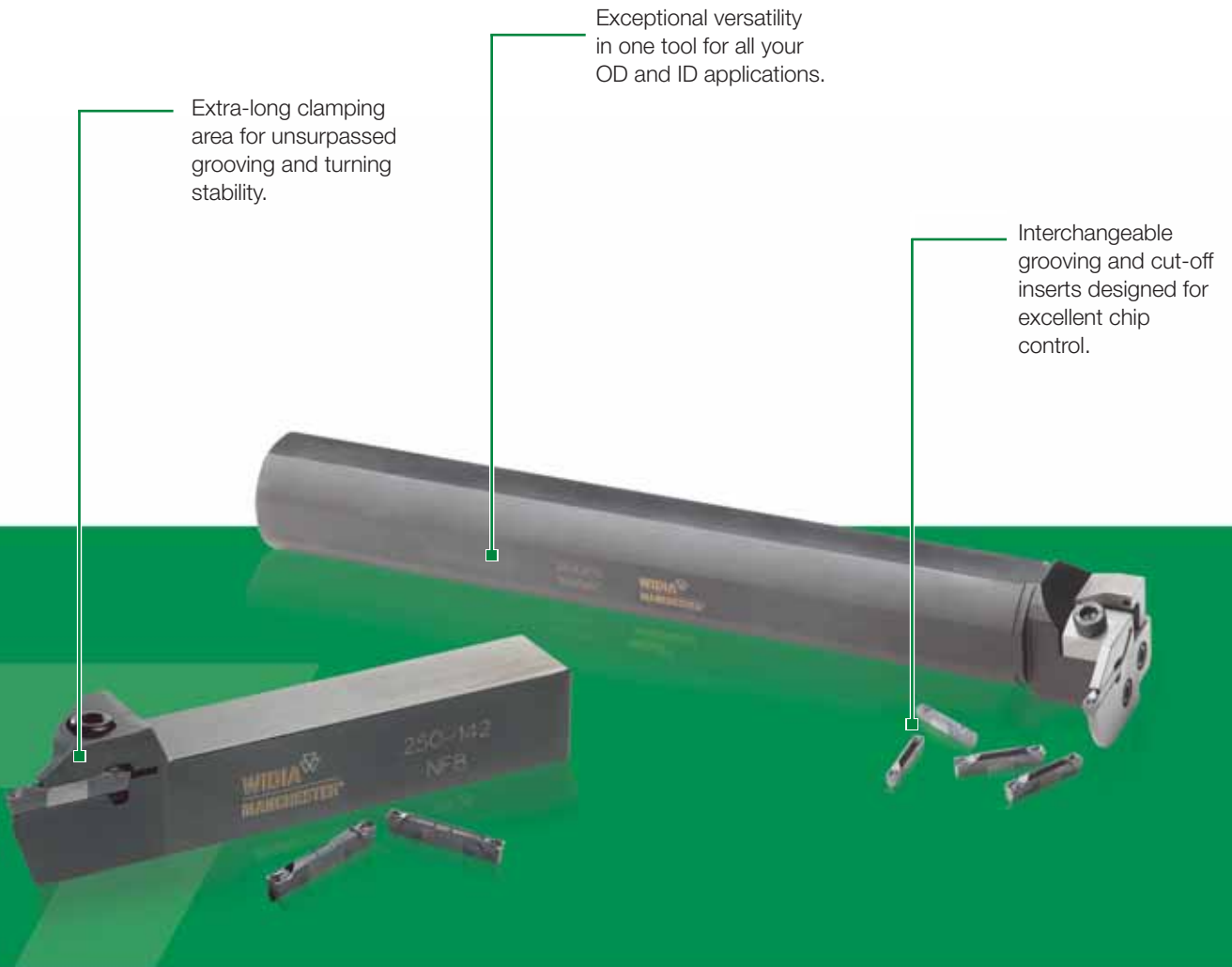
Versatile and Well Constructed

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

WMT Toolholders

- Outstanding system rigidity and clamping capabilities.
- Guarantees fast cycles times and limited turret indexes.
- Precise insert positioning for accurate machining.
- Double-V shape means operator-friendly insert indexing and optimum insert positioning.





WMT™ SLS



- Integral and modular Serrated Locking System (SLS) accepts SX, SX Ultra, and PT/PC inserts.
- Replaceable cartridge makes changing applications quick and easy.
- Adaptable and easy to use, it reduces setup time and downtime between jobs.
- A variety of insert widths available to meet your specific needs.

Choosing the Correct WMT™ Cutter

Grooving, Cut-Off, Turning, and Profiling

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!

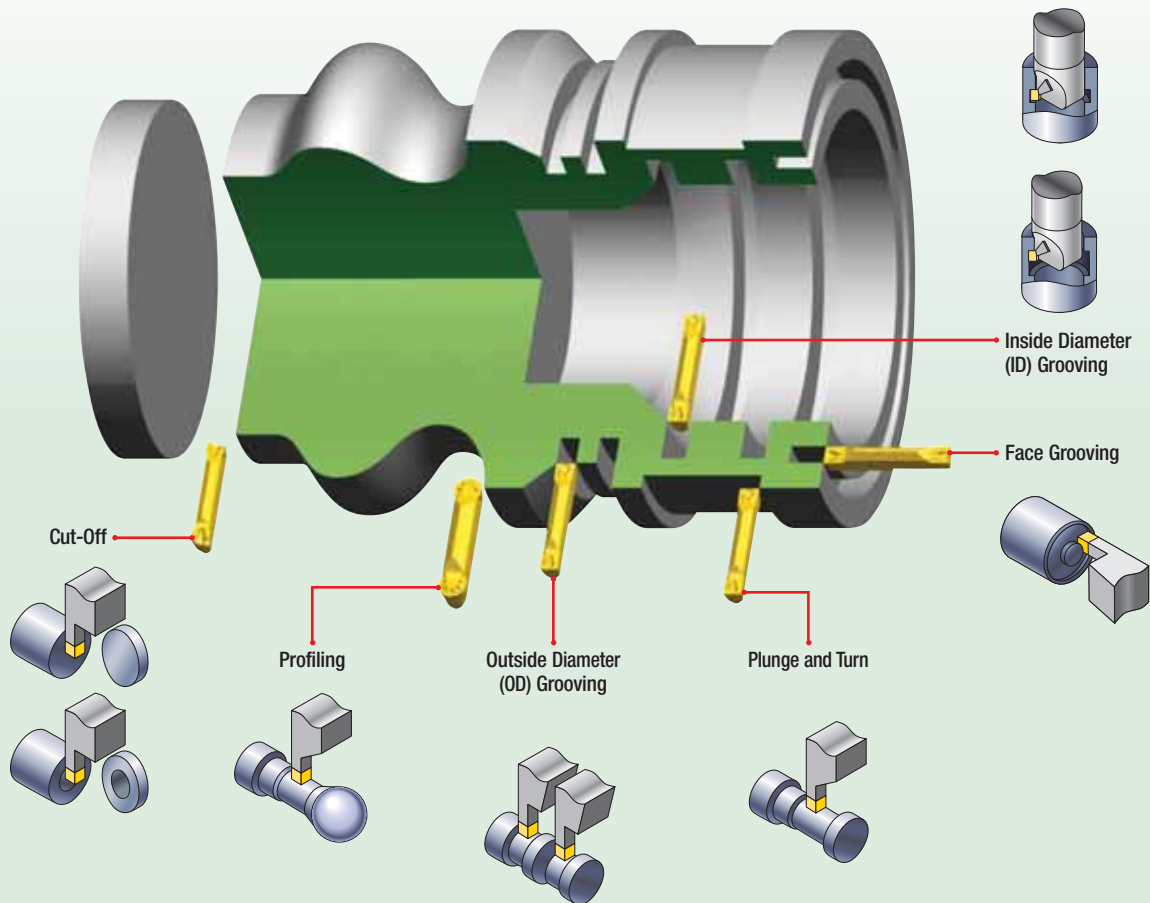
The WMT system, with its extra-long clamping area and precise insert positioning, ensures exceptionally fast and accurate machining, all-in-one tool, for your most demanding grooving, cut-off, turning, and profiling applications.

It is perfect for all general purpose operations, including both shallow and deep grooving.

Utilize 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:

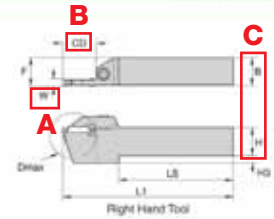
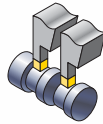
Each tool has a material grid marked with a letter indicating the materials that can be machined.

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







■ OD Grooving

order number	catalog number	A		D max	F	C		HD	LT	LS	clamp screw
		W	CD			H	B				
3655137	250319	.059	.850	—	.991	1.000	1.000	—	8.000	4.679	606266
3655938	250321	.079	—	1.062	.375	.375	.369	.125	4.500	3.500	606249
3655940	250323	.079	—	1.125	.500	.500	.494	.188	4.500	3.500	606249
3655942	250326	.079	.850	—	.625	.625	.603	.250	5.000	4.000	606249
3655944	250327	.079	.850	—	.750	.750	.719	—	5.000	3.687	606249
3655946	250329	.079	.850	—	1.000	1.000	.969	—	6.000	4.660	606249
3655968	250109	.094	—	1.062	.375	.375	.365	.125	4.500	3.500	606249
3655992	250111	.094	—	1.250	.500	.500	.490	.190	4.500	3.290	606249
3655994	250113	.094	.750	—	.625	.625	.603	.250	5.000	3.480	619205
3655996	250115	.094	.750	—	.750	.750	.719	.250	5.000	3.480	619205
3655934	250188	.094	.420	—	.750	.750	.719	—	5.000	3.695	619205
3655936	250193	.094	.750	—	.990	1.000	.969	—	6.000	4.300	619205
3655998	250117	.125	.440	—	.625	.625	.603	—	5.000	3.695	619205
3655900	250119	.125	.675	—	.625	.625	.603	.250	5.000	3.355	619205
3655906	250127	.125	.440	—	.750	.750	.719	—	5.000	3.695	619205
3655908	250129	.125	.675	—	.750	.750	.719	.250	5.000	3.355	619205
3655916	250141	.125	.440	—	1.000	1.000	.969	—	6.000	4.695	619205
3655918	250143	.125	.675	—	1.000	1.000	.969	—	6.000	4.375	619205
3655920	250145	.156	.675	—	1.000	1.000	.969	—	6.000	4.375	619205
3655930	250181	.156	.440	—	.625	.625	.603	—	5.000	3.695	619205
3655932	250183	.156	.440	—	.750	.750	.719	—	5.000	3.695	619205
3655902	250123	.188	.560	—	.629	.625	.603	—	5.000	3.562	619168
3655904	250125	.188	1.000	—	.679	.625	.603	.250	5.000	3.655	619168
3655910	250133	.188	.560	—	.750	.750	.719	—	5.000	3.562	619168
3655912	250135	.188	1.000	—	.750	.750	.719	.250	5.000	3.655	619168
3655922	250147	.188	.560	—	1.000	1.000	.969	—	6.000	4.562	619168
3655924	250149	.188	1.000	—	1.000	1.000	.969	—	6.000	4.175	619168
3655914	250137	.250	.560	—	.754	.750	.719	—	5.000	3.562	619168
3655926	250151	.250	.560	—	1.004	1.000	.969	—	6.000	4.562	619168
3655928	250153	.250	1.000	—	1.002	1.000	.969	—	6.000	4.174	619168
3639143	250175	.312	.560	—	1.250	1.250	1.207	—	6.000	4.553	619168
3639145	250177	.312	1.000	—	—	1.250	1.207	—	6.000	4.174	619168

	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

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

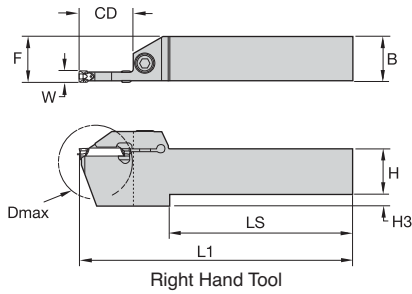
See page D23 for Grades and Grade Descriptions.

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.

ANSI ISO 513		VDI 3323		WMT™ Grooving, Cut-Off, and Turning Recommended Cutting Speed Starting Conditions											
Material Group		Cutting Speed • vc SFM													
		TN6016 (M83)			TN6031 (M43)			TN6026 (M433B)							
		min	Start	max	min	Start	max	min	Start	max	min	Start	max		
P	1	350	650	750	440	540	640	395	495	595					
	2	350	650	750	405	595	695	445	545	645					
	3	450	550	650	405	505	605	365	465	565					
	4	500	600	700	450	500	600	405	505	605					
	5	450	550	650	405	505	605	365	465	565					
	6	450	550	650	405	505	605	365	465	565					
	7	540	640	740	485	585	685	435	535	635					
	8	450	550	650	405	505	605	365	465	565					
	9	450	550	650	405	505	605	365	465	565					
	10	475	575	675	430	530	630	385	485	585					
	11	400	500	600	360	460	560	325	425	525					
	12	450	550	650	405	505	605	365	465	565					
	13.1	450	550	650	405	505	605	365	465	565					
13.2	400	500	600	360	460	560	325	425	525						
M	14.1	350	450	550	315	415	515	265	365	465					
	14.2	280	380	480	250	350	450	225	325	425					
	14.3	275	325	425	205	305	405	180	280	380					
	14.4	175	275	375	160	260	360	140	240	340					
K	15	600	700	800	540	640	740	485	585	685					
	16	450	550	650	405	505	605	365	465	565					
	17	500	600	700	450	550	650	405	505	605					
	18	475	575	675	430	530	630	385	485	585					
	19	650	750	850	585	685	785	525	625	725					
	20	450	550	650	405	505	605	365	465	565					
N	21	1000	1100	1200	900	1000	1100								
	22	800	900	1000	720	820	920								
	23	1000	1100	1200	900	1000	1100								
	24	800	900	1000	720	820	920								
	25	700	800	900	630	730	830								
	26	500	600	700	450	550	650								
	27	500	600	700	450	550	650								
	28	500	600	700	450	550	650								
	29	450	550	650	405	505	605								
	30	450	550	650	405	505	605								
S	31	170	270	370	155	255	355	140	240	340					
	32	120	220	320	110	210	310	95	195	295					
	33	125	225	325	115	215	315	100	200	300					
	34	100	200	300	90	190	290	80	180	280					
	35	110	210	310	100	200	300	90	190	290					
	36	220	320	420	200	300	400	180	280	380					
	37	125	225	325	115	215	315	100	200	300					



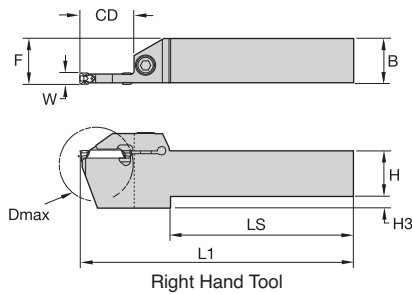
Right Hand Tool

■ OD Grooving and Cut-Off

order number	catalog number	H	W	CD	D max	F	B	H3	L1	LS	clamp screw
	Right hand										
3655938	250301	.375	.079	—	1.062	.375	.369	.125	4.500	3.410	606249
3655888	250109	.375	.094	—	1.062	.375	.365	.125	4.500	3.410	606249
3655940	250303	.500	.079	—	1.125	.500	.494	.188	4.500	3.410	606249
3655892	250111	.500	.094	—	1.250	.500	.490	.190	4.500	3.290	606249
3655942	250305	.625	.079	.650	—	.625	.603	.250	5.000	3.680	606249
3655894	250113	.625	.094	.750	—	.625	.603	.250	5.000	3.480	619205
3655898	250117	.625	.125	.440	—	.625	.603	—	5.000	3.695	619205
3655900	250119	.625	.125	.875	—	.625	.603	.250	5.000	3.355	619205
3655930	250181	.625	.156	.440	—	.625	.603	—	5.000	3.695	619205
3655902	250123	.625	.188	.560	—	.629	.603	—	5.000	3.562	619168
3655904	250125	.625	.188	1.000	—	.629	.603	.250	5.500	3.655	619168
3655944	250307	.750	.079	.650	—	.750	.719	—	5.000	3.680	606249
3655896	250115	.750	.094	.750	—	.750	.719	.250	5.000	3.480	619205
3655934	250189	.750	.094	.420	—	.750	.719	—	5.000	3.695	619205
3655906	250127	.750	.125	.440	—	.750	.719	—	5.000	3.695	619205
3655908	250129	.750	.125	.875	—	.750	.719	.250	5.000	3.355	619205
3655932	250183	.750	.156	.440	—	.750	.719	—	5.000	3.695	619205
3655910	250133	.750	.188	.560	—	.750	.719	—	5.000	3.562	619168
3655912	250135	.750	.188	1.000	—	.750	.719	.250	5.500	3.655	619168
3655914	250137	.750	.250	.560	—	.754	.719	—	5.000	3.562	619168
3656137	250319	1.000	.059	.650	—	.991	1.000	—	6.000	4.679	606266
3655946	250309	1.000	.079	.650	—	1.000	.969	—	6.000	4.680	606249
3655936	250193	1.000	.094	.750	—	.990	.969	—	6.000	4.500	619205
3655916	250141	1.000	.125	.440	—	1.000	.969	—	6.000	4.695	619205
3655918	250143	1.000	.125	.875	—	1.000	.969	—	6.000	4.375	619205
3655920	250145	1.000	.156	.875	—	1.000	.969	—	6.000	4.375	619205
3655922	250147	1.000	.188	.560	—	1.000	.969	—	6.000	4.562	619168
3655924	250149	1.000	.188	1.000	—	1.000	.969	—	6.000	4.175	619168
3655926	250151	1.000	.250	.560	—	1.004	.969	—	6.000	4.562	619168
3655928	250153	1.000	.250	1.000	—	1.002	.969	—	6.000	4.174	619168
3539143	250175	1.250	.312	.560	—	1.250	1.207	—	6.000	4.553	619168
3539145	250177	1.250	.312	1.000	—	—	1.207	—	6.000	4.174	619168

(continued)

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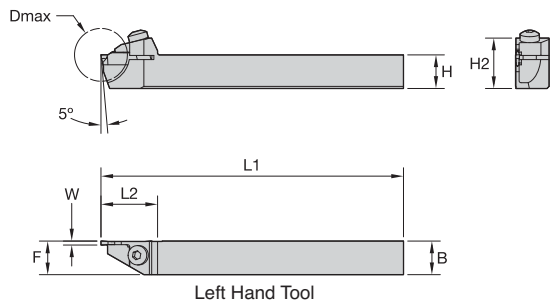


■ OD Grooving and Cut-Off

order number	catalog number	H	W	CD	D max	F	B	H3	L1	LS	clamp screw
Left hand											
3655939	250302	.375	.079	—	1.062	.375	.369	.125	4.500	3.410	606249
3655889	250110	.375	.094	—	1.062	.375	.365	.125	4.500	3.410	606249
3655941	250304	.500	.079	—	1.125	.500	.494	.188	4.500	3.410	606249
3655893	250112	.500	.094	—	1.250	.500	.490	.190	4.500	3.290	606249
3655943	250306	.625	.079	.650	—	.625	.603	.250	5.000	3.680	606249
3655895	250114	.625	.094	.750	—	.625	.603	.250	5.000	3.480	619205
3655899	250118	.625	.125	.440	—	.625	.603	—	5.000	3.695	619205
3655901	250120	.625	.125	.875	—	.625	.603	.250	5.000	3.355	619205
3655931	250182	.625	.156	.440	—	.625	.603	—	5.000	3.695	619205
3655903	250124	.625	.188	.560	—	.629	.603	—	5.000	3.562	619168
3655905	250126	.625	.188	1.000	—	.629	.603	.250	5.500	3.655	619168
3655945	250308	.750	.079	.650	—	.750	.719	—	5.000	3.680	606249
3655897	250116	.750	.094	.750	—	.750	.719	.250	5.000	3.480	619205
3655935	250190	.750	.094	.420	—	.750	.719	—	5.000	3.695	619205
3655907	250128	.750	.125	.440	—	.750	.719	—	5.000	3.695	619205
3655909	250130	.750	.125	.875	—	.750	.719	.250	5.000	3.355	619205
3655933	250184	.750	.156	.440	—	.750	.719	—	5.000	3.697	619205
3655911	250134	.750	.188	.560	—	.750	.719	—	5.000	3.562	619168
3655913	250136	.750	.188	1.000	—	.750	.719	.250	5.500	3.655	619168
3655915	250138	.750	.250	.560	—	.754	.719	—	5.000	3.562	619168
3656138	250320	1.000	.059	.650	—	.991	1.000	—	6.000	4.679	606249
3655947	250310	1.000	.079	.650	—	1.000	.969	—	6.000	4.680	606249
3655937	250194	1.000	.094	.750	—	1.000	.969	—	6.000	4.500	619205
3655917	250142	1.000	.125	.440	—	1.000	.969	—	6.000	4.695	619205
3655919	250144	1.000	.125	.875	—	1.000	.969	—	6.000	4.375	619205
3655921	250146	1.000	.156	.875	—	1.000	.969	—	6.000	4.375	619205
3655923	250148	1.000	.188	.560	—	1.000	.969	—	6.000	4.562	619168
3655925	250150	1.000	.188	1.000	—	1.000	.969	—	6.000	4.175	619168
3655927	250152	1.000	.250	.560	—	1.004	.969	—	6.000	4.562	619168
3655929	250154	1.000	.250	1.000	—	1.004	.969	—	6.000	4.174	619168
3539144	250176	1.250	.312	.560	—	1.250	1.207	—	6.000	4.553	619168
3539146	250178	1.250	.312	1.000	—	—	1.2070	—	6.000	4.174	619168

WMT™ Grooving, Cut-Off, and Turning

Integral Toolholders for Swiss-Style Machines

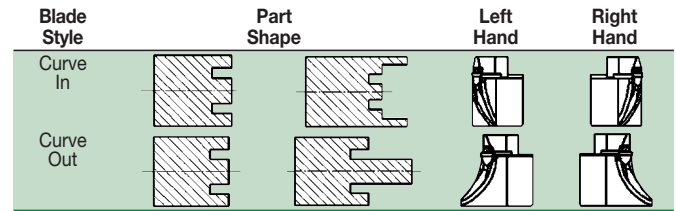
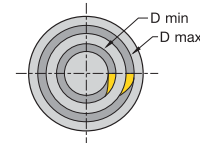
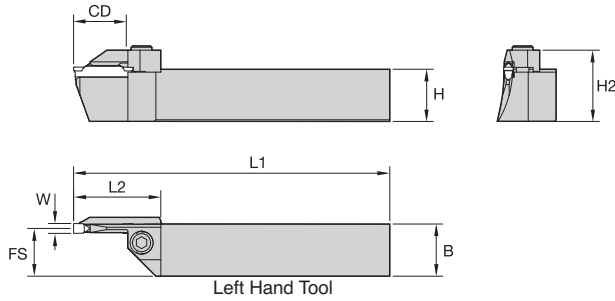


Left Hand Tool

■ Swiss Grooving and Cut-Off

order number	catalog number	W	D max	B	H	H2	F	L1	L2	clamp screw
Right hand										
3655948	250311	.059	.787	.375	.375	.625	.375	4.500	.842	606249
3655949	250313	.059	.787	.500	.500	.750	.500	4.500	.842	606249
3656133	250315	.059	1.024	.625	.625	.925	.626	5.000	.952	606266
3656135	250317	.059	1.024	.750	.750	1.050	.750	5.000	.952	606266
3656139	250321	.079	.787	.375	.375	.625	.375	4.500	.843	606249
3656141	250323	.079	.787	.500	.500	.750	.500	4.500	.843	606249
3656143	250325	.079	1.024	.625	.625	.925	.625	5.000	.953	606266
3656145	250327	.079	1.024	.750	.750	1.050	.750	5.000	.953	606266
Left hand										
3656186	250312	.059	.787	.375	.375	.625	.375	4.500	.842	606249
3656101	250314	.059	.787	.500	.500	.750	.500	4.500	.842	606249
3656134	250316	.059	1.024	.625	.625	.925	.626	5.000	.952	606266
3656136	250318	.059	1.024	.750	.750	1.050	.750	5.000	.952	606266
3656140	250322	.079	.787	.375	.375	.625	.375	4.500	.843	606249
3656142	250324	.079	.787	.500	.500	.750	.500	4.500	.843	606249
3656144	250326	.079	1.024	.625	.625	.925	.625	5.000	.953	606266
3656146	250328	.079	1.024	.750	.750	1.050	.750	5.000	.953	606266

NOTE: Insert exterior edge in line with toolholder edge for .375" and .500" shank toolholders.



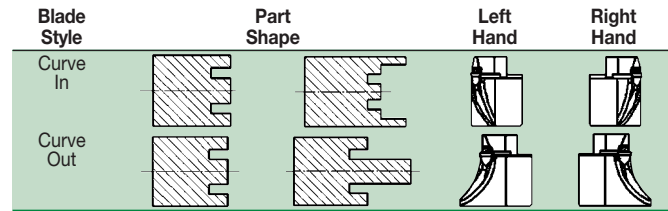
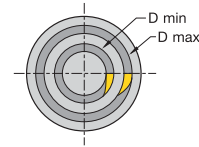
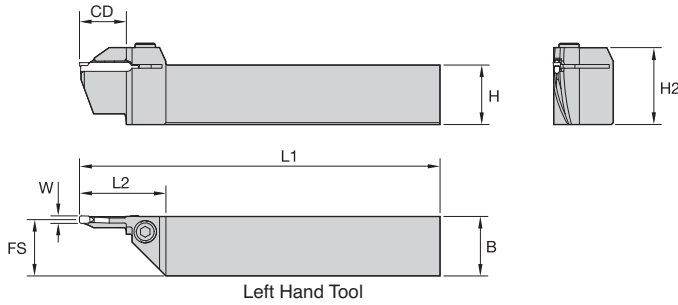
■ **Curve Out**

order number	catalog number	W	CD	D max	D min	FS	H2	H	B	L1	L2	clamp	clamp screw
Right hand													
3656147	251117	.125	.500	2.000	1.500	.937	1.280	.990	.990	6.000	1.343	—	619205
3656149	251119	.125	.625	2.750	2.000	.937	1.280	.990	.990	6.000	1.343	—	619205
3656151	251121	.125	.625	4.000	2.750	.937	1.280	.990	.990	6.000	1.343	—	619205
3656153	251123	.125	.750	8.000	4.000	.937	1.280	.990	.990	6.000	1.438	—	619205
3656155	251133	.188	.625	2.000	1.500	.906	1.355	.990	.990	6.000	1.500	446102	619168
3656157	251135	.188	.750	2.750	2.000	.906	1.352	.990	.990	6.000	1.500	446102	619168
3656159	251137	.188	.750	4.000	2.750	.906	1.352	.990	.990	6.000	1.655	446104	619168
3656161	251139	.188	1.000	8.000	4.000	.906	1.352	.990	.990	6.000	1.655	446104	619168
3656163	251149	.250	.625	2.000	1.500	.877	1.377	.990	.990	6.000	1.500	446102	619168
3656165	251151	.250	.750	2.750	2.000	.875	1.372	.990	.990	6.000	1.500	446102	619168
3656168	251155	.250	1.000	8.000	4.000	.875	1.372	.990	.990	6.000	1.655	446104	619168
3656187	251153	.251	.750	4.000	2.750	.875	1.372	.990	.990	6.000	1.655	446104	619168
Left hand													
3656148	251118	.125	.500	2.000	1.500	.937	1.280	.990	.990	6.000	1.343	—	619205
3656152	251122	.125	.625	4.000	2.750	.937	1.280	.990	.990	6.000	1.343	—	619205
3656150	251120	.125	.625	2.750	2.000	.937	1.280	.990	.990	6.000	1.343	—	619205
3656154	251124	.125	.750	8.000	4.000	.937	1.280	.990	.990	6.000	1.438	—	619205
3656156	251134	.188	.625	2.000	1.500	.906	1.355	.990	.990	6.000	1.500	446101	619168
3656160	251138	.188	.750	4.000	2.750	.906	1.352	.990	.990	6.000	1.655	446103	619168
3656158	251136	.188	.750	2.750	2.000	.906	1.352	.990	.990	6.000	1.500	446101	619168
3656162	251140	.188	1.000	8.000	4.000	.906	1.352	.990	.990	6.000	1.655	446103	619168
3656164	251150	.250	.625	2.000	1.500	.875	1.377	.990	.990	6.000	1.500	446101	619168
3656166	251152	.250	.750	2.750	2.000	.875	1.372	.990	.990	6.000	1.500	446101	619168
3656167	251154	.250	.750	4.000	2.750	.875	1.372	.990	.990	6.000	1.655	446103	619168
3656169	251156	.250	1.000	8.000	4.000	.875	1.372	.990	.990	6.000	1.655	446103	619168

NOTE: Insert cutting edge for WMT Face Grooving system is positioned +.030" above center.
 The WMT Face Grooving system is not designed to cut diameters of less than .850".
 Toolholders that accept .125" width inserts have an integral clamp.
 Toolholders that accept .187" and .250" width inserts are supplied with a detachable clamp.

WMT™ Grooving, Cut-Off, and Turning

Integral Toolholders for Face Grooving



Curve In

order number	catalog number	W	CD	D max	D min	B	H	H2	FS	L1	L2	clamp	clamp screw
Right hand													
3539321	252109	.125	.625	4.000	2.750	.990	.990	1.280	.937	6.000	1.343	—	MS326
3539323	252111	.125	.750	8.000	4.000	.990	.990	1.280	.937	6.000	1.438	—	MS326
3539325	252117	.187	.750	4.000	2.750	.990	.990	1.336	.906	6.000	1.655	446104	619168
3539327	252119	.187	1.000	8.000	4.000	.990	.990	1.336	.906	6.000	1.655	446104	619168
3539329	252125	.250	.765	4.000	2.750	.990	.990	1.336	.875	6.000	1.655	446104	619168
3539331	252127	.250	1.000	8.000	4.000	.990	.990	1.336	.875	6.000	1.655	446104	619168
Left hand													
3539322	252110	.125	.625	4.000	2.750	.990	.990	1.280	.937	6.000	1.343	—	MS326
3539324	252112	.125	.750	8.000	4.000	.990	.990	1.280	.937	6.000	1.438	—	MS326
3539326	252118	.187	.750	4.000	2.750	.990	.990	1.336	.906	6.000	1.655	446103	619168
3539328	252120	.187	1.000	8.000	4.000	.990	.990	1.336	.906	6.000	1.655	446103	619168
3539330	252126	.250	.765	4.000	2.750	.990	.990	1.336	.875	6.000	1.655	446103	619168
3539332	252128	.250	1.000	8.000	4.000	.990	.990	1.336	.875	6.000	1.655	446103	619168

NOTE: Insert cutting edge for WMT Face Grooving system is positioned $+.030''$ above center.

The WMT Face Grooving system is not designed to cut diameters of less than $.850''$.

Toolholders that accept $.125''$ width inserts have an integral clamp.

Toolholders that accept $.187''$ and $.250''$ width inserts are supplied with a detachable clamp.

WIN WITH WIDIA™

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

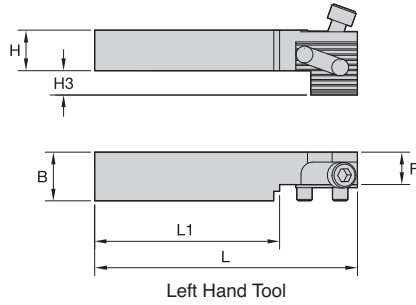
- Guarantees fast cycle times and limited turret indexes.
- Precise insert positioning for accurate machining.

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.

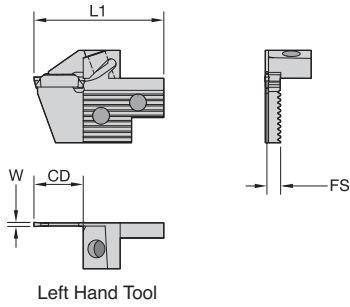
To learn more, contact your local Authorized Distributor or visit www.widia.com.

WIDIA 
Win with WIDIA™



■ Grooving, Cut-Off, and Face Grooving

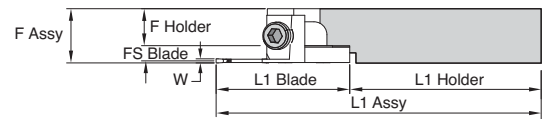
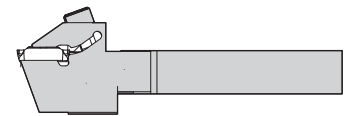
order number	catalog number	H	B	L	L1	F	H3	cartridge screw
Right hand								
3656170	253101	.625	.750	4.050	2.850	.547	.375	606255
3656172	253103	.750	.750	4.050	2.850	.547	.250	606255
3656176	253107	1.000	1.000	5.050	3.850	.797	—	619419
3656174	253105	1.250	1.250	5.050	3.850	1.047	—	619419
Left hand								
3656171	253102	.625	.750	4.050	2.850	.547	.375	606255
3656173	253104	.750	.750	4.050	2.850	.547	.250	606255
3656177	253108	1.000	1.000	5.050	3.850	.797	—	619419
3656175	253106	1.250	1.250	5.050	3.850	1.047	—	619168



■ Grooving and Cut-Off

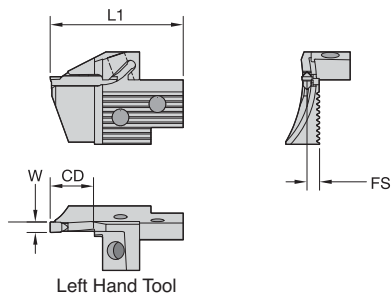
order number	catalog number	W	CD	L1	FS
Right hand					
3653461	348101	.059	.650	1.934	.204
3653463	348103	.079	.650	1.932	.195
3653465	348105	.094	.752	2.050	.185
3653467	348107	.118	.874	2.150	.175
3653469	348109	.158	.874	2.150	.187
3653703	348111	.188	1.000	2.250	.170
3653705	348113	.250	1.000	2.250	.159
Left hand					
3653462	348102	.059	.650	1.934	.204
3653464	348104	.079	.650	1.932	.195
3653466	348106	.094	.752	2.050	.185
3653468	348108	.118	.874	2.150	.175
3653470	348110	.158	.874	2.150	.187
3653704	348112	.188	1.000	2.250	.170
3653706	348114	.250	1.000	2.250	.159

NOTE: Widths of .156", .187", and .250" are not recommended for .625" shank toolholders.
Width of .250" is not recommended for .750" shank toolholders.

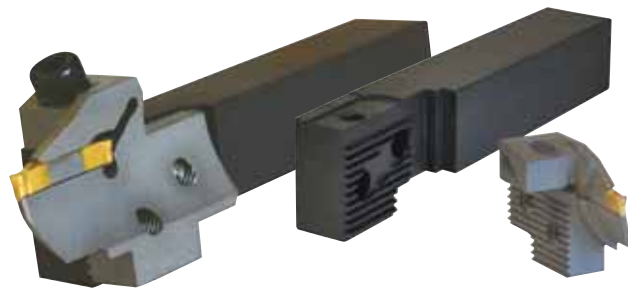


$$L1 \text{ Assy} = L1 \text{ (holder)} + L1 \text{ (blade)}$$

$$F \text{ Assy} = F \text{ (holder)} + FS \text{ (blade)} + W/2 + .031"$$



Left Hand Tool



Right Hand Assembly

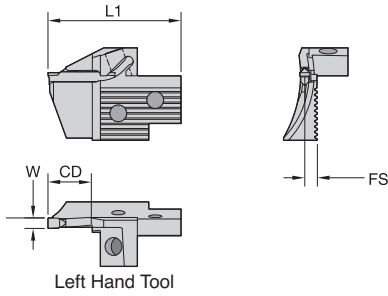
■ Face Grooving • Curve Out

order number	catalog number	W	D min	D max	CD	FS	L1
	Right hand						
3653707	349101	.125	1.500	2.000	.500	.174	1.980
3653708	349102	.125	2.000	2.750	.625	.175	1.980
3653709	349103	.125	2.750	4.000	.625	.175	1.980
3653710	349104	.125	4.000	8.000	.750	.175	2.075
3653715	349109	.156	1.500	2.000	.500	.187	1.980
3653716	349110	.156	2.000	2.750	.625	.187	1.980
3653717	349111	.156	2.750	4.000	.625	.187	1.980
3653718	349112	.156	4.000	8.000	.750	.187	2.075
3653723	349117	.187	1.500	2.000	.625	.170	2.074
3653724	349118	.187	2.000	2.750	.750	.170	2.074
3653725	349119	.187	2.750	4.000	.750	.170	2.230
3653726	349120	.187	4.000	8.000	1.000	.170	2.230
3653731	349125	.250	1.200	2.000	.625	.222	2.075
3653732	349126	.250	2.000	2.750	.750	.222	2.075
3653733	349127	.250	2.750	4.000	.750	.222	2.230
3653734	349128	.250	4.000	8.000	1.000	.222	2.230

NOTE: Width of .250" is not recommended for .750" shank toolholders.
See page D16 for shank tooling.

(continued)

(continued)



Left Hand Tool

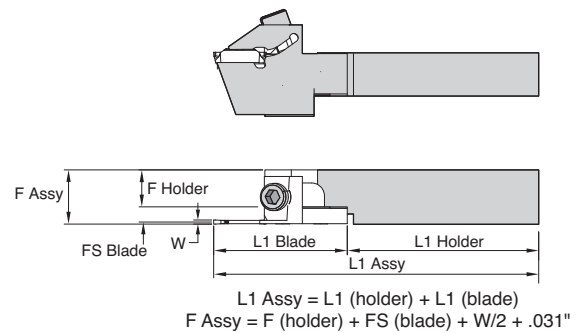
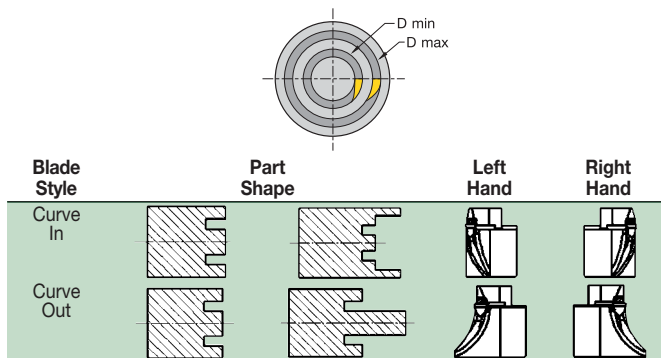


Right Hand Assembly

■ Face Grooving • Curve Out

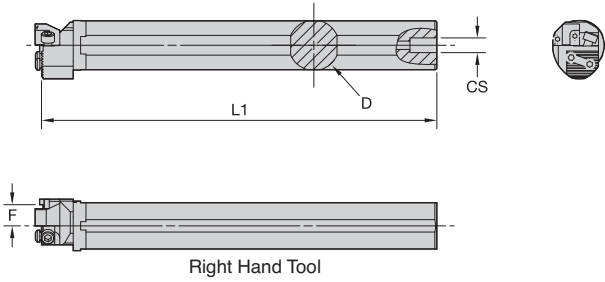
order number	catalog number	W	D min	D max	CD	FS	L1
Left hand							
3653711	349105	.125	1.500	2.000	.500	.174	1.980
3653712	349106	.125	2.000	2.750	.625	.175	1.980
3653713	349107	.125	2.750	4.000	.625	.175	1.980
3653714	349108	.125	4.000	8.000	.750	.175	2.075
3653719	349113	.156	1.500	2.000	.500	.187	1.980
3653720	349114	.156	2.000	2.750	.625	.187	1.980
3653721	349115	.156	2.750	4.000	.625	.187	1.980
3653722	349116	.156	4.000	8.000	.750	.187	2.075
3653727	349121	.187	1.500	2.000	.625	.170	2.074
3653728	349122	.187	2.000	2.750	.750	.170	2.074
3653729	349123	.187	2.750	4.000	.750	.170	2.230
3653730	349124	.187	4.000	8.000	1.000	.170	2.230
3653735	349129	.250	1.200	2.000	.625	.222	2.075
3653736	349130	.250	2.000	2.750	.750	.222	2.075
3653737	349131	.250	2.750	4.000	.750	.222	2.230
3653738	349132	.250	4.000	8.000	1.000	.222	2.230

NOTE: Width of .250" is not recommended for .750" shank toolholders.
See page D16 for shank tooling.



WMT™ Grooving, Cut-Off, and Turning

SLS Boring Bars

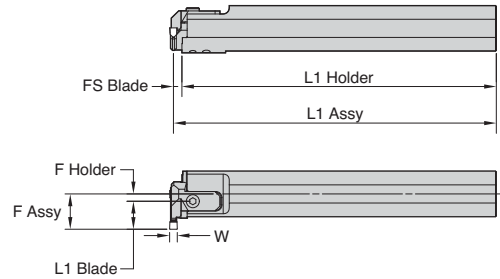


Left Hand Assembly

■ ID Grooving

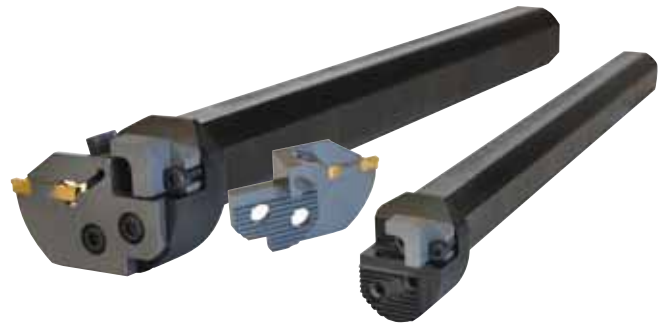
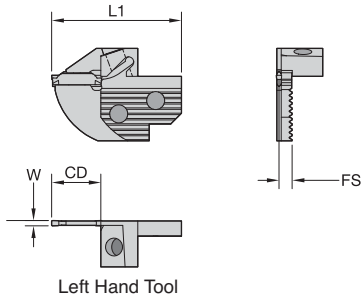
order number	catalog number	D	F	L1	CS	coolant support screw	coolant spout	coolant support screw	clamp screw
Right hand									
3656178	254101	1.000	-0.630	7.766	1/4-18 NPT	606256	614125	619151	619168
3656180	254103	1.250	-0.630	9.766	1/4-18 NPT	606256	614125	619151	619168
3656182	254105	1.500	-0.630	11.766	1/4-18 NPT	606256	614125	619151	619168
3656184	254107	2.000	-0.512	11.766	1/4-18 NPT	606256	614125	619151	619168
Left hand									
3656179	254102	1.000	-0.630	7.766	1/4-18 NPT	606256	614126	619151	619168
3656181	254104	1.250	-0.630	9.766	1/4-18 NPT	606256	614126	619151	619168
3656183	254106	1.500	-0.630	11.766	1/4-18 NPT	606256	614126	619151	619168
3656185	254108	2.000	-0.512	11.766	1/4-18 NPT	606256	614126	619151	619168

NOTE: Right-hand holders use left-hand cartridges.



$$L1 \text{ Assy} = L1 \text{ (holder)} + FS \text{ (blade)} + W/2 + .031''$$

$$F \text{ Assy} = F \text{ (holder)} + L1 \text{ (blade)}$$



■ ID Grooving

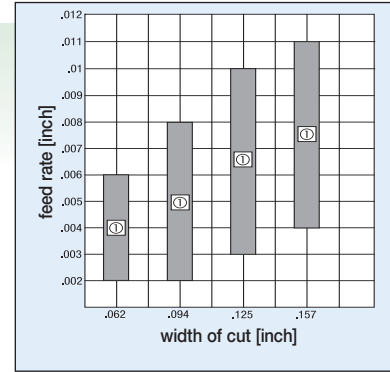
order number	catalog number	W	CD	FS	L1
Right hand					
3653739	350103	.079	.500	.195	1.932
3653741	350105	.094	.625	.185	2.050
3653743	350107	.125	.750	.175	2.150
3653745	350109	.156	.750	.187	2.150
3653747	350111	.187	.850	.170	2.250
3653749	350113	.250	.850	.159	2.250
Left hand					
3653740	350104	.079	.500	.195	1.932
3653742	350106	.094	.625	.185	2.050
3653744	350108	.125	.750	.175	2.150
3653746	350110	.156	.750	.187	2.150
3653748	350112	.187	.850	.170	2.250
3653750	350114	.250	.850	.159	2.250

NOTE: Widths of .187" and .250" are not recommended for 1.000" shank toolholders.
Right-hand holders use left-hand cartridges.

SX Cut-Off Inserts

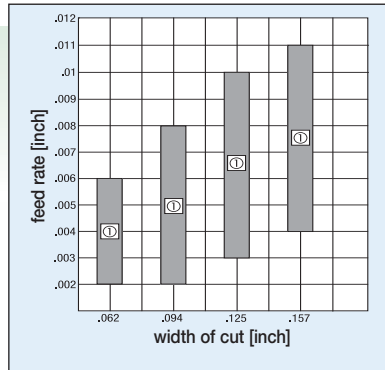


- Wiper flats where surface finish is critical.
- Double-ended, V-bottom, and top, mechanically clamped.
- Neutral, right-, and left-hand lead angles up to 12°.
- Designed to increase speed and feed.
- Chip geometry designed for excellent chip control and minimized cutting pressure on various materials.



① Recommended feed

SX-Ultra Cut-Off Inserts



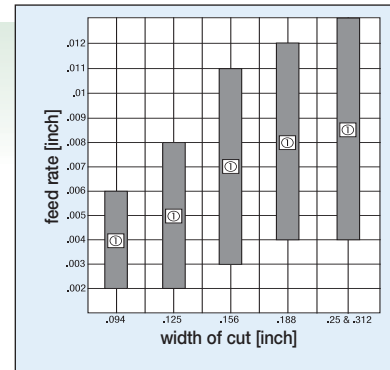
① Recommended feed

- 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 minimized 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

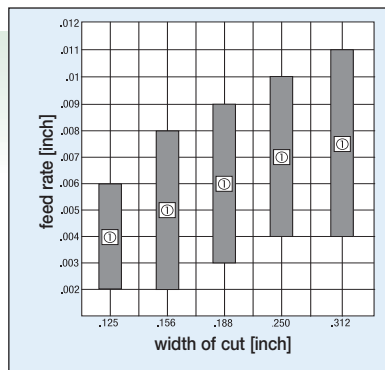


- High positive rake geometry for low cutting force, especially in soft materials.
- Deep grooving tool for plunge and turn OD and face grooving operations.
- Delivers chip control over full range of DOC when turning.
- Cuts in both axial and radial direction.



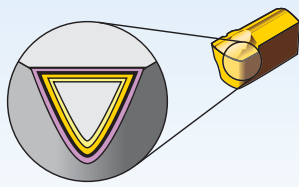
① Recommended feed

PC Grooving and Profiling Inserts



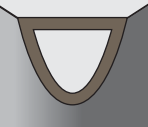
① Recommended feed

- Superior chip control.
- Full nose radius geometry for plunge and contour operations.
- Effective cutting edge geometry exceeds 180° for increased versatility.



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

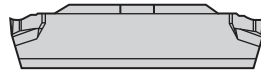
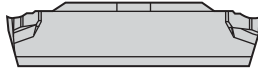
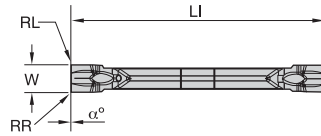
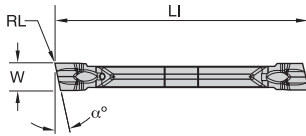
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Coating		Grade Description	05	10	15	20	25	30	35	40	45
Grade	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										
	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.	N								
			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								



Grooving, Cut-Off, and Turning • WMT

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM								
Material Group		min			Start			max		
P	1 2 3 4 5 6 7 8 9 10 11 12 13.1 13.2	TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
		550	650	750	440	540	640	395	495	595
		550	650	750	495	595	695	445	545	645
		450	550	650	405	505	605	365	465	565
		500	600	700	450	550	650	405	505	605
		450	550	650	405	505	605	365	465	565
		450	550	650	405	505	605	365	465	565
		540	640	740	485	585	685	435	535	635
		450	550	650	405	505	605	365	465	565
		450	550	650	405	505	605	365	465	565
		475	575	675	430	530	630	385	485	585
		400	500	600	360	460	560	325	425	525
		450	550	650	405	505	605	365	465	565
400	500	600	360	460	560	325	425	525		
M	14.1 14.2 14.3 14.4	TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
		350	450	550	315	415	515	285	385	485
		280	380	480	250	350	450	225	325	425
		225	325	425	205	305	405	180	280	380
175	275	375	160	260	360	140	240	340		
K	15 16 17 18 19 20	TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
		600	700	800	540	640	740	485	585	685
		450	550	650	405	505	605	365	465	565
		500	600	700	450	550	650	405	505	605
		475	575	675	430	530	630	385	485	585
		650	750	850	585	685	785	525	625	725
450	550	650	405	505	605	365	465	565		
N	21 22 23 24 25 26 27 28 29 30	TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
		1000	1100	1200	900	1000	1100			
		800	900	1000	720	820	920			
		1000	1100	1200	900	1000	1100			
		800	900	1000	720	820	920			
		700	800	900	630	730	830			
		500	600	700	450	550	650			
		500	600	700	450	550	650			
		500	600	700	450	550	650			
		450	550	650	405	505	605			
450	550	650	405	505	605					
S	31 32 33 34 35 36 37	TN6016 (M93)			TN6031 (M43)			TN6026 (M433B)		
		170	270	370	155	255	355	140	240	340
		120	220	320	110	210	310	95	195	295
		125	225	325	115	215	315	100	200	300
		100	200	300	90	190	290	80	180	280
		110	210	310	100	200	300	90	190	290
		220	320	420	200	300	400	180	280	380
		125	225	325	115	215	315	100	200	300



RR = RL

● first choice
○ alternate choice

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

■ WMT-SX

catalog number	W		RR		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583106	2,39	.094	0,13	.005	22,33	.879	—	N - Neutral	●	●	●
583111	3,18	.125	0,17	.007	25,44	1.000	—	N - Neutral	●	●	●

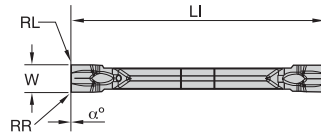
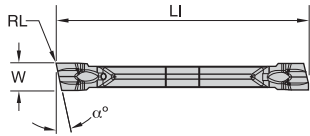
catalog number	W		RR		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583108	2,39	.094	0,13	.005	22,33	.879	5	L - Left	●	●	●
583110	2,39	.094	0,13	.005	22,38	.881	12	L - Left	●	●	●
583113	3,18	.125	0,17	.007	25,40	1.000	5	L - Left	●	●	●
583115	3,18	.125	0,17	.007	25,45	1.002	12	L - Left	●	●	●

catalog number	W		RL		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583107	2,39	.094	0,13	.005	22,33	.879	5	R - Right	●	●	●
583109	2,39	.094	0,13	.005	22,38	.881	12	R - Right	●	●	●
583112	3,18	.125	0,17	.007	25,40	1.000	5	R - Right	●	●	●
583114	3,18	.125	0,17	.007	25,45	1.002	12	R - Right	●	●	●

Grooving, Cut-Off, and Turning • Cut-Off Inserts

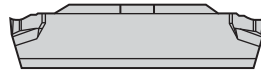
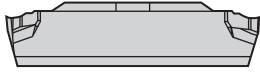
WMT™ Grooving, Cut-Off, and Turning

Cut-Off Inserts



● first choice
○ alternate choice

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



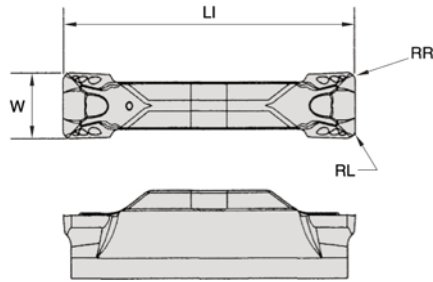
RR = RL

■ WMT-SX Ultra

catalog number	W		RR		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583140	2,39	.094	0,13	.005	22,33	.879	—	N - Neutral	●	○	○
583145	3,18	.125	0,17	.007	25,44	1.000	—	N - Neutral	●	○	○

catalog number	W		RR		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583142	2,39	.094	0,13	.005	22,33	.879	5	L - Left	●	○	○
583144	2,39	.094	0,13	.005	22,38	.881	12	L - Left	●	○	○
583147	3,18	.125	0,17	.007	25,40	1.000	5	L - Left	●	○	○
583149	3,18	.125	0,17	.007	25,45	1.002	12	L - Left	●	○	○

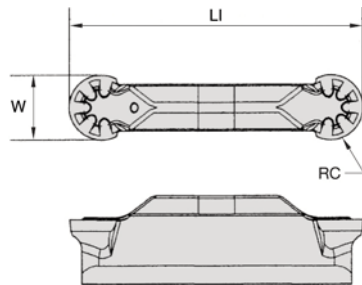
catalog number	W		RL		LI		α°	hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in					
583141	2,39	.094	0,13	.005	22,33	.879	5	R - Right	●	○	○
583143	2,39	.094	0,13	.005	22,38	.881	12	R - Right	●	○	○
583146	3,18	.125	0,17	.007	25,40	1.000	5	R - Right	●	○	○
583148	3,18	.125	0,17	.007	25,45	1.002	12	R - Right	●	○	○



RR = RL

■ **WMT-PT**

catalog number	W		RR		LI		hand	TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in				
582125	2,39	.094	0,15	.006	22,15	.872	N - Neutral	●	●	●
582126	2,39	.094	0,38	.015	22,15	.872	N - Neutral	●	●	●
582101	3,18	.125	0,23	.009	25,40	1.000	N - Neutral	●	●	●
582102	3,18	.125	0,76	.030	25,40	1.000	N - Neutral	●	●	●
582103	3,96	.156	0,25	.010	25,40	1.000	N - Neutral	●	●	●
582104	3,96	.156	0,76	.030	25,40	1.000	N - Neutral	●	●	●
582105	4,78	.188	0,25	.010	28,63	1.127	N - Neutral	●	●	●
582106	4,78	.188	0,76	.030	28,63	1.127	N - Neutral	●	●	●
582107	6,35	.250	0,25	.010	28,63	1.127	N - Neutral	●	●	●
582108	6,35	.250	0,76	.030	28,63	1.127	N - Neutral	●	●	●
582110	7,93	.312	0,76	.030	28,58	1.125	N - Neutral	●	●	●
582148	7,93	.312	1,52	.060	28,58	1.125	N - Neutral	●	●	●



■ **WMT-PC**

catalog number	W		RC		LI		TN6016	TN6026	TN6031
	mm	in	mm	in	mm	in			
581101	3,18	.125	1,59	.063	25,55	1.006	●	●	●
581102	3,96	.156	1,98	.078	25,40	1.000	●	●	●
581103	4,78	.188	2,39	.094	28,65	1.128	●	●	●
581104	6,35	.250	3,18	.125	29,01	1.142	●	●	●
581105	7,93	.312	3,96	.156	29,01	1.142	●	●	●

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

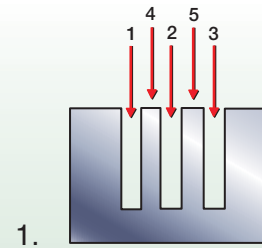
● first choice
○ alternate choice

Troubleshooting

When groove width is greater than insert width, two methods are possible:

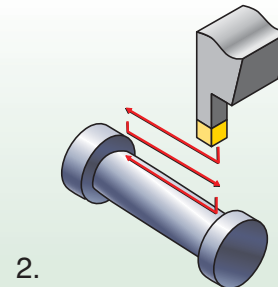
1 Multiple-Pass Grooving

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 times the insert width.



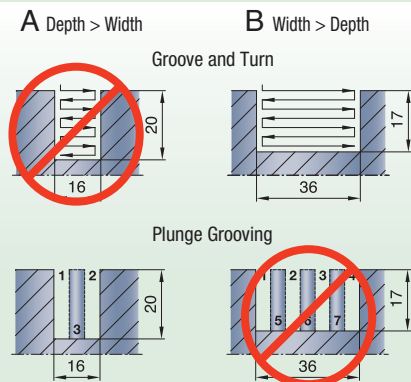
2 Grooving and Turning

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.



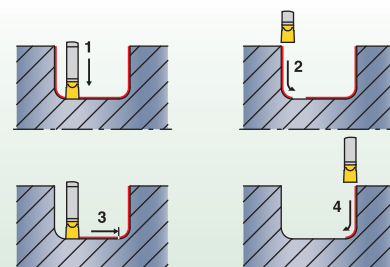
Choosing the Best Method:

- 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. They should be your first toolholder choice when possible.
- 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 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 necessary, for optimum tool life and chip control.

On the Web



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Whether your operation is turning, milling, or holmaking, WIDIA brands are the high-performance tooling you need. We offer standard and custom solutions for the general engineering market.

WIDIA™ TopGroove™

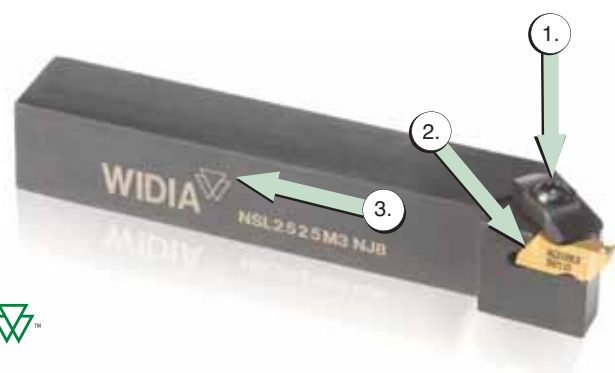
WIDIA has set the industry standard for threading and grooving productivity with the TopGroove clamping design. The proven performance of this system has been enhanced with the addition of new insert geometries and the expansion of our carbide grade offering.

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 molded 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.
- Versatile design enables one system to handle OD and ID grooving, face grooving, back turning, undercutting, and even threading operations.
- New CVD TN7110 grade.

The Most Advanced Turning Solutions in the Industry

Perfect for shallow grooving operations, the WIDIA TopGroove clamping system provides a complete line of grooving geometries and an extensive grade selection to meet even the most demanding application requirements. For increased rigidity, versatility, chip control, and carbide grade options, the TopGroove clamping system is the proven solution.

With maximum clamping rigidity and superior versatility, TopGroove inserts employ a unique top rake chip control geometry that efficiently evacuates chips and produces better quality parts, faster than ever before.

Utilize this comprehensive, easy-to-use guide for the information necessary to identify, choose, and select the appropriate cutting tools for your specific needs.

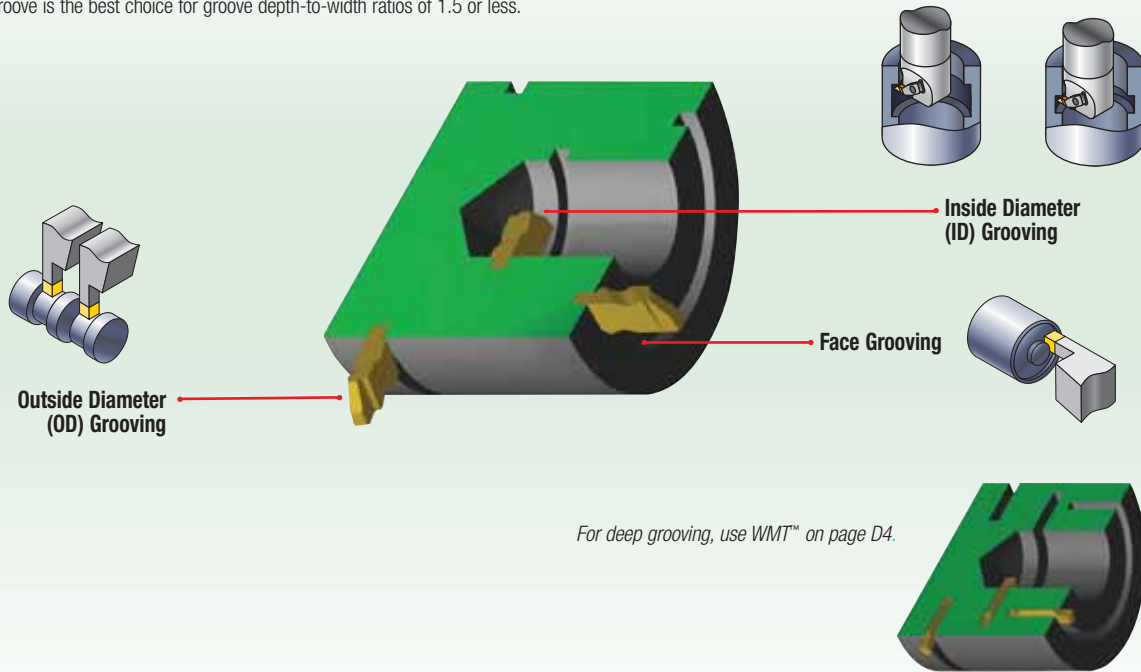
What you need to know:

- Material being machined.
- Groove depth, width, and profile.
- Application to be performed (face, 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.



TopGroove™ for Internal, External, and Face Grooving Applications

system capabilities			minimum	maximum
	OD/ID Grooving	width	.020" (0,50mm)	.375" (9,53mm)
		depth	—	.500" (12,7mm)
	Face Grooving	width	.125" (3,2mm)	.250" (6,35mm)
		depth	—	.500" (12,7mm)
	Internal Grooving	diameter	.440" (11,2mm)	—
	Face Grooving Diameter	standard	.940" (23,9mm)	—
		deep	—	—
	Deep OD/ID Grooving	width	.059" (1,50mm)	.250" (6,35mm)
		depth	—	.500" (12,7mm)
	Deep Face Grooving	width	.125" (3,18mm)	.250" (6,35mm)
depth		—	.500" (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

order number	catalog number	C		F	L1	L2	BA	CD	A	gage insert	clamp	clamp screw	Res/ Torx Plus
		H	B										
3632147	NSR062	.375	.375	.562	2.50	.75	.35	.138	NL2R	CM74	S310	7/64	
3639035	NSR062V	.500	.500	.750	3.50	.75	.35	.138	NL2R	CM74	S310	7/64	
3639044	NSR102B	.625	.625	.875	4.50	.75	.35	.138	NL2R	CM74	S310	7/64	
3639026	NSR122B	.750	.750	1.000	4.50	.75	.35	.138	NL2R	CM74	S310	7/64	
3639025	NSR162C	1.000	1.000	1.250	5.00	.75	.35	.138	NL2R	CM74	S310	7/64	
3639027	NSR123A	.750	.750	1.000	4.00	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3639023	NSR123B	.750	.750	1.000	4.50	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3638692	NSR163C	1.000	1.000	1.250	5.00	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3638691	NSR163D	1.000	1.000	1.250	6.00	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3639028	NSR203D	1.250	1.250	1.500	6.00	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3637509	NSR243D	1.500	1.500	2.000	6.00	1.38	.50	.210	NL3R	CM72LP	S2112	25 P	
3637535	NSR243E	1.500	1.500	2.000	7.00	1.38	.50	.210	NL3R	CM72LP	S2112	25 P	
3637496	NSR353D	1.250	1.000	1.250	6.00	1.25	.50	.210	NL3R	CM72LP	S2112	25 P	
3637509	NSR205D	1.250	1.250	1.500	6.00	2.00	.61	.415	NL5R	CM80	S352	1/4	
3637540	NSR345D	1.500	1.500	2.000	6.00	2.00	.61	.415	NL5R	CM80	S352	1/4	
3632161	Left hand NSL062	.375	.375	.562	2.50	.75	.35	.138	NL2L	CM75	S310	7/64	
3637495	NSL062V	.500	.500	.750	3.50	.75	.35	.138	NL2L	CM75	S310	7/64	
3637510	NSL102B	.625	.625	.875	4.50	.75	.35	.138	NL2L	CM75	S310	7/64	
3632145	NSL122B	.750	.750	1.000	4.50	.75	.35	.138	NL2L	CM75	S310	7/64	
3632138	NSL162C	1.000	1.000	1.250	5.00	.75	.35	.138	NL2L	CM75	S310	7/64	
3632152	NSL123A	.750	.750	1.000	4.00	1.25	.50	.210	NL3L	CM73LP	S2112	25 P	

	application	conventional toolholders	modular blades
	OD Grooving and Plunge and Turn	page D38	—
	ID Grooving	page D42	—

4 Select chipbreaker style for the application:

See application guide on page D44 for a complete list of insert styles.

NOTE: Chart shows recommended starting feed rates.

See page D45.

TopGroove™ Inserts
 Feed Values for Grooving

TopGroove • NG-K, NG-1L, and NG

NG-K

NG

- For general purpose, O-ring, and circle grooving applications.
- Chip control enables true optimization and productivity.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

Recommended feed

TopGroove • NGP and NGD-K

NGP

NGD-K

- Positive rake angles.
- For deep, O-ring, circle, 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.

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.

Recommended feed

A Choose the appropriate insert width "W" for your specific application.

B Select the required corner radius value "RR".

TopGroove™
 Grooving Inserts

● first choice
○ alternate choice

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

■ NG

catalog number	A W		Ap max		B RR		T		insert size	TM6010	TM6025	TN2110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand													
NG2031R	0,79	.031	—	—	0,09	.0036	1,27	.050	2	●	●	●	●
NG2041R	1,04	.041	—	—	0,09	.0036	1,27	.050	2	●	●	●	●
NG2050R	1,47	.058	—	—	0,19	.0075	1,27	.050	2	●	●	●	●
NG2062R	1,58	.062	—	—	0,19	.0075	2,79	.110	2	●	●	●	●
NG3047R	1,19	.047	—	—	0,19	.0075	1,91	.075	3	●	●	●	●
NG3062R	1,58	.062	—	—	0,19	.0075	2,39	.094	3	●	●	●	●
NG3094R	2,39	.094	—	—	0,19	.0075	3,81	.150	3	●	●	●	●
NG3125R	3,18	.125	—	—	0,19	.0075	3,81	.150	3	●	●	●	●

5 Select grade:

		Recommended Grades					
cutting condition		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 D46 for Grades and Grade Descriptions.

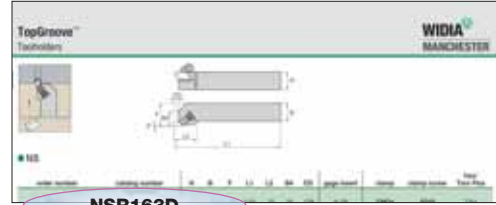
6 Determine cutting data:

- A Based on material group and grade, identify starting speed (vc).
- B First choice starting speed is in **bold**.

See page D48 for cutting data.

ANSI ISO 513		VDI 3323		Cutting Speed • vc SFM											
Material Group				TN6010			TN6025			TN7110			TNM		
				min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1	455	570	685	425	455	490	655	705	750	295	310	325		
	2	425	520	620	390	520	655	620	800	960	295	340	455		
	3	360	455	555	325	425	520	520	670	820	225	295	360		
	4	390	490	590	390	490	590	590	750	915	260	340	425		
	5	325	425	520	325	425	520	490	630	785	225	295	360		
	6	390	490	590	390	490	590	590	750	915	260	340	425		
	7	325	425	520	295	410	520	455	620	785	195	275	360		
	8	295	390	490	260	360	455	390	555	720	160	245	325		
	9	195	295	390	195	260	325	295	410	520	130	180	225		
	10	295	340	390	260	310	360	425	490	555	195	225	260		
	11	160	210	260	160	210	260	260	340	425	130	160	195		
	12	390	505	620	390	455	520	590	685	785	260	310	360		
	13.1	295	390	490	360	340	425	425	540	655	195	245	295		
13.2	145	195	245	130	180	210	210	275	325	95	130	145			
M	14.1	295	390	490	195	245	295				195	245	295		
	14.2	245	325	390	160	195	245				160	195	245		
	14.3	180	245	310	130	160	180				130	160	180		
	14.4	145	195	245	95	130	145				95	130	145		
K	15	455	555	655	225	295	325	620	790	960	225	295	325		
	16	325	425	520	160	210	260	520	650	820	160	210	260		
	17	390	490	590	195	225	260	590	750	920	195	225	260		
	18	295	390	490	130	180	225	390	560	720	130	180	225		
	19	490	590	685	260	310	360	620	790	960	260	310	360		
20	360	455	555	195	245	295	590	750	920	195	245	295			
N	21	1965	2400	2950	1965	2400	2950				1965	2400	2950		
	22	1640	2130	2620	1640	2130	2620				1640	2130	2620		
	23	1965	2400	2950	1965	2400	2950				1965	2400	2950		
	24	1640	2130	2620	1640	2130	2620				1640	2130	2620		
	25	750	980	1210	750	980	1210				750	980	1210		
	26	490	655	820	490	655	820				490	655	820		
	27	490	655	820	490	655	820				490	655	820		
	28	360	455	555	360	455	555				360	455	555		
	29	195	260	325	195	260	325				195	260	325		
	30	260	325	390	260	325	390				260	325	390		
S	31	120	145	180	85	120	145				85	120	145		
	32	85	115	145	65	95	115				65	95	115		
	33	75	90	115	55	75	90				55	75	90		
	34	45	55	80	35	45	55				35	45	55		
	35	50	55	80	35	50	55				35	50	55		
	36	195	235	260	135	195	235				135	195	235		

TopGroove Holder Identification System

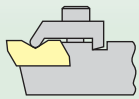


NSR163D

N

Insert Holding Method

N — TopGroove*



*Proprietary standard only.

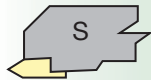
S

Insert Mounting Location

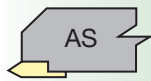
End mount



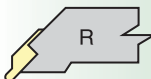
Side mount Offset



Side mount No offset for swiss machining



NRR Undercut

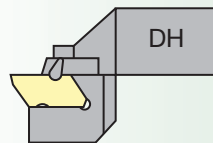


R

Hand of Tool

Drop Head

Drop Head



16

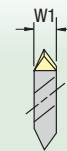
Shank Size

Inch:

For shanks 5/8" square and larger, the number represents the number of sixteenths of width and height. For shanks under 5/8" square, the number of sixteenths of cross section is preceded by a zero. For rectangular holders, the first digit represents the number of eighths of width and the second digit the number of quarters of height, except for a toolholder 1-1/4" x 1-1/2", which is given the number 91.

3

Insert Size

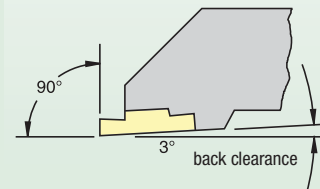


insert size	W1
2	.150"
3	.195"
4	.255"
5	.380"
6	.383"
8	.438"

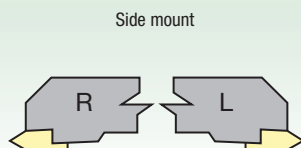
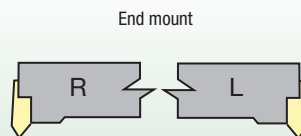
D

Qualified Surface and Length

- A — qualified back and end, 4" long
- B — qualified back and end, 4.5" long
- C — qualified back and end, 5" long
- D — qualified back and end, 6" long
- E — qualified back and end, 7" long
- V — qualified back and end, 3.5" long*



NOTE: Holders are designed to locate insert inclined to 3° to provide back clearance down open side.



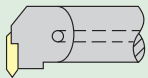
**TopGroove
Boring Bar Identification System**



A

Bar Type

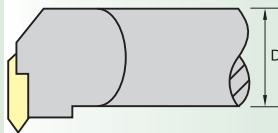
Steel with coolant



32

Bar Diameter

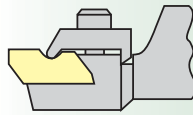
A two-digit number that indicates the bar diameter in 1/16" increments.



N

Insert Holding Method

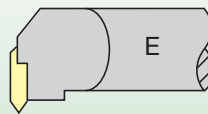
N — TopGroove



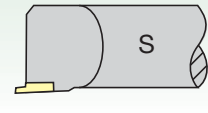
E

Insert Location

End mount



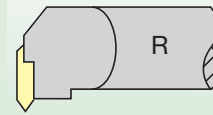
Side mount



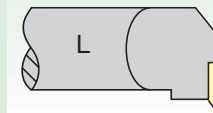
R

Hand of Tool

Right hand

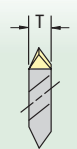


Left hand

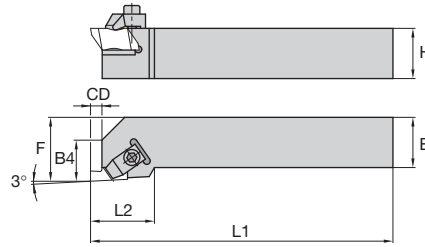
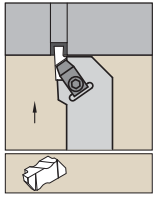


3

Insert Size



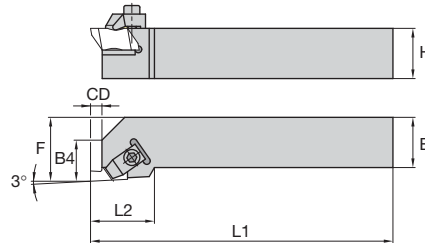
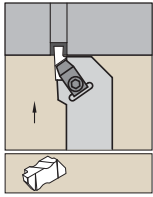
insert size	T
1	.100"
2	.150"
3	.195"
4	.255"
5	.380"
6	.383"
8	.438"



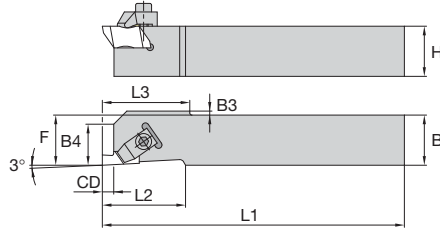
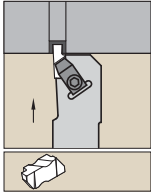
■ NS

Grooving, Cut-Off, and Turning • TopGroove

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
Right hand												
3632147	NSR062	.375	.375	.562	2.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639035	NSR082V	.500	.500	.750	3.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639044	NSR102B	.625	.625	.875	4.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639026	NSR122B	.750	.750	1.000	4.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639025	NSR162C	1.000	1.000	1.250	5.00	.75	.35	.138	N.2R	CM74	S310	7/64
3639027	NSR123A	.750	.750	1.000	4.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3639023	NSR123B	.750	.750	1.000	4.50	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3638592	NSR163C	1.000	1.000	1.250	5.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3638591	NSR163D	1.000	1.000	1.250	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3639028	NSR203D	1.250	1.250	1.500	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3637506	NSR243D	1.500	1.500	2.000	6.00	1.38	.50	.210	N.3R	CM72LP	S2112	25 IP
3637535	NSR243E	1.500	1.500	2.000	7.00	1.38	.50	.210	N.3R	CM72LP	S2112	25 IP
3637496	NSR853D	1.250	1.000	1.250	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3637509	NSR205D	1.250	1.250	1.500	6.00	2.00	.61	.415	N.5R	CM80	S352	1/4
3637540	NSR245D	1.500	1.500	2.000	6.00	2.00	.61	.415	N.5R	CM80	S352	1/4
Left hand												
3632161	NSL062	.375	.375	.562	2.50	.75	.35	.138	N.2L	CM75	S310	7/64
3637485	NSL082V	.500	.500	.750	3.50	.75	.35	.138	N.2L	CM75	S310	7/64
3637510	NSL102B	.625	.625	.875	4.50	.75	.35	.138	N.2L	CM75	S310	7/64
3632145	NSL122B	.750	.750	1.000	4.50	.75	.35	.138	N.2L	CM75	S310	7/64
3632138	NSL162C	1.000	1.000	1.250	5.00	.75	.35	.138	N.2L	CM75	S310	7/64
3632152	NSL123A	.750	.750	1.000	4.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639032	NSL123B	.750	.750	1.000	4.50	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639029	NSL163C	1.000	1.000	1.250	5.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639024	NSL163D	1.000	1.000	1.250	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639037	NSL203D	1.250	1.250	1.500	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3637515	NSL243D	1.500	1.500	2.000	6.00	1.38	.50	.210	N.3L	CM73LP	S2112	25 IP
3637548	NSL243E	1.500	1.500	2.000	7.00	1.38	.50	.210	N.3L	CM73LP	S2112	25 IP
3637508	NSL853D	1.250	1.000	1.250	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3637536	NSL205D	1.250	1.250	1.500	6.00	2.00	.61	.415	N.5L	CM81	S352	1/4

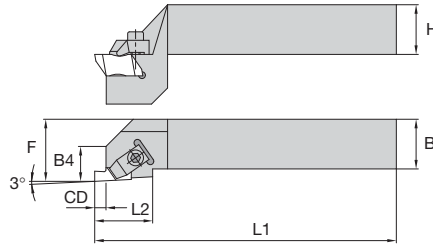
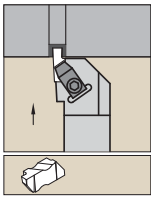

■ NS (with shim)

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp clamp	hex/ Torx Plus	shim shim	shim screw	shim ID	screw drive size
	Right hand														
3639031	NSR164C	1.000	1.000	1.250	5.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3639033	NSR164D	1.000	1.000	1.250	6.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3637529	NSR204C	1.250	1.250	1.500	5.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3639034	NSR204D	1.250	1.250	1.500	6.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3637484	NSR244D	1.500	1.500	2.000	6.00	1.50	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3637501	NSR244E	1.500	1.500	2.000	7.00	1.50	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3637526	NSR854D	1.250	1.000	1.250	6.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3637534	NSR864E	1.500	1.000	1.250	7.00	1.38	.54	.294	N.4R	CM72LP	S2112	25 IP	SM420	SL344	—
3632153	NSR166D	1.000	1.000	1.250	6.00	1.38	.67	.334	N.6R	CM120	S412	5/32	SM416	S111	1/16
3637472	NSR206D	1.250	1.250	1.500	6.00	1.38	.67	.334	N.6R	CM120	S412	5/32	SM416	S111	1/16
3637520	NSR246D	1.500	1.500	2.000	6.00	1.50	.67	.334	N.6R	CM120	S412	5/32	SM416	S111	1/16
3637539	NSR168D	1.000	1.000	1.250	6.00	1.25	.72	.225	N.8R	CM144	S422	3/16	SM419	S112	1/16
	Left hand														
3632151	NSL164C	1.000	1.000	1.250	5.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3639040	NSL164D	1.000	1.000	1.250	6.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3641699	NSL204C	1.250	1.250	1.500	5.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3639036	NSL204D	1.250	1.250	1.500	6.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3637505	NSL244D	1.500	1.500	2.000	6.00	1.50	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3637533	NSL244E	1.500	1.500	2.000	7.00	1.50	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3637541	NSL854D	1.250	1.000	1.250	6.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3641700	NSL864E	1.500	1.000	1.250	7.00	1.38	.54	.294	N.4L	CM73LP	S2112	25 IP	SM420	SL344	—
3637487	NSL166D	1.000	1.000	1.250	6.00	1.38	.67	.334	N.6L	CM121	S412	5/32	SM416	S111	1/16
3637507	NSL206D	1.250	1.250	1.500	6.00	1.38	.67	.334	N.6L	CM121	S412	5/32	SM416	S111	1/16
3637546	NSL246D	1.500	1.500	2.000	6.00	1.50	.67	.334	N.6L	CM121	S412	5/32	SM416	S111	1/16



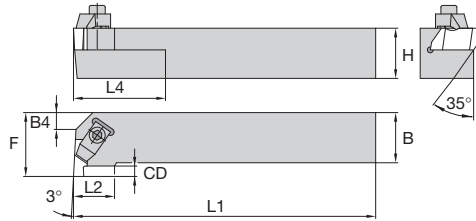
■ NAS (for Swiss Machines)

order number	catalog number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	hex/Torx Plus
	Right hand													
3632140	NASR062D	.375	.375	.375	6.00	.75	.35	.138	.07	.88	N.2R	CM182	S310	7/64
3636529	NASR082D	.500	.500	.500	6.00	.75	.35	.138	—	—	N.2R	CM182	S310	7/64
3639039	NASR102B	.625	.625	.625	4.50	.75	.35	.138	—	—	N.2R	CM74	S310	7/64
	Left hand													
3639042	NASR083D	.500	.500	.500	6.00	1.25	.50	.210	.13	1.32	N.3R	CM184LP	S2112	25 IP
3636532	NASR103B	.625	.625	.625	4.50	1.25	—	.210	—	—	N.3R	CM184LP	S2112	25 IP
3637531	NASL062D	.375	.375	.375	6.00	.75	.35	.138	.07	.88	N.2L	CM183	S310	7/64
3636534	NASL082D	.500	.500	.500	6.00	.75	.35	.138	—	—	N.2L	CM183	S310	7/64
3637489	NASL102B	.625	.625	.625	4.50	.75	.35	.138	—	—	N.2L	CM75	S310	7/64
3637497	NASL083D	.500	.500	.500	6.00	1.25	.50	.210	.13	1.32	N.3L	CM185	S412	25 IP
3636524	NASL103B	.625	.625	.625	4.50	1.25	—	.210	—	—	N.3L	CM185LP	S2112	25 IP



■ NS-DH

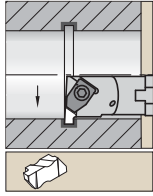
order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/Torx Plus	jack screw	wrench size jack screw
	Right hand													
3637547	NSRDH122B	.750	.750	1.000	4.50	.75	.40	.138	N.2R	CM74	S310	7/64	—	—
3637499	NSRDH163C	1.000	1.000	1.250	5.00	1.25	.58	.210	N.3R	CM72LP	S2112	25 IP	—	—
3637528	NSRDH163D	1.000	1.000	1.250	6.00	1.25	.58	.210	N.3R	CM72LP	S2112	25 IP	—	—
3637511	NSRDH203D	1.250	1.250	1.500	6.00	1.25	.62	.210	N.3R	CM72LP	S2112	25 IP	S965	3/16
3637530	NSRDH204D	1.250	1.250	1.500	6.00	1.38	.62	.294	N.4R	CM72LP	S2112	25 IP	S965	3/16
	Left hand													
3637518	NSLDH203D	1.250	1.250	1.500	6.00	1.25	.62	.210	N.3L	CM73LP	S2112	25 IP	S965	3/16



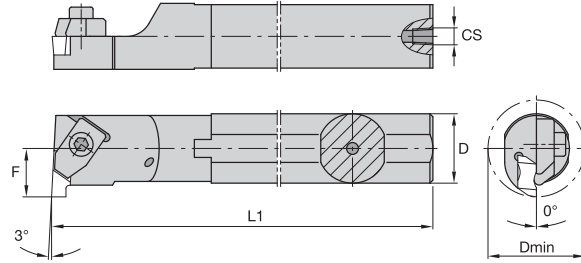
■ NE

order number	catalog number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand												
3637521	NER062	.375	.375	.750	2.50	.50	.50	—	.138	N.2L	CM75	S310	7/64
3637494	NER082V	.500	.500	.750	3.50	.50	1.00	—	.138	N.2L	CM75	S310	7/64
3637517	NER102B	.625	.625	.750	4.50	—	1.00	—	.138	N.2L	CM75	S310	7/64
3632156	NER122B	.750	.750	1.000	4.50	.50	1.00	.29	.138	N.2L	CM75	S310	7/64
3637486	NER162C	1.000	1.000	1.250	5.00	.50	1.00	.41	.138	N.2L	CM75	S310	7/64
3632133	NER123B	.750	.750	1.125	4.50	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3639030	NER163D	1.000	1.000	1.250	6.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3639038	NER163C	1.000	1.000	1.250	5.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3632150	NER203D	1.250	1.250	1.500	6.00	.75	2.00	.26	.210	N.3L	CM73LP	S2112	25 IP
3637523	NER853D	1.250	1.000	1.250	6.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3637524	NER243D	1.500	1.500	2.000	6.00	.75	2.00	.76	.210	N.3L	CM73LP	S2112	25 IP
3639043	NER164D	1.000	1.000	1.375	6.00	.75	2.00	—	.294	N.4L	CM73LP	S2112	25 IP
3637492	NER164C	1.000	1.000	1.375	5.00	.75	2.00	—	.294	N.4L	CM73LP	S2112	25 IP
3632157	NER204D	1.250	1.250	1.625	6.00	.75	2.00	.27	.294	N.4L	CM73LP	S2112	25 IP
3637522	NER244D	1.500	1.500	2.000	6.00	.75	2.00	.65	.294	N.4L	CM73LP	S2112	25 IP
3637542	NER205D	1.250	1.250	2.000	6.00	1.44	2.00	—	.415	N.5L	CM81	S352	1/4
3637544	NER206D	1.250	1.250	1.625	6.00	.75	2.00	.27	.300	N.6L	CM121	S412	5/32
	Left hand												
3637525	NEL062	.375	.375	.750	2.50	.50	.50	—	.138	N.2R	CM74	S310	7/64
3632158	NEL082V	.500	.500	.750	3.50	.50	1.00	—	.138	N.2R	CM74	S310	7/64
3637532	NEL102B	.625	.625	.750	4.50	—	1.00	—	.138	N.2R	CM74	S310	7/64
3637503	NEL122B	.750	.750	1.000	4.50	.50	1.00	.29	.138	N.2R	CM74	S310	7/64
3637500	NEL162C	1.000	1.000	1.250	5.00	.50	1.00	.41	.138	N.2R	CM74	S310	7/64
3632144	NEL123B	.750	.750	1.125	4.50	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3639041	NEL163D	1.000	1.000	1.250	6.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3632155	NEL163C	1.000	1.000	1.250	5.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3632154	NEL203D	1.250	1.250	1.500	6.00	.75	2.00	.26	.210	N.3R	CM72LP	S2112	25 IP
3637538	NEL853D	1.250	1.000	1.250	6.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3637537	NEL243D	1.500	1.500	2.000	6.00	.75	2.00	.76	.210	N.3R	CM72LP	S2112	25 IP
3637493	NEL164C	1.000	1.000	1.375	5.00	.75	2.00	—	.294	N.4R	CM72LP	S2112	25 IP
3632162	NEL164D	1.000	1.000	1.375	6.00	.75	2.00	—	.294	N.4R	CM72LP	S2112	25 IP
3632159	NEL204D	1.250	1.250	1.625	6.00	.75	2.00	.27	.294	N.4R	CM72LP	S2112	25 IP
3637543	NEL244D	1.500	1.500	2.000	6.00	.75	2.00	.65	.294	N.4R	CM72LP	S2112	25 IP
3637549	NEL205D	1.250	1.250	2.000	6.00	1.44	2.00	—	.415	N.5R	CM80	S352	1/4
3641697	NEL206D	1.250	1.250	1.625	6.00	.75	2.00	.27	.300	N.6R	CM120	S412	5/32

Grooving, Cut-Off, and Turning • TopGroove



Steel shank with through coolant.

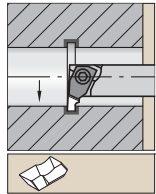


■ A-NE

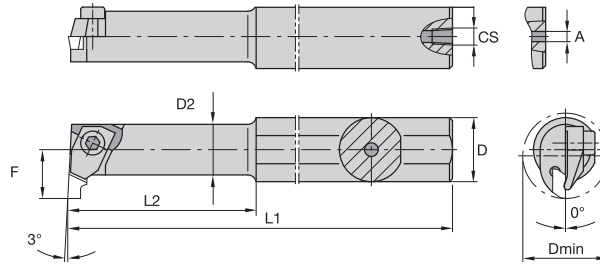
Grooving, Cut-Off, and Turning • TopGroove

order number	catalog number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand									
3632117	A08NER2	.500	.730	8.000	.437	1/16-27 NPT	N.2L	CM147	S39	7/64
3632114	A10NER2	.625	1.000	10.000	.500	1/8-27 NPT	N.2L	CM75	S310	7/64
3632118	A12NER2	.750	1.125	10.000	.562	1/8-27 NPT	N.2L	CM75	S310	7/64
3632130	A16NER2	1.000	1.375	12.000	.688	1/4-18 NPT	N.2L	CM75	S310	7/64
3632113	A16NER3	1.000	1.375	12.000	.688	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632116	A20NER3	1.250	1.750	14.000	.875	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632115	A24NER3	1.500	2.000	14.000	1.000	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632132	A28NER3	1.750	2.250	14.000	1.125	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632122	A32NER3	2.000	2.500	16.000	1.250	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632146	A40NER3	2.500	3.000	16.000	1.500	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632123	A28NER4	1.750	2.500	14.000	1.250	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3632125	A32NER4	2.000	2.750	16.000	1.375	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3632136	A40NER4	2.500	3.250	16.000	1.625	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3637514	A32NER5	2.000	2.812	16.000	1.406	1/4-18 NPT	N.5L	CM81	S352	1/4
3632143	A32NER6	2.000	2.750	16.000	1.375	1/4-18 NPT	N.6L	CM121	S412	5/32
3637498	A40NER6	2.500	3.250	16.000	1.625	1/4-18 NPT	N.6L	CM121	S412	5/32
	Left hand									
3632131	A08NEL2	.500	.730	8.000	.437	1/16-27 NPT	N.2R	CM146	S39	7/64
3632127	A10NEL2	.625	1.000	10.000	.500	1/8-27 NPT	N.2R	CM74	S310	7/64
3632126	A12NEL2	.750	1.125	10.000	.562	1/8-27 NPT	N.2R	CM74	S310	7/64
3632142	A16NEL2	1.000	1.375	12.000	.688	1/4-18 NPT	N.2R	CM74	S310	7/64
3632120	A16NEL3	1.000	1.375	12.000	.688	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632124	A20NEL3	1.250	1.750	14.000	.875	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632128	A24NEL3	1.500	2.000	14.000	1.000	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637490	A28NEL3	1.750	2.250	14.000	1.125	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632139	A32NEL3	2.000	2.500	16.000	1.250	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637504	A40NEL3	2.500	3.000	16.000	1.500	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632141	A28NEL4	1.750	2.500	14.000	1.250	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3632149	A32NEL4	2.000	2.750	16.000	1.375	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3637491	A40NEL4	2.500	3.250	16.000	1.625	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3637527	A32NEL5	2.000	2.812	16.000	1.406	1/4-18 NPT	N.5R	CM80	S352	1/4
3637512	A32NEL6	2.000	2.750	16.000	1.375	1/4-18 NPT	N.6R	CM120	S412	5/32

NOTE: Minimum bore capability varies with depth of groove. See pages D66–D67 for details.



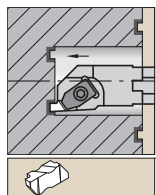
Necked steel shank with through coolant.



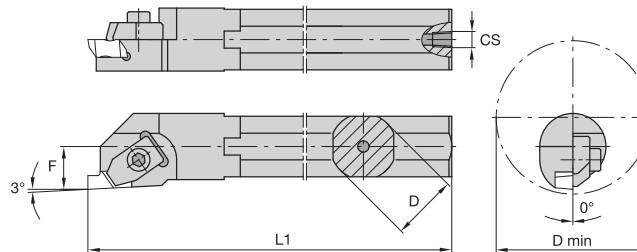
■ **A-NE-1**

order number	catalog number	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand												
3632121	A06NER1	.375	.440	.312	6	1.25	.258	.125	—	N.1L	CM109	S304	5/64
3632119	A08NER1	.500	.440	.312	8	1.25	.258	—	1/16-27 NPT	N.1L	CM109	S304	5/64
3632148	A10NER1	.625	.800	—	10	—	.406	—	1/8-27 NPT	N.1L	CM109	S304	5/64

NOTE: Minimum bore capability varies with depth of groove. See pages D66–D67 for details.



Steel shank with through coolant.



■ **A-NS**

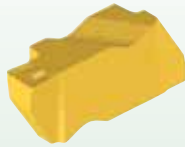
order number	catalog number	D	D min	L1	F	CS	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand									
3632129	A16TNSR3	1.000	2.250	12	.640	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632135	A20UNSR3	1.250	2.250	14	.765	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632134	A24UNSR3	1.500	2.250	14	.890	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637516	A28UNSR3	1.750	2.250	14	1.015	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632160	A32VNSR3	2.000	2.375	16	1.281	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637513	A40VNSR3	2.500	2.875	16	1.531	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
	Left hand									
3632137	A16TNSL3	1.000	2.250	12	.640	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3637495	A20UNSL3	1.250	2.250	14	.765	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3637488	A24UNSL3	1.500	2.250	14	.890	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3637502	A32VNSL3	2.000	2.375	16	1.281	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP

NOTE: Minimum bore capability varies with depth of groove. See pages D66–D67 for details.

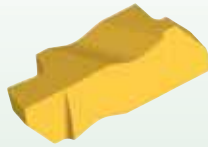
insert style	application	rake angle	page(s)	insert style	application	rake angle	page(s)
NG 	<ul style="list-style-type: none"> • General-purpose grooving. • O-ring grooving. • Circlip grooving. 	neutral	D49	NFD-KI* 	<ul style="list-style-type: none"> • Internal deep face grooving with chip control. • For use in boring bars for internal face grooves. 	10° positive	—
NG-K 	<ul style="list-style-type: none"> • Chip control geometry. • General-purpose grooving. • O-ring grooving. • Circlip grooving. • Light turning. 	10° positive	D50	NP-K 	<ul style="list-style-type: none"> • Turning. • Back turning positive. • Profiling with chip control. 	10° positive	D56
NGC-K* 	<ul style="list-style-type: none"> • Combined groove and chamfered edge break in one positive plunge with chip control. • Designed for DIN 471/472 standard circlip grooves. 	10° positive	—	NR 	<ul style="list-style-type: none"> • Full radius grooving. • Turning and profiling. 	neutral	D56
NGD* 	<ul style="list-style-type: none"> • Deep grooving. 	neutral	—	NR-K 	<ul style="list-style-type: none"> • Chip control geometry. • Full radius grooving, turning, and profiling. 	10° positive	D58
NGD-K 	<ul style="list-style-type: none"> • Chip control geometry. • Deep grooving. • Light turning. 	10° positive	D53	NRD 	<ul style="list-style-type: none"> • Deep grooving. • Full radius end-form. 	neutral	D58
NGP 	<ul style="list-style-type: none"> • General-purpose grooving. • O-ring grooving. • Circlip grooving. 	5° positive	D54	NRP* 	<ul style="list-style-type: none"> • Full radius grooving. • Light-turning profiling. 	5° positive	—
NF* 	<ul style="list-style-type: none"> • Face grooving. • Additional side clearance. 	neutral	—	NU* 	<ul style="list-style-type: none"> • Undercutting. 	neutral	—
NF-K 	<ul style="list-style-type: none"> • Face grooving with chip control. • Additional side clearance. 	10° positive	D55	NV* 	<ul style="list-style-type: none"> • Poly-Vee grooving. 	neutral	—
NFD-K 	<ul style="list-style-type: none"> • Deep face grooving with chip control. • Additional side clearance. 	10° positive	D55	NB/NBD 	<ul style="list-style-type: none"> • Blanks. • Blanks for deep grooving. • Available in uncoated grades only. 	—	D59

*Inserts are available as custom solutions.

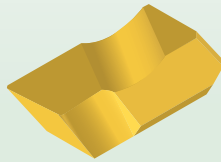
TopGroove • NG-K, NG-1L, and NG



NG-K

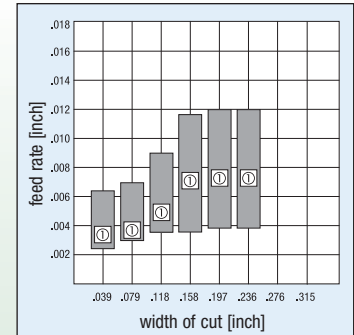


NG



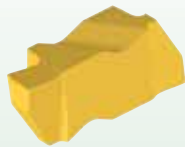
NG-1L

- Chip control enables true optimization and productivity.
- For general-purpose, O-ring, and circlip grooving applications.
- Precision ground for accurate edge location.
- Can be used in both toolholders and boring bars.

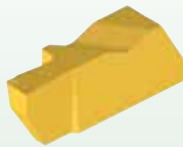


① Recommended feed

TopGroove • NGP and NGD-K

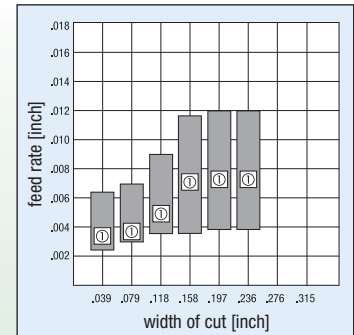


NGP



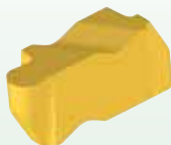
NGD-K

- 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.

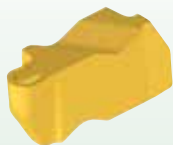


① Recommended feed

TopGroove • NR and NR-K

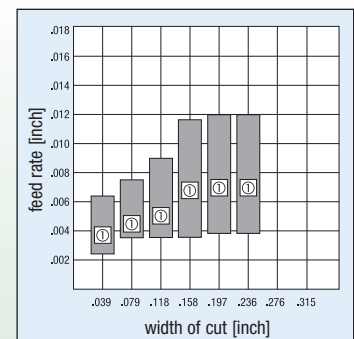


NR



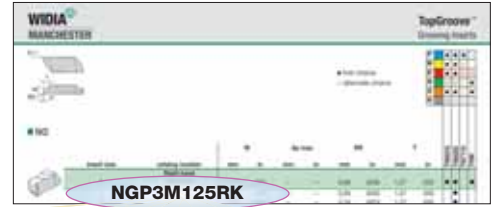
NR-K

- 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

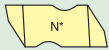
TopGroove Insert Identification System



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

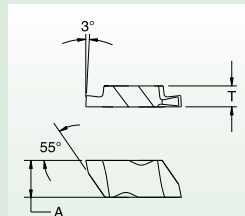
Additional Information

- D — Deep grooving
- P — Positive
- C — Groove and chamfer

3

Insert Size

insert size	S		W1	
	inch	mm	inch	mm
1	.100	2,54	.100	2,54
2	.219	5,56	.150	3,81
3	.344	8,74	.195	4,95
4	.453	11,51	.255	6,98
5	.688	17,48	.380	9,65
6	.453	11,51	.383	9,73



M

Size Identification

- M — Metric insert groove width
- C — Circlip groove insert width is nominal circlip size
- Blank — indicates inch width insert

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 .001".

inch example
1/32 = .031"

Width Tolerance: ±.001" unless otherwise specified

**Omit position for TopGroove NB-style blanks.

125

Groove Size**

R

Hand of Insert

- L — Left hand
- R — Right hand

Shown for groove and chamfer inserts in .0004" increments.

Blank

Cutting Depth

K

Chipbreaker Design

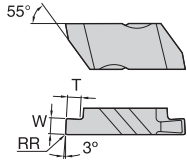
- K — Standard chip control
- E — Hone only

Groove size

- J or L — Poly-Vee inserts
- I — Internal face grooving

Grooving, Cut-Off, and Turning • TopGroove

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM											
Material Group		Cutting Speed • vc SFM											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P		TN6010			TN6025			TN7110			THM		
	1	455	570	685	425	455	490	655	705	750	295	310	325
	2	425	520	620	390	520	655	620	800	980	295	340	455
	3	360	455	555	325	425	520	520	670	820	225	295	360
	4	390	490	590	390	490	590	590	750	915	260	340	425
	5	325	425	520	325	425	520	490	635	785	225	295	360
	6	390	490	590	390	490	590	590	750	915	260	340	425
	7	325	425	520	295	410	520	455	620	785	195	275	360
	8	295	390	490	260	360	455	390	555	720	160	245	325
	9	195	295	390	195	260	325	295	410	520	130	160	225
	10	295	340	390	260	310	360	425	490	555	195	225	260
	11	160	210	260	160	210	260	260	340	425	130	160	195
	12	390	505	620	390	455	520	590	685	785	260	310	360
13.1	295	390	490	260	340	425	425	540	655	195	245	295	
13.2	145	195	245	130	180	210	210	275	325	95	130	145	
M		TN6010			TN6025			TN7110			THM		
	14.1	295	390	490	195	245	295				195	245	295
	14.2	245	325	390	160	195	245				160	195	245
	14.3	180	245	310	130	160	180				130	160	180
14.4	145	195	245	95	130	145				95	130	145	
K		TN6010			TN6025			TN7110			THM		
	15	455	555	655	225	295	325	620	790	980	225	295	325
	16	325	425	520	160	210	260	520	650	820	160	210	260
	17	390	490	590	195	225	260	590	750	920	195	225	260
	18	295	390	490	130	180	225	390	560	720	130	180	225
	19	490	590	685	260	310	360	620	790	980	260	310	360
20	360	455	555	195	245	295	590	750	920	195	245	295	
N		TN6010			TN6025			TN7110			THM		
	21	1965	2460	2950	1965	2460	2950				1965	2460	2950
	22	1640	2130	2620	1640	2130	2620				1640	2130	2620
	23	1965	2460	2950	1965	2460	2950				1965	2460	2950
	24	1640	2130	2620	1640	2130	2620				1640	2130	2620
	25	750	980	1210	750	980	1210				750	980	1210
	26	490	655	820	490	655	820				490	655	820
	27	490	655	820	490	655	820				490	655	820
	28	360	455	555	360	455	555				360	455	555
	29	195	260	325	195	260	325				195	260	325
	30	260	325	390	260	325	390				260	325	390
S		TN6010			TN6025			TN7110			THM		
	31	120	145	180	85	120	145				85	120	145
	32	95	115	145	65	95	115				65	95	115
	33	75	90	115	55	75	90				55	75	90
	34	45	55	80	35	45	55				35	45	55
	35	50	55	80	35	50	55				35	50	55
	36	195	235	260	135	195	235				135	195	235
	37	95	115	145	65	95	115				65	95	115



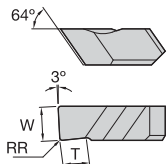
● first choice
○ alternate choice

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

■ NG

catalog number	W		Ap max		RR		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand													
NG2031R	0,79	.031	—	—	0,09	.0035	1,27	.050	2	●	●	●	
NG2041R	1,04	.041	—	—	0,09	.0035	1,27	.050	2		●		
NG2058R	1,47	.058	—	—	0,19	.0075	1,27	.050	2		●		
NG2062R	1,58	.062	—	—	0,19	.0075	2,79	.110	2	●	●	●	
NG3047R	1,19	.047	—	—	0,19	.0075	1,91	.075	3	●	●	●	
NG3062R	1,58	.062	—	—	0,19	.0075	2,39	.094	3	●	●	●	
NG3094R	2,39	.094	—	—	0,19	.0075	3,81	.150	3	●	●	●	
NG3125R	3,18	.125	—	—	0,19	.0075	3,81	.150	3	●	●	●	
NG4250R	6,35	.250	—	—	0,57	.0225	6,35	.250	4	●	●	●	
Left hand													
NG2031L	0,79	.031	—	—	0,09	.0035	1,27	.050	2		●		
NG2058L	1,47	.058	—	—	0,19	.0075	1,27	.050	2		●		
NG2062L	1,58	.062	—	—	0,19	.0075	2,79	.110	2		●		
NG3047L	1,19	.047	—	—	0,19	.0075	1,91	.075	3	●	●	●	
NG3062L	1,58	.062	—	—	0,19	.0075	2,39	.094	3	●	●	●	
NG3094L	2,39	.094	—	—	0,19	.0075	3,81	.150	3	●	●	●	
NG3125L	3,18	.125	—	—	0,19	.0075	3,81	.150	3	●	●	●	
NG4250L	6,35	.250	—	—	0,57	.0225	6,35	.250	4	●	●	●	
NG5M500L	5,00	.197	—	—	0,32	.0125	9,52	.375	5		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

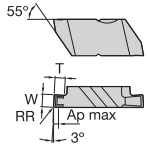


■ NG-1L

catalog number	W		Ap max		RR		T		insert size	cutting edges	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in						
Left hand														
NG1047L	1,19	.047	—	—	0,19	.0075	1,91	.075	1	1	●			
NG1062L	1,58	.062	—	—	0,19	.0075	1,91	.075	1	1	●			
NG1094L	2,39	.094	—	—	0,19	.0075	1,91	.075	1	1	●			

NOTE: Width tolerance is +/- .003" (+/- 0,076mm) on NG-1L inserts.

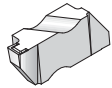
(continued)



● first choice
○ alternate choice

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

■ NG-K

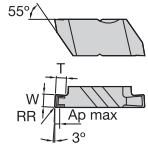


catalog number	W		Ap max		RR		T		insert size	TNG610	TNG625	TNG710	THM
	mm	in	mm	in	mm	in	mm	in					
NG3M400RK	4,00	.158	2,92	.115	0,32	.0125	3,81	.150	3	●	●	●	
NG3M425RK	4,25	.167	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	
NG3M450RK	4,50	.177	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	
NG3189RK	4,80	.189	2,92	.115	0,57	.0225	3,81	.150	3	●	●	○	
NG4M300RK	3,00	.118	1,02	.040	0,19	.0075	3,81	.150	4	●	●	○	
NG4125RK	3,18	.125	1,02	.040	0,19	.0075	3,81	.150	4	●	●	○	
NG4M350RK	3,50	.138	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	
NG4M400RK	4,00	.158	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	
NG4M450RK	4,50	.177	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	
NG4189RK	4,80	.189	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	
NG4M500RK	5,00	.197	2,92	.115	0,32	.0125	6,35	.250	4	●	●	○	
NG4M550RK	5,50	.217	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	
NG4M600RK	6,00	.236	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	
NG4250RK	6,35	.250	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	
Left hand													
NG2M050LK	0,50	.020	0,64	.025	0,09	.0035	0,64	.025	2	●	●	○	
NG2031LK	0,79	.031	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2M080LK	0,80	.032	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2M100LK	1,00	.039	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2047LK	1,19	.047	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2M120LK	1,20	.047	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2M140LK	1,40	.055	0,76	.030	0,09	.0035	1,27	.050	2	●	●	○	
NG2M150LK	1,50	.059	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2062LK	1,58	.062	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M170LK	1,70	.067	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M175LK	1,75	.069	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M195LK	1,95	.077	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M200LK	2,00	.079	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M220LK	2,20	.087	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M225LK	2,25	.088	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2094LK	2,39	.094	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M250LK	2,50	.098	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M275LK	2,75	.108	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M300LK	3,00	.118	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2125LK	3,18	.125	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG2M325LK	3,25	.128	1,09	.043	0,19	.0075	2,79	.110	2	●	●	○	
NG3M100LK	1,00	.039	0,76	.030	0,19	.0075	1,91	.075	3	●	●	○	
NG3047LK	1,19	.047	0,76	.030	0,19	.0075	1,91	.075	3	●	●	○	
NG3M120LK	1,20	.047	0,76	.030	0,19	.0075	1,91	.075	3	●	●	○	
NG3M150LK	1,50	.059	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	
NG3062LK	1,58	.062	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	
NG3M175LK	1,75	.069	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	

(continued)

Grooving, Cut-Off, and Turning • TopGroove

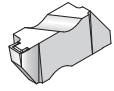
(continued)



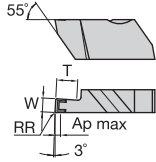
● first choice
○ alternate choice

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

■ NG-K



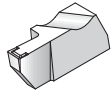
catalog number	W		Ap max		RR		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
NG3072LK	1,83	.072	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	○
NG3078LK	1,98	.078	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	○
NG3M200LK	2,00	.079	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	○
NG3M220LK	2,20	.087	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	○
NG3M225LK	2,25	.088	1,02	.040	0,19	.0075	2,39	.094	3	●	●	○	○
NG3094LK	2,39	.094	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M250LK	2,50	.098	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M275LK	2,75	.108	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M300LK	3,00	.118	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3125LK	3,18	.125	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M320LK	3,20	.126	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M325LK	3,25	.128	1,02	.040	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M350LK	3,50	.138	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	○
NG3156LK	3,96	.156	2,92	.115	0,19	.0075	3,81	.150	3	●	●	○	○
NG3M400LK	4,00	.158	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	○
NG3M425LK	4,25	.167	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	○
NG3M450LK	4,50	.177	2,92	.115	0,32	.0125	3,81	.150	3	●	●	○	○
NG3189LK	4,80	.189	2,92	.115	0,57	.0225	3,81	.150	3	●	●	○	○
NG4M300LK	3,00	.118	1,02	.040	0,19	.0075	3,81	.150	4	●	●	○	○
NG4125LK	3,18	.125	1,02	.400	0,19	.0075	3,81	.150	4	●	●	○	○
NG4M350LK	3,50	.138	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	○
NG4M400LK	4,00	.158	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	○
NG4M450LK	4,50	.177	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	○
NG4189LK	4,80	.189	2,92	.115	0,57	.0225	6,35	.250	4	●	●	○	○
NG4M500LK	5,00	.197	2,92	.115	0,32	.0125	6,35	.250	4	●	●	○	○
NG4M550LK	5,50	.217	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	○
NG4M600LK	6,00	.236	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	○
NG4250LK	6,35	.250	3,81	.150	0,57	.0225	6,35	.250	4	●	●	○	○



● first choice
○ alternate choice

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

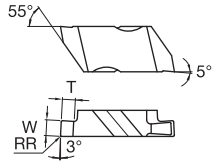
■ **NGD-K**



catalog number	W		Ap max		RR		T		insert size	cutting edges	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in						
Right hand														
NGD2M150RK	1,50	.059	1,09	.043	0,19	.0075	4,06	.160	2	1	●	●		
NGD2M200RK	2,00	.079	1,09	.043	0,19	.0075	5,08	.200	2	1	●	●		
NGD2M250RK	2,50	.098	1,09	.043	0,19	.0075	5,08	.200	2	1	●	●		
NGD3062RK	1,58	.062	1,02	.040	0,19	.0075	3,18	.125	3	2	●	●		
NGD3M200RK	2,00	.079	1,02	.040	0,19	.0075	4,06	.160	3	1	●	●		
NGD3094RK	2,39	.094	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		●
NGD3M250RK	2,50	.098	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3M300RK	3,00	.118	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3125RK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3M350RK	3,50	.138	2,92	.115	0,32	.0125	6,35	.250	3	1	●	●		
NGD3M400RK	4,00	.157	2,92	.115	0,32	.0125	6,35	.250	3	1	●	●		
NGD3189RK	4,80	.189	2,92	.115	0,57	.0225	6,35	.250	3	1	●	●		
NGD4125RK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	4	2	●	●		
NGD4M400RK	4,00	.157	2,92	.115	0,57	.0225	9,53	.375	4	1	●	●		
NGD4M450RK	4,50	.177	2,92	.115	0,57	.0225	12,70	.500	4	1	●	●		
NGD4189RK	4,80	.189	2,92	.115	0,57	.0225	9,53	.375	4	1	●	●		
NGD4M500RK	5,00	.197	2,92	.115	0,57	.0225	12,70	.500	4	1	●	●		
NGD4M550RK	5,50	.217	3,81	.150	0,57	.0225	12,70	.500	4	1	●	●		
NGD4250RK	6,35	.250	3,81	.150	0,57	.0225	12,70	.500	4	1	●	●		
Left hand														
NGD2M150LK	1,50	.059	1,09	.043	0,19	.0075	4,06	.160	2	1	●	●		
NGD2M200LK	2,00	.079	1,09	.043	0,19	.0075	5,08	.200	2	1	●	●		
NGD2M250LK	2,50	.098	1,09	.043	0,19	.0075	5,08	.200	2	1	●	●		
NGD3062LK	1,58	.062	1,02	.040	0,19	.0075	3,18	.125	3	2	●	●		
NGD3M200LK	2,00	.079	1,02	.040	0,19	.0075	4,06	.160	3	1	●	●		
NGD3094LK	2,39	.094	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		●
NGD3M250LK	2,50	.098	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3M300LK	3,00	.118	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3125LK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	3	1	●	●		
NGD3M350LK	3,50	.138	2,92	.115	0,32	.0125	6,35	.250	3	1	●	●		
NGD3M400LK	4,00	.157	2,92	.115	0,32	.0125	6,35	.250	3	1	●	●		
NGD3189LK	4,80	.189	2,92	.115	0,57	.0225	6,35	.250	3	1	●	●		
NGD4125LK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	4	2	●	●		
NGD4M400LK	4,00	.157	2,92	.115	0,57	.0225	9,53	.375	4	1	●	●		
NGD4M450LK	4,50	.177	2,92	.115	0,57	.0225	12,70	.500	4	1	●	●		
NGD4189LK	4,80	.189	2,92	.115	0,57	.0225	9,53	.375	4	1	●	●		
NGD4M500LK	5,00	.197	2,92	.115	0,57	.0225	12,70	.500	4	1	●	●		
NGD4M550LK	5,50	.217	3,81	.150	0,57	.0225	12,70	.500	4	1	●	●		
NGD4250LK	6,35	.250	3,81	.150	0,57	.0225	12,70	.500	4	1	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

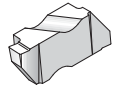
Grooving, Cut-Off, and Turning • TopGroove



● first choice
○ alternate choice

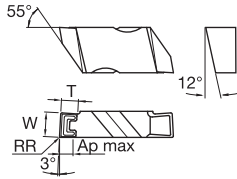
P	●	●	●	●
M	●	●	○	○
K	●	●	○	○
N	○	○	○	○
S	●	●	○	○
H	○	○	○	○

■ **NGP**



catalog number	W		Ap max		RR		T		insert size	TNG010	TNG025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand													
NGP2M150R	1,50	.059	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2062R	1,58	.062	—	—	0,19	.0075	2,79	.110	2	●			
NGP2M200R	2,00	.079	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2M250R	2,50	.098	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2M300R	3,00	.118	—	—	0,19	.0075	2,79	.110	2	●			●
NGP3M150R	1,50	.059	—	—	0,19	.0075	1,90	.075	3	●			●
NGP3M200R	2,00	.079	—	—	0,19	.0075	2,79	.110	3	●			●
NGP3M250R	2,50	.098	—	—	0,19	.0075	3,81	.150	3	●			●
NGP3M300R	3,00	.118	—	—	0,19	.0075	3,81	.150	3	●			●
Left hand													
NGP2M150L	1,50	.059	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2062L	1,58	.062	—	—	0,19	.0075	2,79	.110	2	●			
NGP2M200L	2,00	.079	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2M250L	2,50	.098	—	—	0,19	.0075	2,79	.110	2	●			●
NGP2M300L	3,00	.118	—	—	0,19	.0075	2,79	.110	2	●			●
NGP3M150L	1,50	.059	—	—	0,19	.0075	1,90	.075	3	●			●
NGP3M200L	2,00	.079	—	—	0,19	.0075	2,79	.110	3	●			●
NGP3M250L	2,50	.098	—	—	0,19	.0075	3,81	.150	3	●			●
NGP3M300L	3,00	.118	—	—	0,19	.0075	3,81	.150	3	●			●

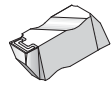
NOTE: Right-hand insert shown; left-hand insert is mirror image.



● first choice
○ alternate choice

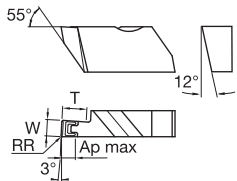
P	●	●	●	●
M	●	●	○	○
K	●	●	○	○
N	○	○	○	●
S	○	○	○	○
H	○	○	○	○

■ **NF-K**

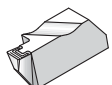


catalog number	W		Ap max		RR		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand													
NF3M200RK	2,00	.079	1,02	.040	0,19	.0075	1,78	.070	3		●		
NF3M300RK	3,00	.118	1,02	.040	0,19	.0075	3,81	.150	3		●		
NF3125RK	3,18	.125	1,02	.040	0,19	.0075	3,81	.150	3		●		
Left hand													
NF3M200LK	2,00	.079	1,02	.040	0,19	.0075	1,78	.070	3		●		
NF3M300LK	3,00	.118	1,02	.040	0,19	.0075	3,81	.150	3		●		
NF3125LK	3,18	.125	1,02	.040	0,19	.0075	3,81	.150	3		●		
NF3156LK	3,96	.156	2,92	.115	0,19	.0075	3,81	.150	3		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.



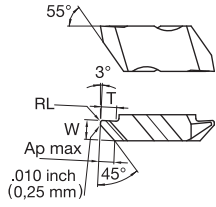
■ **NFD-K**



catalog number	W		Ap max		RR		T		insert size	cutting edges	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in						
Right hand														
NFD3M300RK	3,00	.118	1,02	.040	0,19	.0075	6,35	.250	3	1		●		
NFD3125RK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	3	1		●		
NFD4189RK	4,80	.189	2,92	.115	0,57	.0225	9,53	.375	4	1		●		
Left hand														
NFD4250RK	6,35	.250	3,81	.150	0,57	.0225	12,70	.500	4	1		●		
NFD3M300LK	3,00	.118	1,02	.040	0,19	.0075	6,35	.250	3	1		●		
NFD3125LK	3,18	.125	1,02	.040	0,19	.0075	6,35	.250	3	1		●		
NFD4189LK	4,80	.189	2,92	.115	0,57	.0225	9,53	.375	4	1		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

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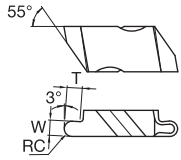
NP-K

● first choice
○ alternate choice

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

catalog number	W		Ap max		RL		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand NP2002RK	3,68	.145	—	—	0,25	.0100	2,79	.110	2	●	●		
NP3002RK	4,83	.190	—	—	0,25	.0100	5,08	.200	3	●	●		
NP3012RK	4,83	.190	—	—	0,25	.0100	5,08	.200	3		●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.
Width tolerance is +/- .005" (+/- 0,13mm).



NR

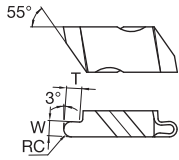
catalog number	W		Ap max		RC		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand NR2M050R	1,00	.039	—	—	0,50	.0197	1,27	.050	2	●	●	●	
NR2M075R	1,50	.059	—	—	0,75	.0295	2,79	.110	2	●	●	●	
NR2031R	1,58	.062	—	—	0,79	.0310	2,79	.110	2	●	●		
NR2M100R	2,00	.079	—	—	1,00	.0394	2,79	.110	2	●	●	●	
NR2047R	2,39	.094	—	—	1,19	.0470	2,79	.110	2		●		
NR2M125R	2,50	.098	—	—	1,25	.0492	2,79	.110	2	●	●	●	
NR2M150R	3,00	.118	—	—	1,50	.0591	2,79	.110	2	●	●	●	
NR2M175R	3,50	.138	—	—	1,75	.0689	2,79	.110	2	●	●	●	
NR3031R	1,58	.062	—	—	0,79	.0310	2,39	.094	3	●	●		●
NR3M100R	2,00	.079	—	—	1,00	.0394	2,39	.094	3	●	●	●	
NR3047R	2,39	.094	—	—	1,19	.0470	3,81	.150	3	●	●		●
NR3M125R	2,50	.098	—	—	1,25	.0492	3,81	.150	3	●	●	●	
NR3M150R	3,00	.118	—	—	1,50	.0591	3,81	.150	3	●	●	●	
NR3062R	3,18	.125	—	—	1,59	.0625	3,81	.150	3	●	●		●
NR3M175R	3,50	.138	—	—	1,75	.0689	3,81	.150	3	●	●	●	
NR3M200R	4,00	.157	—	—	2,00	.0787	3,81	.150	3	●	●	●	
NR3M225R	4,50	.177	—	—	2,25	.0886	3,81	.150	3	●	●	●	
NR3094R	4,78	.188	—	—	2,39	.0940	3,81	.150	3	●	●		
NR4M200R	4,00	.157	—	—	2,00	.0787	6,35	.250	4	●	●	●	
NR4M225R	4,50	.177	—	—	2,25	.0886	6,35	.250	4	●	●	●	
NR4M250R	5,00	.197	—	—	2,50	.0984	6,35	.250	4	●	●	●	
NR4125R	6,35	.250	—	—	3,18	.1250	6,35	.250	4	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

(continued)

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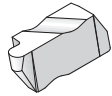
(continued)



● first choice
○ alternate choice

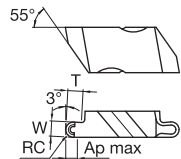
P	●	●	●	●
M	●	●	○	○
K	●	●	○	○
N	○	○	○	○
S	○	○	○	○
H	○	○	○	○

■ NR



catalog number	W		Ap max		RC		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Left hand													
NR2M050L	1,00	.039	—	—	0,50	.0197	1,27	.050	2	●	●	●	
NR2M075L	1,50	.059	—	—	0,75	.0295	2,79	.110	2	●	●	●	
NR2031L	1,58	.062	—	—	0,79	.0310	2,79	.110	2	●	●	●	
NR2M100L	2,00	.079	—	—	1,00	.0394	2,79	.110	2	●	●	●	
NR2047L	2,39	.094	—	—	1,19	.0470	2,79	.110	2	●	●	●	
NR2M125L	2,50	.098	—	—	1,25	.0492	2,79	.110	2	●	●	●	
NR2M150L	3,00	.118	—	—	1,50	.0591	2,79	.110	2	●	●	●	
NR2M175L	3,50	.138	—	—	1,75	.0689	2,79	.110	2	●	●	●	
NR3031L	1,58	.062	—	—	0,79	.0310	2,39	.094	3	●	●	●	●
NR3M100L	2,00	.079	—	—	1,00	.0394	2,39	.094	3	●	●	●	●
NR3047L	2,39	.094	—	—	1,19	.0470	3,81	.150	3	●	●	●	●
NR3M125L	2,50	.098	—	—	1,25	.0492	3,81	.150	3	●	●	●	●
NR3M150L	3,00	.118	—	—	1,50	.0591	3,81	.150	3	●	●	●	●
NR3062L	3,18	.125	—	—	1,59	.0625	3,81	.150	3	●	●	●	●
NR3M175L	3,50	.138	—	—	1,75	.0689	3,81	.150	3	●	●	●	●
NR3M200L	4,00	.157	—	—	2,00	.0787	3,81	.150	3	●	●	●	●
NR3M225L	4,50	.177	—	—	2,25	.0886	3,81	.150	3	●	●	●	●
NR3094L	4,78	.188	—	—	2,39	.0940	3,81	.150	3	●	●	●	●
NR4M200L	4,00	.157	—	—	2,00	.0787	6,35	.250	4	●	●	●	●
NR4M225L	4,50	.177	—	—	2,25	.0886	6,35	.250	4	●	●	●	●
NR4M250L	5,00	.197	—	—	2,50	.0984	6,35	.250	4	●	●	●	●
NR4125L	6,35	.250	—	—	3,18	.1250	6,35	.250	4	●	●	●	●

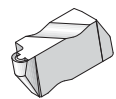
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● first choice
○ alternate choice

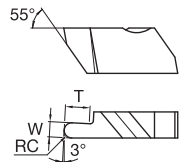
P	●	●	●	●
M	●	●	○	○
K	●	●	○	○
N	○	○	○	●
S	●	●	○	●
H	○	○	○	○

NR-K

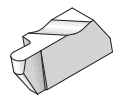


catalog number	W		Ap max		RC		T		insert size	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in					
Right hand													
NR3031RK	1,58	.062	1,98	.078	0,79	.0310	2,39	.094	3	●	●		
NR3047RK	2,39	.094	1,91	.075	1,19	.0470	3,81	.150	3	●	●		
NR3062RK	3,18	.125	2,92	.115	1,59	.0625	3,81	.150	3	●	●		
NR3078RK	3,96	.156	2,54	.100	1,98	.0780	3,81	.150	3	●	●		
NR4062RK	3,18	.125	2,92	.115	1,59	.0625	3,81	.150	4	●	●		
NR4094RK	4,78	.188	3,81	.150	2,39	.0940	6,35	.250	4	●	●		
NR4125RK	6,35	.250	3,81	.150	3,18	.1250	6,35	.250	4	●	●		
Left hand													
NR3031LK	1,58	.062	1,98	.078	0,79	.0310	2,39	.094	3	●	●		
NR3047LK	2,39	.094	1,91	.075	1,19	.0470	3,81	.150	3	●	●		
NR3062LK	3,18	.125	2,92	.115	1,59	.0625	3,81	.150	3	●	●		
NR3078LK	3,96	.156	2,54	.100	1,98	.0780	3,81	.150	3	●	●		
NR4062LK	3,18	.125	2,92	.115	1,59	.0625	3,81	.150	4	●	●		
NR4094LK	4,78	.188	3,81	.150	2,39	.0940	6,35	.250	4	●	●		
NR4125LK	6,35	.250	3,81	.150	3,18	.1250	6,35	.250	4	●	●		

NOTE: Right-hand insert shown; left-hand insert is mirror image.

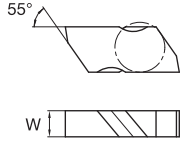


NRD



catalog number	W		Ap max		RC		T		insert size	cutting edges	TN6010	TN6025	TN7110	THM
	mm	in	mm	in	mm	in	mm	in						
Right hand														
NRD3031R	1,58	.062	—	—	0,79	.0310	3,18	.125	3	2	●	●		
NRD3062R	3,18	.125	—	—	1,59	.0625	6,35	.250	3	1	●	●		
NRD4062R	3,18	.125	—	—	1,59	.0625	6,35	.250	4	2	●	●		
NRD4125R	6,35	.250	—	—	3,18	.1250	12,70	.500	4	1	●	●		
Left hand														
NRD3031L	1,58	.062	—	—	0,79	.0310	3,18	.125	3	2	●	●		
NRD3062L	3,18	.125	—	—	1,59	.0625	6,35	.250	3	1	●	●		
NRD4062L	3,18	.125	—	—	1,59	.0625	6,35	.250	4	2	●	●		
NRD4125L	6,35	.250	—	—	3,18	.1250	12,70	.500	4	1	●	●		

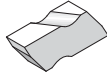
NOTE: Right-hand insert shown; left-hand insert is mirror image.



● first choice
○ alternate choice

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

■ NB

catalog number	W		insert size	TN6010	TN6025	TN7110	THM
	mm	in					
 Right hand NB2R	3,81	.150	2				●
NB3R Left hand	4,95	.195	3				●
NB2L	3,81	.150	2				●
NB3L	4,95	.195	3				●

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.

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TopGroove Inserts: The Best Platform for Customization

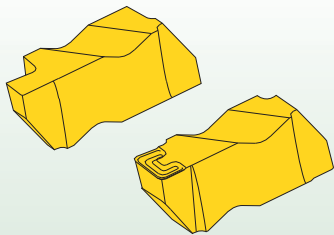
All TopGroove custom order inserts benefit from the superior rigidity of our TopGroove toolholder and clamping system. For added productivity, most custom orders can be incorporated into the double-ended inserts.

Custom orders start with proven WIDIA™ carbide grade technology as the basis for optimizing tool performance. Positive top rake angles are also available in most inserts.

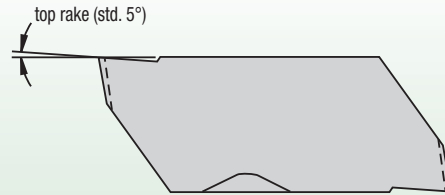
State-of-the-art CAD enables rapid development of your custom insert design. For convenience, a concept drawing is always available to facilitate engineering development of an insert.

There are limitless variations of the flat-top TopGroove design. Additionally, chip control in the most common styles enables true optimization and productivity. WIDIA offers NB- and NBD-style insert blanks as well. These blanks can be end-form ground in your own shop.

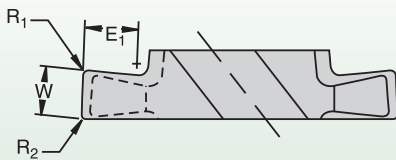
Whatever your special grooving requirements may be, WIDIA can provide an effective solution. We have the technical expertise, resources, and commitment to help you develop insert designs that satisfy your metalcutting application demands.



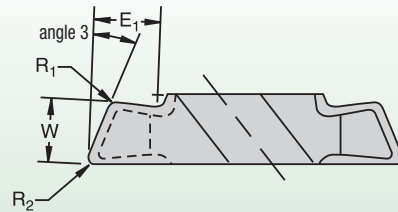
top rake



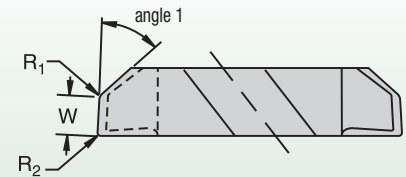
style A



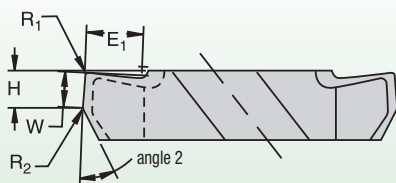
style B1



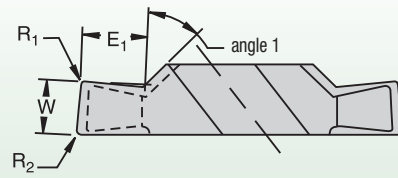
style B2



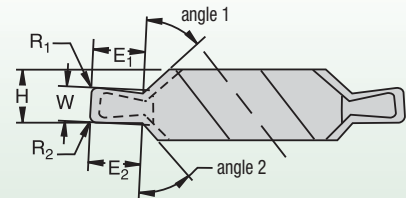
style B3



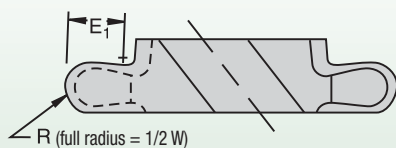
style B4



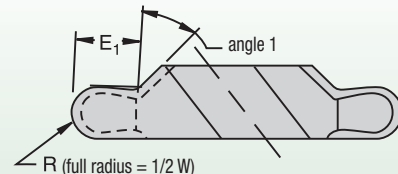
style C1



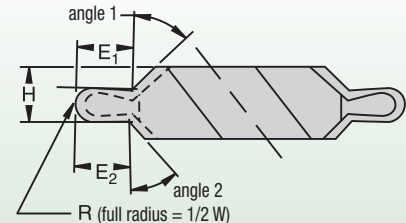
style D



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 (R₁)

Angle 2

Corner Radius 2 (R₂)

Offset (H)

Cutting Depth (E₁)

Other (please specify)

Special Instructions

(please make any necessary notes or sketches in the box at right)

Closest Catalog Standard

Customer

Distributor

Shipping Requirements

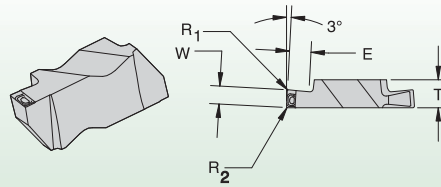
Ground Next Day Air 2nd Day Air 3rd Day Air

Attention Distributors: Use this worksheet to collect information for your customer.

■ A-SK Specials

10° positive cutting action

- Grooving
- Face grooving



insert catalog 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	.026-.056 .057-.135	.000-.007 .003-.013	.050 .110	.150	carbide grades quoted upon request. See page D46.
NG3-R-SK or NF3-R-SK	NG3-L-SK or NF3-L-SK	.042-.067 .068-.076 .077-.094 .095-.105 .106-.125 .126-.134 .135-.156 .157-.174 .184-.196	.003-.013 .005-.020 .005-.030 .005-.020 .005-.030 .005-.020 .005-.030 .008-.018 .018-.028	.094 .094 .150 .150 .150 .150 .150 .150 .150	.195	
NG4-R-SK or NF4-R-SK	NG4-L-SK or NF4-L-SK	.100-.110 .111-.125 .126-.131 .132-.156 .157-.162 .163-.189 .190-.191 .192-.204 .245-.257	.005-.020 .005-.030 .005-.020 .005-.030 .005-.020 .005-.030 .018-.028 .008-.018 .018-.025	.150 .150 .150 .150 .150 .250 .250 .250 .250	.255	

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W=.090, R₁=.010, R₂=.010, grade TN6010.

Unless otherwise specified, a standard tolerance of ±.001" on width (W) will be applied, and a standard tolerance of ±.0025" on radii (R₁ and R₂) will be applied.

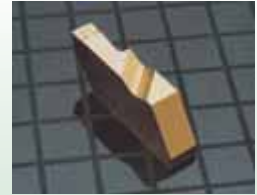
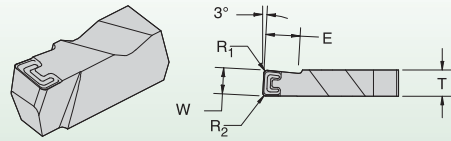
If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

■ A-SK Specials

10° positive cutting action

- Deep grooving
- Deep face grooving



insert catalog 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	.057–.069	.003–.013	.125	.195	carbide grades quoted upon request. See page D46.
		.089–.101*	.003–.013	.250		
		.120–.132*	.003–.013	.250		
		.184–.196*	.018–.028	.250		
NGD4-R-SK or NFD4-R-SK	NG4-L-SK or NF4-L-SK	.120–.132*	.003–.013	.250	.255	
		.180–.196*	.018–.028	.375		
		.245–.257*	.018–.028	.500		

*One cutting edge.

NG-SK, NF-SK, NGD-SK, and NFD-SK inserts may be specially ordered within the specifications listed in the above charts.

Order example: NF3R-SK W=.090,
R₁=.010, R₂=.010, grade TN6010.

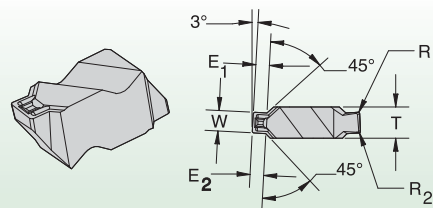
Unless otherwise specified, a standard tolerance of ±.001" on width (W) will be applied, and a standard tolerance of ±.0025" on radii (R₁ and R₂) will be applied.

If deeper cutting depth (E) is required, please specify. Refer to the application drawing and charts for maximum face groove depths and minimum face groove diameters.

In addition to the guidelines above, full radius face groove inserts may be quoted. Under certain conditions, chip control performance may vary from standard insert styles.

■ C1-SK Specials

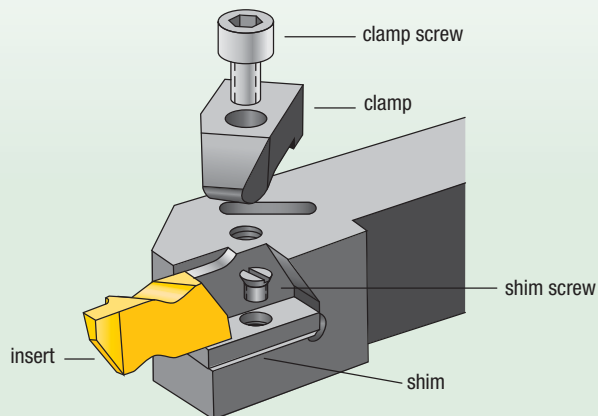
- Groove and chamfer













insert catalog 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	.047–.125	.005–.015	.100	.150	carbide grades quoted upon request.
NB3-R-K	NB3-L-K	.094–.170	.005–.025	.150	.195	See page D46.

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	—	—

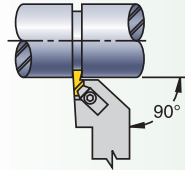
*1" diameter boring head.

**Boring head.

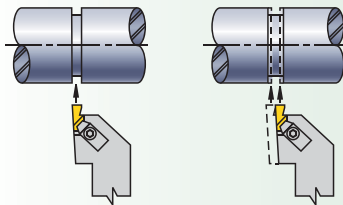
Grooving Tool Failure and Solution Guide

Practical Solutions to Common Grooving Problems

Holder Position for Grooving Operation

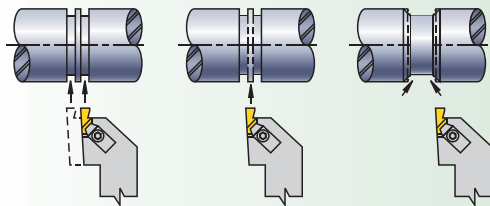


How to Cut a Groove Slightly Wider than the Groove Tool



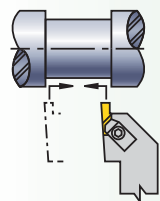
1. Plunge the center of the groove.
2. Plunge each side of the groove to get the specified width. Use a slower feed rate when cutting groove sides.

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



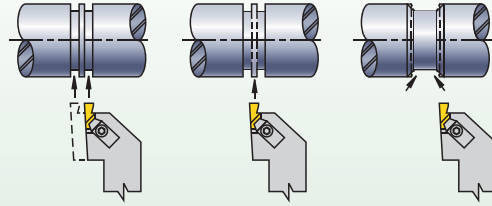
1. Follow recommendations explained above.
2. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined here.
3. Use the lightest depth of cut that still enables good chip surface finishing.

problem	solution
burr	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Reduce tool and workpiece overhang. 2. Adjust speed and feed (usually increase first). 3. Ensure center height.
insert chipping	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 .005" (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 .003"–.012" IPR (0,08–0,3 mm/rev).

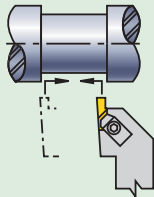


Machining Guidelines for Chip Control • Turning/Profiling

Maximum depth of cut for side cutting (turning/profiling) depends on the material being cut and the width of the tool.

- .031"–.062" (0,79mm–1,6mm) wide insert can cut up to .025" (0,6mm) deep.
- .067"–.128" (1,7mm–3,3mm) wide insert can cut up to .040" (1,0mm) deep.
- .138"–.189" (3,5mm–4,8mm) wide insert can cut up to .080" (2,0mm) deep.
- .197"–.250" (5,0mm–6,35mm) wide insert can cut up to .120" (3,0mm) deep.

Finish Turning the Groove



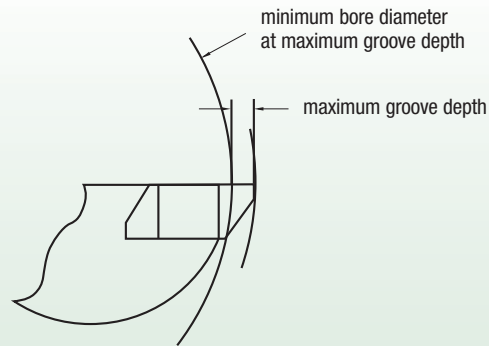
1. Plunge both sides of groove width.
2. Plunge center area to remove web of material remaining.
3. To avoid insert chipping and to achieve groove wall perpendicularity, follow the tool path outlined.
4. Use the lightest depth of cut that still allows good chipbreaking, tool life, and surface finish.

Groove Limits				
insert catalog number	maximum internal groove depth		minimum bore diameter	
	inch	mm	inch	mm
NG-1094L	.075	1,91	.800	20,32
—	.040	1,02	.440	11,18
NG-2031R/L	.050	1,27	.730	18,54
NG-2041R/L	—	—	—	—
NG-2047R/L	—	—	—	—
NG-2058R/L	—	—	—	—
—	.110	2,79	2,500	63,50
NG-2062R/L	.102	2,59	1,750	44,45
NG-2094R/L	.098	2,49	1,500	38,10
NG-2125R/L	.080	2,03	1,000	25,40
—	.055	1,40	.730	18,54
NG-3047R/L	—	—	—	—
NG-3062R/L	.094	2,39	1,750	44,45
NG-3072R/L	.090	2,29	1,625	41,28
NG-3078R/L	.075	1,91	1,375	34,93
NG-3088R/L	—	—	—	—
NG-3094R/L	—	—	—	—
NG-3097R/L	.150	3,81	2,375	60,33
NG-3105R/L	—	—	—	—
NG-3110R/L	.145	3,68	2,125	53,98
NG-3122R/L	—	—	—	—
NG-3125R/L	.138	3,51	1,875	47,63
NG-3142R/L	—	—	—	—
NG-3156R/L	.125	3,18	1,625	41,28
NG-3178R/L	—	—	—	—
NG-3185R/L	.110	2,79	1,375	34,93
NG-3189R/L	—	—	—	—
NG-4125R/L	.150	3,81	2,750	69,85
—	.250	6,35	5,750	146,05
NG-4189R/L	.245	6,22	5,000	127,00
NG-4213R/L	.240	6,10	4,500	114,30
NG-4219R/L	.218	5,54	3,250	82,55
NG-4250R/L	.200	5,08	2,500	63,50

NOTE: The same maximum groove depth and minimum bore diameter values also apply to metric, NG-K (chip control), and NR (full radius) inserts of similar size.

The same internal grooving depth limits are a function of bar clearance versus bore diameters.

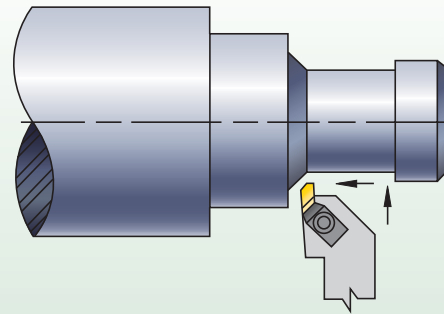
Internal Groove Depth versus Bar Interference



NOTE: Internal grooving depth limits are a function of bar clearance versus bore diameters.

Machining Guidelines for Back Turning/Turning/Profiling

The NP-K-style TopGroove inserts were engineered specifically for back turning on small automatic lathes, but they also find applications for other light turning and profiling operations. For general applications, maximum depth of cut should not exceed .108" (2,74mm) for size 2 inserts or .151" (3,84mm) for size 3 inserts.



Machining Guidelines for Using TopGroove Deep Grooving Inserts (NGD)

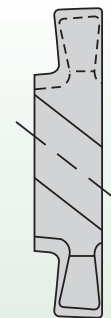
Typically, those NGD- and NRD-style inserts with two cutting edges require no machine offset changes. However, those inserts with only one cutting edge do require offset changes. Refer to the chart here to ensure proper offset adjustments.

insert catalog number	add to C dimension		add to F dimension	
	inch	mm	inch	mm
NGD-3062	.000	0,00	.000	0,00
NGD-3094	.100	2,54	.100	2,54
NGD-3125	.100	2,54	.100	2,54
NGD-3189	.100	2,54	.100	2,54
NGD-4125	.000	0,00	.000	0,00
NGD-4189	.125	3,18	.125	3,18
NGD-4250	.250	6,35	.250	6,35
NRD-3031	.000	0,00	.000	0,00
NRD-3062	.100	2,54	.100	2,54
NRD-4062	.000	0,00	.000	0,00
NRD-4094	.250	6,35	.250	6,35
NRD-4125	.250	6,35	.250	6,35

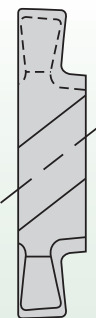
TopGroove Insert Selection Guide

- 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 D46 for carbide grade selection and more technical information.



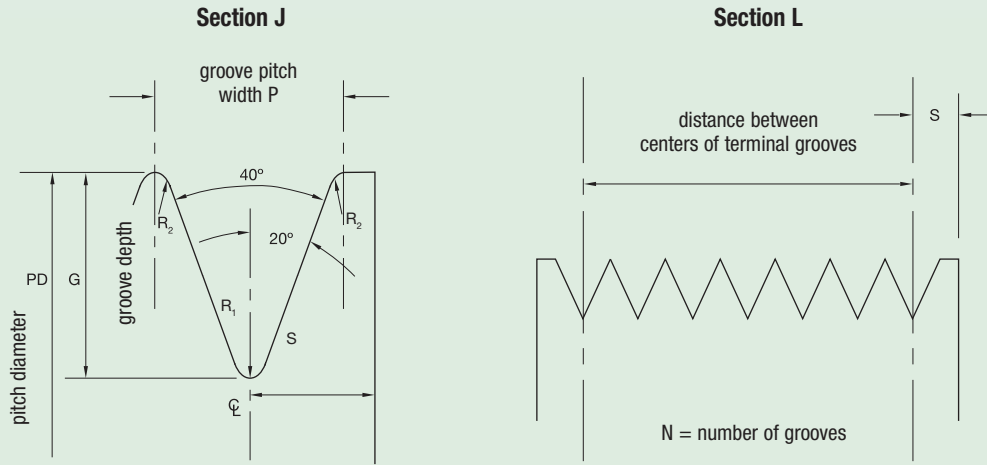
left-hand insert



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.

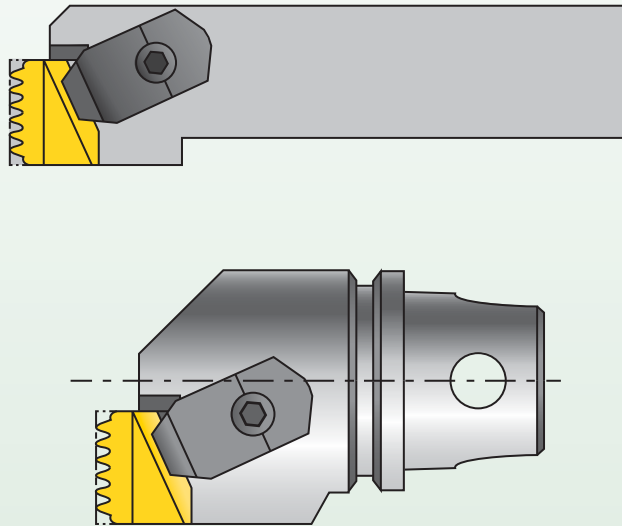


Groove Dimensions and Tolerances for Sheaves

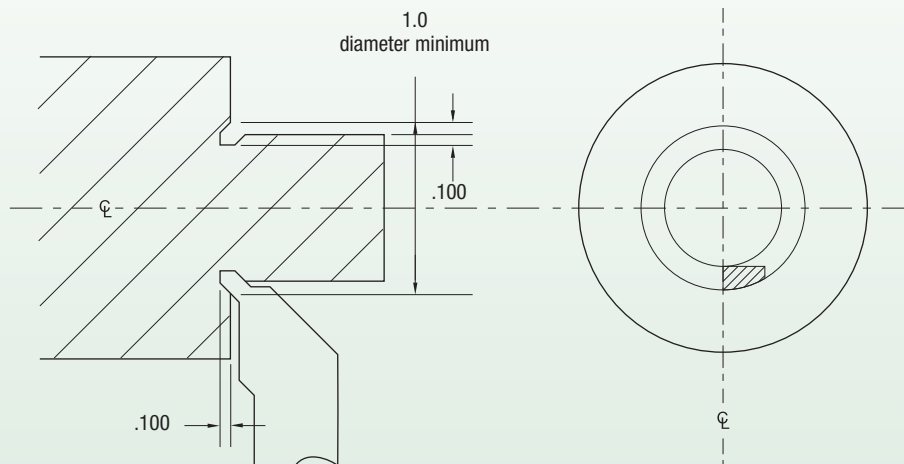
groove cross section	pitch width (P)	groove depth (G)	minimum radius (R2)	radius (R1)	terminal distance	distance between centers of terminal grooves and maximum accumulated tolerance
J	.092 ±.001	.087 ±.005	.008	.0125 ±.0025	1/8	(N-1).092 ±.010
L	.185 ±.002	.201 ±.005	.015	.0125 ±.0025	3/8	(N-1).185 ±.010

Multiple Tooth Poly-Vee Grooving

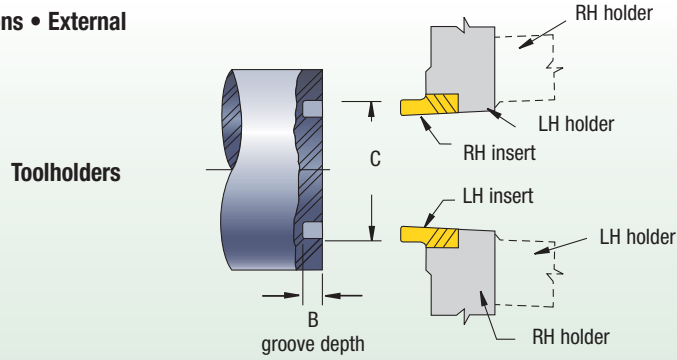
Let WIDIA™ quote your multiple tooth poly-vee grooving applications. Semi-standard inserts and holders are available. The strong TopGroove design holds the insert rigid and outperforms any other tooling method for this application.



Machining Guidelines for Undercutting Operations Performed with Custom Solution and TopGroove NU Inserts (NU3094, NU3125, and NU3156)

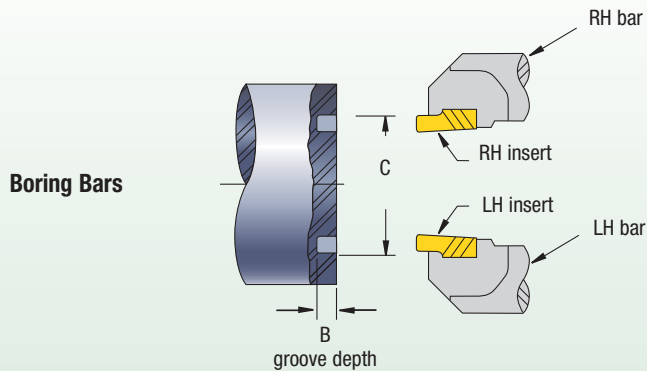


Machining Guidelines for Face Grooving Operations • External



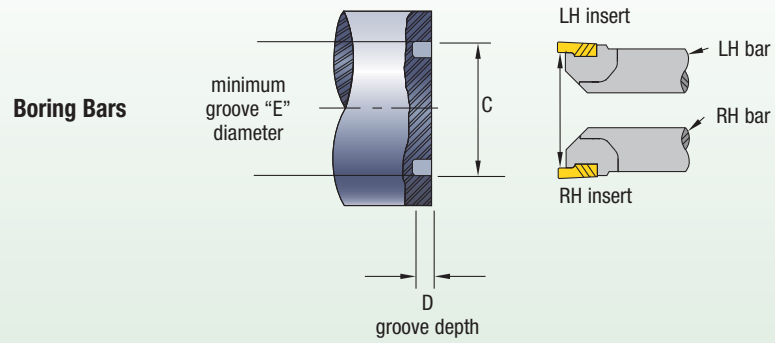
Standard NF/NDF Inserts				
insert family	maximum groove depth B		minimum groove diameter C	
	inch	mm	inch	mm
NF-3	.060	1,52	.94	23,9
NF-3	.094	2,39	1.20	30,5
NF-3	.125	3,18	1.42	36,1
NF-3	.150	3,81	1.63	41,3
NFD-3	.250	6,35	1.88	47,6
NFD-4	.375	9,53	2.25	57,2
NFD-4	.500	12,70	2.25	57,2

Machining Guidelines for Face Grooving Operations • External



Standard NG/NGD Inserts				
insert family	maximum groove depth B		minimum groove diameter C	
	inch	mm	inch	mm
NG-2	.050	1,27	2.13	54,0
NG-2	.110	2,79	3.50	88,9
NG-3	.094	2,39	4.00	101,6
NG-3	.125	3,18	5.00	127,0
NG-3	.150	3,81	5.50	139,7
NGD-3	.250	6,35	6.88	174,6
NG-4	.150	3,81	6.00	152,4
NG-4	.250	6,35	8.25	209,6
NGD-4	.375	9,53	8.75	222,3
NGD-4	.500	12,70	8.75	222,3

Machining Guidelines for Face Grooving Operations • Internal



Standard NG/NGD Inserts				
insert family	maximum groove depth D		minimum groove diameter E	
	inch	mm	inch	mm
NFD-3-KI	.250	6,35	2.250	63,5
<p><i>NOTE: Also check minimum bore diameter of boring bar. See page D42.</i></p>				

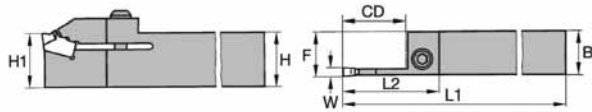
ProGroove™

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.

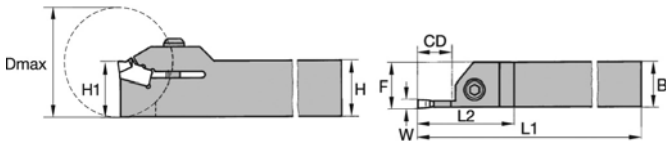




Right Hand Tool

■ Grooving and Cut-Off

order number	catalog number	W	CD	H	B	F	L1	L2	H1	cap screw	wrench
Right hand											
2962743	12250023000	.118	.787	.750	.750	.764	5.000	1.260	.750	12148596200	12148041200
2962745	12250023200	.118	.984	1.000	1.000	1.012	6.000	1.575	1.000	12148596200	12148041200
2962747	12250024000	.158	.984	.750	.750	.768	5.000	1.575	.750	12148596200	12148041200
2962749	12250024200	.158	.984	1.000	1.000	10.160	6.000	1.575	1.000	12148596200	12148041200
2962751	12250025200	.197	1.260	1.000	1.000	1.016	6.000	2.087	1.000	12148596200	12148041200
Left hand											
2962744	12250023100	.118	.787	.750	.750	.764	5.000	1.260	.750	12148596200	12148041200
2962746	12250023300	.118	.984	1.000	1.000	1.012	6.000	1.575	1.000	12148596200	12148041200
2962748	12250024100	.158	.984	.750	.750	.768	5.000	1.575	.750	12148596200	12148041200
2962750	12250024300	.158	.984	1.000	1.000	1.016	6.000	1.575	1.000	12148596200	12148041200
2962752	12250025300	.197	1.260	1.000	1.000	1.016	6.000	2.087	1.000	12148596200	12148041200

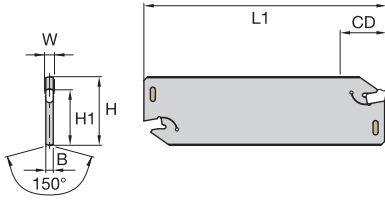


Right Hand Tool

■ Grooving and Profiling

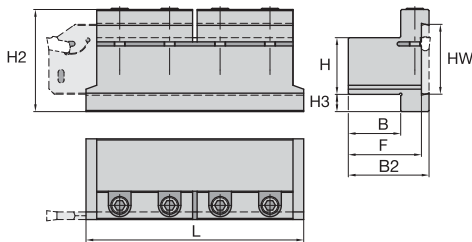
order number	catalog number	W	CD	D max	H	B	F	L1	L2	H1	cap screw	wrench
Right hand												
2962733	12250013000	.118	.394	1.000	.984	.984	.764	5.906	1.221	.750	12148596200	12148041200
2962735	12250013200	.118	.394	1.000	1.000	1.000	1.016	6.000	1.024	1.000	12148596200	12148041200
2962737	12250014000	.158	.492	1.260	.750	.750	.768	5.000	1.221	.750	12148596200	12148041200
2962739	12250014200	.158	.492	1.260	1.000	1.000	1.016	6.000	1.221	1.000	12148596200	12148041200
2962741	12250015200	.197	.492	—	1.000	1.000	1.016	6.000	1.221	1.000	12148596200	12148041200
Left hand												
2962734	12250013100	.118	.394	1.000	.750	.750	.764	5.000	1.024	.750	12148596200	12148041200
2962736	12250013300	.118	.394	1.000	1.000	1.000	1.016	6.000	1.024	1.000	12148596200	12148041200
2962738	12250014100	.158	.492	1.260	.750	.750	.768	5.000	1.221	.750	12148596200	12148041200
2962740	12250014300	.158	.492	1.260	1.000	1.000	1.016	6.000	1.221	1.000	12148596200	12148041200
2962742	12250015300	.197	.492	—	1.000	1.000	1.016	6.000	1.221	1.000	12148596200	12148041200

NOTE: Select shorter CD dimension for added stability.



■ **Cut-Off Blades**

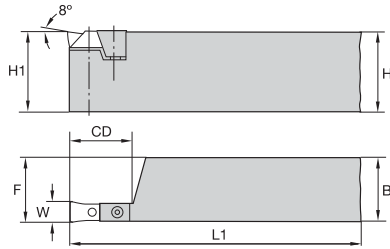
order number	catalog number	W	H	H1	L1	B	CD	wrench
2021629	12251332000	.079	.748	.618	3.543	.067	.787	12146003800
2021639	12251342000	.079	1.024	.843	4.331	.067	.984	12146003800
2008113	12251352000	.079	1.260	.984	5.906	.067	.984	12146003800
2021640	12251343000	.118	1.024	.843	4.331	.095	1.575	12146003800
2008116	12251353000	.118	1.260	.984	5.906	.095	1.969	12146003800
2021641	12251344000	.158	1.024	.843	4.331	.126	1.575	12146003800
2008119	12251354000	.158	1.260	.984	5.906	.126	1.969	12146003800
2008122	12251355000	.197	1.260	.984	5.906	.165	2.362	12146003800
2008135	12251356000	.236	1.260	.984	5.906	.197	2.362	12146009500
2008138	12251358000	.315	1.260	.984	5.906	.268	2.362	12146009500
2021743	12251368000	.315	2.067	1.772	9.843	.268	3.937	12146009500



■ **Cut-Off Blade Holders**

order number	catalog number	HW	H	B	F	H2	B2	H3	L	cap screw	wrench
2968845	32251221200	1.024	.750	.750	1.161	1.57	1.34	.32	3.39	125.625	12148041300
2968846	32251221600	1.260	1.000	1.000	1.417	1.89	1.63	.30	4.33	125.630	12148041300
2968847	32251222000	1.260	1.250	1.250	1.673	1.97	1.89	.13	4.33	125.630	12148041300

Grooving, Cut-Off, and Turning • ProGroove

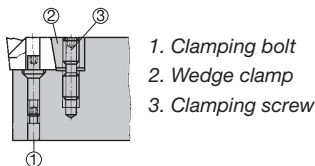


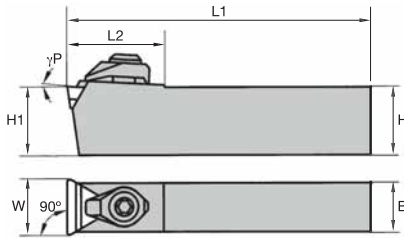
■ Grooving

order number	catalog number	W	CD	H	H1	B	L1	F
Right hand								
2983280	32250110100	.321	.866	1.250	1.250	1.000	6.020	1.021
2983281	32250110300	.400	.906	1.250	1.250	1.000	6.020	1.021
2983282	32250110500	.480	1.181	1.500	1.500	1.250	7.020	1.272
2983973	32250110700	.559	1.181	1.500	1.500	1.250	7.020	1.272
2983974	32250110900	.638	1.339	1.500	1.500	1.250	7.020	1.272
Left hand								
2983975	32250110200	.321	.866	1.250	1.250	1.000	6.020	1.021
2983976	32250110400	.400	.906	1.250	1.250	1.000	6.020	1.021
2983977	32250110600	.480	1.181	1.500	1.500	1.250	7.020	1.272
2983978	32250110800	.559	1.181	1.500	1.500	1.250	7.020	1.272
2983979	32250111000	.638	1.339	1.500	1.500	1.250	7.020	1.272

■ Spare Parts

catalog number	clamping bolt	wedge clamp	clamping screw	wrench for clamp screw	wrench for clamping bolt
Right hand					
32250110100	12148060600	12148094300	12148574100	12148041000	12148046000
32250110300	12148060600	12148094400	12148574700	12148041100	12148046000
32250110500	12148060700	12148094500	12148574900	12148041100	12148040900
32250110700	12148060700	12148094600	12148574000	12148041200	12148040900
32250110900	12148060800	12148094700	12148574000	12148041200	12148041000
Left hand					
32250110200	12148060600	12148094300	12148574100	12148041000	12148046000
32250110400	12148060600	12148094400	12148574700	12148041100	12148046000
32250110600	12148060700	12148094500	12148574900	12148041100	12148040900
32250110800	12148060700	12148094600	12148574000	12148041200	12148040900
32250111000	12148060800	12148094700	12148574000	12148041200	12148041000





■ Grooving

order number	catalog number	W	H	H1	B	L1	L2	γP°	insert 1
2022921	12191061900	.409	.787	.787	.374	4.921	.827	3	TP..1103../TP..22..
2007414	12191062086	.602	.787	.787	.512	5.906	1.063	3	TP..1603../TP..32..
2022922	12191062586	.602	.984	.984	.512	5.906	1.063	3	TP..1603../TP..32..
2058066	12191062686	.795	.984	.984	.709	5.906	1.378	3	TP..2204../TP..43..
2022923	12191063286	.795	1.260	1.260	.709	7.087	1.378	3	TP..2204../TP..43..

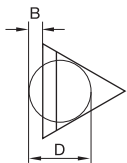
NOTE: Holders 276-STP are supplied without chipbreaker. For chipbreaker order numbers, see below.

■ For Grooving without Chipbreaker

catalog number	clamp	clamp screw	shim	shim screw	washer	wrench
12191061900	12148589300	12148589800	12148032586	12148021900		12148041100
12191062086	12148583800	12148586000	12148031686	12148024100	12148024200	12148041200
12191062686	12148586900	12148021100	12148032086	12148024500	12148024800	12148041200
12191062586	12148583800	12148586000	12148031686	12148024100	12148024200	12148041200
12191063286	12148586900	12148021100	12148032086	12148024500	12148024800	12148041200

■ For Grooving with Chipbreaker (order additional clamp and chipbreaker)

insert	clamp with chipbreaker	D	chipbreakers					
			B – edge width					
			.016	.047	.071	.098	.126	.158
TP...22...	12148589200	.250	12148591011	12148588211	12148588311	12148588411	–	–
TP...32...	12148589300	.375	12148591111	12148586611	12148587011	12148587111	12148580011	–
TP...43...	12148586900	.500	–	–	12148580411	12148580511	12148580611	12148582511



Grooving, Cut-Off, and Turning • 276

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.

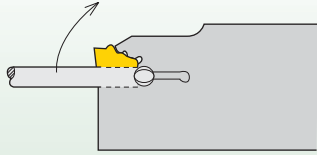
ProGroove Grooving and Cut-Off

- 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.

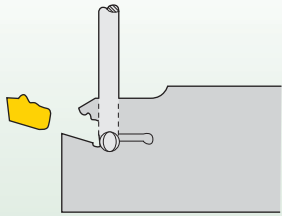
To learn more, contact your local Authorized Distributor or visit www.widia.com.

WIDIA™
Win with WIDIA™

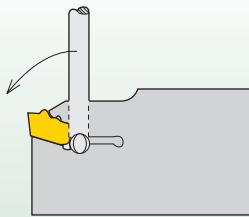
ProGroove System



To change the cutting insert, place the wrench into the blade recess. The blade mouth is opened by turning through 90°.

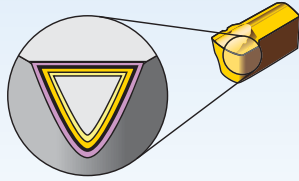


In this position, the wrench is self-locking, leaving both hands free for changing the cutting insert.



The cutting insert is pressed against the rear seat in the blade mouth, releasing the wrench. The insert is accurately positioned and securely clamped.







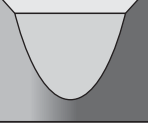
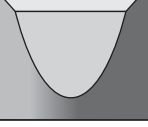


Coatings provide high-speed capability and are engineered for finishing to light roughing.

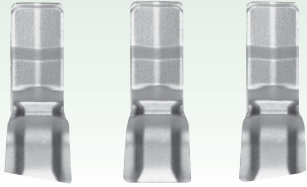
- Reduce cycle times — high speed and feed capability.
- Longer tool life — new multi-layer coating provides better wear resistance.

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

Grade

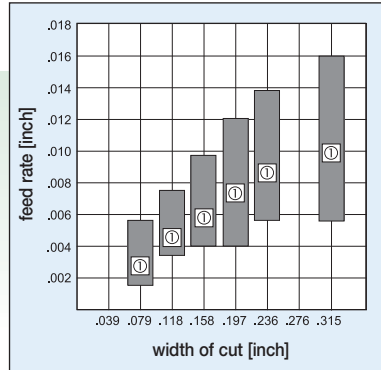
Coating	Grade Description	05	10	15	20	25	30	35	40	45	
TN6030  HC-P30	PVD-TiAlN Nano-layer coated carbide. Medium and heavy machining for steels and nodular cast irons. Recommended at medium cutting speeds when good toughness properties are required.	P									
		M									
		K									
TN7525  HC-P25	MT-CVD/CVD — TiN-TiCN-Al ₂ O 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 ₂ O ₃ coated carbide. Medium and heavy machining for steels and nodular cast iron.	P									
		K									
TN8025  HC-M25	MT-CVD/CVD-TiN-TiCN-Al ₂ O 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

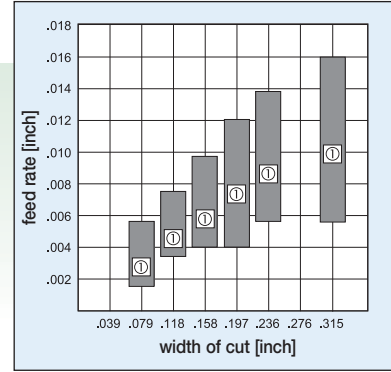


left-hand neutral right-hand

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



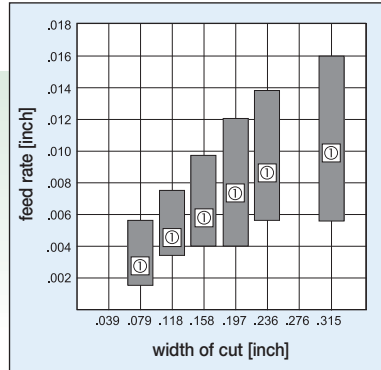
① Recommended feed

ProGroove • M

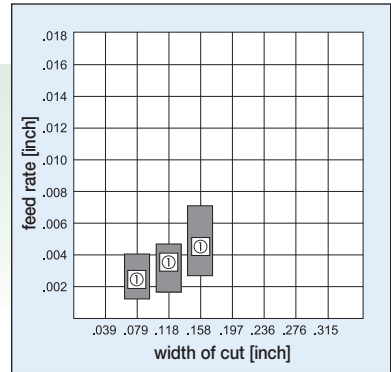


neutral

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.

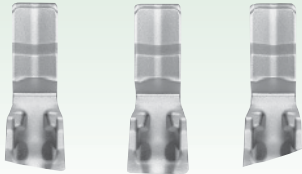


① Recommended feed



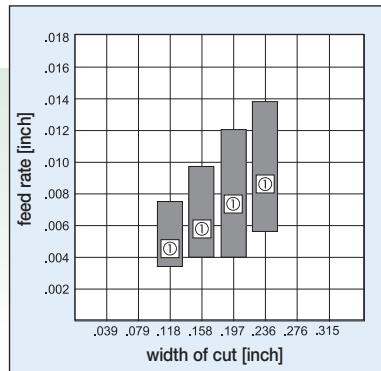
① Recommended feed

ProGroove • S

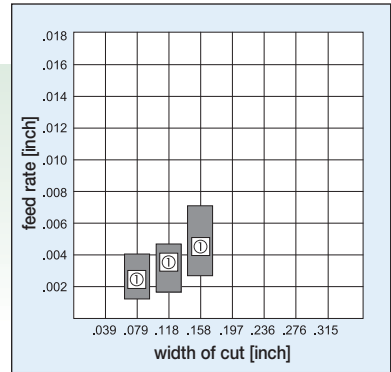


left-hand neutral right-hand

For low-burr parting with straight flanks and smooth surface finishes. All inserts are recommended for parting and grooving slender workpieces, part diameter <1.25", and thin-wall tubes.



① Recommended feed

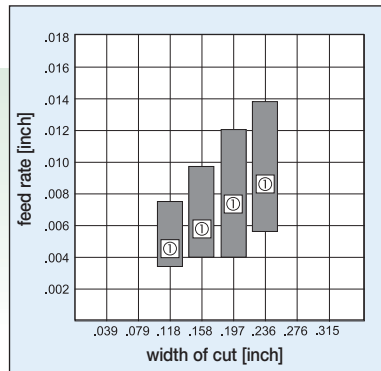


① Recommended feed

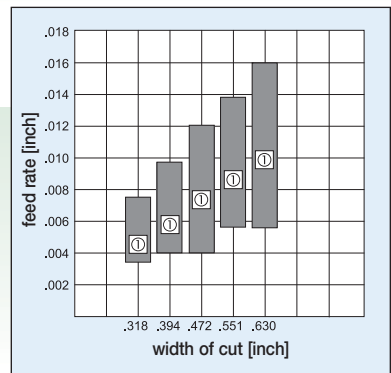
ProGroove • R



Full round inserts for profiling, grooving, and copy turning. Very good chip control for broad general use. Accurate, reproducible cutting edge positioning.



① Recommended feed



① Recommended feed

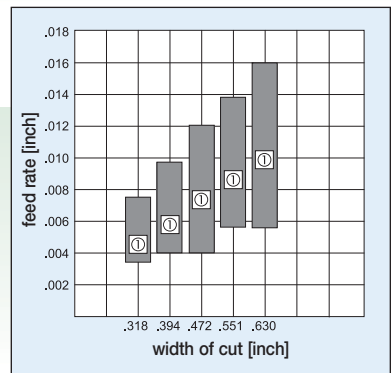
LG System • 0 and 1



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.

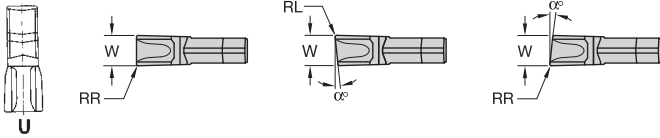
...1
Inserts with wide range of uses in grooving and deep grooving of short chipping materials.



① Recommended feed

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM																	
Material Group		Cutting Speed • vc SFM																	
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P		TN6030			TN7525			TN7535			TN8025			THM			TTM		
	1	425	455	490	655	705	750	455	570	685							295	310	325
	2	390	520	655	620	800	980	425	520	620							295	340	455
	3	325	425	520	520	670	820	360	455	555							225	295	360
	4	390	490	590	590	750	915	390	490	590							260	340	425
	5	325	425	520	490	635	785	325	425	520							225	295	360
	6	390	490	590	590	750	915	390	490	590							260	340	425
	7	295	410	520	455	620	785	325	425	520							195	275	360
	8	260	360	455	390	555	720	295	390	490							160	245	325
	9	195	260	325	295	410	520	195	295	390							130	160	225
	10	260	310	360	425	490	555	295	340	390							195	225	260
	11	160	210	260	260	340	425	160	210	260							130	160	195
	12	390	455	520	590	685	785	390	505	620							260	310	360
	13.1	260	340	425	425	540	655	295	390	490							195	245	295
13.2	130	180	210	210	275	325	145	195	245							95	130	145	
M		TN6030			TN7525			TN7535			TN8025			THM			TTM		
	14.1	295	390	490							295	390	490				195	245	295
	14.2	245	325	390							245	325	390				160	195	245
	14.3	180	245	310							180	245	310				130	160	180
14.4	145	195	245							145	195	245				95	130	145	
K		TN6030			TN7525			TN7535			TN8025			THM			TTM		
	15	225	295	325	455	555	655							225	295	325			
	16	160	210	260	325	425	520							160	210	260			
	17	195	225	260	390	490	590							195	225	260			
	18	130	180	225	295	390	490							130	180	225			
	19	260	310	360	490	590	685							260	310	360			
20	195	245	295	360	455	555							195	245	295				
N		TN6030			TN7525			TN7535			TN8025			THM			TTM		
	21													1965	2460	2950			
	22													1640	2130	2620			
	23													1965	2460	2950			
	24													1640	2130	2620			
	25													750	980	1210			
	26													490	655	820			
	27													490	655	820			
	28													360	455	555			
	29													195	260	325			
30													260	325	390				
S		TN6030			TN7525			TN7535			TN8025			THM			TTM		
	31													85	120	145			
	32													65	95	115			
	33													55	75	90			
	34													35	45	55			
	35													35	50	55			
	36													135	195	235			
	37													65	95	115			

Grooving, Cut-Off, and Turning • ProGroove



● first choice
○ alternate choice

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

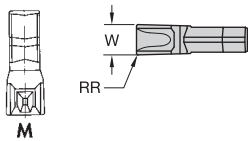
■ PGU

catalog number	W		RR		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567320	2,10	.083	0,20	.008	—	N - Neutral	●	●	●	●	●	●
123567330	3,10	.122	0,30	.012	—	N - Neutral	●	●	●	●	●	●
123567340	4,10	.161	0,30	.012	—	N - Neutral	●	●	●	●	●	●
123567350	5,10	.201	0,30	.012	—	N - Neutral	●	●	●	●	●	●
123567360	6,10	.240	0,40	.016	—	N - Neutral	●	●	●	●	●	●
123567380	8,15	.321	0,60	.024	—	N - Neutral	●	●	●	●	●	●

catalog number	W		RR		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567231	3,10	.122	0,25	.010	6	L - Left	●	●	●	●	●	●
123567241	4,10	.161	0,25	.010	6	L - Left	●	●	●	●	●	●

catalog number	W		RL		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567230	3,10	.122	0,25	.010	6	R - Right	●	●	●	●	●	●
123567240	4,10	.161	0,25	.010	6	R - Right	●	●	●	●	●	●

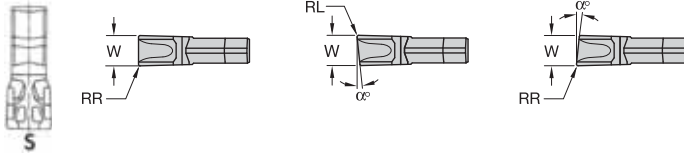
NOTE: W tolerance on all = ± 0.002 " ($\pm 0,05$ mm).



■ PGM

catalog number	W		RR		α°	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in							
123567420	2,10	.083	0,20	.008	—	●	●	●	●	●	●
123567430	3,10	.122	0,30	.012	—	●	●	●	●	●	●
123567440	4,10	.161	0,30	.012	—	●	●	●	●	●	●
123567450	5,10	.201	0,30	.012	—	●	●	●	●	●	●
123567460	6,10	.240	0,40	.016	—	●	●	●	●	●	●
123567480	8,15	.321	0,60	.024	—	●	●	●	●	●	●

NOTE: W tolerance on all = ± 0.002 " ($\pm 0,05$ mm).



● first choice
○ alternate choice

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

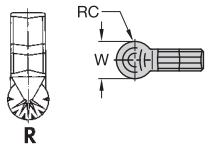
■ PGS

catalog number	W		RR		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567702	2,25	.089	0,20	.008	—	N - Neutral			●	●		
123567703	3,25	.128	0,20	.008	—	N - Neutral			●	●		
123567704	4,25	.167	0,20	.008	—	N - Neutral			●	●		

catalog number	W		RR		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567721	2,25	.089	0,20	.008	6	L - Left			●	●		
123567731	3,25	.128	0,20	.008	6	L - Left			●	●		
123567741	4,25	.167	0,20	.008	6	L - Left			●	●		

catalog number	W		RL		α°	hand	TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in								
123567720	2,25	.089	0,20	.008	6	R - Right			●	●		
123567730	3,25	.128	0,20	.008	6	R - Right			●	●		
123567740	4,25	.167	0,20	.008	6	R - Right			●	●		

NOTE: W tolerance on all = ±.002" (±0,05mm).



■ PGR

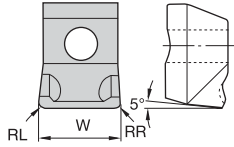
catalog number	W		RC		TN6030	TN7525	TN7535	TN8025	THM	TTM
	mm	in	mm	in						
123567803	3,00	.118	1,50	.059				●		
123567804	4,00	.158	2,00	.079				●		
123567805	5,00	.197	2,50	.098				●		
123567806	6,00	.236	3,00	.118				●		

NOTE: W tolerance on all = ±.003" (±0,07mm).

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LG

Grooving Inserts



RR = RL

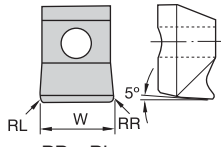
- first choice
- alternate choice

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

■ LGN0

catalog number	W		RR		TN6030	TN7525	TN7535	TN8025	TFM	TTM
	mm	in	mm	in						
123568080	8,15	.321	0,80	.032	●	●	●	●	●	●
123568100	10,15	.400	0,80	.032	●	●	●	●	●	●
123568120	12,20	.480	0,80	.032	●	●	●	●	●	●
123568140	14,20	.559	0,80	.032	●	●	●	●	●	●
123568160	16,20	.638	0,80	.032	●	●	●	●	●	●

NOTE: W tolerance on all = ±.002" (±0,05mm).



RR = RL

■ LGN1

catalog number	W		RR		TN6030	TN7525	TN7535	TN8025	TFM	TTM
	mm	in	mm	in						
123568081	8,15	.321	0,80	.032					●	
123568101	10,15	.400	0,80	.032					●	
123568121	12,20	.480	0,80	.032					●	
123568141	14,20	.559	0,80	.032					●	
123568161	16,20	.638	0,80	.032					●	

NOTE: W tolerance on all = ±.002" (±0,05mm).

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Specifically engineered to deliver toolholder flexibility with integral, component, universal, and blade-style designs.

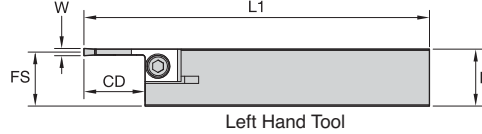
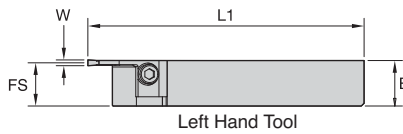
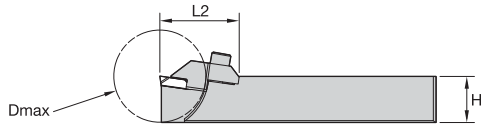
Features:

- Insert widths .063"–.157" (2,0mm–4,0mm).
- Toolholder shank sizes .375"–1.250" (10,0mm–31,75mm).
- Cut-off up 3.0" (76,0mm) bar capacity.

Benefits:

- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.





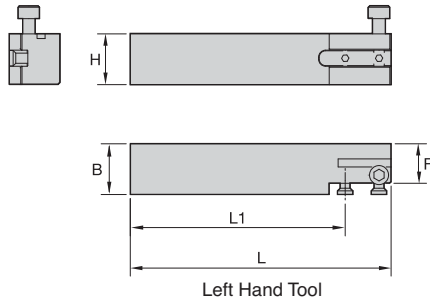
Right Hand Tool

■ Square Shank

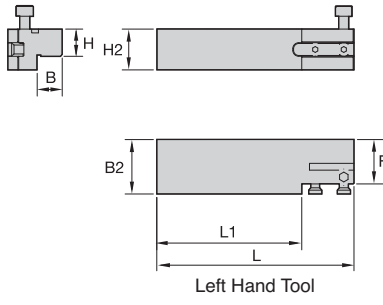
order number	catalog number	W	D max	CD	B	FS	H	L2	L1	clamp	clamp screw
Right hand											
3538685	206173	.094	1.063	—	.365	.328	.375	.987	2.630	435152	619122
3538687	206175	.094	1.063	—	.490	.453	.500	.978	6.000	435152	619122
3538679	206167	.094	1.500	—	.615	.578	.625	1.293	4.500	435140	619123
3538683	206171	.094	1.500	—	.740	.703	.750	1.293	4.500	435140	619120
3538672	206145	.125	1.000	—	.488	.437	.500	.928	6.000	435130	619122
3538681	206169	.125	1.500	—	.613	.562	.625	1.293	4.500	435126	619123
3563787	206139	.125	1.500	—	.738	.687	.750	1.293	4.500	435126	619120
3538744	206420	.125	—	1.000	.988	.937	1.000	1.687	6.000	435180	619164
3538745	206421	.188	—	1.000	.978	.906	1.000	1.691	6.000	435180	619164
Left hand											
3538686	206174	.094	1.063	—	.365	.328	.375	.987	2.630	435153	619122
3538688	206176	.094	1.063	—	.490	.453	.500	.978	6.000	435153	619122
3538680	206168	.094	1.500	—	.615	.578	.625	1.293	4.500	435141	619123
3538684	206172	.094	1.500	—	.740	.703	.750	1.293	4.500	435141	619120
3538673	206146	.125	1.000	—	.488	.437	.500	.928	6.000	435131	619122
3538682	206170	.125	1.500	—	.613	.562	.625	1.293	4.500	435127	619123
3563800	206140	.125	1.500	—	.738	.687	.750	1.293	4.500	435127	619120
3538746	206422	.125	—	1.000	.988	.937	1.000	1.687	6.000	435181	619164
3538747	206423	.188	—	1.000	.978	.906	1.000	1.687	6.000	435181	619164

NOTE: Above toolholders are supplied with clamp.

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Left Hand Tool



Left Hand Tool

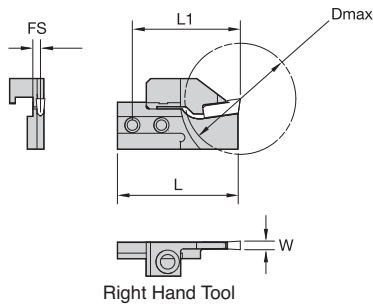


Right Hand Tool

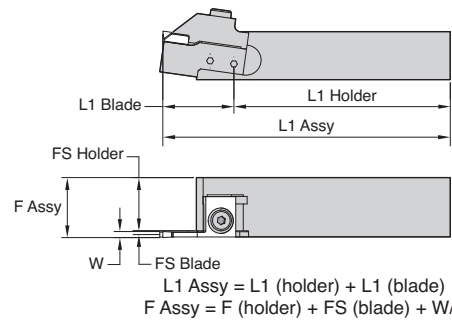
■ 1/2" and 3/4" Shank Toolholders

order number	catalog number	H	B	B2	L	L1	H2	F	hand	support blade screw	clamp screw
3538689	206178	.745	.750	—	3.625	2.913	—	.575	N - Neutral	606167	619124
3563801	206179	.500	.460	1.000	3.625	2.913	.750	.815	R - Right	606167	619124

NOTE: 206178 can use right- or left-hand blade and clamp.



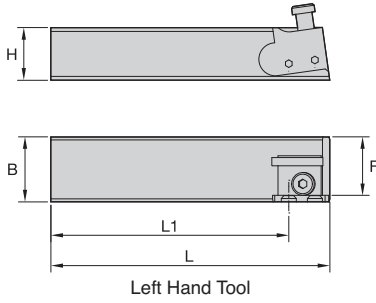
Right Hand Tool



L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2

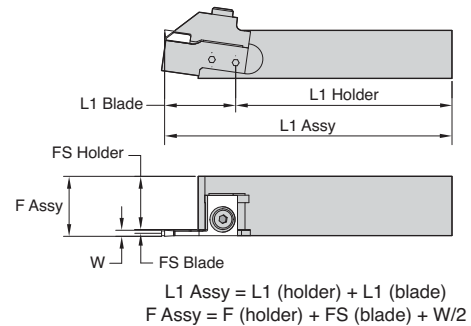
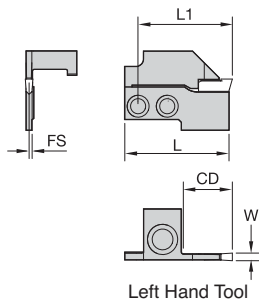
■ 1/2" and 3/4" Shank Blades

order number	catalog number	W	D max	FS	L	L1	clamp
Right hand							
3539515	333101	.094	1.625	.128	1.767	1.580	435154
3539516	333102	.125	1.625	.112	1.767	1.580	435155
Left hand							
3539517	333103	.094	1.625	.128	1.767	1.580	435156
3539518	333104	.125	1.625	.112	1.767	1.580	435157



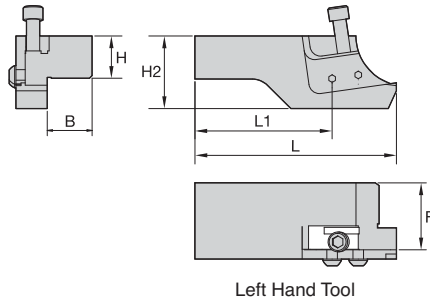
■ 1" and 1-1/4" Shank Toolholders

order number	catalog number	H	B	L	L1	F	support blade screw	clamp screw
Right hand								
3538669	206141	1.000	1.234	5.291	4.510	1.109	606164	619121
3538670	206143	1.250	1.484	5.291	4.510	1.359	606164	619121
Left hand								
3563786	206142	1.000	1.234	5.291	4.510	1.109	606164	619121



■ 1" and 1-1/4" Shank Blades

order number	catalog number	W	CD	FS	L	L1	clamp
Right hand							
3563591	331117	.094	.500	.094	1.419	1.165	435142
3539504	331101	.125	.813	.078	1.724	1.482	435128
3539506	331103	.188	.813	.078	1.724	1.482	435128
Left hand							
3539510	331118	.094	.500	.094	1.419	1.165	435143
3539505	331102	.125	.813	.078	1.724	1.482	435129
3539507	331104	.188	.813	.078	1.724	1.482	435129



Right Hand Tool

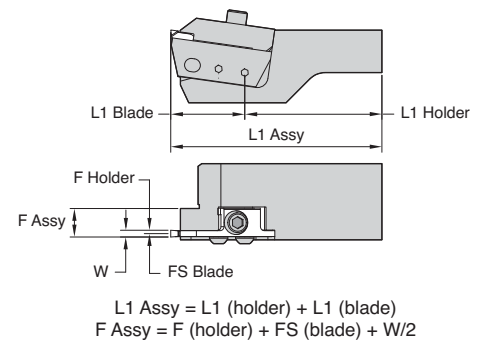
■ Universal Style 2-1/4" Bar Capacity

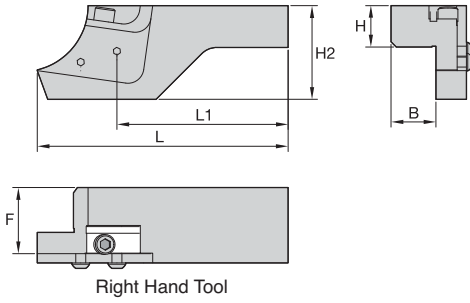
order number	catalog number	B	H	H2	F	L1	L	support blade screw	clamp screw
Right hand									
3538667	206128	.812	.750	1.719	1.334	2.747	4.270	606171	619112
3538659	206114	.912	1.000	1.719	1.434	3.867	5.390	606171	619112
3538665	206123	1.062	1.000	1.719	1.584	3.247	4.770	606171	S352
Left hand									
3538658	206113	1.062	1.000	1.719	1.584	4.247	5.770	606171	S352
3538662	206118	.812	.750	1.719	1.334	2.747	4.270	606171	619112
3563798	206108	1.062	1.000	1.719	1.434	3.867	5.390	606171	619112
3538668	206136	1.062	1.000	1.719	1.584	3.247	4.770	606171	619112

NOTE: .750" shank holders 206118 and 206128 use different clamps.

■ Components

W	L1	FS	left hand clamp	clamp for toolholder 206118 only	support blade	clamp for toolholder 206128 only	right hand clamp
.094	1.752	.036	435149	435151	310109	435150	435148
.125	1.752	.050	435104	435110	310102	435116	435101
.188	1.752	.072	435105	435109	310108	435117	435102



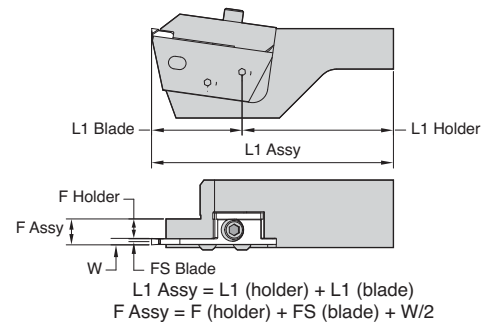


■ Universal Style 3" Bar Capacity

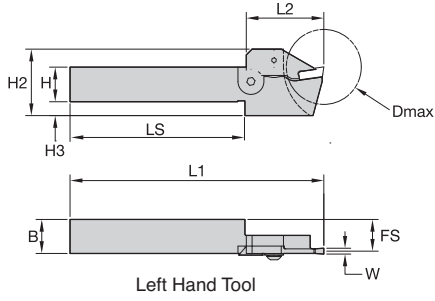
order number	catalog number	B	H	H2	F	L1	L	support blade screw	clamp screw
Right hand									
3538660	206115	.964	1.000	2.219	1.454	3.754	5.640	606171	S352
3538661	206116	1.064	1.000	2.219	1.554	3.754	5.640	606171	619112
3587587	206121	1.194	1.250	2.219	1.684	4.004	5.890	606171	619112
Left hand									
3563799	206110	1.074	1.000	2.219	1.554	3.304	5.190	606171	619112
3538663	206119	1.104	1.000	2.219	1.554	3.754	5.640	606171	619112

■ Components

W	L1	FS	left hand clamp	support blade	right hand clamp
.125	2.246	.050	435137	309111	435136
.188	2.246	.072	435106	309105	435103
.250	2.246	.094	435107	309106	435108



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■ Sub-Spindle

order number	catalog number	W	D max	B	FS	H	H2	H3	L1	LS	L2	button-head cap screw	clamp	flat-head cap screw	washer
Right hand															
3538762	206502	.094	1.630	.740	.703	.750	1.444	.300	5.500	3.790	1.680	619174	409184	619177	613139
3538760	206500	.126	2.630	.987	.937	1.000	1.754	.375	6.000	3.600	2.375	619174	409182	619175	613139
3538761	206501	.126	2.630	.987	.937	1.000	1.754	.375	6.000	3.600	2.375	619174	409183	619175	613139
Left hand															
3538765	206505	.126	1.630	.737	.687	.750	1.439	.300	5.500	3.790	1.681	619174	409187	619176	613139
3538764	206504	.126	1.630	.737	.687	.750	1.439	.300	5.500	3.790	1.681	619174	409186	619176	613139

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- Insert widths .079"–.157" (2,0mm–4,0mm).
- Toolholder shank sizes .394"–1.25" (10,0mm–31,75mm).
- Cut-off up to 2.99" (76,0mm) bar capacity.
- Quick, reliable insert indexing.
- Positive mechanical clamping.
- CNC square shank, screw machine, and PL blade-style toolholders.

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4 Select chipbreaker style for the application:

See the application guide on page D97 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 (X ² has wipers)	X²-Ultra	X²-Ultra	X²-Ultra	X²-Ultra	—
second choice	S²-Ultra	S²-Ultra	Classic	S²-Ultra	S²-Ultra	—

5 Select grade:

machining condition	Recommended Grades				
	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
unfavorable 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 D96 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 D98 for cutting data.

ANSI ISO 513		VDI 3323		Cutting Speed • vc SFM																		
Material Group				min	Start	max	min	Start	max	min	Start	max	min	Start	max							
P	1	C2						CS						GC						M40		
					300	400	500	570	645	770	125	260	370									
					240	300	400	490	560	630	110	230	330									
					210	275	340	410	465	520	90	165	240									
					220	300	390	480	500	540	100	185	290									
					190	270	350	420	470	50	155	230										
					225	300	390	460	500	540	100	195	290									
					190	270	350	390	440	490	85	160	235									
					180	260	340	340	395	450	75	150	220									
					125	180	270	230	295	360	60	120	180									
					150	250	310	360	395	430	80	155	230									
					105	180	270	205	305	405	60	115	170									
					235	310	390	450	510	570	120	225	330									
			220	260	300	340	390	440	95	155	215											
			100	140	180	170	200	230	55	90	125											
M	14.1	C2						CS						GC						M40		
					180	190	220				100	145	190									
					142	150	178	205				85	130	170								
					143	125	140	155				70	95	120								
			144	90	105	120				50	75	100										
K	15	C2						CS						GC						M40		
					450	550	650				250	350	450									
					16	375	440	500				170	265	360								
					17	425	500	570				200	310	420								
			18	300	375	450				130	240	330										

Separator • X² and X²-Ultra



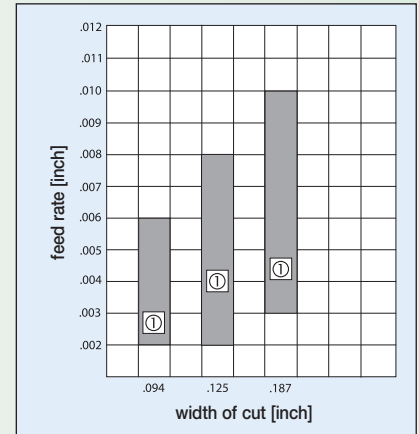
X²

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.



X²-Ultra

This insert has the same geometry as the WMT-SX-Ultra. The X²-Ultra is an enhanced version of the X² and is ideal for stainless steels, nickel-based alloys, tool steel, INCONEL®, and titanium.



① Recommended feed

Separator • S² and S²-Ultra



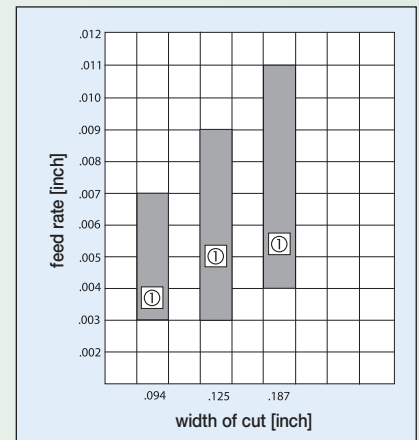
S²

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.



S²-Ultra

The S²-Ultra is an enhanced version of the S² and is ideal for 300 series stainless steels, nickel-based alloys, tool steel, INCONEL, and titanium at moderate to high speeds and feeds.



① Recommended feed

Separator • Classic and F²



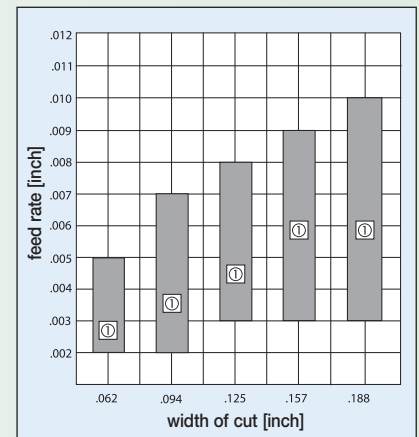
Classic

A good general-purpose insert for carbon steels, alloy steels, and most stainless steels. The Separator Classic chipbreaker is designed to perform well at moderate to slow speeds and feeds. The Classic provides standard high lead angles and sharp corners, making it the first choice when choosing an insert for nib-free cut-off.



F²

This insert provides superior flatness and finish on a wide variety of materials. Ideal for thick wall parts or cutting off larger diameter parts to center. The Separator F² performs well at slow to moderate speeds and feeds.



① Recommended feed

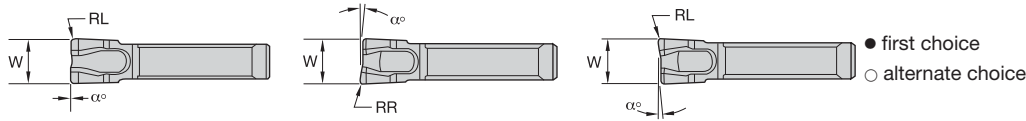
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ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM											
Material Group		C2			C5			GC			M40		
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	1				300	400	500	570	645	720	125	260	370
	2				240	350	460	490	560	630	110	220	330
	3				210	275	340	410	465	520	90	165	240
	4				220	305	390	460	500	540	100	195	290
	5				190	270	350	370	420	470	80	155	230
	6				225	308	390	460	500	540	100	195	290
	7				190	270	350	390	440	490	85	160	235
	8				180	260	340	340	395	450	75	150	220
	9				125	198	270	230	295	360	60	120	180
	10				190	250	310	360	395	430	80	155	230
	11				105	188	270	205	305	405	60	115	170
	12				235	313	390	450	510	570	120	225	330
	13.1				220	260	300	340	390	440	95	155	215
13.2				100	140	180	170	200	230	55	90	125	
M	14.1	160	190	220							100	145	190
	14.2	150	178	205							85	130	170
	14.3	125	140	155							70	95	120
	14.4	90	105	120							50	75	100
K	15	450	550	650							250	350	450
	16	375	440	500							170	265	360
	17	425	500	570							200	310	420
	18	300	375	450							150	240	330
	19	500	600	700							275	375	475
20	400	475	550							180	290	400	
N	21	1000	1350	1700							700	1200	1700
	22	800	1150	1500							500	1000	1500
	23	1000	1350	1700							700	1200	1700
	24	800	1150	1500							500	1000	1500
	25	700	800	900							450	675	900
	26	500	550	600							300	450	600
	27	500	550	600							300	450	600
	28	300	350	400							200	300	400
	29	200	250	300							150	225	300
	30	250	300	350							150	250	350
S	31	120	145	170							90	125	160
	32	90	100	110							70	85	100
	33	70	75	80							45	60	75
	34	60	65	70							40	50	60
	35	60	65	70							40	50	60
	36	180	195	210							110	155	200
	37	90	100	110							60	80	100

Cutting Speed • vc SFM												VDI 3323	ANSI ISO 513
min	Start	max	min	Start	max	min	Start	max	min	Start	max	Material Group	
M43			M433B			M45			M93			1 2 3 4 5 6 7 8 9 10 11 12 13.1 13.2	P
350	525	700	—	—	—	150	275	400	500	650	800		
280	455	630	—	—	—	140	250	360	425	550	700		
240	365	490	—	—	—	115	190	265	360	475	570		
260	405	550	—	—	—	130	225	320	400	490	600		
210	340	470	—	—	—	100	175	250	325	425	520		
260	405	550	—	—	—	130	225	320	400	500	600		
215	345	475	—	—	—	110	175	245	340	440	540		
200	330	455	—	—	—	90	160	230	300	400	500		
140	255	370	—	—	—	70	135	200	200	300	400		
210	305	400	—	—	—	100	170	240	320	400	475		
115	245	375	100	235	370	70	130	190	180	320	450		
280	395	510	280	405	530	130	245	360	390	505	620		
260	330	400	260	340	420	110	180	250	295	390	490		
110	160	210	110	170	230	65	100	140	150	200	250		
M43			M433B			M45			M93			14.1 14.2 14.3 14.4	M
170	250	330	180	300	420	110	165	220	295	390	490		
140	205	270	150	245	340	105	155	205	245	325	390		
110	160	210	120	195	270	85	120	155	180	245	310		
85	125	165	90	150	210	60	90	120	145	195	245		
M43			M433B			M45			M93			15 16 17 18 19 20	K
350	500	650	750	950	1150	300	400	500	500	650	800		
250	375	500	550	750	950	200	325	450	350	500	650		
300	435	570	650	850	1050	230	360	490	400	550	700		
200	325	450	600	800	1000	175	275	375	375	525	675		
400	550	700	800	1000	1200	320	420	520	550	590	850		
270	410	550	700	900	1100	210	340	470	360	460	700		
M43			M433B			M45			M93			21 22 23 24 25 26 27 28 29 30	N
900	1450	2000				800	1300	1800	1000	1600	2200		
700	1250	1800				600	1100	1600	800	1400	2000		
900	1450	2000				800	1300	1800	1000	1600	2200		
700	1250	1800				600	1100	1600	800	1400	2000		
600	850	1100				500	750	1000	700	1000	1300		
400	550	700				350	500	650	500	650	800		
400	550	700				350	500	650	500	650	800		
250	350	450				225	325	425	300	450	600		
180	265	350				150	240	325	200	300	400		
200	300	400				175	275	375	250	400	500		
M43			M433B			M45			M93			31 32 33 34 35 36 37	S
100	140	180	110	155	200	100	135	170	120	170	220		
75	95	120	80	105	130	75	90	110	95	115	150		
50	70	90	60	80	100	50	65	80	75	90	115		
45	55	70	50	65	80	45	55	70	60	75	90		
45	55	70	50	65	80	45	55	70	60	75	90		
120	170	220	130	180	230	120	165	210	180	220	260		
75	95	115	80	105	130	75	90	110	95	115	145		



Grooving, Cut-Off, and Turning • Separator



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

■ X²

catalog number	W		RR		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507305	2,39	.094	0,14	.006	—	N - Neutral					●		●	●
507308	3,20	.126	0,17	.007	—	N - Neutral					●		●	●

catalog number	W		RR		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507307	2,39	.094	0,14	.006	5	L - Left					●		●	●
507310	3,20	.126	0,17	.007	5	L - Left					●		●	●

catalog number	W		RL		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507306	2,39	.094	0,14	.006	5	R - Right					●		●	●
507309	3,20	.126	0,17	.007	5	R - Right					●		●	●

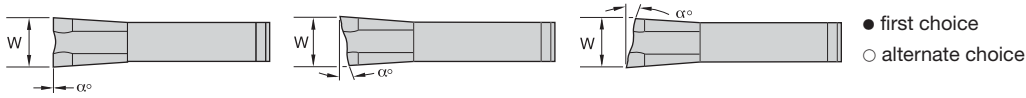
■ X² Ultra

catalog number	W		RR		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507354	2,39	.094	0,15	.006	—	N - Neutral						●		
507357	3,20	.126	0,15	.006	—	N - Neutral						●		

catalog number	W		RR		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507356	2,39	.094	0,13	.005	5	L - Left						●		
507359	3,20	.126	0,15	.006	5	L - Left						●		

catalog number	W		RL		α°	hand	C2	C5	GC	M40	M43	M43B	M45	M83
	mm	in	mm	in										
507355	2,39	.094	0,13	.005	5	R - Right						●		
507358	3,20	.126	0,15	.006	5	R - Right						●		

Grooving, Cut-Off, and Turning • Separator



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

■ F2

catalog number	W			hand	C2	C5	GC	M40	M43	M43B	M45	M93
	mm	in	α°									
507240	2,39	.094	—	N - Neutral				●			●	
507244	3,20	.126	—	N - Neutral				●			●	
catalog number	W			hand	C2	C5	GC	M40	M43	M43B	M45	M93
	mm	in	α°									
507255	2,39	.094	12	L - Left				●				
507257	3,18	.125	4	L - Left							●	
507258	3,18	.125	12	L - Left							●	
507259	3,18	.125	18	L - Left							●	
catalog number	W			hand	C2	C5	GC	M40	M43	M43B	M45	M93
	mm	in	α°									
507241	2,39	.094	4	R - Right				●			●	
507242	2,39	.094	12	R - Right				●			●	
507243	2,39	.094	18	R - Right				●			●	
507245	3,18	.125	4	R - Right				●			●	
507246	3,18	.125	12	R - Right				●			●	
507247	3,18	.125	18	R - Right				●			●	
507252	4,75	.187	4	R - Right				●			●	
507253	4,78	.188	12	R - Right				●	●		●	

Grooving, Cut-Off, and Turning • Separator

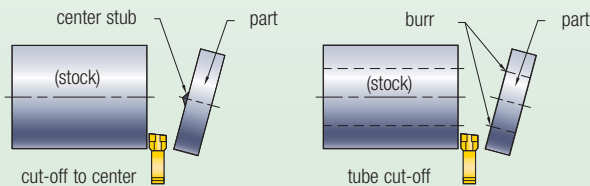
Definitions and Guidelines

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:

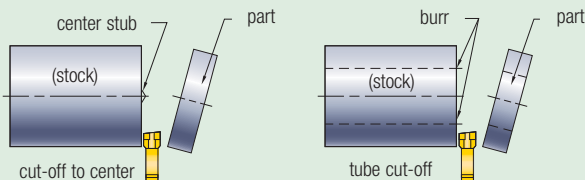
- Use lead angle-type inserts (Figures 1 and 2). Lead angle on a cut-off insert reduces the burr that remains on the part but decreases tool life and increases tool side deflection and possibly cycle time.

Figure 1
Insert selection **left-hand lead**



Left-hand lead insert leaves center stub or burr on part and produces clean stock surface.

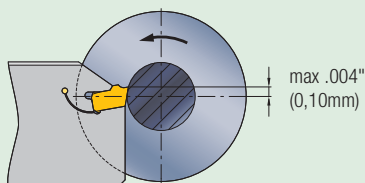
Figure 2
Insert selection **right-hand lead**



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 $\pm .004"$ (0,1mm) to the center; recommended cutting position is $.002"$ (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 minimize the center stub or cut-off burr length. Decrease the feed rate to maximum $.002"$ (0,05mm) or less at the point where diameter equals insert width.

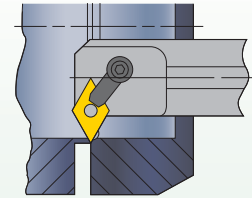


Figure 4
Internal chamfer line up

- 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.

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.

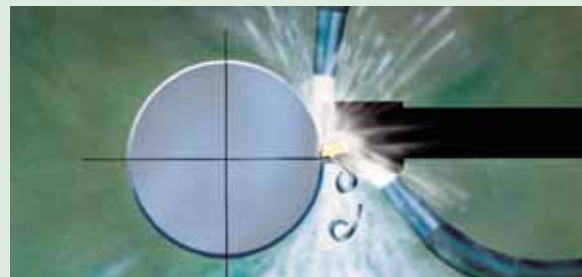


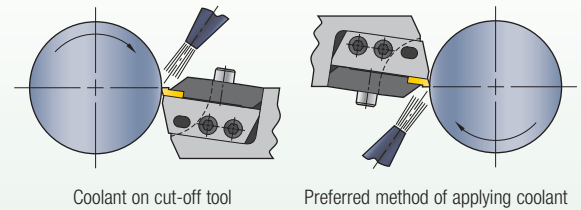
Figure 5
Preferred method for applying coolant

- 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.

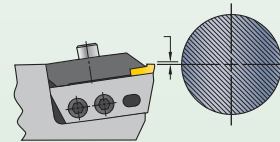
Figure A



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 S² or X².
- 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 .000"–.005" (0,0mm–0,0001mm) above center (see Figure B).

Figure B



Minimize edge chipping:

- Check to see if tool is significantly above or below center.
- Reduce feed prior to part drop off.
- Use Separator S² or X².
- 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.

Improve surface finish:

- For low to moderate speed (sfpm), use Separator F2.
- For moderate to high speed (sfpm), use Separator S² or X².
- 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).

(continued)

(continued)

Eliminate chatter:

- Minimize tool blade and holder overhang.
- Minimize part overhang.
- Use strongest toolholder system.
- Use a more narrow width of insert.
- Chipbreaker might be too aggressive. (Call Technical Support.)
- Adjust speed and feed rate up or down.
- Hold workpiece rigidly.
- With a longer part, support with steady rest or live center.
- Avoid machine dwell.
- Use S² or X² 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 .002" (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 minimize 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.

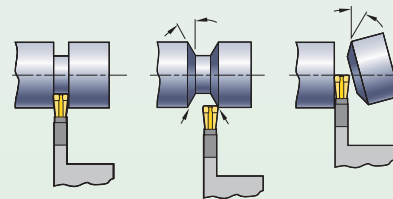
Eliminate built-up edge:

- Select proper grade for insert.
- Increase speed (RPM).
- Increase the feed rate.
- Use ample amounts of well-directed coolant (see Figure A on page D105).

Chamfer and cut-off operations:

- Use Separator S² or X².
- 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

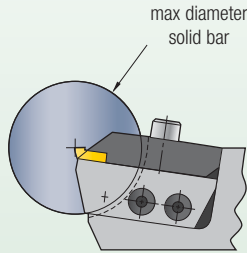


Figure 1
Standard bar capacity shown

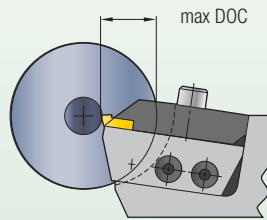


Figure 2
Larger bar diameter shown

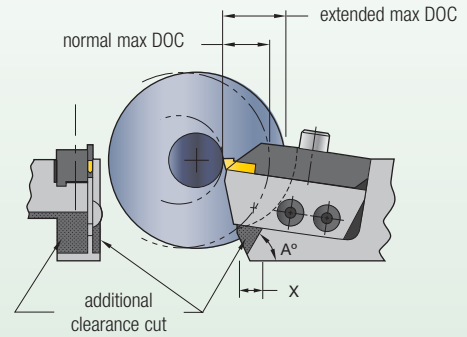


Figure 3
Modified toolholder with larger bar diameter shown

Capacity Chart for 2-1/4" Diameter Bar Capacity Tooling

bar diameter	2.5"	3.0"	3.5"	4.0"	4.5"	5.0"	6.0"	NOTE
max DOC	0.94"	0.75"	0.62"	0.56"	0.50"	0.47"	0.44"	with no modification on toolholder
	1.12"	1.03"	0.97"	0.91"	0.87"	0.84"	0.78"	with no modification on toolholder X = .40" A = 50"

Capacity Chart for 3" Diameter Bar Capacity Tooling

bar diameter	3.5"	4.0"	4.5"	5.0"	6.0"	NOTE
max DOC	1.12"	1.00"	0.88"	0.78"	0.69"	with no modification on toolholder
	1.44"	1.37"	1.31"	1.25"	1.12"	with no modification on toolholder X = .40" A = 50"

Ranger™

Ranger™ Adjustable Face Grooving System

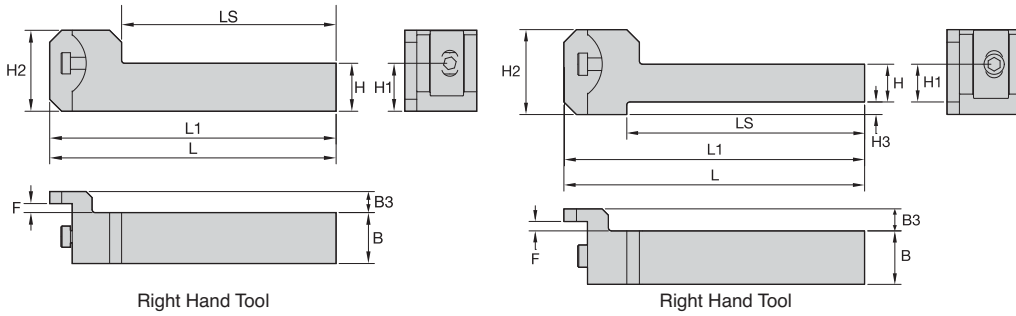
Features:

- Enables the adjustment of the support blade from 2.25" (57,0mm) to 16" (406,0mm) diameter for initial plunge.
- Insert widths .126" (3,2mm); .188" (4,9mm); and .250" (6,4mm).

Benefits:

- Available in both CW and CCW rotation and in both sweep-in or sweep-out styles.
- 2.25" (57,0mm) to 16" (406,0mm) OD face grooving with one adjustable assembly.



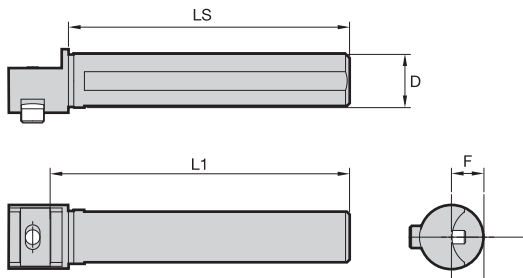


Left Hand Assembly

■ Square Shank

order number	catalog number	B	B3	F	H	H1	H2	H3	L	L1	LS	support blade screw	nut
Right hand													
3538796	235103	1.06	.44	-0.19	.75	.75	1.69	.25	5.98	5.963	4.475	606218	613137
3538797	235104	1.06	.44	-0.19	1.00	1.00	1.69	—	5.98	5.963	5.090	606218	613137
3538798	235105	1.06	.47	-0.19	1.25	1.25	1.94	—	5.98	5.963	5.090	606218	613137
Left hand													
3538799	235106	1.06	.44	-0.19	.75	.75	1.69	.25	5.98	5.963	4.475	606218	613137
3538800	235107	1.06	.44	-0.19	1.00	1.00	1.69	—	5.98	5.963	5.090	606218	613137
3538801	235108	1.06	.44	-0.19	1.25	1.25	1.94	—	5.98	5.963	5.090	606218	613137

NOTE: These holders can only use curve-out cartridge assembly.
Right-hand holder uses left-hand cartridge assembly.

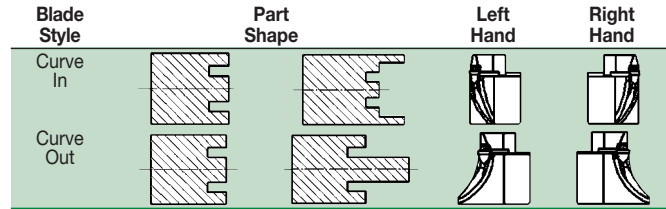
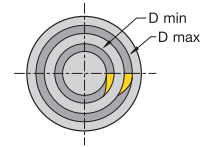
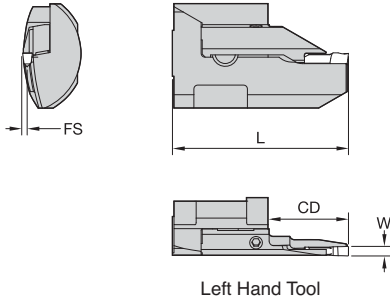


Left Hand Assembly

■ Round Shank

order number	catalog number	D	L1	LS	F	support blade screw	washer
3538803	235110	1.000	6.750	6.750	.763	619155	613135
3538802	235109	1.250	6.750	6.750	.763	619155	613135
3538794	235101	1.500	6.750	6.750	.763	619155	613135

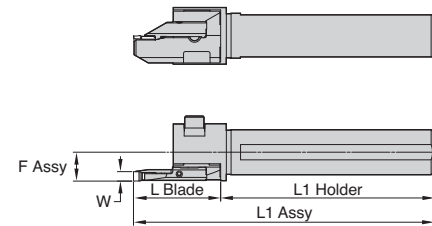
NOTE: Toolholders can be used as left hand or right hand.
These holders can use curve-in and curve-out cartridge assembly.



■ Curve In

order number	catalog number	W	CD	D min	D max	FS	L	hand	clamp	clamp screw
3539537	338123	.125	.75	2.25	15.75	-0.071	2.30	L - Left	440203	606219
3539538	338124	.188	1.00	2.25	15.75	-0.094	2.30	L - Left	440204	606219
3539546	338132	.250	1.00	2.25	15.75	-0.125	2.30	L - Left	4402122	606219
3539535	338121	.125	.75	2.25	15.75	-0.071	2.30	R - Right	440201M	606219
3539536	338122	.188	1.00	2.25	15.75	-0.094	2.30	R - Right	440202	606219
3539545	338131	.250	1.00	2.25	15.75	-0.125	2.30	R - Right	440211	606219

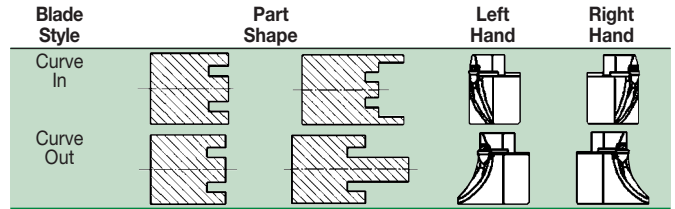
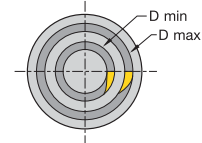
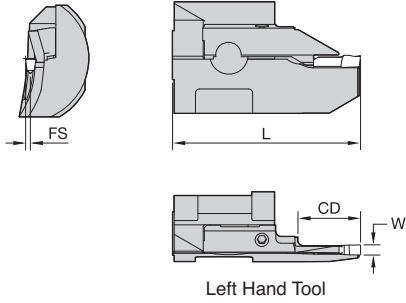
NOTE: RH cartridge goes with LH toolholder.
LH cartridge goes with RH toolholder.



For Round Shank

$$F \text{ Assy} = W/2 + F \text{ (holder)} + FS \text{ (blade)}$$

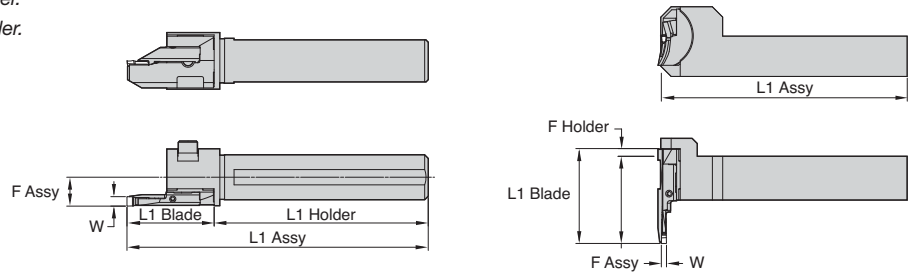
$$L1 \text{ Assy} = L1 \text{ (holder)} + L \text{ (blade)}$$



■ **Curve Out**

order number	catalog number	W	CD	D min	D max	FS	L	hand	clamp	clamp screw
3539539	338125	.125	.75	2.25	15.75	-0.058	2.30	L - Left	440205	606219
3539540	338126	.188	1.00	2.25	15.75	-0.094	2.30	L - Left	440206	606219
3539541	338127	.250	1.00	2.25	15.75	-0.125	2.30	L - Left	440207	606219
3539542	338128	.125	.75	2.25	15.75	-0.058	2.30	R - Right	440208	606219
3539543	338129	.188	1.00	2.25	15.75	-0.094	2.30	R - Right	440209	606219
3539544	338130	.250	1.00	2.25	15.75	-0.125	2.30	R - Right	440210M	606219

NOTE: RH cartridge goes with LH toolholder.
LH cartridge goes with RH toolholder.



For Round Shank

$$F \text{ Assy} = W/2 + F \text{ (holder)} + FS \text{ (blade)}$$

$$L1 \text{ Assy} = L1 \text{ (holder)} + L1 \text{ (blade)}$$

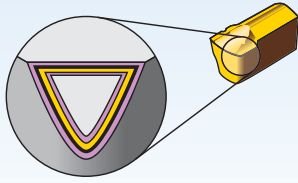
For Square Shank

$$F \text{ Assy} = F \text{ (holder)} + L1 \text{ (blade)}$$

$$L1 \text{ Assy} = W/2 + L1 \text{ (holder)} + FS \text{ (blade)}$$

Grades and Grade Descriptions

Ranger™



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

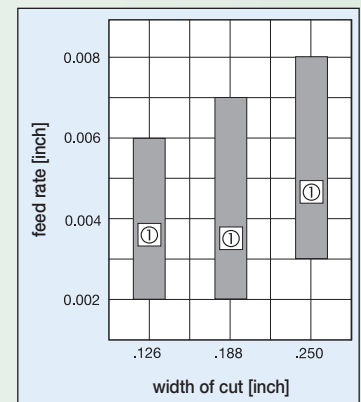
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Grade	Coating	Grade Description	Speed (ft/min)																					
			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																					
			K																					
			N																					
			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 color.	P																					
			M																					
			K																					
			N																					
M40	 HC-P35	A premium, single-phase PVD TiN coating over a tough, specially formulated substrate that performs well under extremely low to moderate speed conditions found on screw machines. Ideal for carbon steels, alloy steels, most stainless steels, and many high-temperature alloys.	P																					
			M																					
			K																					
			N																					
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																					
			M																					
			K																					
			S																					

Ranger • Face Grooving

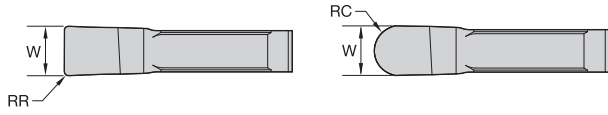


- Inserts available for plunge-groove and full-nose radii.
- Geometry design to provide clearance deep grooving.
- Superior chip control.



① Recommended feed

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM											
Material Group		Cutting Speed • vc SFM											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P		C2			GC			M40			M43		
	1				570	645	720	125	260	370	350	525	700
	2				490	560	630	110	220	330	280	455	630
	3				410	465	520	90	165	240	240	365	490
	4				460	500	540	100	195	290	260	405	550
	5				370	420	470	80	155	230	210	340	470
	6				460	500	540	100	195	290	260	405	550
	7				390	440	490	85	160	235	215	345	475
	8				340	395	450	75	150	220	200	330	455
	9				230	295	360	60	120	180	140	255	370
	10				360	395	430	80	155	230	210	305	400
	11				205	305	405	60	115	170	115	245	375
	12				450	510	570	120	225	330	280	395	510
	13.1				340	390	440	95	155	215	260	330	400
13.2				170	200	230	55	90	125	110	160	210	
M		C2			GC			M40			M43		
	14.1	160	190	220				100	145	190	170	250	330
	14.2	150	178	205				85	130	170	140	205	270
	14.3	125	140	155				70	95	120	110	160	210
14.4	90	105	120				50	75	100	85	125	165	
K		C2			GC			M40			M43		
	15	450	550	650				250	350	450	350	500	650
	16	375	440	500				170	265	360	250	375	500
	17	425	500	570				200	310	420	300	435	570
	18	300	375	450				150	240	330	200	325	450
	19	500	600	700				275	375	475	400	550	700
20	400	475	550				180	290	400	270	410	550	
N		C2			GC			M40			M43		
	21	1000	1350	1700				700	1200	1700	900	1450	2000
	22	800	1150	1500				500	1000	1500	700	1250	1800
	23	1000	1350	1700				700	1200	1700	900	1450	2000
	24	800	1150	1500				500	1000	1500	700	1250	1800
	25	700	800	900				450	675	900	600	850	1100
	26	500	550	600				300	450	600	400	550	700
	27	500	550	600				300	450	600	400	550	700
	28	300	350	400				200	300	400	250	350	450
	29	200	250	300				150	225	300	180	265	350
	30	250	300	350				150	250	350	200	300	400
S		C2			GC			M40			M43		
	31	120	145	170				90	125	160	100	140	180
	32	90	100	110				70	85	100	75	95	120
	33	70	75	80				45	60	75	50	70	90
	34	60	65	70				40	50	60	45	55	70
	35	60	65	70				40	50	60	45	55	70
	36	180	195	210				110	155	200	120	170	220
	37	90	100	110				60	80	100	75	95	115



● first choice
○ alternate choice

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

■ Face Grooving

catalog number	W		RR		RC		C2	GC	M40	M43
	mm	in	mm	in	mm	in				
506101	3,18	.125	0,25	.010	—	—	●	●	●	●
506102	3,18	.125	0,25	.010	—	—	●	●	●	○
506104	3,18	.125	—	—	1,59	.063	●	○	●	○
506105	3,18	.125	—	—	1,59	.063	●	○	●	○
506103	4,78	.188	0,25	.010	—	—	●	●	○	●
506106	4,78	.188	—	—	2,39	.094	○	○	●	○
506107	6,35	.250	0,25	.010	—	—	○	○	●	○
506108	6,35	.250	—	—	3,18	.125	○	○	●	○

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.

Grooving, Cut-Off, and Turning • Ranger

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

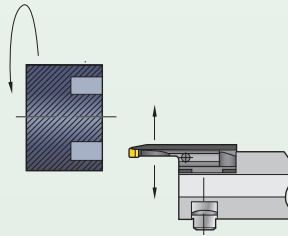
given diameter setting	plunge range at diameter setting	
	smallest OD	largest OD
2-1/4	2-1/4	2-3/8
2-1/2	2-3/8	2-5/8
2-3/4	2-9/16	2-15/16
3.0	2-5/8	3-3/8
3-1/2	3-1/16	3-15/16
4.0	3-1/2	4-1/2
5.0	4-1/4	5-3/4
6.0	5	7
8.0	6-1/2	9-1/2
10.0	8	11
11-16	9	16

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 4" OD, plunge cuts from 3-1/2" OD to 4-1/2" OD can be made without changing the 4" OD setting.

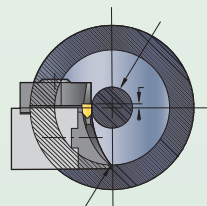
Widening a Face Groove

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 +.030" 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 <.850" diameters.



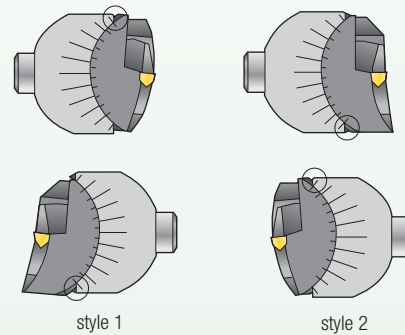
Adjusting Information for Ranger Tooling

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:

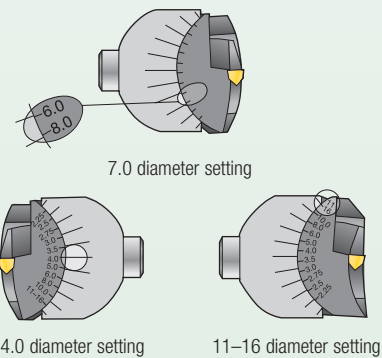
Step 1 Loosen the support blade locking screw and rotate the support blade so that the 2.25 mark is above the top line on the toolholder. [Below the line on toolholder for style 2.]

2.25 diameter settings



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.



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.

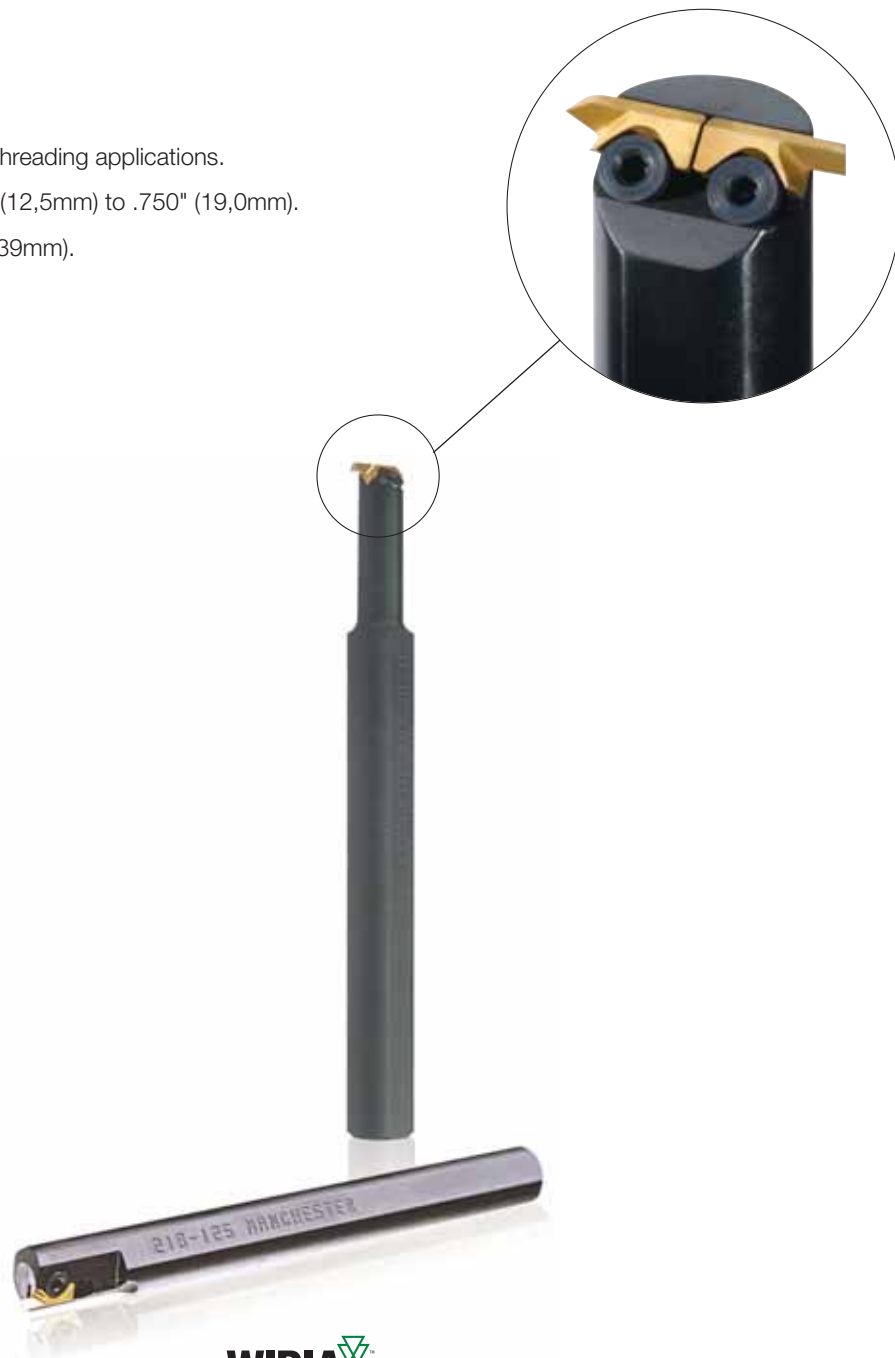
NOTE: It is important that these instructions are followed. Failure to do so may result in damage to the tool and the workpiece.

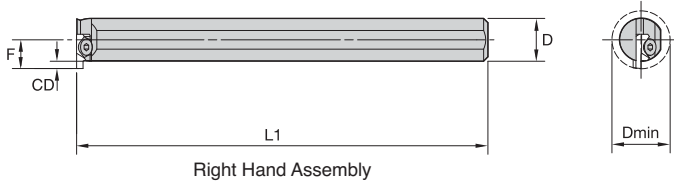
S-LOC™

S-LOC • ID Boring, Grooving, Face Grooving, and Threading

Features and Benefits:

- Specifically for ID grooving and threading applications.
- Bar diameters range from .500" (12,5mm) to .750" (19,0mm).
- Maximum depth of cut .094" (2,39mm).



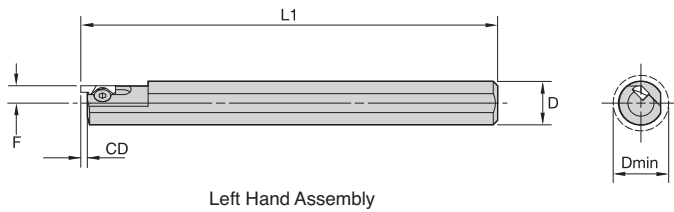


Right Hand Assembly

■ ID Grooving

order number	catalog number	CD	L1	D	F	D min	hand	clamp screw
3538777	218123	.094	6.004	.625	.419	.780	L - Left	606190
3636872	218119	.094	6.004	.500	.312	.560	N - Neutral	606190
3538775	218121	.094	6.004	.625	.312	.560	N - Neutral	606190
3538778	218124	.094	8.004	.750	.510	.940	N - Neutral	606190
3538776	218122	.094	6.004	.625	.419	.780	R - Right	606190

NOTE: Can be used with right- or left-hand inserts.
Right-hand assemblies use left-hand inserts.
218119, 218121, and 218124 may be used as either right- or left-hand holders.

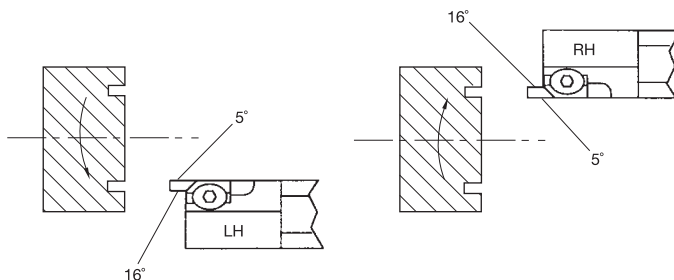


Left Hand Assembly

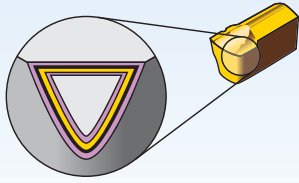
■ Face Grooving

order number	catalog number	CD	L1	D	F	D min	clamp screw
3538779	Right hand 218125	.094	6.000	.625	.250	.640	606190
	Left hand 218126	.094	6.000	.625	.250	.640	

NOTE: 1/2" 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.

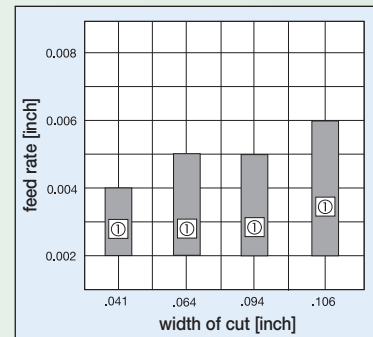
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Coating		Grade Description	05 10 15 20 25 30 35 40 45																			
C2		A general-purpose tungsten carbide for use on cast irons, non-ferrous alloys, and many high-temperature alloys.	M																			
	HW-K15		K																			
			N																			
			S																			
C5		A general-purpose alloyed tungsten carbide for steel cutting.	P																			
	HW-P30		M																			
GC		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 color.	P																			
	HC-P15																					
M40		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																			
	HC-P35		M																			
			K																			
			N																			
		S																				

S-LOC

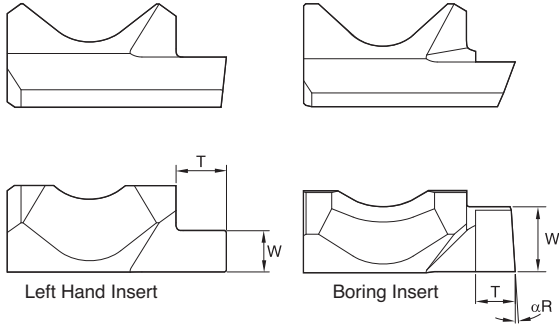


- Unique clamping surface on inserts.
- Used in ID boring and grooving applications.
- Superior chip control.



Ⓢ Recommended feed

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM											
Material Group		Cutting Speed • vc SFM											
		min	Start	max	min	Start	max	min	Start	max	min	Start	max
P		C2			C5			GC			M40		
	1				300	400	500	570	645	720	125	260	370
	2				240	350	460	490	560	630	110	220	330
	3				210	275	340	410	465	520	90	165	240
	4				220	305	390	460	500	540	100	195	290
	5				190	270	350	370	420	470	80	155	230
	6				225	308	390	460	500	540	100	195	290
	7				190	270	350	390	440	490	85	160	235
	8				180	260	340	340	395	450	75	150	220
	9				125	198	270	230	295	360	60	120	180
	10				190	250	310	360	395	430	80	155	230
	11				105	188	270	205	305	405	60	115	170
	12				235	313	390	450	510	570	120	225	330
	13.1				220	260	300	340	390	440	95	155	215
13.2				100	140	180	170	200	230	55	90	125	
M		C2			C5			GC			M40		
	14.1	160	190	220							100	145	190
	14.2	150	178	205							85	130	170
	14.3	125	140	155							70	95	120
14.4	90	105	120							50	75	100	
K		C2			C5			GC			M40		
	15	450	550	650							250	350	450
	16	375	440	500							170	265	360
	17	425	500	570							200	310	420
	18	300	375	450							150	240	330
	19	500	600	700							275	375	475
20	400	475	550							180	290	400	
N		C2			C5			GC			M40		
	21	1000	1350	1700							700	1200	1700
	22	800	1150	1500							500	1000	1500
	23	1000	1350	1700							700	1200	1700
	24	800	1150	1500							500	1000	1500
	25	700	800	900							450	675	900
	26	500	550	600							300	450	600
	27	500	550	600							300	450	600
	28	300	350	400							200	300	400
	29	200	250	300							150	225	300
	30	250	300	350							150	250	350
S		C2			C5			GC			M40		
	31	120	145	170							90	125	160
	32	90	100	110							70	85	100
	33	70	75	80							45	60	75
	34	60	65	70							40	50	60
	35	60	65	70							40	50	60
	36	180	195	210							110	155	200
	37	90	100	110							60	80	100



● first choice
○ alternate choice

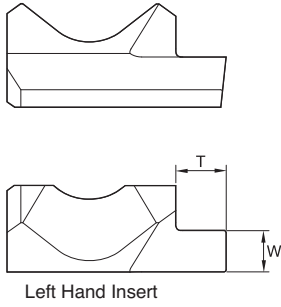
P	●
M	●
K	○
N	●
S	○
H	○

■ ID Grooving

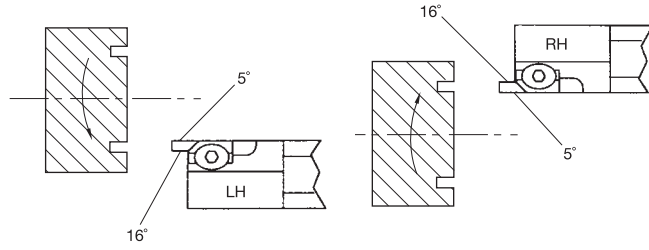
catalog number	W		T		αR	M40
	mm	in	mm	in		
Right hand						
510124	1,04	.041	2,08	.082	—	●
510128	1,63	.064	2,92	.115	—	●
510104	2,39	.094	2,92	.115	—	●
510132	2,50	.099	2,92	.115	—	●
510134	2,71	.107	2,92	.115	—	●
Left hand						
510113	1,04	.041	2,08	.082	—	●
510114	1,21	.048	2,08	.082	—	●
510115	1,36	.054	2,08	.082	—	●
510116	1,37	.057	2,08	.082	—	●
510117	1,63	.064	2,92	.115	—	●
510118	1,80	.071	2,92	.115	—	●
510119	1,94	.077	2,39	.094	—	●
510120	2,22	.088	2,92	.115	—	●
510101	2,39	.094	2,92	.115	—	●
510121	2,50	.099	2,92	.115	—	●
510122	2,64	.104	2,92	.115	—	●
510123	2,71	.107	2,92	.115	—	●
510102	3,81	.150	2,39	.094	4,00	●

NOTE: Insert 510102 is used for boring.

Grooving, Cut-Off, and Turning • S-LOC



Left Hand Insert



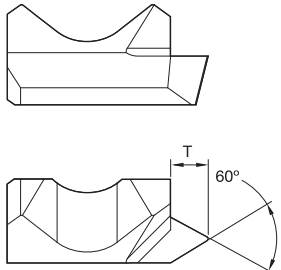
- Side clearance angles as noted.
- Use left-hand tooling for counterclockwise rotation only.
- Use right-hand tooling for clockwise rotation only.

- first choice
- alternate choice

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

■ Face Grooving

catalog number	W		T		C2	C5	GC	M40
	mm	in	mm	in				
Right hand								
510136	1,98	.078	2,39	.094	●	●	●	●
510108	2,39	.094	2,39	.094	●			●
510138	2,59	.102	2,39	.094				●
Left hand								
510135	1,98	.078	2,39	.094		●		●
510107	2,39	.094	2,39	.094				●
510137	2,59	.102	2,39	.094				●



Left Hand Insert

■ Threading

catalog number	T		C2	C5	GC	M40
	mm	in				
Right hand						
510106	2,38	.094	●			●
Left hand						
510103	2,38	.094	●	●	●	●

NOTE: Minimum 10 threads per inch.

Grooving, Cut-Off, and Turning • S-LOC

Chipmaker™

Chipmaker • OD and ID Boring, Grooving, and Face Grooving

OD and ID Grooving Toolholders are specifically engineered with integral- and component-style toolholders, and single- and multi-edge Chipmaker grooving inserts, to provide a complete grooving portfolio.

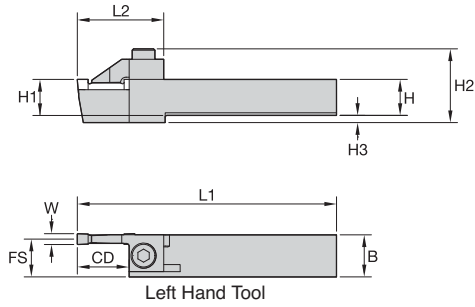
- OD and ID grooving toolholders.
- Utilize double-ended “dog bone-style” inserts.
- Component toolholder systems.
- Contouring, and turning capabilities.
- Toolholder shank sizes 5/8"–1.50" (16,0mm–38,0mm).
- Grooving depths 5/16"–13/16" (7,94mm–19,0mm).
- Positive mechanical clamping system.
- Toolholders for straight OD and end mount applications.



OD and ID Grooving Inserts

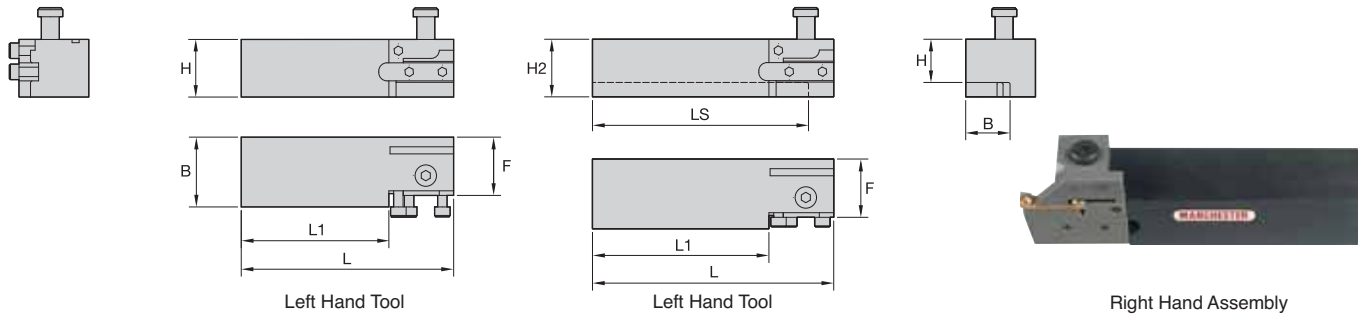


- Double end, vee-bottom, mechanically clamped.
- .010"–.030" (0,3mm–0,6mm) corner radii and full nose radius.
- Multiple chip management geometries:
 - Flat-top with no chip geometry.
 - Flat-top with positive rake.
 - Molded bump and vee-chip control geometry.
 - Plow breaker-style chipbreaker.
- Various substrates — PVD and CVD coating.



■ Square Shank

order number	catalog number	W	CD	H	B	H1	H2	H3	L1	L2	FS	clamp	clamp screw
Right hand													
3538825	236125	.126	.750	.625	.737	.625	1.274	.125	4.500	1.375	.687	441101	619168
3538819	236107	.126	.750	.750	.737	.750	1.274	—	5.000	1.375	.687	441101	619168
3538813	236101	.126	.750	1.000	.987	1.000	1.524	—	5.000	1.375	.937	441101	619168
3538826	236126	.188	.875	.625	.730	.625	1.280	.125	4.500	1.500	.656	441102	619168
3538820	236108	.188	.875	.750	.730	.750	1.280	—	5.000	1.500	.656	441102	619168
3538814	236102	.188	.875	1.000	.980	1.000	1.530	—	5.000	1.500	.906	441102	619168
3538821	236109	.250	.875	.750	.730	.750	1.280	—	5.000	1.500	.625	441102	619168
3538815	236103	.250	.875	1.000	.980	1.000	1.530	—	5.000	1.500	.875	441102	619168
Left hand													
3538827	236127	.126	.750	.625	.737	.625	1.274	.125	4.500	1.375	.687	441103	619168
3538822	236110	.126	.750	.750	.737	.750	1.274	—	5.000	1.375	.687	441103	619168
3538816	236104	.126	.750	1.000	.987	1.000	1.524	—	5.000	1.375	.937	441103	619168
3538828	236128	.188	.875	.625	.730	.625	1.280	.125	4.500	1.500	.656	441104	619168
3538823	236111	.188	.875	.750	.730	.750	1.280	—	5.000	1.500	.656	441104	619168
3538817	236105	.188	.875	1.000	.980	1.000	1.530	—	5.000	1.500	.906	441104	619168
3538824	236112	.250	.875	.750	.730	.750	1.280	—	5.000	1.500	.625	441104	619168
3538818	236106	.250	.875	1.000	.980	1.000	1.530	—	5.000	1.500	.875	441104	619168



■ 5/16" and 1/2" Depth of Cut

order number	catalog number	B	H	H2	L1	LS	L	F	clamp screw	support blade screw
Right hand										
3538632	203344	.770	.750	1.000	3.063	3.750	4.188	1.012	619111	619102
3538631	203343	.770	.750	1.000	2.563	3.250	3.688	1.012	619111	619102
3563789	203235	1.212	1.250	—	4.563	4.563	5.688	1.012	619111	619102
3538624	203281	1.212	1.000	—	4.563	4.563	5.688	1.012	619111	619102
3634221	203223	1.212	1.000	—	3.563	3.563	4.688	1.012	619111	619102
3634219	203219	1.212	1.000	—	2.563	2.563	3.688	1.012	619111	619102
Left hand										
3538634	203346	.770	.750	1.000	3.063	3.750	4.188	1.012	619111	619102
3565414	203308	1.212	1.250	—	4.563	4.563	5.688	1.012	619111	619102
3634246	203234	1.212	1.000	—	2.563	2.563	3.688	1.012	619121	619102
3538622	203275	1.212	1.000	—	3.563	3.563	4.688	1.012	619111	619102
3538625	203285	1.212	1.000	—	4.563	4.563	5.688	1.012	619111	619102

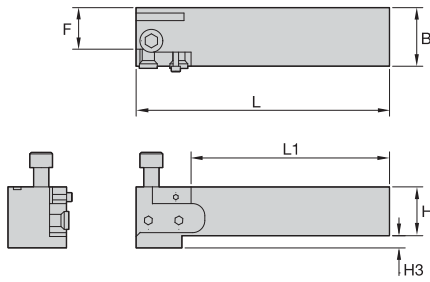
■ Components for 5/16" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.437	.172	308123	407118	601101	407101	308106
.156	1.437	.157	308124	407119	601101	407102	308107M
.188	1.437	.141	308125	407120	601102	407103	308108
.250	1.437	.110	308126	407121	601102	407104	308109
.312	1.437	.192	308127	407122	601103	407105	308110

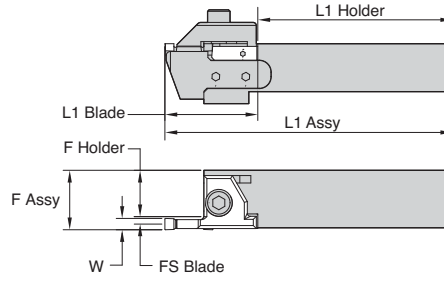
■ Components for 1/2" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.625	.172	308130	407124	601104	407107	308113
.156	1.625	.192	308143	407129	601104	407108	308114
.188	1.625	.157	308131	407125	601105	407109	308115
.250	1.625	.110	308137	407127	601105	407110	308116
.312	1.625	.192	308145	407130	601106	407111	308117

Grooving, Cut-Off, and Turning • Chipmaker



Right Hand Tool



Right Hand Assembly
L1 Assy = L1 (holder) + L1 (blade)
F Assy = F (holder) + FS (blade) + W/2



Right Hand Assembly

■ 5/8" or 13/16" Depth of Cut

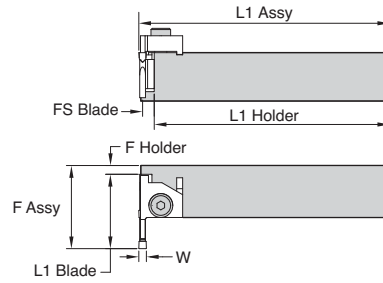
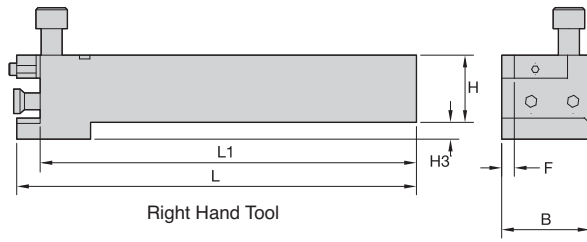
order number	catalog number	B	H	H3	L1	L	F	support blade screw	clamp screw
Right hand									
3634247	203287	1.199	1.000	.250	4.063	5.188	.850	606160	619110
3538619	203245	1.199	1.250	—	4.563	5.688	.850	606160	619110
3634244	203231	1.449	1.250	—	4.063	5.188	1.100	606160	619110
Left hand									
3538617	203112	1.949	1.500	—	4.563	5.688	1.600	606160	619110
3538640	203352	1.199	1.000	.250	4.063	5.188	.850	606160	619110
3538621	203271	1.449	1.250	—	3.813	4.938	1.100	606160	619110
3538618	203232	1.449	1.250	—	4.063	5.188	1.100	606160	619110
3634245	203233	1.949	1.500	—	4.563	5.688	1.600	606160	619110

■ Components for 5/8" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.750	.334	308148	407133	601112	407131	308146
.156	1.750	.319	308149	407134	601112	407132	308147

■ Components for 13/16" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.937	.303	308150	407135	601107	407113	308119
.250	1.937	.272	308151	407144	601107	407143	308120
.312	1.937	.241	308152	407137	601108	407115	308121
.376	1.937	.209	308153	407138	601108	407116	308122



Right Hand Assembly

Left Hand Assembly

L1 Assy = L1 (holder) + FS (blade) + W/2
F Assy = F (holder) + L1 (blade)

■ Right Angle • 5/8" and 13/16" Depth of Cut

order number	catalog number	B	F	H	H3	L	L1	support blade screw	clamp screw	stop screw
Right hand										
3538653	204270	1.313	.188	1.000	.250	5.949	5.600	606160	619110	619101
3538644	204215	1.313	.188	1.250	—	5.949	5.600	606160	619110	619101
3538647	204259	1.500	.376	1.500	—	5.949	5.600	606160	619110	619101
Left hand										
3538652	204269	1.313	.188	1.000	.250	5.949	5.600	606160	619110	619101
3615158	204214	1.313	.188	1.250	—	5.949	5.600	606160	619110	619101
3538646	204258	1.500	.375	1.500	—	5.949	5.600	606160	619110	619101

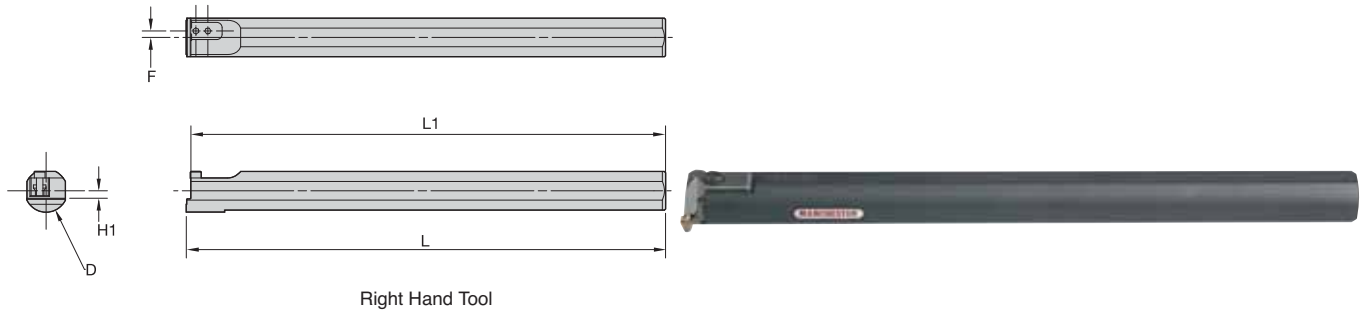
■ Components for 5/8" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.750	.334	308148	407133	601112	407131	308146
.156	1.750	.319	308149	407134	601112	407132	308147

■ Components for 13/16" Depth of Cut

W	L1	FS	left hand support blade	clamp	stop	clamp	right hand support blade
.126	1.937	.303	308150	407135	601107	407113	308119
.250	1.937	.272	308151	407144	601107	407143	308120
.312	1.937	.241	308152	407137	601108	407115	308121
.376	1.937	.209	308153	407138	601108	407116	308122

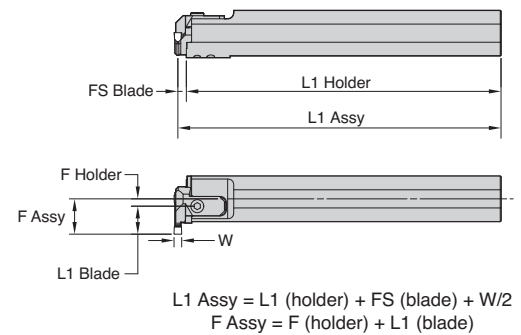
NOTE: Use left-hand components in right-hand toolholders. Use right-hand components in left-hand toolholders.

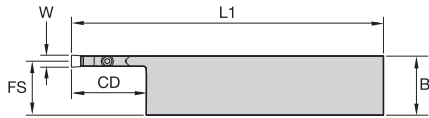


■ ID Grooving 1-1/4" Diameter

order number	catalog number	D	F	H1	L1	L	support blade screw	clamp screw
	Right hand							
3538648	204263	1.250	.188	-0.238	13.865	14.000	606192	619120
3538792	226262	1.260	.188	-0.238	13.865	14.000	606225	619152
	Left hand							
3538791	226261	.984	.000	-0.238	11.865	12.000	606225	619152
3563796	204262	1.000	.000	-0.238	11.865	12.000	606192	619120
3538649	204264	1.250	.188	-0.238	13.865	14.000	606192	619120
3538789	226252	1.260	.188	-0.238	13.865	14.000	606225	619152

NOTE: Toolholders 204261 and 204262 can be used as a right or left hand.
 Left-hand toolholders use right-hand components.
 Right-hand toolholders use left-hand components.
 Use inserts that have additional clearance for ID boring.





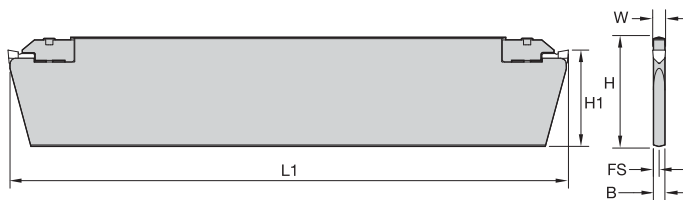
Left Hand Tool



Right Hand Assembly

■ **DAG Extended DOC**

order number	catalog number	W	CD	B	H	L1	L2	FS	H2	clamp	clamp screw
Right hand											
3538848	237101	.250	1.500	.980	.990	6.500	1.203	.875	1.214	442101	619170
3538852	237105	.250	1.500	1.230	1.240	6.500	1.203	1.125	1.464	442101	619170
3538849	237102	.313	1.500	.980	.990	6.500	1.229	.845	1.229	442102	619170
3538853	237106	.313	1.500	1.230	1.240	6.500	1.229	1.095	1.479	442102	619170
Left hand											
3538850	237103	.250	1.500	.980	.990	6.500	1.203	.875	1.214	442101	619170
3538854	237107	.250	1.500	1.230	1.240	6.500	1.203	1.125	1.464	442101	619170
3538851	237104	.313	1.500	.980	.990	6.500	1.229	.845	1.229	442102	619170
3538855	237108	.313	1.500	1.230	1.240	6.500	1.229	1.095	1.479	442102	619170



■ **DAG Blades**

order number	catalog number	W	L1	H	H1	FS	B	clamp	clamp screw
3539595	341101	.236	10.300	2.068	1.770	.106	.212	442101	619170
3539596	341102	.315	10.300	2.067	1.770	.135	.270	442102	619170

Grooving, Cut-Off, and Turning • Chipmaker

Chipmaker

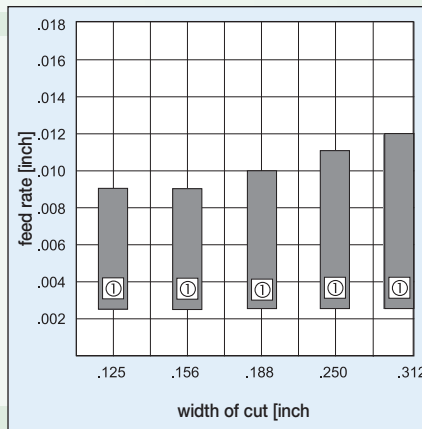


First choice for chip control and reduced cutting forces for most materials. Precision width for deep grooving. Plunge and turn capable.

Positive Rake Inserts

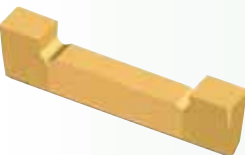


Reduced cutting pressures versus neutral rake-style for deep grooving. Plunge and turn capable.



① Recommended feed

Neutral Rake Inserts



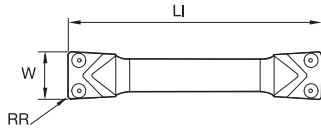
First choice for cast iron or other short chipping materials. Widest selection of corner radii. Precision width for deep grooving. Plunge and turn capable.

Chipmaker 95



Chip control for applications using aggressive feed rates to deliver productivity. Plunge mode only. Precision width for deep grooving.

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM														
Material Group		Cutting Speed • vc SFM														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P		GC			M40			M43			M45			M93		
	1	570	645	720	125	260	370	350	525	700	150	275	400	500	650	800
	2	490	560	630	110	220	330	280	455	630	140	250	360	425	550	700
	3	410	465	520	90	165	240	240	365	490	115	190	265	360	475	570
	4	460	500	540	100	195	290	260	405	550	130	225	320	400	490	600
	5	370	420	470	80	155	230	210	340	470	100	175	250	325	425	520
	6	460	500	540	100	195	290	260	405	550	130	225	320	400	500	600
	7	390	440	490	85	160	235	215	345	475	110	175	245	340	440	540
	8	340	395	450	75	150	220	200	330	455	90	160	230	300	400	500
	9	230	295	360	60	120	180	140	255	370	70	135	200	200	300	400
	10	360	395	430	80	155	230	210	305	400	100	170	240	320	400	475
	11	205	305	405	60	115	170	115	245	375	70	130	190	180	320	450
	12	450	510	570	120	225	330	280	395	510	130	245	360	390	505	620
	13.1	340	390	440	95	155	215	260	330	400	110	180	250	295	390	490
13.2	170	200	230	55	90	125	110	160	210	65	100	140	150	200	250	
M					M40			M43			M45			M93		
	14.1				100	145	190	170	250	330	110	165	220	295	390	490
	14.2				85	130	170	140	205	270	105	155	205	245	325	390
	14.3				70	95	120	110	160	210	85	120	155	180	245	310
14.4				50	75	100	85	125	165	60	90	120	145	195	245	
K		M24			M40			M43			M45			M93		
	15	750	950	1150	250	350	450	350	500	650	300	400	500	500	650	800
	16	550	750	950	170	265	360	250	375	500	200	325	450	350	500	650
	17	650	850	1050	200	310	420	300	435	570	230	360	490	400	550	700
	18	600	800	1000	150	240	330	200	325	450	175	275	375	375	525	675
	19	800	1000	1200	275	375	475	400	550	700	320	420	520	550	590	850
20	700	900	1100	180	290	400	270	410	550	210	340	470	360	460	700	
N					M40			M43			M45			M93		
	21				700	1200	1700	900	1450	2000	800	1300	1800	1000	1600	2200
	22				500	1000	1500	700	1250	1800	600	1100	1600	800	1400	2000
	23				700	1200	1700	900	1450	2000	800	1300	1800	1000	1600	2200
	24				500	1000	1500	700	1250	1800	600	1100	1600	800	1400	2000
	25				450	675	900	600	850	1100	500	750	1000	700	1000	1300
	26				300	450	600	400	550	700	350	500	650	500	650	800
	27				300	450	600	400	550	700	350	500	650	500	650	800
	28				200	300	400	250	350	450	225	325	425	300	450	600
	29				150	225	300	180	265	350	150	240	325	200	300	400
	30				150	250	350	200	300	400	175	275	375	250	400	500
S					M40			M43			M45			M93		
	31				90	125	160	100	140	180	100	135	170	120	170	220
	32				70	85	100	75	95	120	75	90	110	95	115	150
	33				45	60	75	50	70	90	50	65	80	75	90	115
	34				40	50	60	45	55	70	45	55	70	60	75	90
	35				40	50	60	45	55	70	45	55	70	60	75	90
	36				110	155	200	120	170	220	120	165	210	180	220	260
	37				60	80	100	75	95	115	75	90	110	95	115	145



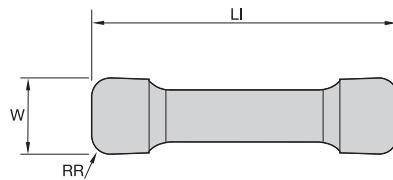
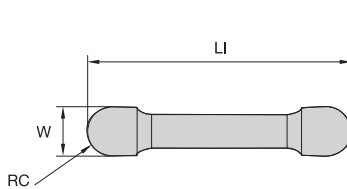
● first choice
○ alternate choice

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

Chipmaker

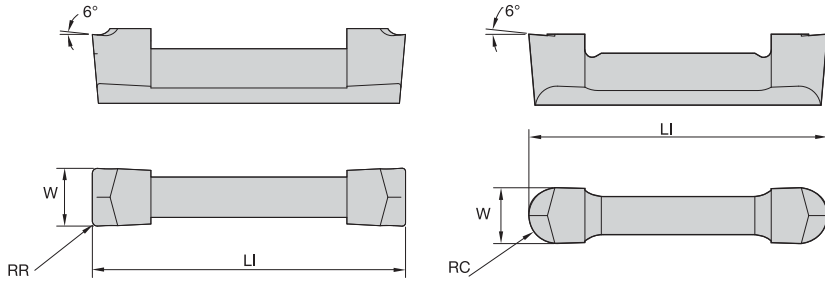
catalog number	W		RR		LI		GC	M24	M40	M43	M45	M53	M83
	mm	in	mm	in	mm	in							
508238	3,20	.126	0,25	.010	22,23	.875	●	●	●	●	●	●	●
508250	3,20	.126	0,25	.010	22,23	.875	●	●	●	●	●	●	●
508244	3,20	.126	0,76	.030	22,23	.875	●	●	●	●	●	●	●
508245	3,96	.156	0,76	.030	22,23	.875	●	●	●	●	●	●	●
508251	4,78	.188	0,25	.010	25,40	1.000	●	●	●	●	●	●	●
508239	4,78	.188	0,25	.010	25,40	1.000	●	●	●	●	●	●	●
508246	4,78	.188	0,76	.030	25,40	1.000	●	●	●	●	●	●	●
508240	6,35	.250	0,25	.010	25,40	1.000	●	●	●	●	●	●	●
508252	6,35	.250	0,25	.010	25,40	1.000	●	●	●	●	●	●	●
508247	6,35	.250	0,76	.030	25,40	1.000	●	●	●	●	●	●	●
508242	7,93	.312	0,25	.010	28,58	1.125	●	●	●	●	●	●	●
508248	7,93	.312	0,76	.030	28,58	1.125	●	●	●	●	●	●	●
508243	9,55	.376	0,25	.010	28,58	1.125	●	●	●	●	●	●	●
508249	9,55	.376	0,76	.030	28,58	1.125	●	●	●	●	●	●	●

NOTE: 508250, 508251, and 508252 have additional clearance for ID Boring.



OD Neutral

catalog number	W		RR		RC		LI		GC	M24	M40	M43	M45	M53	M83
	mm	in	mm	in	mm	in	mm	in							
508301	3,20	.126	0,25	.010	—	—	22,23	.875	●	●	●	●	●	●	●
508307	3,20	.126	0,76	.030	—	—	22,23	.875	●	●	●	●	●	●	●
508313	3,20	.126	—	—	1,60	.063	22,23	.875	●	●	●	●	●	●	●
508302	3,96	.156	0,25	.010	—	—	22,23	.875	●	●	●	●	●	●	●
508314	3,96	.156	—	—	1,98	.078	22,23	.875	●	●	●	●	●	●	●
508303	4,78	.188	0,25	.010	—	—	25,40	1.000	●	●	●	●	●	●	●
508309	4,78	.188	0,76	.030	—	—	25,40	1.000	●	●	●	●	●	●	●
508315	4,78	.188	—	—	2,39	.094	25,40	1.000	●	●	●	●	●	●	●
508304	6,35	.250	0,25	.010	—	—	25,40	1.000	●	●	●	●	●	●	●
508340	6,35	.250	1,52	.060	—	—	25,40	1.000	●	●	●	●	●	●	●
508316	6,35	.250	—	—	3,18	.125	25,40	1.000	●	●	●	●	●	●	●

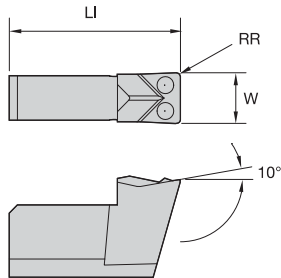


● first choice
○ alternate choice

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

■ **Chipmaker 95**

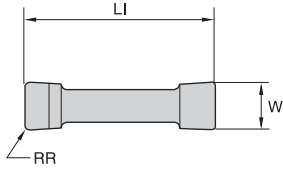
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	mm	in	mm	in	mm	in	mm	in							
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508404	3,20	.126	0,76	.030	—	—	22,23	.875			●			●	
508405	3,20	.126	—	—	1,60	.063	22,23	.875			●			●	
508412	4,78	.188	0,25	.010	—	—	25,40	1.000			●			●	
508413	4,78	.188	0,76	.030	—	—	25,40	1.000			●			●	
508422	6,35	.250	0,25	.010	—	—	25,40	1.000			●			●	
508423	6,35	.250	0,76	.030	—	—	25,40	1.000			●			●	
508424	6,35	.250	1,52	.060	—	—	25,40	1.000			●			●	



■ **DAG • Grooving and Cut-Off**

catalog number	W		RR		LI	
	mm	in	mm	in	mm	in
507172	3,20	.126	0,25	.010	10,77	.424
507182	6,35	.250	0,25	.010	12,34	.486
507183	6,35	.250	0,76	.030	12,34	.486
507185	7,93	.312	0,25	.010	13,95	.549
507186	7,93	.312	0,76	.030	13,95	.549

NOTE: 507172 has additional clearance for ID Boring.



- first choice
- alternate choice

P			
M			
K	●		
N			
S			
H			●

■ CBN

catalog number	W		RR		LI		CBNGI	CBNHT
	mm	in	mm	in	mm	in		
528301	3,18	.125	0,25	.010	22,23	.875	●	●
528325	4,78	.188	0,76	.030	25,40	1.000	●	●
528303	4,78	.188	0,25	.010	25,40	1.000	●	●

Grooving, Cut-Off, and Turning • Chipmaker



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Laydown Threading	E5
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Insert Overview	E10
Grades and Grade Descriptions	E11
Toolholder Identification System	E12
Toolholders	E12– E18
Boring Bar Identification System	E20
Boring Bars	E20–E22
Insert Identification System	E24
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Technical Information	E67–E90
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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!



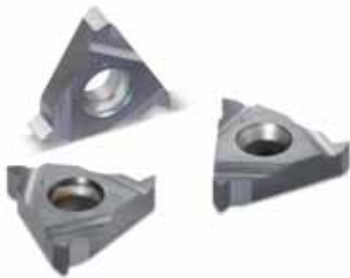
TopThread

With the largest selection of insert geometries and carbide grades available on the market today, the TopThread system is the best choice for coarse pitch and 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.

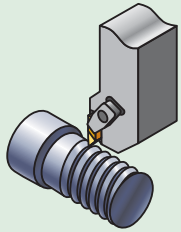


Laydown Threading

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 grades for high-performance applications.
- Low-profile design enables unrestricted chip flow.
- Three cutting edges per insert for superior, consistent results.

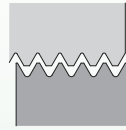
TopThread External Threading



Square Shank Toolholder Sizes:

- Inch — .375"–1.5"
- Metric — 10,0mm–32,0mm

Fine Pitch



Cresting (Full Profile):

UN maximum TPI of 32
ISO minimum pitch of 1,5mm

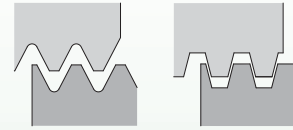
Partial Profile — Flat Top (NTF and NTK):

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



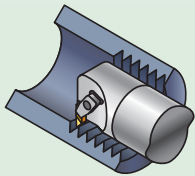
Cresting (Full Profile):

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

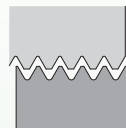
TopThread Internal Threading



Boring Bar Diameters:

- Inch — .312"–2.5"
- Metric — 10,0mm–50,0mm
- Minimum bore — .440" (11,5mm)
- Steel

Fine Pitch



Cresting (Full Profile):

UN maximum TPI of 16
ISO minimum pitch of 1,5mm

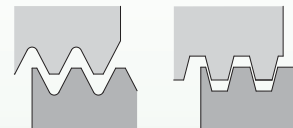
Partial Profile — Flat Top (NT-1L, NTF and NTK):

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



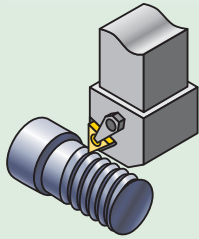
Cresting (Full Profile):

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

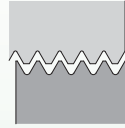
Laydown External Threading



Square Shank Toolholder Sizes:

- Inch — .500"–1.25" available
- Metric — 8,0mm–40,0mm available

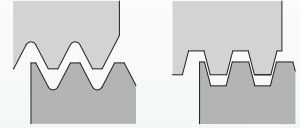
Fine Pitch



Cresting (Full Profile) and Partial Profile:

- UN maximum TPI of 48
- ISO minimum pitch of 0,5mm

Coarse Pitch/Heavy Duty



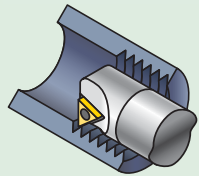
Cresting (Full Profile):

- UN minimum TPI of 8
- ISO maximum pitch of 5,0mm

Partial Profile:

- UN minimum TPI of 5
- ISO maximum pitch of 5,0mm

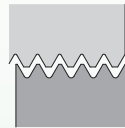
Laydown Internal Threading



Boring Bar Diameters:

- Inch — .375"–1.25"
- Metric — 12,0mm–50,0mm
- Minimum bore — .500" (13,0mm)
- Steel and carbide

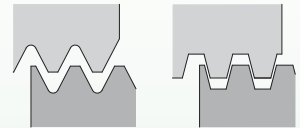
Fine Pitch



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.

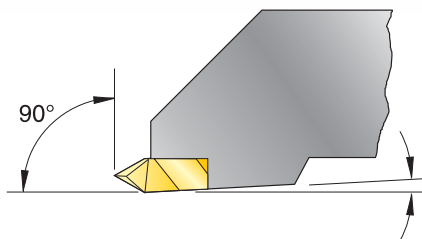
TopThread Insert Technology

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 & 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

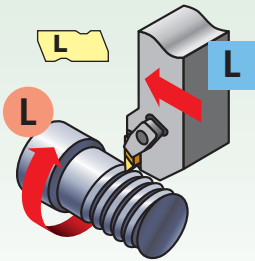


hand of toolholder

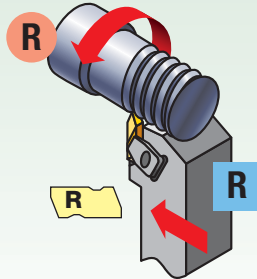


hand of insert

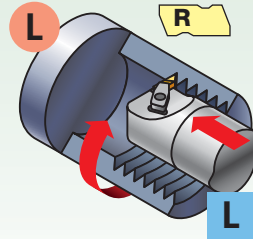
Feed direction toward the chuck • standard helix



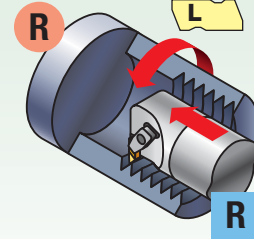
external left-hand thread



external right-hand thread

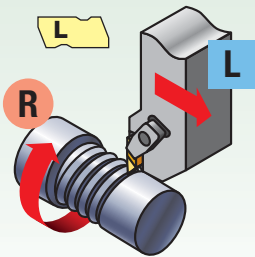


internal left-hand thread

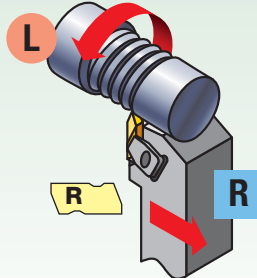


internal right-hand thread

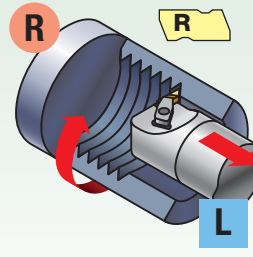
Feed direction away from the chuck • reverse helix



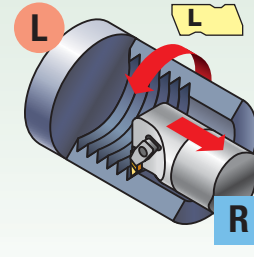
external right-hand thread



external left-hand thread



internal right-hand thread



internal left-hand thread

Step 2 • Select Holder from Catalog Page

The insert size must match the gage insert size of your toolholder selection:

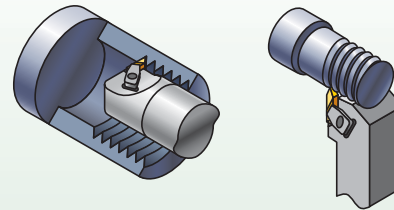
Required Information:

- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

catalog number	gage insert
NSR-163D	N.3R
NSR-164D	N.4R

NOTE: TopThread toolholders and boring bars are listed with a gage insert to indicate the size and hand required. They are compatible with both grooving and threading inserts of the same size.

Select the appropriate holder for the insert size and hand:



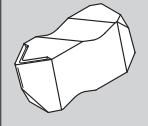
NOTE: Optimize your threading operation by using the proper infeed angle and the recommended infeed values.

See the Technical section on pages E73–E79 of this catalog.

For internal threading, minimum bore varies depending on thread type. See page E80 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	catalog 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 (SFM)

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 m/min 160–750 SFM	TN6010 50–185 m/min 160–600 SFM	TN6010 70–210 m/min 230–700 SFM	—	TN6010 20–120 m/min 65–400 SFM
first choice	TN6025 40–200 m/min 130–650 SFM	TN6025 40–135 m/min 130–450 SFM	TN6025 60–145 m/min 200–475 SFM	TN6025 50–360 m/min 160–1150 SFM	TN6025 10–100 m/min 35–330 SFM

* 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

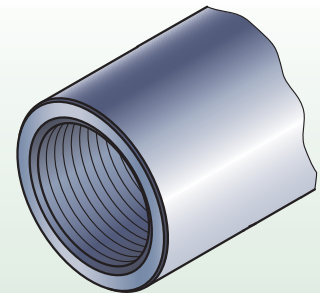
Positive: NTP, NTK, NJP, NJK

TopThread Threading Example:

application: 8 TPI Acme internal right-hand thread
 material: alloy steel
 workpiece diameter: 4.5" (114,3mm)
 good cutting conditions
 feed towards the chuck

Recommendation:

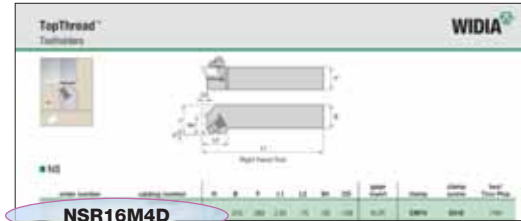
insert: NA3L8
 grade: TN6010
 insert size: 3
 boring bar: A40NER3
 gage insert: N.3L
 speed: 150 m/min (500 SFM)
 infeed passes*: 12 passes



* Infeed recommendations provided in technical data section on pages E75–E79.

style			thread profile	standard	tolerance class	cresting	application	page(s)
chip control — K	neutral	positive						
NT-K	NT	NTP	Partial Profile 60°	—	—	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	E25–E26
NT-CK			Partial Profile 60° — coarse pitch	—	—	N	Coarse pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	E27
	NTF	NTK	Partial Profile 60° — fine pitch	—	—	N	Fine pitch 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches — able to thread close to shoulders.	E27–E28
	NTC		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	E29
		NJP	UNJ	SAEA588791	3A/3B	N	Controlled root radius on external threads for military and aerospace industries.	E30
		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.	E30
	NDC-V		NPT	ANSI/ACME B1.201:1983	Standard NPT	Y	National Pipe Thread standard forms for pipe fittings.	E31
	NDC-V-M		NPT — multi-tooth	ANSI/ACME B1.201:1983	Standard NPT	Y	High-productivity multi-tooth threading inserts for NPT threads.	E31
	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.	E32
	NDC-RD		API Round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing and line pipe in the oil and gas industry, including 8 and 10 round forms.	E32
	NA		Acme	ANSI B1.5:1988	3G	N	29° truncated thread form for motion applications in a wide variety of industries.	E33
	NAS		Stub Acme	ANSI B1.8:1988	2G	N	Shallow depth 29° truncated thread form for motion applications in a wide variety of industries.	E34
	NTB-B		American Buttress — 45° clearance flank leading (Pull)	ANSI B1.9:1973	Class 2	N	Sawtooth form for axial load bearing applications in a variety of industries — use the “B” style when the 45° clearance flank is the leading edge.	E34

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

16

Shank Size

Inch:
Indicates the holder cross section. For shanks 5/8" square and larger, it represents the number of sixteenths of width and height. For shanks under 5/8" square, the number of sixteenths of cross section is preceded by a zero. For rectangular holders, the first digit represents the number of eighths of width and the second digit the number of quarters of height, except for a toolholder 1-1/4" x 1-1/2", which is given the number 91.

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

W1

insert size	W1
2	.150"
3	.195"
4	.255"
5	.380"
6	.383"
8	.438"

D

Qualified Surface and Length

A – qualified back and end, 4" (101,60mm) long
 B – qualified back and end, 4.5" (114,30mm) long
 C – qualified back and end, 5" (127,00mm) long
 D – qualified back and end, 6" (152,40mm) long
 E – qualified back and end, 7" (177,80mm) long
 V – qualified back and end, 3.5" (88,90mm) long*

On the Web



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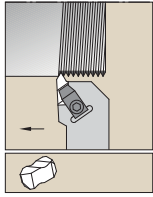
The WIDIA Products Group offers world-class products and services globally. Our distributors know us, and more importantly, they know you. They know better than anyone in the industry how to put the global power of WIDIA to work for you — in your industry, in your region, and for your business.

Contact Us

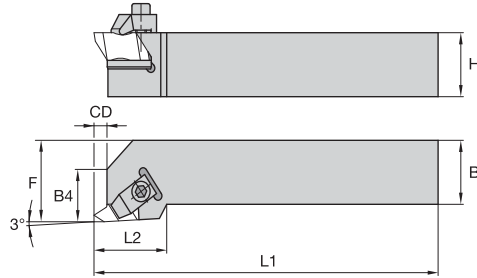
Our customers are important to us. We want to provide you the best customer service in the industry. If you have a comment or question, please send it to us. We strive to respond to all inquiries within 24 hours.

WIDIA Products

Whether your operation is turning, milling, or holmaking, WIDIA brands are the high-performance tooling you need. We offer standard and custom solutions for the general engineering market.



See page E10 for inserts.

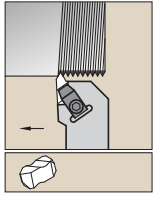


Right Hand Tool

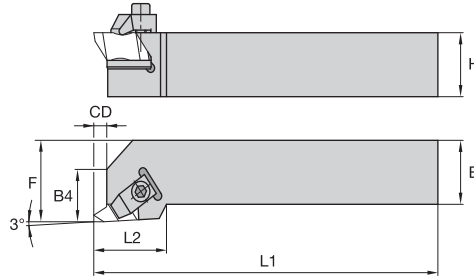
■ NS

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/ Torx Plus
	Right hand											
3632147	NSR062	.375	.375	.562	2.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639035	NSR082V	.500	.500	.750	3.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639044	NSR102B	.625	.625	.875	4.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639026	NSR122B	.750	.750	1.000	4.50	.75	.35	.138	N.2R	CM74	S310	7/64
3639025	NSR162C	1.000	1.000	1.250	5.00	.75	.35	.138	N.2R	CM74	S310	7/64
3639027	NSR123A	.750	.750	1.000	4.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3639023	NSR123B	.750	.750	1.000	4.50	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3638592	NSR163C	1.000	1.000	1.250	5.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3638591	NSR163D	1.000	1.000	1.250	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3639028	NSR203D	1.250	1.250	1.500	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3637506	NSR243D	1.500	1.500	2.000	6.00	1.38	.50	.210	N.3R	CM72LP	S2112	25 IP
3637535	NSR243E	1.500	1.500	2.000	7.00	1.38	.50	.210	N.3R	CM72LP	S2112	25 IP
3637496	NSR853D	1.250	1.000	1.250	6.00	1.25	.50	.210	N.3R	CM72LP	S2112	25 IP
3637509	NSR205D	1.250	1.250	1.500	6.00	2.00	.61	.415	N.5R	CM80	S352	1/4
3637540	NSR245D	1.500	1.500	2.000	6.00	2.00	.61	.415	N.5R	CM80	S352	1/4
	Left hand											
3632161	NSL062	.375	.375	.562	2.50	.75	.35	.138	N.2L	CM75	S310	7/64
3637485	NSL082V	.500	.500	.750	3.50	.75	.35	.138	N.2L	CM75	S310	7/64
3637510	NSL102B	.625	.625	.875	4.50	.75	.35	.138	N.2L	CM75	S310	7/64
3632145	NSL122B	.750	.750	1.000	4.50	.75	.35	.138	N.2L	CM75	S310	7/64
3632138	NSL162C	1.000	1.000	1.250	5.00	.75	.35	.138	N.2L	CM75	S310	7/64
3632152	NSL123A	.750	.750	1.000	4.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639032	NSL123B	.750	.750	1.000	4.50	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639029	NSL163C	1.000	1.000	1.250	5.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639024	NSL163D	1.000	1.000	1.250	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3639037	NSL203D	1.250	1.250	1.500	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3637515	NSL243D	1.500	1.500	2.000	6.00	1.38	.50	.210	N.3L	CM73LP	S2112	25 IP
3637548	NSL243E	1.500	1.500	2.000	7.00	1.38	.50	.210	N.3L	CM73LP	S2112	25 IP
3637508	NSL853D	1.250	1.000	1.250	6.00	1.25	.50	.210	N.3L	CM73LP	S2112	25 IP
3637536	NSL205D	1.250	1.250	1.500	6.00	2.00	.61	.415	N.5L	CM81	S352	1/4

NOTE: F dimension shown over N-style gage insert.



See page E10 for inserts.

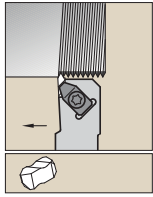


Right Hand Tool

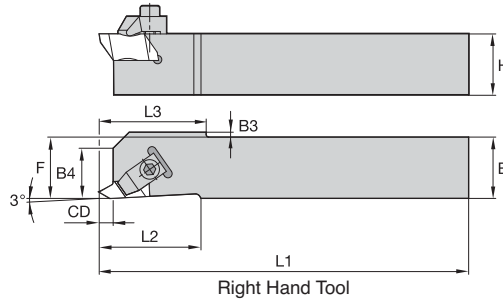
■ NS (with shim)

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	shim	shim screw	clamp	clamp screw	hex/Torx Plus
	Right hand													
3639031	NSR164C	1.000	1.000	1.250	5.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3639033	NSR164D	1.000	1.000	1.250	6.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3637526	NSR854D	1.250	1.000	1.250	6.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3637529	NSR204C	1.250	1.250	1.500	5.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3639034	NSR204D	1.250	1.250	1.500	6.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3637534	NSR864E	1.500	1.000	1.250	7.00	1.38	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3637484	NSR244D	1.500	1.500	2.000	6.00	1.50	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3637501	NSR244E	1.500	1.500	2.000	7.00	1.50	.54	.294	N.4R	SM420	SL344	CM72LP	S2112	25 IP
3632153	NSR166D	1.000	1.000	1.250	6.00	1.38	.67	.334	N.6R	SM416	S111	CM120	S412	5/32
3637472	NSR206D	1.250	1.250	1.500	6.00	1.38	.67	.334	N.6R	SM416	S111	CM120	S412	5/32
3637520	NSR246D	1.500	1.500	2.000	6.00	1.50	.67	.334	N.6R	SM416	S111	CM120	S412	5/32
3637539	NSR168D	1.000	1.000	1.250	6.00	1.25	.72	.225	N.8R	SM419	S112	CM144	S422	3/16
	Left hand													
3632151	NSL164C	1.000	1.000	1.250	5.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3639040	NSL164D	1.000	1.000	1.250	6.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3637541	NSL854D	1.250	1.000	1.250	6.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3641699	NSL204C	1.250	1.250	1.500	5.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3639036	NSL204D	1.250	1.250	1.500	6.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3641700	NSL864E	1.500	1.000	1.250	7.00	1.38	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3637505	NSL244D	1.500	1.500	2.000	6.00	1.50	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3637533	NSL244E	1.500	1.500	2.000	7.00	1.50	.54	.294	N.4L	SM420	SL344	CM73LP	S2112	25 IP
3637487	NSL166D	1.000	1.000	1.250	6.00	1.38	.67	.334	N.6L	SM416	S111	CM121	S412	5/32
3637507	NSL206D	1.250	1.250	1.500	6.00	1.38	.67	.334	N.6L	SM416	S111	CM121	S412	5/32
3637546	NSL246D	1.500	1.500	2.000	6.00	1.50	.67	.334	N.6L	SM416	S111	CM121	S412	5/32

NOTE: F dimension shown over N-style gage insert.



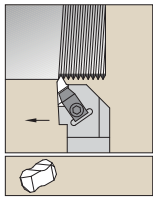
See page E10 for inserts.



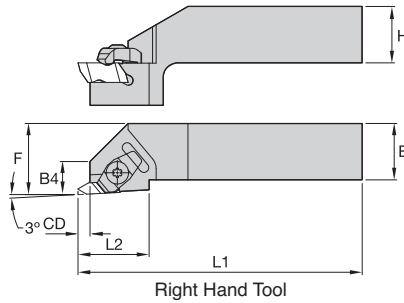
■ NAS

order number	catalog number	H	B	F	L1	L2	B4	CD	B3	L3	gage insert	clamp	clamp screw	hex/Torx Plus
	Right hand													
3632140	NASR062D	.375	.375	.375	6.00	.75	.35	.138	.070	.88	N.2R	CM182	S310	7/64
3636529	NASR082D	.500	.500	.500	6.00	.75	.35	.138	—	—	N.2R	CM182	S310	7/64
3639039	NASR102B	.625	.625	.625	4.50	.75	.35	.138	—	—	N.2R	CM74	S310	7/64
3639042	NASR083D	.500	.500	.500	6.00	1.25	.50	.210	.125	1.32	N.3R	CM184LP	S2112	25 IP
3636532	NASR103B	.625	.625	.625	4.50	1.25	—	.210	—	—	N.3R	CM184LP	S2112	25 IP
	Left hand													
3637531	NASL062D	.375	.375	.375	6.00	.75	.35	.138	.070	.88	N.2L	CM183	S310	7/64
3636534	NASL082D	.500	.500	.500	6.00	.75	.35	.138	—	—	N.2L	CM183	S310	7/64
3637489	NASL102B	.625	.625	.625	4.50	.75	.35	.138	—	—	N.2L	CM75	S310	7/64
3637497	NASL083D	.500	.500	.500	6.00	1.25	.50	.210	.125	1.32	N.3L	CM185	S412	25 IP
3636524	NASL103B	.625	.625	.625	4.50	1.25	—	.210	—	—	N.3L	CM185LP	S2112	25 IP

NOTE: F dimension shown over N-style gage insert.



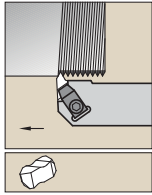
See page E10 for inserts.



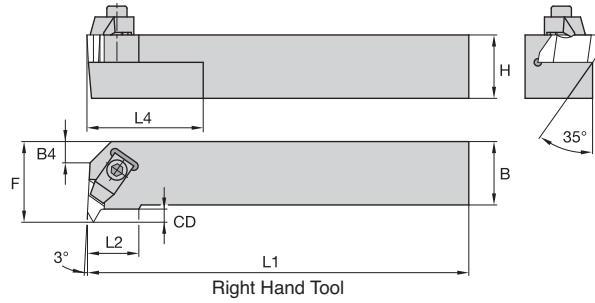
■ NS-DH

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/Torx Plus	jack screw
	Right hand												
3637547	NSRDH122B	.750	.750	1.000	4.50	.75	.40	.138	N.2R	CM74	S310	7/64	—
3637499	NSRDH163C	1.000	1.000	1.250	5.00	1.25	.58	.210	N.3R	CM72LP	S2112	25 IP	—
3637528	NSRDH163D	1.000	1.000	1.250	6.00	1.25	.58	.210	N.3R	CM72LP	S2112	25 IP	—
3637511	NSRDH203D	1.250	1.250	1.500	6.00	1.25	.62	.210	N.3R	CM72LP	S2112	25 IP	S965
3637530	NSRDH204D	1.250	1.250	1.500	6.00	1.38	.62	.294	N.4R	CM72LP	S2112	25 IP	S965
	Left hand												
3637518	NSLDH203D	1.250	1.250	1.500	6.00	1.25	.62	.210	N.3L	CM73LP	S2112	25 IP	S965

NOTE: F dimension shown over N-style gage insert.



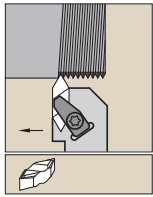
See page E10 for inserts.



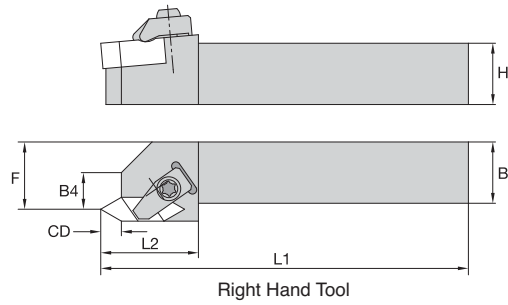
■ NE

order number	catalog number	H	B	F	L1	L2	L4	B4	CD	gage insert	clamp	clamp screw	hex/Torx Plus
	Right hand												
3637521	NER062	.375	.375	.750	2.50	.50	.50	—	.138	N.2L	CM75	S310	7/64
3637494	NER082V	.500	.500	.750	3.50	.50	1.00	—	.138	N.2L	CM75	S310	7/64
3637517	NER102B	.625	.625	.750	4.50	—	1.00	—	.138	N.2L	CM75	S310	7/64
3632156	NER122B	.750	.750	1.000	4.50	.50	1.00	.29	.138	N.2L	CM75	S310	7/64
3637486	NER162C	1.000	1.000	1.250	5.00	.50	1.00	.41	.138	N.2L	CM75	S310	7/64
3632133	NER123B	.750	.750	1.125	4.50	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3639038	NER163C	1.000	1.000	1.250	5.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3639030	NER163D	1.000	1.000	1.250	6.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3632150	NER203D	1.250	1.250	1.500	6.00	.75	2.00	.26	.210	N.3L	CM73LP	S2112	25 IP
3637524	NER243D	1.500	1.500	2.000	6.00	.75	2.00	.76	.210	N.3L	CM73LP	S2112	25 IP
3637523	NER853D	1.250	1.000	1.250	6.00	.75	2.00	—	.210	N.3L	CM73LP	S2112	25 IP
3637492	NER164C	1.000	1.000	1.375	5.00	.75	2.00	—	.294	N.4L	CM73LP	S2112	25 IP
3639043	NER164D	1.000	1.000	1.375	6.00	.75	2.00	—	.294	N.4L	CM73LP	S2112	25 IP
3632157	NER204D	1.250	1.250	1.625	6.00	.75	2.00	.27	.294	N.4L	CM73LP	S2112	25 IP
3637522	NER244D	1.500	1.500	2.000	6.00	.75	2.00	.65	.294	N.4L	CM73LP	S2112	25 IP
3637542	NER205D	1.250	1.250	2.000	6.00	1.44	2.00	—	.415	N.5L	CM81	S352	1/4
3637544	NER206D	1.250	1.250	1.625	6.00	.75	2.00	.27	.300	N.6L	CM121	S412	5/32
	Left hand												
3637525	NEL062	.375	.375	.750	2.50	.50	.50	—	.138	N.2R	CM74	S310	7/64
3632158	NEL082V	.500	.500	.750	3.50	.50	1.00	—	.138	N.2R	CM74	S310	7/64
3637532	NEL102B	.625	.625	.750	4.50	—	1.00	—	.138	N.2R	CM74	S310	7/64
3637503	NEL122B	.750	.750	1.000	4.50	.50	1.00	.29	.138	N.2R	CM74	S310	7/64
3637500	NEL162C	1.000	1.000	1.250	5.00	.50	1.00	.41	.138	N.2R	CM74	S310	7/64
3632144	NEL123B	.750	.750	1.125	4.50	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3632155	NEL163C	1.000	1.000	1.250	5.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3639041	NEL163D	1.000	1.000	1.250	6.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3632154	NEL203D	1.250	1.250	1.500	6.00	.75	2.00	.26	.210	N.3R	CM72LP	S2112	25 IP
3637537	NEL243D	1.500	1.500	2.000	6.00	.75	2.00	.76	.210	N.3R	CM72LP	S2112	25 IP
3637538	NEL853D	1.250	1.000	1.250	6.00	.75	2.00	—	.210	N.3R	CM72LP	S2112	25 IP
3637493	NEL164C	1.000	1.000	1.375	5.00	.75	2.00	—	.294	N.4R	CM72LP	S2112	25 IP
3632162	NEL164D	1.000	1.000	1.375	6.00	.75	2.00	—	.294	N.4R	CM72LP	S2112	25 IP
3632159	NEL204D	1.250	1.250	1.625	6.00	.75	2.00	.27	.294	N.4R	CM72LP	S2112	25 IP
3637543	NEL244D	1.500	1.500	2.000	6.00	.75	2.00	.65	.294	N.4R	CM72LP	S2112	25 IP
3637549	NEL205D	1.250	1.250	2.000	6.00	1.44	2.00	—	.415	N.5R	CM80	S352	1/4
3641697	NEL206D	1.250	1.250	1.625	6.00	.75	2.00	.27	.300	N.6R	CM120	S412	5/32

NOTE: F dimension shown over N-style gage insert.



See page E10 for inserts.



■ NSU

order number	catalog number	H	B	F	L1	L2	B4	CD	gage insert	clamp	clamp screw	hex/Torx Plus
3641698	Right hand NSUR124C	.750	.750	.875	5.00	1.25	.50	.240	NTU4R	CM72LP	S2112	25 IP
3637545	NSUR164D Left hand	1.000	1.000	1.125	6.00	1.25	.50	.240	NTU4R	CM72LP	S2112	25 IP
3641702	NSUL124C	.750	.750	.875	5.00	1.25	.50	.240	NTU4L	CM73LP	S2112	25 IP
3641701	NSUL164D	1.000	1.000	1.125	6.00	1.25	.50	.240	NTU4L	CM73LP	S2112	25 IP

NOTE: F dimension shown over N-style gage insert.

NSU toolholders only for NTU4 threading inserts.

WIN WITH WIDIA™

WIDIA 



TopThread™ System

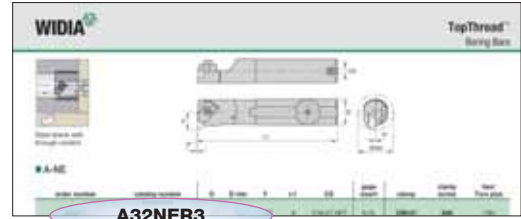
A superior choice for heavy-duty applications like machining Acme, Buttress, and API threads. The WIDIA TopThread system is the best solution for coarse pitch and multi-tooth threading applications. With unmatched tooling technology, you can trust WIDIA TopThread tools for all of your threading and grooving 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.
- Minimizes 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 Authorized Distributor or visit www.widia.com.

WIDIA 
Win with WIDIA™

TopThread Boring Bar Identification System

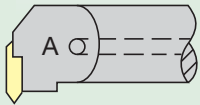


A32NER3

A

Bar Type

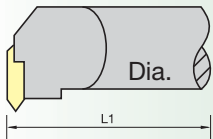
Steel with coolant



32

Bar Diameter

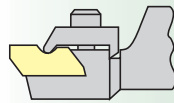
A two-digit number that indicates the bar diameter in 1/16" increments.



N

Insert Holding Method

N* — TopThread



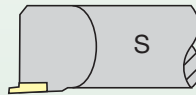
E

Insert Location

End mount



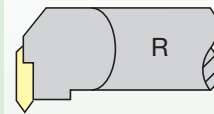
Side mount



R

Hand of Tool

Right hand



Left hand



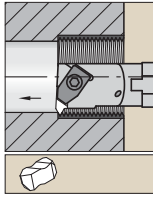
3

Insert Size

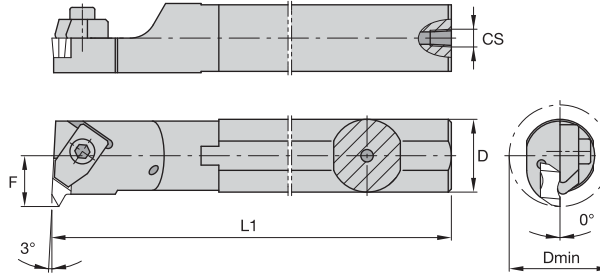
W1



insert size	W1
1	.100"
2	.150"
3	.195"
4	.255"
5	.380"
6	.383"
8	.438"



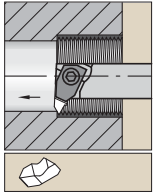
Steel shank with through coolant.
See page E10 for inserts.



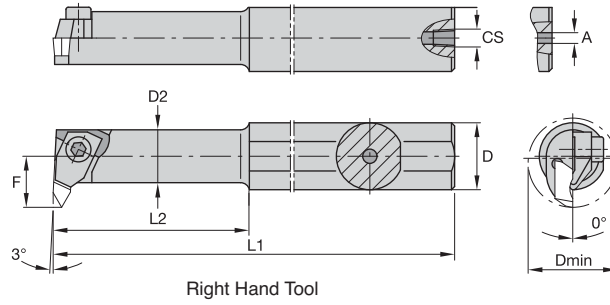
■ **A-NE**

order number	catalog number	D	D min	F	L1	CS	gage insert	clamp	clamp screw	hex/Torx plus
	Right hand									
3632117	A08NER2	.500	.730	.437	8	1/16-27 NPT	N.2L	CM147	S39	7/64
3632114	A10NER2	.625	1.000	.500	10	1/8-27 NPT	N.2L	CM75	S310	7/64
3632118	A12NER2	.750	1.125	.562	10	1/8-27 NPT	N.2L	CM75	S310	7/64
3632130	A16NER2	1.000	1.375	.688	12	1/4-18 NPT	N.2L	CM75	S310	7/64
3632113	A16NER3	1.000	1.375	.688	12	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632116	A20NER3	1.250	1.750	.875	14	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632115	A24NER3	1.500	2.000	1.000	14	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632132	A28NER3	1.750	2.250	1.125	14	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632122	A32NER3	2.000	2.500	1.250	16	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632146	A40NER3	2.500	3.000	1.500	16	1/4-18 NPT	N.3L	CM73LP	S2112	25 IP
3632123	A28NER4	1.750	2.500	1.250	14	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3632125	A32NER4	2.000	2.750	1.375	16	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3632136	A40NER4	2.500	3.250	1.625	16	1/4-18 NPT	N.4L	CM73LP	S2112	25 IP
3637514	A32NER5	2.000	2.812	1.406	16	1/4-18 NPT	N.5L	CM81	S352	1/4
3632143	A32NER6	2.000	2.750	1.375	16	1/4-18 NPT	N.6L	CM121	S412	5/32
3637498	A40NER6	2.500	3.250	1.625	16	1/4-18 NPT	N.6L	CM121	S412	5/32
	Left hand									
3632131	A08NEL2	.500	.730	.437	8	1/16-27 NPT	N.2R	CM146	S39	7/64
3632127	A10NEL2	.625	1.000	.500	10	1/8-27 NPT	N.2R	CM74	S310	7/64
3632126	A12NEL2	.750	1.125	.562	10	1/8-27 NPT	N.2R	CM74	S310	7/64
3632142	A16NEL2	1.000	1.375	.688	12	1/4-18 NPT	N.2R	CM74	S310	7/64
3632120	A16NEL3	1.000	1.375	.688	12	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632124	A20NEL3	1.250	1.750	.875	14	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632128	A24NEL3	1.500	2.000	1.000	14	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637490	A28NEL3	1.750	2.250	1.125	14	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632139	A32NEL3	2.000	2.500	1.250	16	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3637504	A40NEL3	2.500	3.000	1.500	16	1/4-18 NPT	N.3R	CM72LP	S2112	25 IP
3632141	A28NEL4	1.750	2.500	1.250	14	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3632149	A32NEL4	2.000	2.750	1.375	16	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3637491	A40NEL4	2.500	3.250	1.625	16	1/4-18 NPT	N.4R	CM72LP	S2112	25 IP
3637527	A32NEL5	2.000	2.812	1.406	16	1/4-18 NPT	N.5R	CM80	S352	1/4
3637512	A32NEL6	2.000	2.750	1.375	16	1/4-18 NPT	N.6R	CM120	S412	5/32

NOTE: F dimension shown over N-style gage insert.



Necked steel shank with through coolant.
See page E10 for inserts.



■ **A-NE-1**

order number	catalog number	D	D min	D2	L1	L2	F	A	CS	gage insert	clamp	clamp screw	hex
	Right hand												
3632121	A06NER1	.375	.440	.312	6	1.25	.258	.125	—	N.1L	CM109	S304	5/64
3632119	A08NER1	.500	.440	.312	8	1.25	.258	—	1/16-27 NPT	N.1L	CM109	S304	5/64
3632148	A10NER1	.625	.800	—	10	—	.406	—	1/8-27 NPT	N.1L	CM109	S304	5/64

NOTE: F dimension shown over N-style gage insert.

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WIDIA[▽]
HANITA[™]

WIDIA[▽]
MANCHESTER[™]

WIDIA[▽]
CIRCLE[™]

WIDIA[▽][™]

WIDIA[▽]
CLAPPDICO[™]

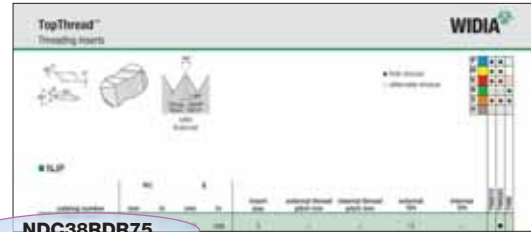
WIDIA[▽]
GTD[™]

WIDIA[▽]
RÜBIG[™]

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TopThread Insert Identification System

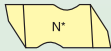


NDC38RDR75

N

Type of Insert

N — TopThread*



*Proprietary standard only.

D

Insert Style

C

Additional Information

- B — Buttress
- F — Fine pitch
- S — Stub Acme
- C — Cresting
- P — Positive rake
- K — Fine pitch, positive

3

Insert Size

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 .001" increments (NJ, NJF, NJP, NJK) or M indicates metric ISO thread

R

Hand of Insert

- R — Right hand
- L — Left hand

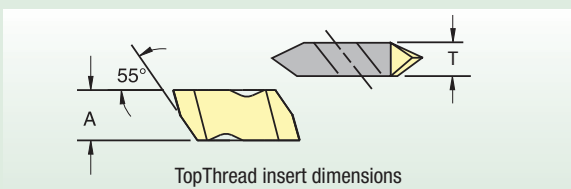
75

Definition of Insert

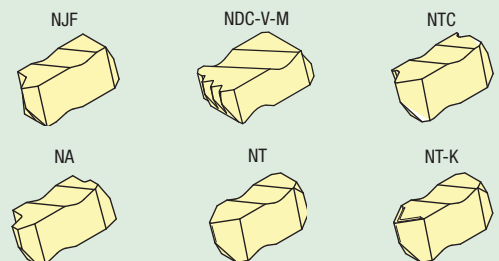
- Threads per inch or pitch (for metric)
- "A" or "B" type Buttress insert
- Taper per foot — API threads

Additional Information

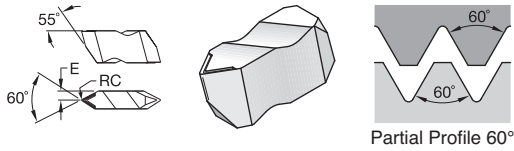
- A — Acme
- D — API or NPT
- J — UNJ thread
- T — 60° V thread
- W — 55° V Whitworth



insert size	A		T	
	inch	mm	inch	mm
1	.100	2,54	.100	2,54
2	.219	5,56	.150	3,81
3	.344	8,74	.195	4,95
4	.453	11,51	.255	6,48
5	.688	17,48	.380	9,65
6	.453	11,51	.383	9,73
8	.312	7,93	.438	11,13



- 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

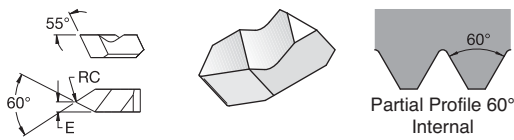


● first choice
○ alternate choice

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

■ **NT-K**

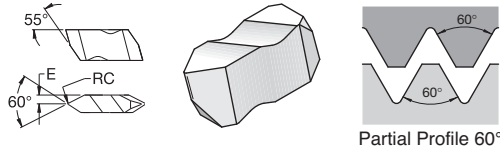
catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand												
NT2RK	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3RK	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4RK	0,17	.007	3,25	.128	4	1,25–6,25	2,00–6,25	4–20	4–12		●	
Left hand												
NT2LK	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3LK	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	



■ **NT-1L**

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Left hand												
NT1L	0,08	.003	1,09	.043	1	—	1,00–2,00	—	12–24	●	●	

Threading • TopThread



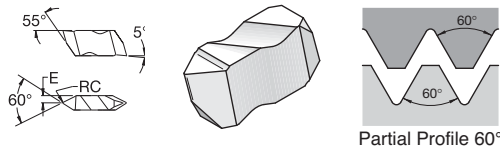
● first choice
○ alternate choice

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

■ NT

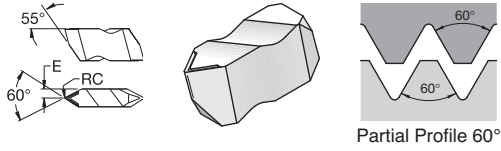
catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand												
NT2R	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3R	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4R	0,17	.007	3,25	.128	4	1,25–6,25	2,00–6,25	4–20	4–12	●	●	
Left hand												
NT2L	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NT3L	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NT4L	0,17	.007	3,25	.128	4	1,25–6,25	2,00–6,25	4–20	4–12		●	

Threading • TopThread



■ NTP

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand												
NTP2R	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NTP3R	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	
NTP4R	0,17	.007	3,25	.128	4	1,25–6,25	2,00–6,25	4–20	4–12		●	
Left hand												
NTP2L	0,10	.004	1,91	.075	2	0,70–3,00	1,25–3,50	8–36	7–20	●	●	
NTP3L	0,17	.007	2,49	.098	3	1,25–4,00	2,00–5,00	6–20	5–12	●	●	

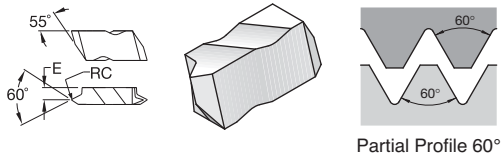


● first choice
○ alternate choice

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

■ **NT-CK**

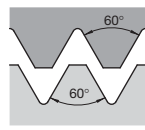
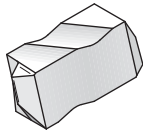
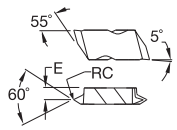
catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NT3RCK	0,34	.014	2,46	.097	3	2,50-4,00	4,00	6-11	6	●	●	



■ **NTF**

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI			
	mm	in	mm	in								
Right hand NTF2R	0,08	.003	2,79	.110	2	0,60-1,75	1,00-2,00	14-44	12-24	●	●	
NTF3R Left hand	0,08	.003	3,58	.141	3	0,60-2,50	1,00-2,50	10-44	9-24	●	●	
NTF3L	0,08	.003	3,58	.141	3	0,60-2,50	1,00-2,50	10-44	9-24	●	●	

Threading • TopThread



Partial Profile 60°

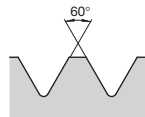
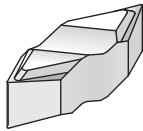
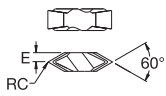
- first choice
- alternate choice

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

■ NTK

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NTK2R	0,08	.003	2,79	.110	2	0,60-1,75	1,00-2,00	14-44	12-24	●	●	
NTK3R Left hand	0,08	.003	3,58	.141	3	0,60-2,50	1,00-2,50	10-44	9-24	●	●	
NTK3L	0,08	.003	3,58	.141	3	0,60-2,50	1,00-2,50	10-44	9-24		●	

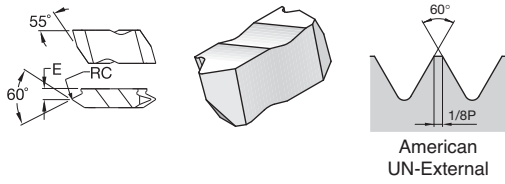
Threading • TopThread



Partial Profile 60°
External

■ NTU

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NTU4R	0,11	.005	3,18	.125	4U	1,25-6,25	—	4-20	—		●	
Left hand NTU4L	0,11	.005	3,18	.125	4U	1,25-6,25	—	4-20	—		●	

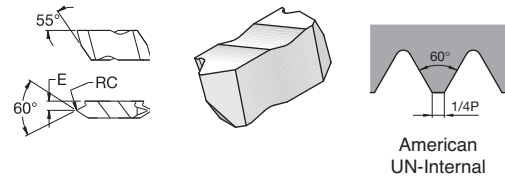


● first choice
○ alternate choice

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

■ **NTC-E**

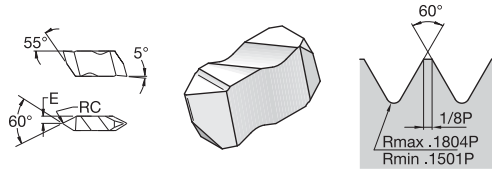
catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NTC3R16E	0,19	.008	3,76	.148	3	—	—	16	—	●	●	
NTC3R14E	0,22	.009	3,76	.148	3	—	—	14	—	●		
NTC3R12E	0,25	.010	3,76	.148	3	—	—	12	—	●		



■ **NTC-I**

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Left hand NTC3L12I	0,10	.004	3,76	.148	3	—	—	—	12		●	

Threading • TopThread



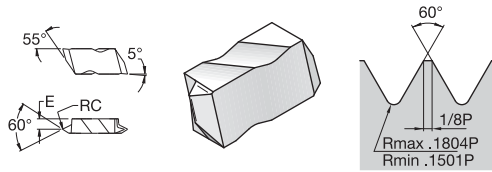
● first choice
○ alternate choice

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

■ **NJP**

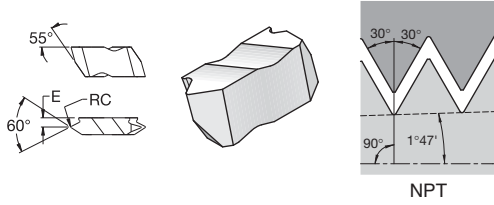
catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NJP3014R12	0,33	.013	2,49	.098	3	—	—	12	—	●	○	○

Threading • TopThread



■ **NJK**

catalog number	RC		E		insert size	external thread pitch mm	internal thread pitch mm	external TPI	internal TPI	TN6010	TN6025	THM
	mm	in	mm	in								
Right hand NJK3008R20	0,20	.008	3,58	.141	3	—	—	20	—	●	○	○

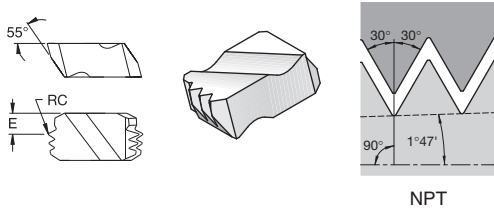


● first choice
○ alternate choice

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

■ **NDC-V**

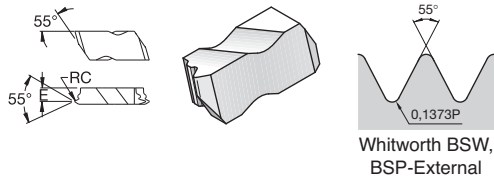
catalog number	RC		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in						
Right hand NDC3115VR75	0,10	.004	3,66	.144	3	11.5	.750	●		



■ **NDC-V-M**

catalog number	RC		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in						
Right hand NDC8115VR75M	0,10	.004	2,59	.102	8	11.5	.750	●		
NDC88VR75M	0,13	.005	2,41	.095	8	8	.750	●		

Threading • TopThread



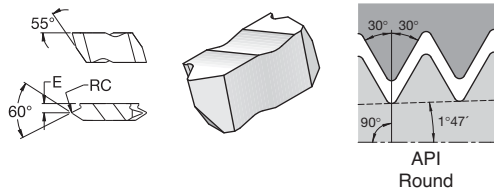
Whitworth BSW,
BSP-External

● first choice
○ alternate choice

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

■ **NWC-E**

catalog number	RC		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in						
Right hand NWC3R14E	0,24	.009	3,43	.135	3	14	—		●	
NWC3R11E	0,30	.012	3,43	.135	3	11	—		●	

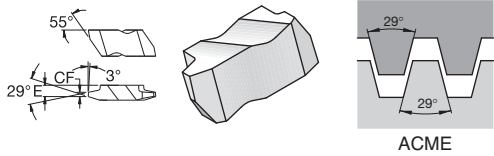


API
Round

■ **NDC-RD**

catalog number	RC		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in						
Right hand NDC38RDR75	0,43	.017	3,18	.125	3	8	.750		●	
Left hand NDC310RDL75	0,36	.014	3,18	.125	3	10	.750		●	
NDC38RDL75	0,43	.017	3,18	.125	3	8	.750		●	

Threading • TopThread



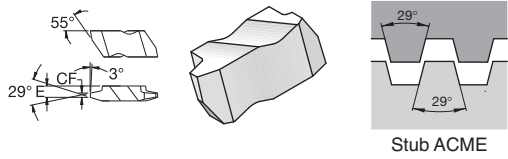
● first choice
○ alternate choice

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

■ NA

catalog number	RC		CF		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in	mm	in						
Right hand												
NA3R8	—	—	1,04	.041	3,79	.149	3	8	—	●	●	●
NA3R6	—	—	1,44	.057	3,79	.149	3	6	—	●	●	●
NA3R4	—	—	2,22	.088	3,38	.133	3	4	—	●	●	●
NA4R4	—	—	2,22	.088	5,13	.202	4	4	—	●	●	●
NA6R3	—	—	3,01	.118	7,19	.283	6	3	—	●	●	●
NA6R2	—	—	4,58	.180	7,19	.283	6	2	—	●	●	●
Left hand												
NA3L8	—	—	1,04	.041	3,79	.149	3	8	—	●	●	●
NA3L6	—	—	1,44	.057	3,79	.149	3	6	—	●	●	●
NA3L4	—	—	2,22	.088	3,38	.133	3	4	—	●	●	●
NA4L4	—	—	2,22	.088	5,13	.202	4	4	—	●	●	●
NA6L3	—	—	3,01	.118	7,19	.283	6	3	—	●	●	●
NA6L2	—	—	4,58	.180	7,19	.283	6	2	—	●	●	●

Threading • TopThread



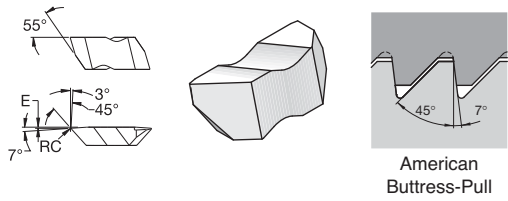
● first choice
○ alternate choice

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

■ **NAS**

catalog number	RC		CF		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in	mm	in						
Right hand NAS3R8	—	—	1,21	.048	3,79	.149	3	8	—	●		
Left hand NAS3L12	—	—	0,83	.033	3,79	.149	3	12	—	●		
NAS3L8	—	—	1,21	.048	3,79	.149	3	8	—	●		
NAS3L6	—	—	1,66	.065	3,79	.149	3	6	—	●		

Threading • TopThread



■ **NTB-B**

catalog number	RC		E		insert size	TPI	TPF	TN6010	TN6025	THM
	mm	in	mm	in						
Left hand NTB3LB	0,17	.007	0,31	.012	3	8-16	—	●		

ANSI ISO 513	VDI 3323	Cutting Speed • vc SFM					
Material Group		Cutting Speed • vc SFM					
		min	Start	max	min	Start	max
P		TN6010			TN6025		
	1	455	570	685	425	455	490
	2	425	520	620	390	520	655
	3	360	455	555	325	425	520
	4	390	490	590	390	490	590
	5	325	425	520	325	425	520
	6	390	490	590	390	490	590
	7	325	425	520	295	410	520
	8	295	390	490	260	360	455
	9	195	295	390	195	260	325
	10	295	340	390	260	310	360
	11	160	210	260	160	210	260
	12	390	505	620	390	455	520
13.1	295	390	490	260	340	425	
13.2	145	195	245	130	180	210	
M		TN6010			TN6025		
	14.1	295	390	490	195	245	295
	14.2	245	325	390	160	195	245
	14.3	180	245	310	130	160	180
14.4	145	195	245	95	130	145	
K		TN6010			TN6025		
	15	455	555	655	225	295	325
	16	325	425	520	160	210	260
	17	390	490	590	195	225	260
	18	295	390	490	130	180	225
19	490	590	685	260	310	360	
20	360	455	555	195	245	295	
N		TN6010			TN6025		
	21	1965	2460	2950	1965	2460	2950
	22	1640	2130	2620	1640	2130	2620
	23	1965	2460	2950	1965	2460	2950
	24	1640	2130	2620	1640	2130	2620
	25	750	980	1210	750	980	1210
	26	490	655	820	490	655	820
	27	490	655	820	490	655	820
	28	360	455	555	360	455	555
	29	195	260	325	195	260	325
30	260	325	390	260	325	390	
S		TN6010			TN6025		
	31	120	145	180	85	120	145
	32	95	115	145	65	95	115
	33	75	90	115	55	75	90
	34	45	55	80	35	45	55
	35	50	55	80	35	50	55
	36	195	235	260	135	195	235
37	95	115	145	65	95	115	

Threading • Speed and Feed Chart

The 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.

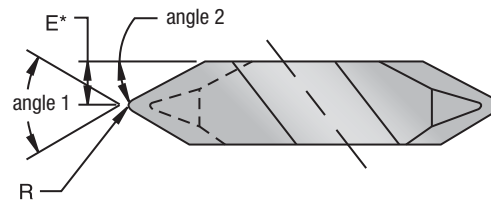
Common examples of special forms are shown here. Please contact your local WIDIA representative for recommendations on satisfying your special threading needs.

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 optimize your productivity. The option of producing standard insert styles in non-standard carbide grades allows you to optimize tool life performance.

style C2

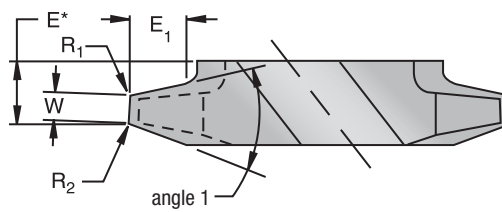
RH shown



*to theoretical sharp point

style C3

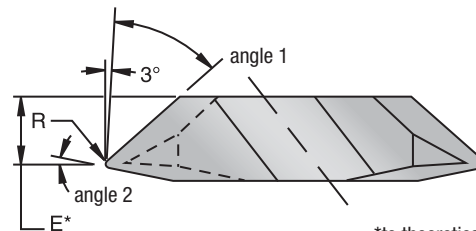
RH shown



*to theoretical sharp point

**style C4
(NTB-A)**

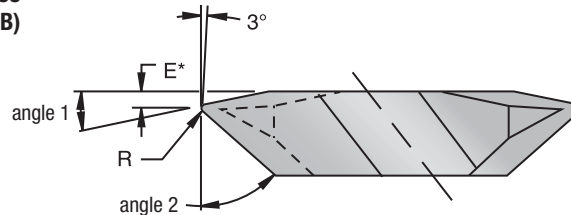
RH shown



*to theoretical sharp point

**style C5
(NTB-B)**

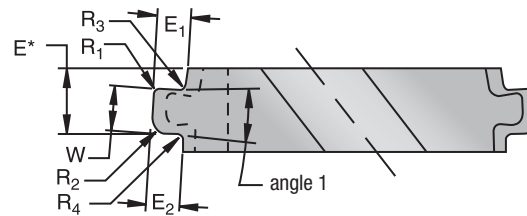
RH shown



*to theoretical sharp point

style C6

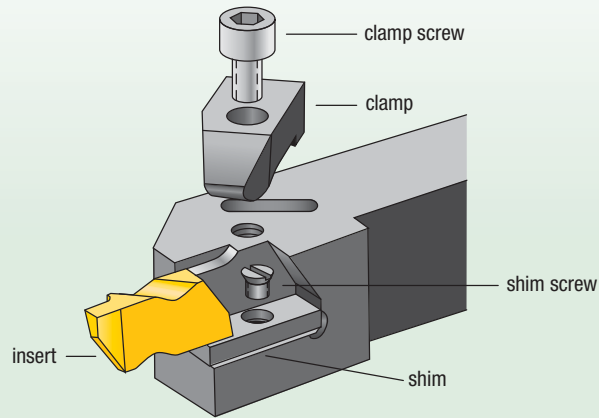
RH shown














*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

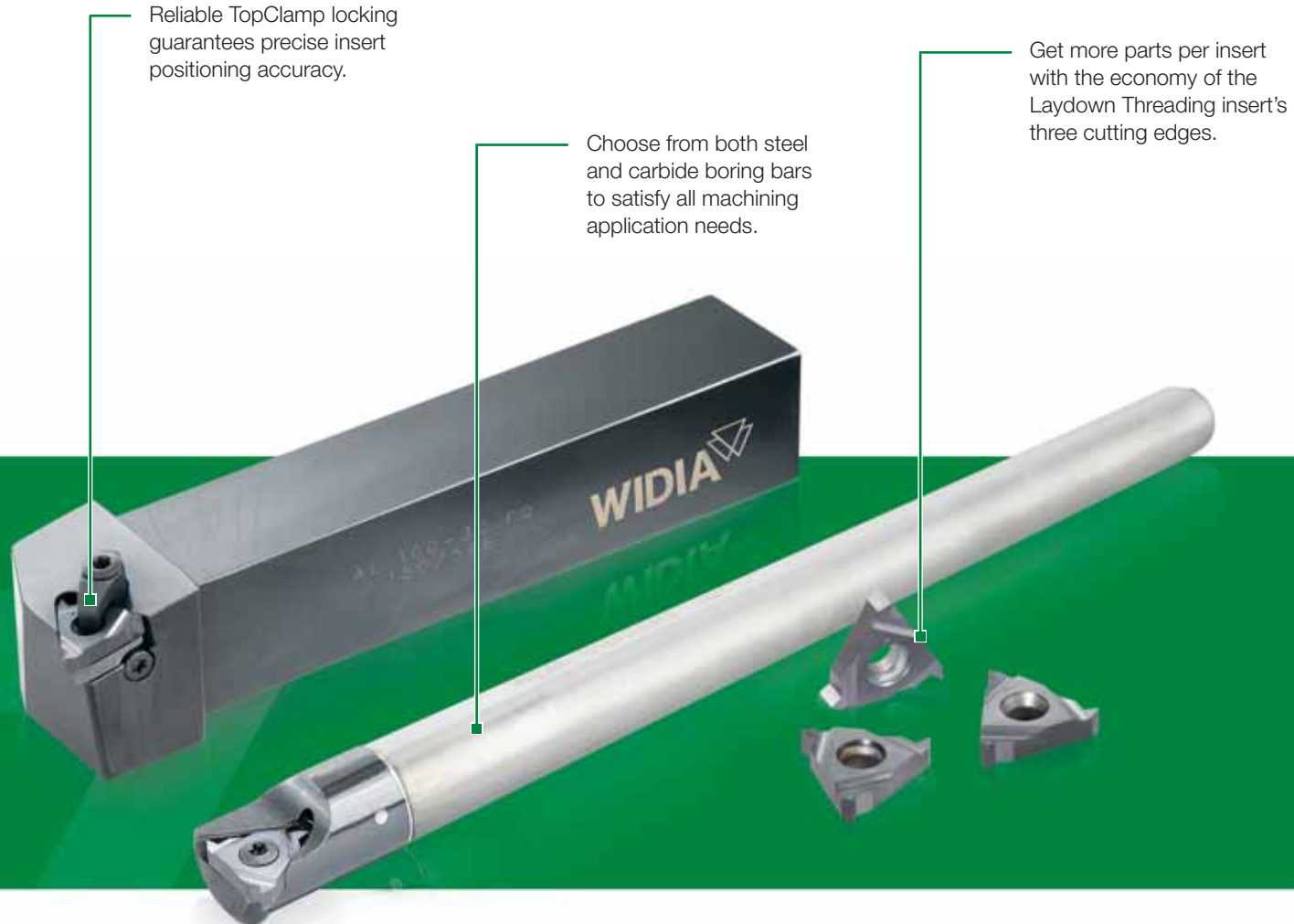
For increased reliability and productivity, look no further than the WIDIA Laydown Threading System for all of your ID and OD threading applications. With variable shim angles and the proper cutting geometry, the Laydown Threading system maximizes tool life and improves thread quality.

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, minimized 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 thread-making operations.
- Ideal for fine-pitch threads, high-helix/multi-start threads, and single-point threading in small-diameter bores.
- Maximized tool life and low-profile design for unhindered chip flow and superior performance.

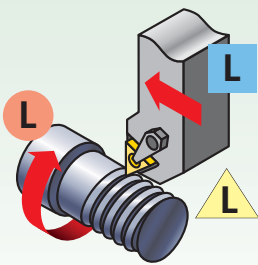
Step 1 • Select Threading Method and Hand of Tooling

Required Information:

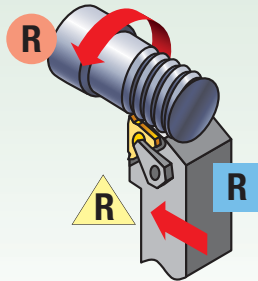
- External/internal operation.
- Spindle rotation/hand of thread.
- Feed direction.



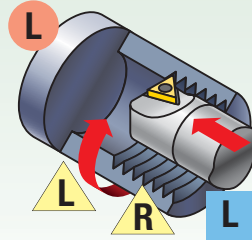
Feed direction toward the chuck • standard helix



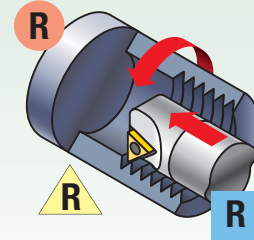
external left-hand thread



external right-hand thread

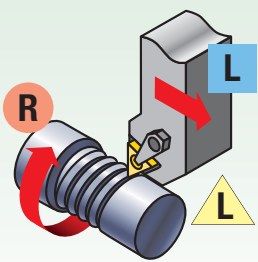


internal left-hand thread

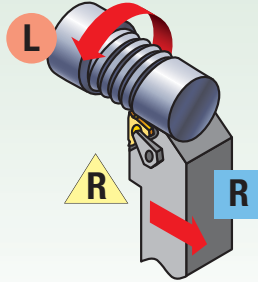


internal right-hand thread

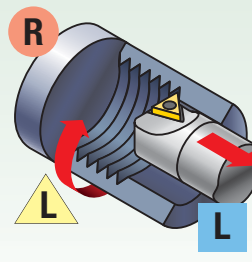
Feed direction away from the chuck • reverse helix



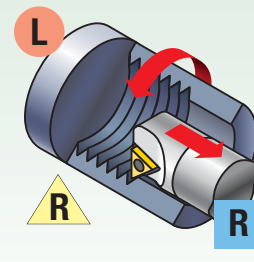
external right-hand thread



external left-hand thread



internal right-hand thread



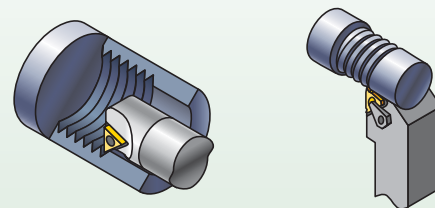
internal left-hand thread

Step 2 • Select Holder from Catalog Page

Required Information:

- External/internal operation.
- Minimum bore diameter (for internal operations).
- Hand of tool.
- Insert size (gage insert).

Select the appropriate holder for the insert size and hand:

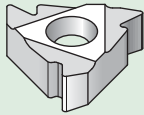


The insert size must match the gage insert size of your toolholder selection:

catalog number	gage insert	minimum bore diameter	shim
S0812LSER2	2IRA60	650"	—
S2020LSER3	3IR...	1.45"	SM-YI3

Step 3 • Choose Insert for Application

- Select cresting inserts for fully controlled thread form including diameter.
- Cresting inserts eliminate the need for deburring and are optimized 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	catalog number	TN6025
11	2IRA60	●
16	3IRAG60	●

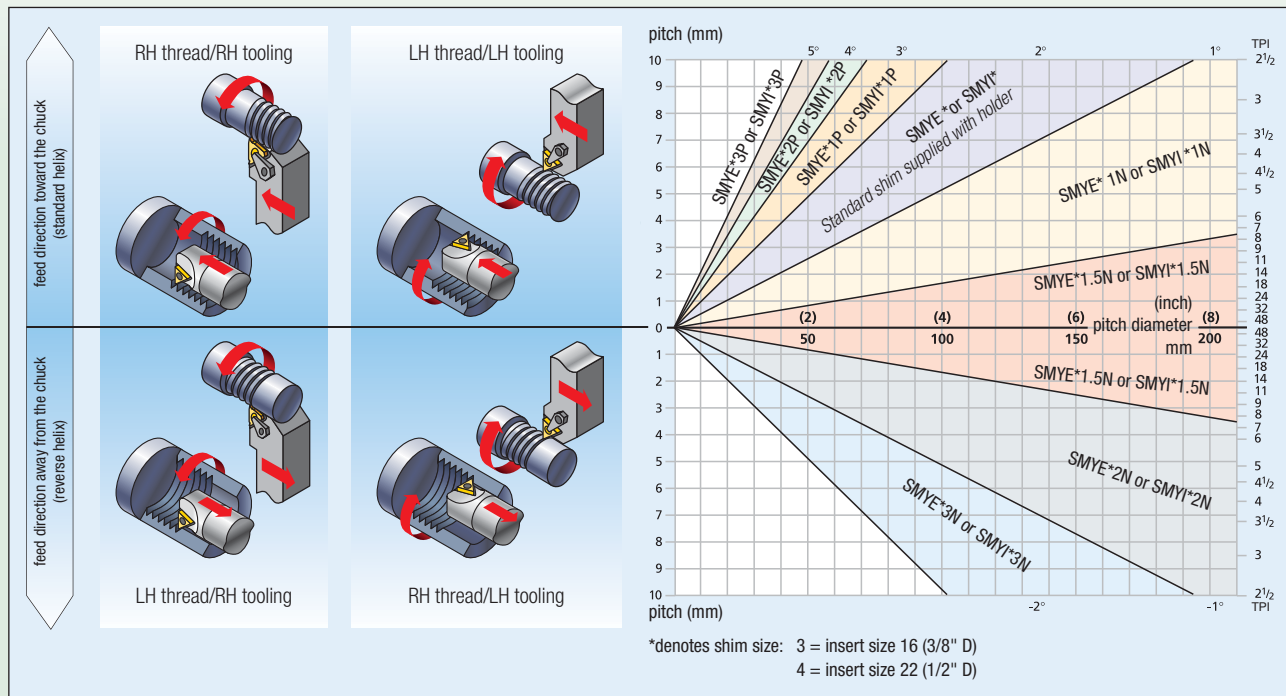
See *threading insert overview* on page E42.

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
SMYL... for internal RH or external LH

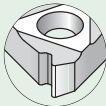


If recommended shim is different from shim supplied with toolholder, order shim separately.

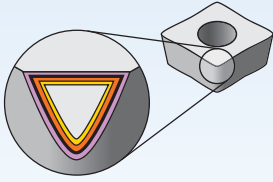
NOTE: Optimize your threading operation by using the proper infeed angle and the recommended infeed values. See the Technical Section on pages E72–E79. Also see detailed shim selection information on page E89–E90.

Step 5 • Select Grade and Speed

Recommendations for Grade and Speed Selection — m/min (sfm)

workpiece material	steel	stainless steel	cast iron	non-ferrous metals	high-temp alloys
Insert Style	 Precision Ground				
First Choice	TN6025 40–200 (130–650)	TN6025 40–135 (130–450)	TN6025 60–145 (200–475)	TN6025 50–360 (160–1150)	TN6025 10–100 (35–330)

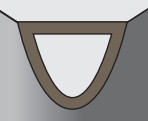
style		thread profile	standard	tolerance class	cresting	application	page(s)	
	flat top							
	60		Partial profile 60°	—	—	N	General use for 60° thread forms, such as ISO and UN, where non-cresting inserts are desired to cut a variety of pitches.	E51–E53
	ISO		Metric ISO	ISO R262, DIN 13	6g/6H	Y	Widely used metric 60° V-form for all industries.	E54–E55
	UN		American UN	ANSI B1.1:74	2A/2B	Y	Widely used inch-based 60° V-form for all industries.	E56–E57
	NPT		NPT	ANSI/ASME B1.20.1S1983	Standard NPT	N	National Pipe Thread standard 60° thread form for pipe fittings.	E58
	55		Partial profile 55°	—	—	N	General use for 55° thread forms such as Whitworth, BSW, and BSP where non-cresting inserts are desired to cut a variety of pitches.	E59
	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.	E60–E61
	API RD		API round	API STD. 5B:1979	Standard API RD	Y	60° V-form with large radius for casing, tubing, and line pipe in the oil and gas industry, including 8 and 10 round forms.	E61–E62
	PG		PG	DIN 40480		Y	80° steel conduit thread.	E62–E63
	RD		Round	DIN 405	7e/7H	Y	Round thread form for tube fittings in the chemical and food industries.	E63–E64
	TR		Trapez	DIN 103	7e/7H	N	30° truncated metric thread form for motion applications.	E64–E65



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.

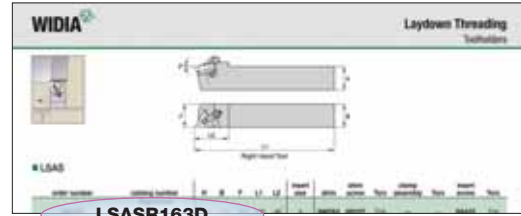
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Coating		Grade Description	05	10	15	20	25	30	35	40	45
Grade	TN6025	 <p>PVD-TiAlN Nano-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>	P								
	HC-P25										

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 optimized 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

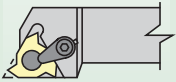


LSASR163D

L

Insert Style

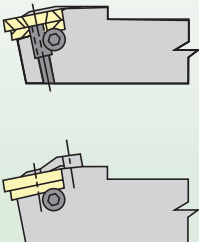
L —
Laydown triangle



S

Insert Holding Method

S —
Insert screw or clamp only



AS

Tool Style

Straight shank



Off-set shank

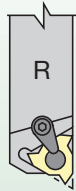
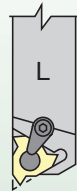


R

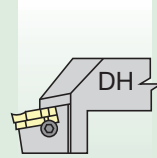
Hand of Tool

Left hand

Right hand



Drop Head



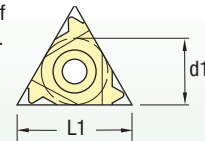
16

Shank Size

Inch:

This shows a two-digit number that indicates the holder cross section. For shanks 5/8" square and over, the number will represent the number of sixteenths of width and height. For shanks under 5/8" square, the number of sixteenths of cross section will be preceded by a zero. For rectangular holders, the first digit represents the number of eighths of width, and the second digit the number of quarters of height, except for a toolholder 1-1/4" x 1-1/2", which is given the number 91.

Size equals number of 1/8" increments of IC.



inch insert size	metric insert size	d1 inch	L1 mm
2	11	1/4	11,0
3	16	3/8	16,5
4	22	1/2	22,0
5	27	5/8	27,0

3

Insert Size

D

Qualified Surface and Length

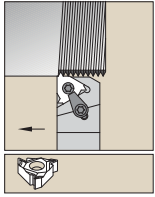
C —
qualified back and end, 5" long

D —
qualified back and end, 6" long

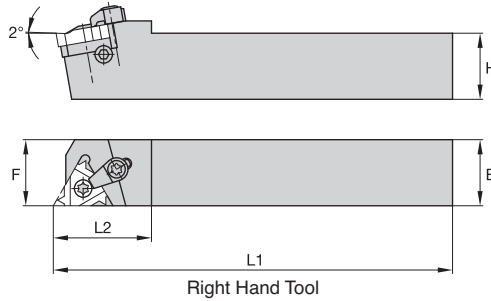
E —
qualified back and end, 7" long

T —
qualified back and end, 3.25" long

Q —
qualified metric holder

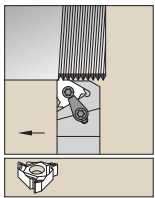


See page E42 for inserts.

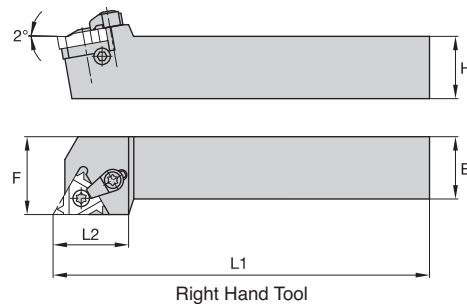


■ LSAS

order number	catalog number	H	B	F	L1	L2	insert size	shim	shim screw	Torx	clamp assembly	Torx	insert screw	Torx
	Right hand													
2968567	LSASR83	.500	.500	.500	3.25	.87	3	SMYE3	SSY3T	T10	—	—	SSA3T	T10
2968583	LSASR103	.625	.625	.630	5.00	1.20	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968584	LSASR123	.750	.750	.750	5.00	1.20	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968585	LSASR163	1.000	1.000	1.000	6.00	1.20	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968587	LSASR203	1.250	1.250	1.250	7.00	1.18	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968586	LSASR164	1.000	1.000	1.000	6.00	1.42	4	SMYE4	SSY4T	T20	CKC4	T20	SSA4T	T20
	Left hand													
2968572	LSASL83	.500	.500	.500	3.25	.87	3	SMYI3	SSY3T	T10	—	—	SSA3T	T10
2968568	LSASL103	.625	.625	.630	5.00	1.20	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968569	LSASL123	.750	.750	.750	5.00	1.20	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968570	LSASL163	1.000	1.000	1.000	6.00	1.20	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968571	LSASL164	1.000	1.000	1.000	6.00	1.42	4	SMYI4	SSY4T	T20	CKC4	T20	SSA4T	T20



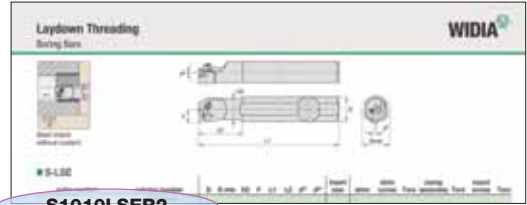
See page E42 for inserts.



■ LSS

order number	catalog number	H	B	F	L1	L2	insert size	shim	shim screw	Torx	clamp assembly	Torx	insert screw	Torx
	Right hand													
2968591	LSSR123D	.750	.750	1.000	6.00	1.00	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968592	LSSR163D	1.000	1.000	1.250	6.00	1.00	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968594	LSSR203D	1.250	1.250	1.500	6.00	1.00	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968593	LSSR164D	1.000	1.000	1.250	6.00	1.20	4	SMYE4	SSY4T	T20	CKC4	T20	SSA4T	T20
	Left hand													
2968588	LSSL123D	.750	.750	1.000	6.00	1.00	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968589	LSSL163D	1.000	1.000	1.250	6.00	1.00	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968590	LSSL164D	1.000	1.000	1.250	6.00	1.20	4	SMYI4	SSY4T	T20	CKC4	T20	SSA4T	T20

Laydown Threading Boring Bar Identification System

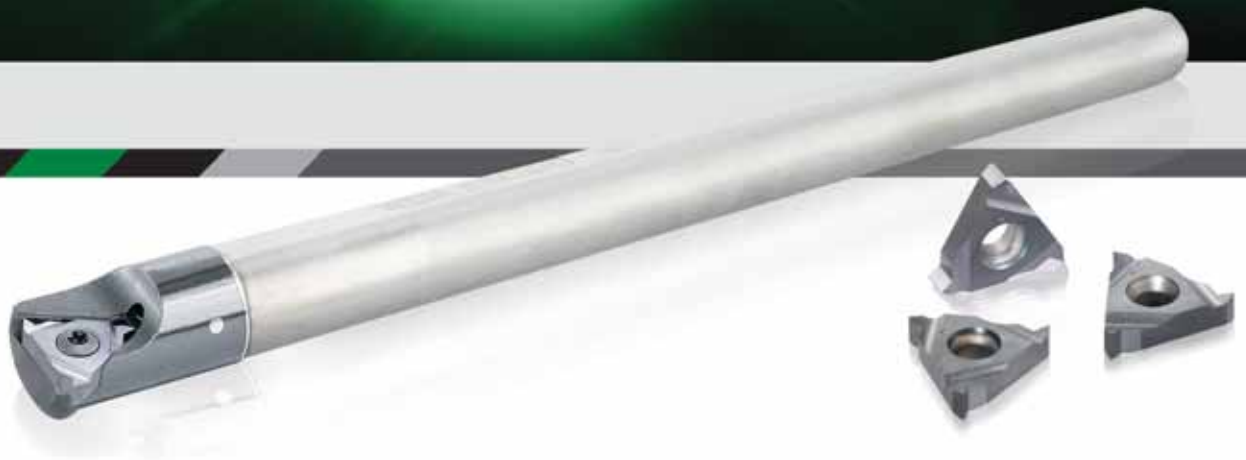


S1010LSER2

S	10	10	L	S	E	R	2																
Bar Type	Primary Necked Shank Bar Diameter	Secondary (mounting) Bar Diameter	Insert Style	Insert Holding Method	Bar Style	Hand of Tool	Insert Size																
<p>E — Carbide with coolant</p> <p>S — Steel shank without coolant</p>	<p>Indicates the primary bar diameter in 1/16" increments.</p> <p>NOTE: Boring bars with primary bar diameters larger than 5/8" are supplied with clamp and insert screw. Secure the insert with either the clamp or insert screw. Do not use both.</p>	<p>Indicates the secondary bar diameter in 1/16" increments.</p>	<p>L — Laydown triangle</p> <p>S — Insert screw or clamp only</p>	<p>S — Insert screw or clamp only</p>	<p>End cutting edge mount</p>	<p>Left hand Right hand</p>	<p>Size equals number of 1/8" increments of IC.</p> <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>inch insert size</th> <th>metric insert size</th> <th>d1 inch</th> <th>L1 mm</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>11</td> <td>1/4</td> <td>11,0</td> </tr> <tr> <td>3</td> <td>16</td> <td>3/8</td> <td>16,5</td> </tr> <tr> <td>4</td> <td>22</td> <td>1/2</td> <td>22,0</td> </tr> </tbody> </table>	inch insert size	metric insert size	d1 inch	L1 mm	2	11	1/4	11,0	3	16	3/8	16,5	4	22	1/2	22,0
inch insert size	metric insert size	d1 inch	L1 mm																				
2	11	1/4	11,0																				
3	16	3/8	16,5																				
4	22	1/2	22,0																				

WIN WITH WIDIA™

WIDIA 



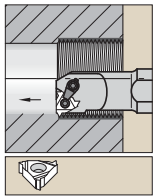
Laydown Threading System

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.

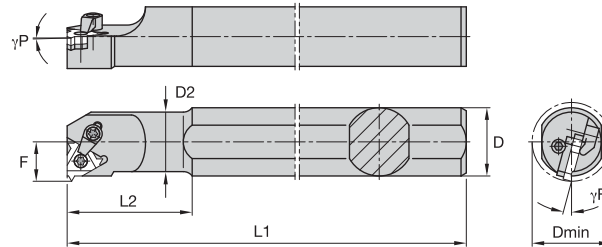
- Low-profile design enables unrestricted chip flow.
- Precision-ground thread forms for precise cuts.
- Ideal choice for fine-pitch threads, high-helix/multi-start threads, and single-point threading in small diameter bores.

To learn more, contact your local Authorized Distributor or visit www.widia.com.

WIDIA 
Win with WIDIA™



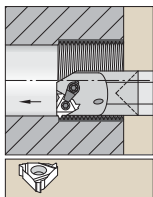
Steel shank without coolant.
See page E42 for inserts.



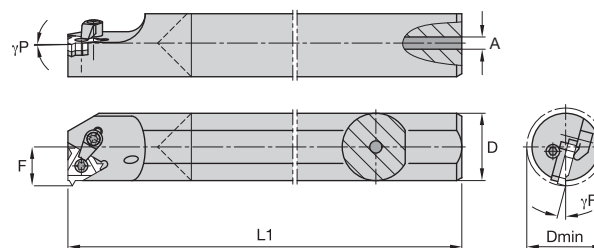
S-LSE

order number	catalog number	D	D min	D2	F	L1	L2	γF°	γP°	insert size	shim	shim screw	clamp assembly	Torx	insert screw	Torx	
right hand																	
2968597	S0612LSER2	.750	.500	.375	.28	7.00	1.00	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2968599	S0812LSER2	.750	.650	.500	.34	7.00	1.25	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2968601	S1012LSER3	.750	.800	.625	.46	7.00	1.50	-15.0	-1.5	3	—	—	—	—	SN3TPKG	T10	
2968763	S1212LSER3	.750	.900	—	.51	7.00	1.57	-15.0	-1.5	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968765	S1620LSER3	1.250	1.200	1.000	.65	10.00	2.50	-15.0	-1.5	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968595	S2020LSER3	1.250	1.450	—	.77	10.00	2.03	-15.0	-1.5	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
left hand																	
2968596	S0612LSEL2	.750	.500	.375	.28	7.00	1.00	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2968598	S0812LSEL2	.750	.650	.500	.34	7.00	1.25	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2968600	S1012LSEL3	.750	.800	.625	.46	7.00	1.50	-15.0	-1.5	3	—	—	—	—	SN3TPKG	T10	
2968602	S1212LSEL3	.750	.900	—	.51	7.00	1.57	-15.0	-1.5	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10
2968764	S1620LSEL3	1.250	1.200	1.000	.65	10.00	2.50	-15.0	-1.5	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10

NOTE: Items listed without a shim are designed for a 1.5° inclination angle.



Carbide shank with through coolant.
See page E42 for inserts.



Right Hand Tool

E-LSE

order number	catalog number	D	D min	F	L1	A	γF°	γP°	insert size	shim	shim screw	clamp assembly	Torx	insert screw	Torx	
Right hand																
2892518	E06LSER2	.375	.500	.280	6.00	.13	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2892520	E08LSER2	.500	.650	.350	8.00	.19	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2892522	E10LSER3	.625	.800	.460	10.00	.22	-15.0	-1.5	3	—	—	—	—	SN3TPKG	T10	
2892554	E12LSER3	.750	.900	.510	10.00	.22	-15.0	-1.5	3	SMYI3	SSY3T	T10	CKC3	T15	SSA3T	T10
Left hand																
2892519	E06LSEL2	.375	.500	.280	6.00	.13	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2892521	E08LSEL2	.500	.650	.350	8.00	.19	-15.0	-1.5	2	—	—	—	—	SSN2T	T8	
2892553	E10LSEL3	.625	.800	.460	10.00	.22	-15.0	-1.5	3	—	—	—	—	SN3TPKG	T10	
2892555	E12LSEL3	.750	.900	.510	10.00	.22	-15.0	-1.5	3	SMYE3	SSY3T	T10	CKC3	T15	SSA3T	T10

NOTE: Items listed without a shim are designed for a 1.5° inclination angle.

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WIDIA[▽]
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CLAPPDICO[™]

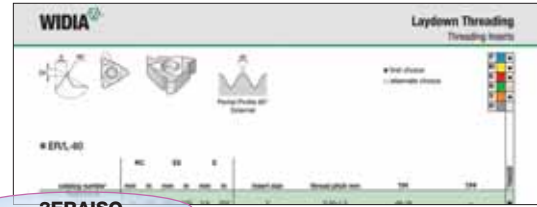
WIDIA[▽]
GTD[™]

WIDIA[▽]
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Laydown Threading Insert Identification System



3ERAISO

3

Insert Size

E

Insert Type

- E — External thread
- I — Internal thread
- UE — External thread
- UI — Internal thread
- VE — External thread
- VI — Internal thread

R

Hand of Insert

- R — Right-hand thread
- L — Left-hand thread

A

Thread Pitch

Partial profile inserts

symbol	inch	mm
A	48–16	0,5–1,5
AG	48–8	0,5–3,0
G	14–8	1,7–3,0
N	7–5	3,5–5,0
Q	4–5	5,5–6,0

Full profile inserts

symbol	inch	mm
Actual TPI	48–8	0,5–0,4

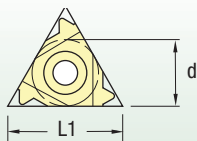
ISO

Thread Profile

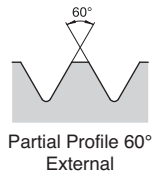
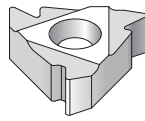
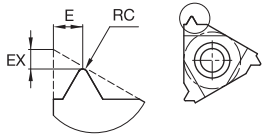
Number of Teeth

- Single tooth profile — No symbol
- Multi-tooth profile — Number of teeth (cutting edge and symbol)
- Multi-tooth profile with two teeth — 2M

- 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



symbol	d	L1
2	0.250	11
3	0.375	16
4	0.500	22
5	0.625	27



- first choice
- alternate choice

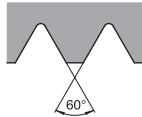
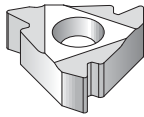
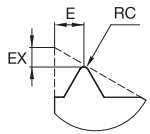
P	●
M	●
K	●
N	○
S	●
H	●

■ ER/L-60

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TNG025
	mm	in	mm	in	mm	in					
Right hand											
2ERA60	0,05	.002	0,9	.035	0,8	.032	2	0,50-1,5	48-16	—	●
3ERA60	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	—	●
3ERAG60	0,08	.003	1,2	.047	1,7	.067	3	0,50-3,0	48-8	—	●
3ERG60	0,28	.011	1,2	.047	1,7	.067	3	1,75-3,0	14-8	—	●
4ERN60	0,53	.021	1,7	.067	2,5	.098	4	3,5-5,0	7-5	—	●
5ERQ60	0,64	.025	2,1	.083	3,1	.122	5	5,5-6,0	4,5-4	—	●
Left hand											
3ELA60	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	—	●
3ELAG60	0,08	.003	1,2	.047	1,7	.067	3	0,50-3,0	48-8	—	●
3ELG60	0,28	.011	1,2	.047	1,7	.067	3	1,75-3,0	14-8	—	●
4ELN60	0,53	.021	1,7	.067	2,5	.098	4	3,5-5,0	7-5	—	●

Laydown Threading

Threading Inserts



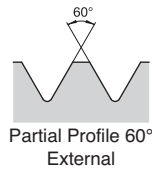
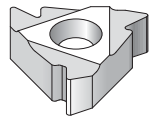
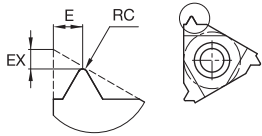
Partial Profile 60°
Internal

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	○

■ IR/L-60

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in	mm	in					
Right hand											
2IRA60	0,05	.002	0,8	.031	0,9	.035	2	0,50-1,5	48-16	—	●
3IRA60	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	—	●
3IRAG60	0,05	.002	1,2	.047	1,7	.067	3	0,50-3,0	48-8	—	●
3IRG60	0,15	.006	1,2	.047	1,7	.067	3	1,75-3,0	14-8	—	●
4IRN60	0,31	.012	1,7	.067	2,5	.098	4	3,5-5,0	7-5	—	●
5IRQ60	0,30	.012	1,8	.071	2,7	.106	5	5,5-6,0	4,5-4	—	●
Left hand											
2ILA60	0,05	.002	0,8	.031	0,9	.035	2	0,50-1,5	48-16	—	●
3ILA60	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	—	●
3ILAG60	0,05	.002	1,2	.047	1,7	.067	3	0,50-3,0	48-8	—	●
3ILG60	0,15	.006	1,2	.047	1,7	.067	3	1,75-3,0	14-8	—	●
4ILN60	0,31	.012	1,7	.067	2,5	.098	4	3,5-5,0	7-5	—	●

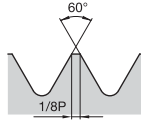
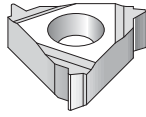
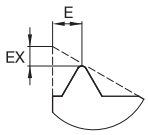


- first choice
- alternate choice

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

■ ER-60

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	PN120	TTS
	mm	in	mm	in	mm	in						
Right hand 44315900	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-8	—	●	●
44315901	0,28	.011	1,2	.047	1,7	.067	3	1,75-3,0	14-8	—	●	●



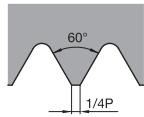
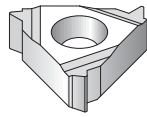
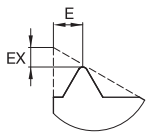
ISO
Metric-External

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

ER/L-ISO

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand									
2ER175ISO	1,1	.043	0,8	.032	2	1,75	—	—	●
2ER15ISO	1,0	.039	0,8	.032	2	1,5	—	—	●
3ER30ISO	1,2	.047	1,6	.063	3	3,0	—	—	●
3ER25ISO	1,1	.043	1,5	.059	3	2,5	—	—	●
3ER20ISO	1,0	.039	1,3	.051	3	2,0	—	—	●
3ER175ISO	0,9	.035	1,2	.047	3	1,75	—	—	●
3ER15ISO	0,8	.031	1,0	.039	3	1,5	—	—	●
3ER125ISO	0,8	.031	0,9	.035	3	1,25	—	—	●
3ER10ISO	0,7	.027	0,7	.027	3	1,0	—	—	●
3ER08ISO	0,6	.024	0,6	.024	3	0,80	—	—	●
3ER075ISO	0,6	.024	0,6	.024	3	0,75	—	—	●
3ER07ISO	0,6	.024	0,6	.024	3	0,70	—	—	●
3ER05ISO	0,6	.024	0,4	.016	3	0,50	—	—	●
3ER035ISO	0,4	.016	0,8	.032	3	0,35	—	—	●
4ER50ISO	1,7	.067	2,5	.098	4	5,0	—	—	●
4ER35ISO	1,6	.063	2,3	.090	4	4,5	—	—	●
4ER45ISO	1,7	.067	2,4	.094	4	4,5	—	—	●
4ER40ISO	1,6	.063	2,3	.090	4	4,0	—	—	●
5ER60ISO	2,9	.114	2,0	.079	5	6,0	—	—	●
5ER55ISO	2,7	.106	1,9	.075	5	5,5	—	—	●
Left hand									
3EL30ISO	1,2	.047	1,6	.063	3	3,0	—	—	●
3EL25ISO	1,1	.043	1,5	.059	3	2,5	—	—	●
3EL20ISO	1,3	.051	1,0	.039	3	2,0	—	—	●
3EL175ISO	0,9	.035	1,2	.047	3	1,75	—	—	●
3EL15ISO	0,8	.031	1,0	.039	3	1,5	—	—	●
3EL125ISO	0,8	.031	0,9	.035	3	1,25	—	—	●
3EL10ISO	0,7	.027	0,7	.027	3	1,0	—	—	●
3EL075ISO	0,6	.024	0,6	.024	3	0,75	—	—	●
3EL05ISO	0,6	.024	0,4	.016	3	0,50	—	—	●
4EL40ISO	1,6	.063	2,3	.090	4	4,0	—	—	●
4EL35ISO	1,6	.063	2,3	.090	4	3,5	—	—	●



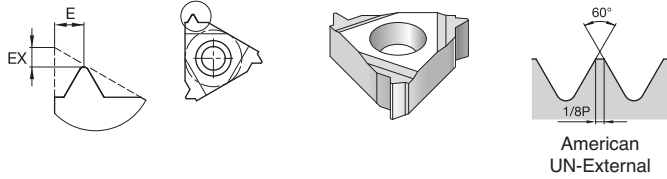
ISO
Metric-Internal

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

IR/L-ISO

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TNG025
	mm	in	mm	in					
Right hand									
2IR20ISO	0,9	.032	1,1	.043	2	2,0	—	—	●
2IR175ISO	0,9	.032	1,1	.043	2	1,75	—	—	●
2IR15ISO	0,8	.032	1,0	.039	2	1,5	—	—	●
2IR125ISO	0,6	.024	0,7	.028	2	1,25	—	—	●
2IR10ISO	0,6	.024	0,7	.028	2	1,0	—	—	●
2IR08ISO	0,6	.024	0,6	.024	2	0,80	—	—	●
2IR075ISO	0,6	.024	0,3	.012	2	0,75	—	—	●
2IR05ISO	0,6	.024	0,6	.024	2	0,50	—	—	●
3IR30ISO	1,1	.043	1,5	.059	3	3,0	—	—	●
3IR25ISO	1,1	.043	1,5	.059	3	2,5	—	—	●
3IR20ISO	1,0	.039	1,3	.051	3	2,0	—	—	●
3IR175ISO	0,9	.035	1,2	.047	3	1,75	—	—	●
3IR15ISO	0,8	.032	1,0	.039	3	1,5	—	—	●
3IR125ISO	0,8	.032	0,9	.035	3	1,25	—	—	●
3IR10ISO	0,6	.024	0,7	.028	3	1,0	—	—	●
3IR08ISO	0,6	.024	0,6	.024	3	0,80	—	—	●
3IR075ISO	0,6	.024	0,6	.024	3	0,75	—	—	●
3IR05ISO	0,6	.024	0,6	.024	3	0,50	—	—	●
4IR50ISO	1,6	.063	2,3	.091	4	5,0	—	—	●
4IR45ISO	1,6	.063	2,4	.095	4	4,5	—	—	●
4IR40ISO	1,6	.063	2,3	.091	4	4,0	—	—	●
4IR35ISO	1,6	.063	2,3	.091	4	3,5	—	—	●
5IR60ISO	1,8	.071	2,5	.098	5	6,0	—	—	●
Left hand									
2IL20ISO	0,9	.035	1,1	.043	2	2,0	—	—	●
2IL15ISO	0,8	.032	1,0	.039	2	1,5	—	—	●
2IL125ISO	0,8	.031	0,9	.035	2	1,25	—	—	●
2IL10ISO	0,6	.024	0,7	.027	2	1,0	—	—	●
2IL075ISO	0,6	.024	0,6	.024	2	0,75	—	—	●
2IL05ISO	0,6	.024	0,4	.016	2	0,50	—	—	●
3IL30ISO	1,1	.043	1,5	.059	3	3,0	—	—	●
3IL25ISO	1,1	.043	1,5	.059	3	2,5	—	—	●
3IL20ISO	1,0	.039	1,3	.051	3	2,0	—	—	●
3IL15ISO	0,8	.032	1,0	.039	3	1,5	—	—	●
3IL10ISO	0,6	.024	0,7	.028	3	1,0	—	—	●
3IL075ISO	0,6	.024	0,6	.024	3	0,75	—	—	●
3IL05ISO	0,6	.024	0,4	.016	3	0,50	—	—	●
4IL50ISO	1,6	.063	2,3	.090	4	5,0	—	—	●
4IL40ISO	1,6	.063	2,3	.090	4	4,0	—	—	●
4IL35ISO	1,6	.063	2,3	.090	4	3,5	—	—	●
5IL60ISO	1,8	.071	2,5	.098	5	6,0	—	—	●
5IL55ISO	1,6	.063	2,3	.091	5	5,5	—	—	●

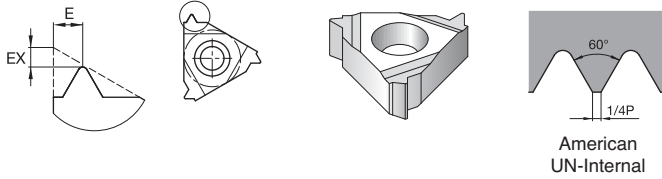


- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	○

ER/L-UN

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand 3ER8UN	1,2	.047	1,6	.063	3	—	8	—	●
3ER48UN	0,6	.024	0,6	.024	3	—	48	—	●
3ER40UN	0,6	.024	0,6	.024	3	—	40	—	●
3ER36UN	0,6	.024	0,6	.024	3	—	36	—	●
3ER32UN	0,6	.024	0,6	.024	3	—	32	—	●
3ER28UN	0,6	.024	0,7	.028	3	—	28	—	●
3ER27UN	0,8	.032	0,7	.028	3	—	27	—	●
3ER24UN	0,7	.028	0,8	.032	3	—	24	—	●
3ER20UN	0,8	.032	0,9	.035	3	—	20	—	●
3ER18UN	0,8	.032	1,0	.039	3	—	18	—	●
3ER16UN	0,9	.035	1,1	.043	3	—	16	—	●
3ER14UN	1,0	.039	1,2	.047	3	—	14	—	●
3ER13UN	1,3	.051	1,0	.039	3	—	13	—	●
3ER12UN	1,1	.043	1,4	.055	3	—	12	—	●
3ER11UN	1,1	.043	1,5	.059	3	—	11	—	●
3ER10UN	1,1	.043	1,5	.059	3	—	10	—	●
Left hand									
3EL8UN	1,2	.047	1,6	.063	3	—	8	—	●
3EL16UN	0,9	.035	1,1	.043	3	—	16	—	●
3EL12UN	1,1	.043	1,4	.055	3	—	12	—	●
3EL10UN	1,1	.043	1,5	.059	3	—	10	—	●



American
UN-Internal

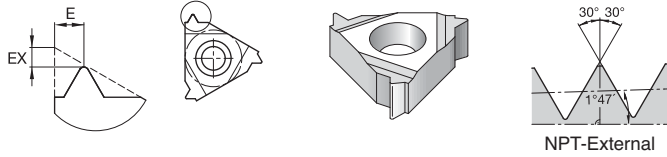
- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

■ IR/L-UN

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand									
2IR32UN	0,6	.024	0,6	.024	2	—	32	—	●
2IR27UN	0,8	.032	0,7	.028	2	—	28	—	●
2IR28UN	0,6	.024	0,7	.027	2	—	28	—	●
2IR24UN	0,7	.027	0,8	.031	2	—	24	—	●
2IR20UN	0,8	.032	0,9	.035	2	—	20	—	●
2IR18UN	0,8	.031	1,0	.039	2	—	18	—	●
2IR16UN	0,9	.035	1,1	.043	2	—	16	—	●
3IR8UN	1,1	.043	1,5	.059	3	—	8	—	●
3IR36UN	0,6	.024	0,6	.024	3	—	36	—	●
3IR32UN	0,6	.024	0,6	.024	3	—	32	—	●
3IR28UN	0,6	.024	0,7	.027	3	—	28	—	●
3IR24UN	0,7	.028	0,8	.032	3	—	24	—	●
3IR20UN	0,8	.032	0,9	.035	3	—	20	—	●
3IR18UN	0,8	.032	1,0	.039	3	—	18	—	●
3IR16UN	0,9	.035	1,1	.043	3	—	16	—	●
3IR14UN	0,9	.035	1,2	.047	3	—	14	—	●
3IR12UN	1,1	.043	1,4	.055	3	—	12	—	●
3IR11UN	1,1	.043	1,5	.059	3	—	11	—	●
3IR10UN	1,1	.043	1,5	.059	3	—	10	—	●
Left hand									
2IL32UN	0,6	.024	0,6	.024	2	—	32	—	●
3IL8UN	1,1	.043	1,5	.059	3	—	8	—	●
3IL12UN	1,1	.043	1,4	.055	3	—	12	—	●

Threading • Laydown Threading



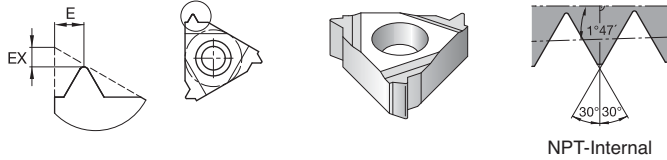
NPT-External

- first choice
- alternate choice

P	■	●
M	■	●
K	■	●
N	■	○
S	■	●
H	■	●

ER/L-NPT

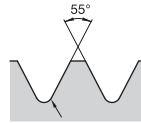
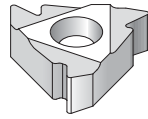
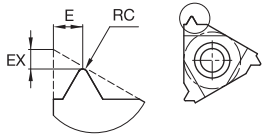
catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TIN6025
	mm	in	mm	in					
Right hand									
3ER27NPT	0,7	.028	0,8	.032	3	—	27	.75	●
3ER18NPT	0,8	.032	1,0	.039	3	—	18	.75	●
3ER14NPT	0,9	.035	1,2	.047	3	—	14	.75	●
3ER115NPT	1,1	.043	1,5	.059	3	—	11.5	.75	●
3ER8NPT	1,3	.051	1,8	.071	3	—	8	.75	●
Left hand									
3EL27NPT	0,7	.027	0,8	.031	3	—	27	.75	●
3EL18NPT	0,8	.031	1,0	.039	3	—	18	.75	●
3EL115NPT	1,1	.043	1,5	.059	3	—	11.5	.75	●
3EL8NPT	1,3	.051	1,8	.071	3	—	8	.75	●



NPT-Internal

IR/L-NPT

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TIN6025
	mm	in	mm	in					
Right hand									
3IR27NPT	0,7	.027	0,8	.031	3	—	27	.75	●
3IR18NPT	0,8	.031	1,0	.039	3	—	18	.75	●
3IR14NPT	0,9	.035	1,2	.047	3	—	14	.75	●
3IR115NPT	1,1	.043	1,5	.059	3	—	11.5	.75	●
3IR8NPT	1,3	.051	1,8	.071	3	—	8	.75	●
Left hand									
3IL14NPT	0,9	.035	1,2	.047	3	—	14	.75	●



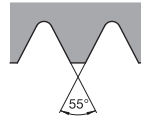
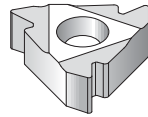
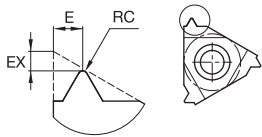
Partial Profile 55°
External

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

ER/L-55

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in	mm	in					
Right hand 3ERAG55	0,08	.003	1,2	.047	1,7	.067	3	0,50-3,0	48-8	-	●
3ERA55	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	-	●
3ERG55	0,20	.008	1,2	.047	1,7	.067	3	1,75-3,0	14-8	-	●
4ERN55	0,43	.017	1,7	.067	2,5	.098	4	3,5-5,0	7-5	-	●
Left hand 3ELG55	0,20	.008	1,2	.047	1,7	.067	3	1,75-3,0	14-8	-	●



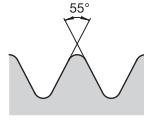
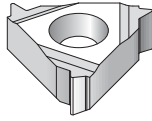
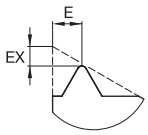
Partial Profile 55°
Internal

IR/L-55

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in	mm	in					
Right hand 2IRA55	0,05	.002	0,8	.031	0,9	.035	2	0,50-1,5	48-16	-	●
3IRAG55	0,07	.003	1,2	.047	1,7	.067	3	0,50-3,0	48-8	-	●
3IRA55	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	-	●
3IRG55	0,21	.008	1,2	.047	1,7	.067	3	1,75-3,0	14-8	-	●
4IRN55	0,43	.017	1,7	.067	2,5	.098	4	3,5-5,0	7-5	-	●
Left hand 3ILAG55	0,07	.003	1,2	.047	1,7	.067	3	0,50-3,0	48-8	-	●
3ILA55	0,05	.002	0,8	.031	0,9	.035	3	0,50-1,5	48-16	-	●
3ILG55	0,21	.008	1,2	.047	1,7	.067	3	1,75-3,0	14-8	-	●

Laydown Threading

Threading Inserts



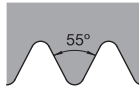
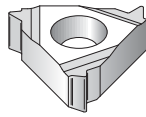
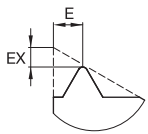
Whitworth BSW,
BSF, BSP-External

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	○

ER/L-W

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand									
3ER36W	0,6	.024	0,6	.024	3	—	36	—	●
3ER32W	0,6	.024	0,6	.024	3	—	32	—	●
3ER28W	0,6	.024	0,7	.028	3	—	28	—	●
3ER26W	0,8	.032	0,7	.028	3	—	26	—	●
3ER24W	0,7	.028	0,8	.032	3	—	24	—	●
3ER20W	0,8	.032	0,9	.035	3	—	20	—	●
3ER19W	0,8	.032	1,0	.039	3	—	19	—	●
3ER18W	0,8	.031	1,0	.039	3	—	18	—	●
3ER16W	0,9	.035	1,1	.043	3	—	16	—	●
3ER14W	1,0	.039	1,2	.047	3	—	14	—	●
3ER12W	1,1	.043	1,4	.055	3	—	12	—	●
3ER11W	1,1	.043	1,5	.059	3	—	11	—	●
3ER10W	1,1	.043	1,5	.059	3	—	10	—	●
3ER9W	1,2	.047	1,7	.067	3	—	9	—	●
3ER8W	1,2	.047	1,5	.059	3	—	8	—	●
4ER7W	1,6	.063	2,3	.090	4	—	7	—	●
4ER6W	1,6	.063	2,3	.091	4	—	6	—	●
Left hand									
3EL11W	1,1	.043	1,5	.059	3	—	11	—	●
3EL8W	1,2	.047	1,5	.059	3	—	8	—	●



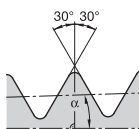
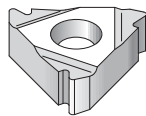
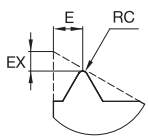
Whitworth BSW,
BSF, BSP-Internal

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

IR/L-W

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand									
2IR19W	0,8	.032	1,0	.039	2	—	19	—	●
2IR18W	1,0	.039	0,8	.032	2	—	18	—	●
2IR16W	1,1	.043	0,9	.035	2	—	16	—	●
2IR14W	0,9	.035	1,1	.043	2	—	14	—	●
3IR19W	0,8	.032	0,9	.035	3	—	19	—	●
3IR18W	0,8	.031	1,0	.039	3	—	18	—	●
3IR16W	0,9	.035	1,1	.043	3	—	16	—	●
3IR14W	1,0	.039	1,2	.047	3	—	14	—	●
3IR12W	1,1	.043	1,4	.055	3	—	12	—	●
3IR11W	1,1	.043	1,5	.059	3	—	11	—	●
3IR8W	1,2	.047	1,5	.059	3	—	8	—	●
4IR7W	1,6	.063	2,3	.090	4	—	7	—	●
4IR6W	1,6	.063	2,3	.090	4	—	6	—	●
Left hand									
2IL19W	0,8	.031	1,0	.039	2	—	19	—	●
2IL14W	0,9	.035	1,1	.043	2	—	14	—	●
3IL14W	1,0	.039	1,2	.047	3	—	14	—	●
3IL11W	1,1	.043	1,5	.059	3	—	11	—	●



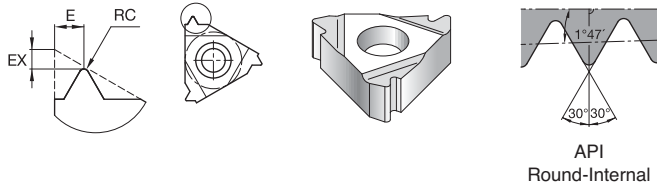
API Round-External
 $\alpha = 1/2 \arctan (TPF/12)$

ER-APIRD

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	
	mm	in	mm	in	mm	in					
3ER10APIRD	0,34	.013	1,2	.047	1,4	.055	3	—	10	.75	●
3ER8APIRD	0,40	.016	1,3	.051	1,5	.059	3	—	8	.75	●

Laydown Threading

Threading Inserts

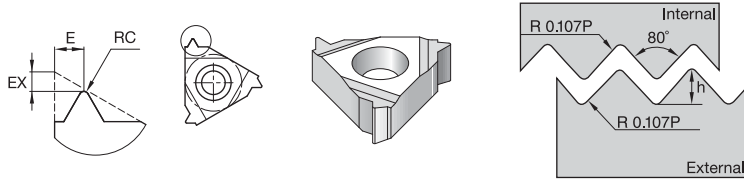


- first choice
- alternate choice

P	■	●
M	■	●
K	■	●
N	■	○
S	■	●
H	■	●

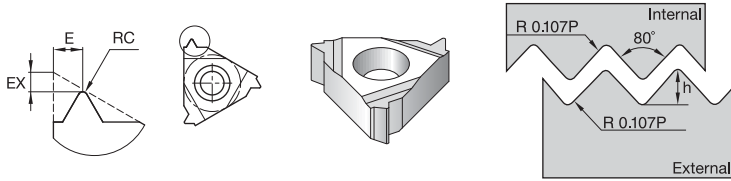
IR-APIRD

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in	mm	in					
Right hand 3IR10APIRD	0,34	.013	1,2	.047	1,4	.055	3	—	10	.75	●
3IR8APIRD	0,40	.016	1,3	.051	1,5	.059	3	—	8	.75	●



ER-PG

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	
	mm	in	mm	in	mm	in					
Right hand 3ER20PG	0,07	.003	0,9	.035	0,8	.032	3	—	20	—	●
3ER18PG	0,09	.004	1,0	.039	0,8	.032	3	—	18	—	●
3ER16PG	0,11	.004	1,1	.043	0,9	.035	3	—	16	—	●

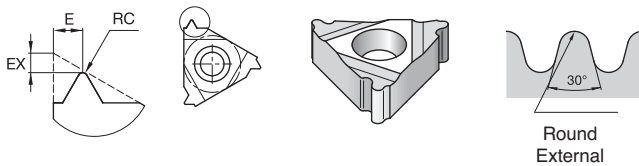


- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

IR-PG

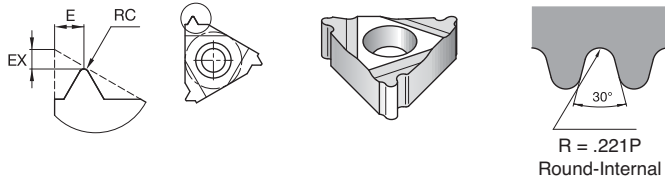
catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TNG025
	mm	in	mm	in	mm	in					
Right hand 2IR18PG	0,09	.004	1,0	.039	0,8	.032	2	—	18	—	●
3IR18PG	0,09	.004	0,1	.039	0,8	.032	3	—	18	—	●
3IR16PG	0,11	.004	1,1	.043	0,8	.032	3	—	16	—	●



ER-RD

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TNG025
	mm	in	mm	in	mm	in					
Right hand 3ER10RD	0,61	.024	1,1	.043	1,2	.047	3	—	10	—	●
3ER8RD	0,76	.030	1,4	.055	1,3	.051	3	—	8	—	●
4ER6RD	1,01	.040	1,5	.059	1,7	.067	4	—	6	—	●
4ER4RD	1,52	.060	2,3	.091	2,2	.087	4	—	4	—	●
Left hand 3EL8RD	0,76	.030	1,4	.055	1,3	.051	3	—	8	—	●

Threading • Laydown Threading

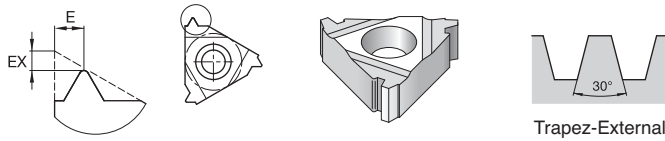


- first choice
- alternate choice

P	■	●
M	■	●
K	■	●
N	■	○
S	■	●
H	■	○

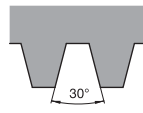
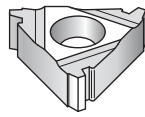
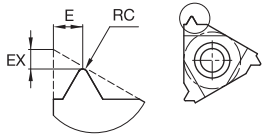
IR/L-RD

catalog number	RC		EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in	mm	in					
Right hand 3IR10RD	0,70	.028	1,1	.043	1,2	.047	3	—	10	—	●
3IR8RD	0,70	.028	1,4	.055	1,4	.055	3	—	8	—	●
3IR6RD	0,94	.037	1,5	.059	1,4	.055	3	—	6	—	●
4IR6RD	0,93	.037	1,5	.059	1,7	.067	4	—	6	—	●
4IR4RD	1,40	.055	2,3	.091	2,2	.087	4	—	4	—	●
Left hand 3IL8RD	0,06	.022	1,4	.055	1,4	.055	3	—	8	—	●



ER/L-TR

catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	
	mm	in	mm	in					
Right hand 3ER3TR	1,3	.051	1,5	.059	3	3,0	—	—	●
3ER2TR	1,1	.043	1,3	.051	3	2,0	—	—	●
3ER15TR	1,0	.039	1,1	.043	3	1,5	—	—	●
4ER5TR	2,1	.083	2,5	.098	4	5,0	—	—	●
4ER4TR	1,7	.067	1,9	.075	4	4,0	—	—	●
5ER6TR	2,3	.091	2,7	.106	5	6,0	—	—	●
Left hand 3EL3TR	1,3	.051	1,5	.059	3	3,0	—	—	●
3EL2TR	1,1	.043	1,3	.051	3	2,0	—	—	●
4EL4TR	1,7	.067	1,9	.075	4	4,0	—	—	●
5EL6TR	2,3	.091	2,7	.106	5	6,0	—	—	●



Trapez-Internal

- first choice
- alternate choice

P	●
M	●
K	●
N	○
S	●
H	●

■ IR/L-TR

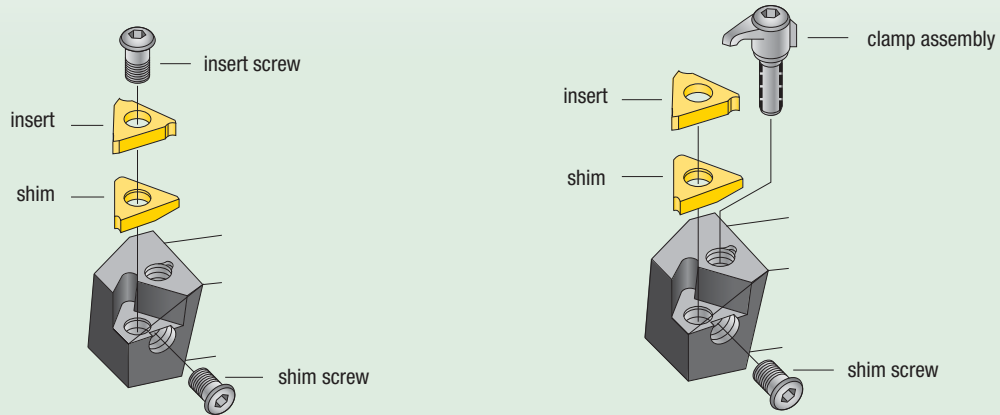
catalog number	EX		E		insert size	thread pitch mm	TPI	TPF	TN6025
	mm	in	mm	in					
Right hand									
3IR3TR	1,3	.051	1,5	.059	3	3,0	—	—	●
3IR15TR	1,0	.039	1,1	.043	3	1,5	—	—	●
4IR5TR	2,1	.083	2,5	.098	4	5,0	—	—	●
4IR4TR	1,7	.067	1,9	.075	4	4,0	—	—	●
5IR6TR	2,3	.091	2,7	.106	5	6,0	—	—	●
Left hand									
3L3TR	1,3	.051	1,5	.059	3	3,0	—	—	●
4L5TR	2,1	.083	2,5	.098	4	5,0	—	—	●

Threading • Laydown Threading

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 E88–E89.



insert size and style	insert screw	shim	shim screw and washer	clamp assembly
3ER	S-SA3T	SM-YIE3	S-SY3T	CK-C3
3EL	S-SA3T	SM-YI3	S-SY3T	CK-C3
4ER	S-SA4T	SM-YIE4	S-SY4T	CK-C4
4EL	S-SA4T	SM-YI4	S-SY4T	CK-C4
Laydown Threading boring bars				
2IR	S-SN2T	—	—	—
2IL	S-SN2T	—	—	—
3IR	S-SA3T	SM-YI3	S-SY3T	CK-C3
3IL	S-SA3T	SM-YIE3	S-SY3T	CK-C3
4IR	S-SA4T	SM-YI4	S-SY4T	CK-C4
4IL	S-SA4T	SM-YIE4	S-SY4T	CK-C4

SM

Shim

-

Y

Y-shim for Laydown standard inserts

E

E – External
I – Internal

3

IC – 1/8"

-

2P

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					
3/8"	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
1/2"	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

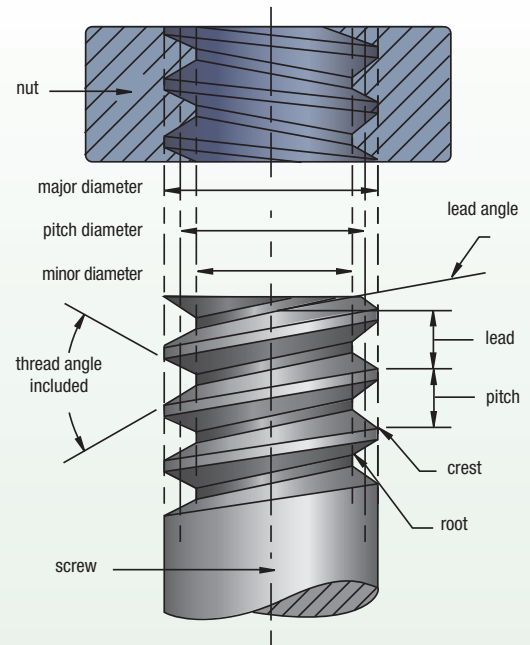
Slanted Shim Kit

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)	ordering code	contains slanted shims
3x	3/8"	ABY3	SM-YE3-2P, 1P, 1N, 2N, 3N SM-YI3-2P, 1P, 1N, 2N, 3N
4x	1/2"	ABY4	SM-YE4-2P, 1P, 1N, 2N, 3N SM-YI4-2P, 1P, 1N, 2N, 3N

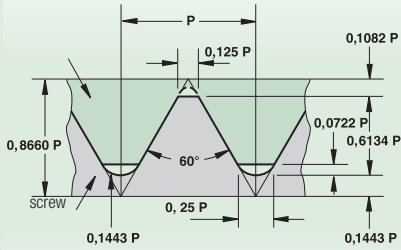
Screw Thread Definitions

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.



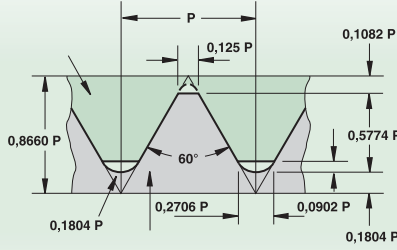
NOTE: Threads per inch (TPI) not shown:
The number of threads per inch measured axially.
The terms pitch and TPI are often used interchangeably. $TPI = 1/pitch$

ISO M (Metric) and UN (Unified National)



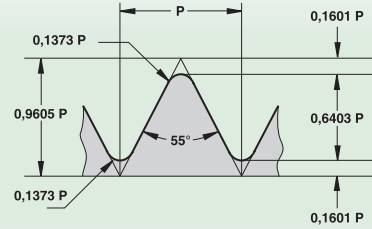
Use: All branches of mechanical industry.

UNJ (controlled root radius)



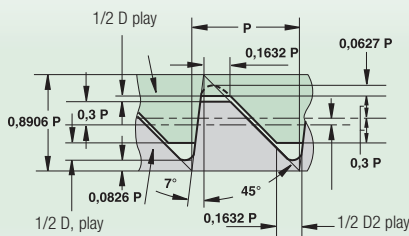
Use: Aircraft and space industry.

Whitworth (BSW)



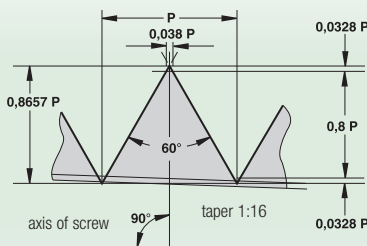
Use: Fittings and pipe couplings for gas, water, and sewer lines (replaced by ISO).

American Buttress



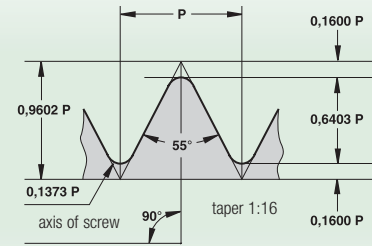
Use: Fittings and pipe couplings.

NPT (American National Pipe Thread)



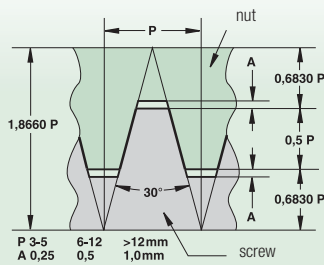
Use: Fittings and pipe couplings.

BSPT (British Standard Pipe Thread)



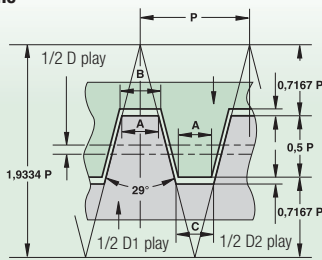
Use: Pipe thread for steam, gas, and water lines.

TR DIN 103



Use: Mechanical industry for motion transmission screws.

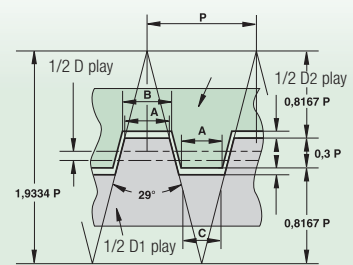
Acme



$A = 0,0307 P$
 $B = 0,3707 P - x D \text{ play}$
 $C = 0,3707 P - (D1 \text{ play} - D2 \text{ play})$

Use: Acme-General is used in mechanical industry for motion transmission screws.

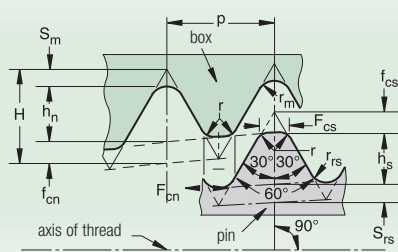
Acme, truncated (Stub)



$A = 0,4224 P$
 $B = 0,4224 P - x D \text{ play}$
 $C = 0,4224 P - (D1 \text{ play} - D2 \text{ play})$

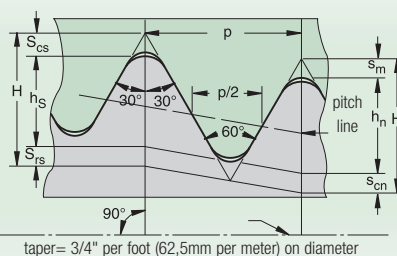
Use: Where normal Acme is too deep.

API Rotary Shoulder Connection



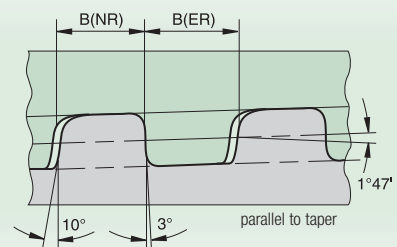
NOTE: Taper shown exaggerated.

API Casing and Tubing Round Thread Form



NOTE: Taper shown exaggerated.

API Buttress





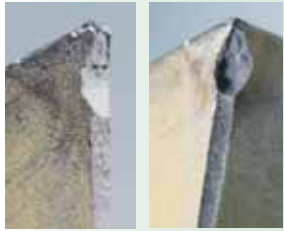




**Suggested Grades and Speeds for Threading
Various Workpiece Materials**

workpiece group	workpiece material	recommendations surface speed – SFM			
		uncoated	PVD coated		CVD coated
		THM	TN6010	TN6025	TN7110
free-machining carbon steel	10L18, 10L45, 1213, 12L13, 12L14, 1140, 1141, 11L44, 1151, 10L50	—	300–650	150–650	525–980
plain carbon steel	10063, 1008, 1010, 1015, 1018, 1020, 1025, 1026, 1108, 1117	—	250–650	150–575	500–920
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	—	250–650	125–550	300–920
alloy steels/tool steels 330–450 HB (36–47 HRC)		—	200–525	—	260–560
martensitic/ferritic stainless/precipitation hardening	416, 420F, 440F, 405, 409, 429, 430, 434, 436, 442, PH	—	150–525	100–400	215–780
austenitic stainless steel	201, 202, 301, 302, 303, 304, 304, 305, 321, 347, 348, 310, 314, 316, 316L, 330	200–350	200–650	150–450	—
gray cast iron 135–270 HB	class 20, 30, 35, 45	200–300	200–775	150–400	525–980
gray cast iron 275–450 HB	class 50, 55, 60	150–250	150–575	50–250	390–920
alloy/ductile iron	A536, J434C, 60-40-18, 80-55-06, 100-70-03	150–250	150–650	100–525	590–985
free-machining aluminum alloys	2024-T4, 2014-T6, 6061-T6, 2011-T3, 3003-H18, A2, Alcan, Alcoa 510, Duralumin	400–800	400–1200	—	—
high-silicon aluminum alloys	A380, A390, A380-1, A390-1, A380-2	—	—	—	—
copper/zinc/brass		250–600	250–1000	150–775	—
non-metallics	Graphite, Nylon, Plastics, Rubbers, Phenolics, Carbon	400–1500	400–1300	150–1000	—
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	80–120	80–400	40–250	—
high-temperature alloys 260–450 HB (26–47 HRC)	Rene 95, Waspaloy A286, Incoloy 800, Haynes 188, Stellite F, Haynes 25	80–100	100–250	20–200	—
titanium alloys	Ti-6Al-4V, Ti-5Al-2.5Sn	110–180	110–325	—	—

NOTE: When workpiece hardness levels are at the top of a range, starting SFM 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
<p>thread with torn finish</p> 	<ul style="list-style-type: none"> • Burrs. • Torn finish. • Steps. 	<ul style="list-style-type: none"> • Use positive rake or full profile insert. • Increase coolant concentration. • Alter infeed. • Increases SFM. • Check machine "Z" travel axis. • Check insert form. • Check for correct shim in LT system.
<p>chatter</p> 	<ul style="list-style-type: none"> • Poor rigidity. • Incorrect speed. • Insert movement. • Improper infeed. • Off centerline. • Wrong edge prep. 	<ul style="list-style-type: none"> • Minimize tool overhang. • Check for workpiece deflection. • Adjust SFM. • Check insert and clamp. • Use modified feed angle. • Verify that tool cutting position is at workpiece centerline. • Adjust hone level by ordering special insert.
<p>built-up edge</p> 	<ul style="list-style-type: none"> • Speed too low. • Insufficient coolant. • Chip load. • Wrong edge prep. 	<ul style="list-style-type: none"> • Increase SFM. • Increase coolant concentration and/or flow. • Adjust infeed angle. • Increase depth of cut per pass. • Adjust hone level by ordering special insert.
<p>deformation</p> 	<ul style="list-style-type: none"> • Wrong grade. • Speed too high. • Improper infeed angle. • Insufficient coolant. 	<ul style="list-style-type: none"> • Use a more wear-resistant grade (e.g., TN6010). • Reduce SFM. • Alter infeed method/angle. • Increase coolant flow.
<p>chipping</p> 	<ul style="list-style-type: none"> • Improper infeed. • Chip load. • Wrong grade. • Incorrect speed. • Poor rigidity. • Wrong edge prep. 	<ul style="list-style-type: none"> • Alter infeed to modified flank. • Increase or decrease number of passes. • Eliminate spring passes. • Use tougher grade (e.g., TN6025). • Increase SFM if chipping on trailing edge. • Decrease SFM if chipping on leading edge. • Minimize tool overhang. • Check for insert movement/check clamp. • Check for possible part deflection. • Adjust hone size by ordering special insert.
<p>broken nose</p> 	<ul style="list-style-type: none"> • Heavy chip load. • Small nose radius. • Wrong grade. • Improper infeed. • Wrong edge prep. 	<ul style="list-style-type: none"> • 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.
<p>flank wear</p> 	<ul style="list-style-type: none"> • Wrong grade. • Insufficient coolant. • Off centerline. 	<ul style="list-style-type: none"> • 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.)

problem	possible solution																	
	increase SFM	reduce SFM	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 .472" 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 .005" (0,127mm) depth of cut and produce an acceptable finish. For some materials, a .001" (0,025mm) to .003" (0,076mm) (spring) pass may be used to improve surface finish, however, chip breaking action may be compromised.

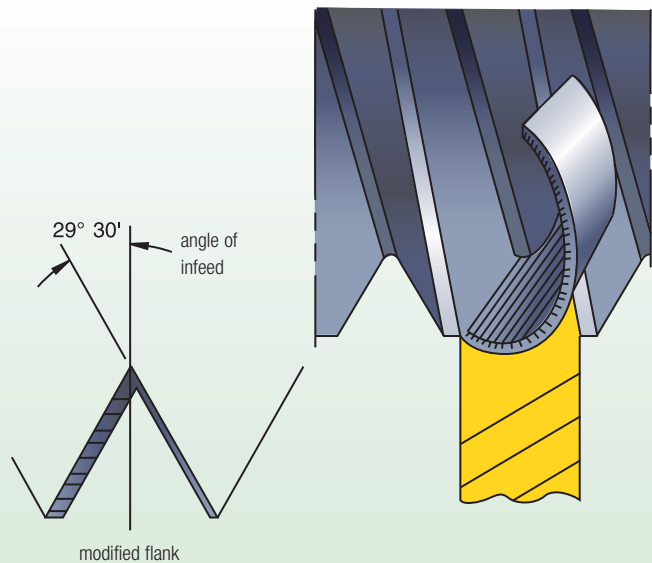


Machine Programming

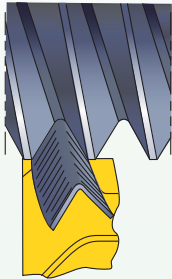
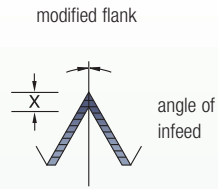
Modern CNC controls allow the programmer to easily adjust infeed angle, the number of passes, and depth of cut for each pass. The chip control threading insert performs best at an infeed angle of 29° 30', although 15° to 30° is acceptable. Also, it is important to maintain a minimum of .005" (0,127mm) 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



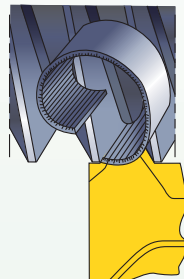
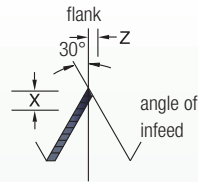
Advantage —

- 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



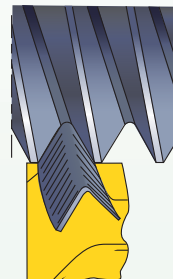
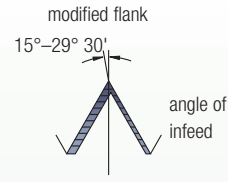
Advantage —

- 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, aluminum, and stainless steels.

Modified flank



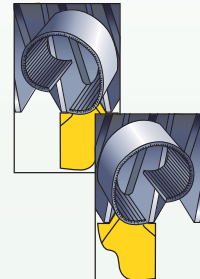
Advantage —

- 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 equalized and chip flow is much less of a problem.

Alternating flank



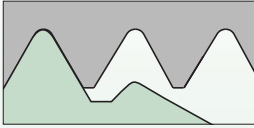
Advantage —

- 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.

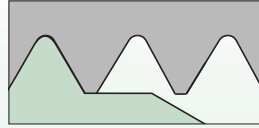
Partial Profile



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.

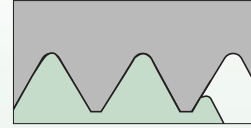
Full Profile



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 0.004"–0.006".

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

inch formula		
to find	given	formula
SFM	D (inch) RPM	$SFM = \frac{\pi \times D}{12"} \times RPM$
RPM	D (inch) SFM	$RPM = \frac{SFM \times 12"}{D \times \pi}$

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

- IPM = inch per minute
- SFM = surface feet per minute
- m/min = meters 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 (IPM or mm/min) of the tool allowed by the machine. Check your maximum speed with the following formulas:

inch formula: maximum cutting speed (SFM) =

$$\text{part diameter (inch)} \times 3.14 \times TPI \times \frac{\text{max IPM}}{12"} =$$

metric formula: 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 .002" (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 .002" (0,05mm) minimum depth of cut specification recommended.

Example:

Infeed per pass formula: accumulated depth = initial doc x $\sqrt{\# \text{ pass}}$
 For example, an 8-pitch external thread has a depth of .0789" (2,0mm).
 25% of .0789" (2,0mm) = approximately .0197" (0,50mm)
 (This is the infeed/doc for the first pass.)

.0197" (0,500mm) x $\sqrt{2} = .0278"$ (0,708mm)
 .0278" (0,708) - .0197" (0,500mm) = .0082" (0,207mm)
 (This is the infeed/doc for the second pass.)

.0197" (0,500mm) x $\sqrt{3} = .0341"$ (0,867mm)
 .0341" (0,867mm) - .0278" (0,708mm) = .0063" (0,159mm)
 (This is the infeed/doc for the third pass.)

.0197" (0,500mm) x $\sqrt{4} = .0394"$ (1,001mm)
 .0394" (1,001mm) - .0341" (0,867mm) = .0053" (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-chipping 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 stabilized cutting edges produce more favorable 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 .0019" (0,05mm). The allowance at the diameter should not exceed .0078" (0,2mm).

Metric ISO, External 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	.012	.018	.024	.030	.036	.042	.048	.060	.072	.085	.097	.109	.121
number of passes	4	4	5	6	6	8	8	10	12	14	15	15	16
values for flank infeed (X/Z)													
order of passes	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	.005/-	.007/-	.008/-	.008/-	.01/-	.009/-	.01/-	.009/-	.009/-	.008/-	.008/-	.009/-	.009/-
2	.003/.002	.005/.003	.006/.003	.006/.004	.008/.004	.008/.004	.009/.005	.01/.006	.011/.006	.012/.007	.013/.007	.014/.008	.015/.009
3	.002/.001	.004/.002	.004/.002	.005/.003	.006/.003	.006/.039	.007/.004	.007/.004	.008/.005	.009/.005	.01/.006	.011/.006	.012/.007
4	.002/.001	.003/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.007/.004	.008/.005	.009/.005	.01/.006
5			.003/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/.003	.006/.004	.007/.004	.007/.004	.008/.005	.009/.005
6				.003/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/0.003	.006/.003	.007/.004	.007/.004	.008/.005
7						.004/.002	.004/.002	.005/.003	.005/0.003	.005/.003	.006/.004	.007/.004	.007/.004
8						.003/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004
9								.004/.002	.004/.003	.005/.003	.005/.003	.006/.003	.006/.004
10								.004/.002	.004/.002	.005/.003	.005/.003	.006/.003	.006/.004
11									.004/.002	.004/.002	.005/.003	.005/.003	.006/.003
12									.004/.002	.004/.002	.005/.003	.005/.003	.006/.003
13										.004/.002	.004/.003	.005/.003	.005/.003
14										.004/.002	.004/.002	.005/.003	.005/.003
15											.004/.002	.005/.003	.005/.003
16													.005/.003

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	.011	.016	.021	.027	.032	.037	.043	.053	.064	.075	.085	.096	.107
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	.004/-	.006/-	.007/-	.008/-	.009/-	.008/-	.01/-	.01/-	.01/-	.011/-	.01/-	.011/-	.011/-
2	.003/.002	.004/.002	.005/.003	.005/.003	.006/.004	.007/.004	.007/.004	.008/.005	.01/.006	.011/.006	.011/.007	.012/.007	.013/.008
3	.002/.001	.003/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.008/.005	.009/.005	.009/.005	.01/.006
4	.002/.001	.003/.001	.003/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.004	.007/.004	.007/.004	.008/.005	.009/.005
5			.003/.002	.003/.002	.037/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.004	.006/.004	.007/.004	.008/.004
6				.003/.002	.003/.002	.003/.002	.004/.002	.004/.002	.005/.003	.006/.003	.006/.003	.006/.004	.007/.004
7						.003/.002	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003	.006/.004
8						.003/.002	.003/.002	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003
9								.003/.002	.004/.002	.004/.003	.005/.003	.005/.003	.005/.003
10								.003/.002	.004/.002	.004/.002	.004/.003	.005/.003	.005/.003
11									.004/.002	.004/.002	.004/.002	.005/.003	.005/.003
12										.004/.002	.004/.002	.005/.003	.005/.003
13											.004/.002	.004/.002	.005/.003
14											.004/.002	.004/.002	.004/.003
15												.004/.002	.004/.002
16													.004/.002

UN Thread, External Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
depth	.026	.031	.034	.038	.044	.051	.056	.061	.068	.077	.088	.102	.123
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	.008/-	.008/-	.009/-	.009/-	.008/-	.009/-	.009/-	.008/-	.008/-	.008/-	.008/-	.009/-	.009/-
2	.006/.003	.006/.004	.007/.004	.007/.004	.007/.004	.009/.005	.009/.005	.009/.005	.01/.006	.011/.006	.012/.007	.014/.008	.016/.009
3	.004/.003	.005/.003	.005/.003	.006/.003	.006/.003	.007/.004	.007/.004	.007/.004	.008/.004	.008/.005	.009/.005	.01/.006	.012/.007
4	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003	.006/.003	.006/.004	.006/.004	.007/.004	.008/.004	.009/.005	.01/.006
5	.003/.002	.004/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.008/.004	.009/.005
6		.003/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.008/.005
7				.004/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004
8					.003/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.005/.003	.006/.003	.007/.004
9					.003/.002	.004/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/.003	.006/.004
10							.004/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.004
11								.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/.003
12									.004/.002	.004/.002	.004/.002	.005/.003	.006/.003
13										.004/.002	.004/.002	.005/.003	.005/.003
14											.004/.002	.004/.003	.005/.003
15												.004/.002	.005/.003
16													.005/.003

UN Thread, Internal Thread Cutting

TPI	24	20	18	16	14	12	11	10	9	8	7	6	5
depth	.023	.027	.030	.034	.039	.045	.049	.054	.060	0.68	.077	.090	.108
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	.008/-	.008/-	.009/-	.009/-	.009/-	.009/-	.01/-	.01/-	.01/-	.01/-	.01/-	.011/-	.012/-
2	.005/.003	.009/.003	.006/.004	.006/.004	.007/.004	.007/.004	.008/.005	.009/.005	.009/.005	.01/.006	.011/.006	.012/.007	.014/.008
3	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.007/.004	.007/.004	.008/.005	.009/.005	.011/.006
4	.003/.002	.004/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/.003	.006/.003	.006/.004	.007/.004	.008/.004	.009/.005
5	.003/.002	.003/.002	.003/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004	.008/.005
6			.003/.002	.003/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.005/.003	.006/.003	.006/.004	.007/.004
7				.003/.002	.003/.002	.004/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.003	.007/.004
8					.003/.002	.003/.002	.004/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003	.006/.004
9						.003/.002	.003/.002	.004/.002	.004/.002	.004/.002	.004/.003	.005/.003	.006/.003
10								.003/.002	.004/.002	.004/.002	.004/.002	.005/.003	.005/.003
11									.003/.002	.004/.002	.004/.002	.004/.003	.005/.003
12										.003/.002	.004/.002	.004/.002	.005/.003
13											.004/.002	.004/.002	.005/.003
14												.004/.002	.005/.003
15													.004/.003

NPT Thread, External, and Internal Machining

pitch, Gg/Z	27.0	18.0	14.0	11.5	8.0
depth	.003	.044	.057	.070	.100
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	.007/-	.009/-	.009/-	.009/-	.01/-
2	.006/.003	.007/.004	.008/.005	.008/.005	.01/.006
3	.005/.003	.006/.003	.007/.004	.007/.004	.01/.006
4	.004/.002	.006/.003	.006/.003	.007/.004	.009/.005
5	.004/.002	.005/.003	.006/.003	.006/.004	.008/.005
6	.003/.002	.005/.003	.005/.003	.006/.003	.008/.004
7		.004/.002	.005/.003	.005/.003	.007/.004
8		.003/.002	.004/.002	.005/.003	.007/.004
9			.004/.002	.005/.003	.007/.004
10			.004/.002	.004/.002	.006/.004
11				.004/.002	.006/.003
12				.004/.002	.005/.003
13					.004/.002
14					.004/.002

BSPT Thread, External, and Internal Machining

pitch, Gg/Z	28	19	14	11
depth	.023	.034	.046	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	.007/-	.009/-	.009/-	.008/-
2	.005/.003	.007/.004	.008/.004	.01/.005
3	.004/.002	.005/.003	.006/.003	.007/.004
4	.003/.002	.005/.002	.005/.003	.006/.003
5	.003/.002	.004/.002	.005/.002	.005/.003
6		.004/.002	.004/.002	.005/.003
7			.004/.002	.005/.002
8			.004/.002	.004/.002
9				.004/.002
10				.004/.002

Trapezoid Thread to DIN 103, External, and Internal Machining

pitch	1.5	2.0	3.0	4.0	5.0
depth	.004	.049	.069	.089	.108
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	.009/-	.01/-	.01/-	.01/-	.011/-
2	.007/.002	.009/.002	.01/.003	.011/.003	.012/.003
3	.005/.001	.007/.002	.009/.002	.01/.003	.011/.003
4	.005/.001	.006/.002	.008/.002	.009/.002	.01/.003
5	.004/.001	.005/.001	.007/.002	.008/.002	.009/.002
6	.004/.001	.004/.001	.006/.002	.007/.002	.008/.002
7		.004/.001	.006/.002	.007/.002	.008/.002
8		.004/.001	.004/.001	.006/.002	.007/.002
9			.005/.001	.006/.002	.007/.002
10			.004/.001	.005/.001	.006/.002
11				.005/.001	.006/.001
12				.004/.001	.005/.001
13					.005/.001
14					.004/.001

Round Thread to DIN 405, External, and Internal Machining

pitch, Gg/Z	10	8	6
depth	.052	.064	.085
number of passes	8	10	12
values for flank infeed (X/Z)			
order of passes	X/Z	X/Z	X/Z
1	.008/-	.009/-	.008/-
2	.008/.002	.008/.002	.01/.003
3	.008/.002	.008/.002	.001/.003
4	.007/.002	.007/.002	.009/.002
5	.006/.002	.007/.002	.008/.002
6	.006/.001	.006/.002	.008/.002
7	.005/.001	.006/.002	.007/.002
8	.004/.001	.005/.001	.006/.002
9		.004/.001	.006/.001
10		.006/.001	.005/.001
11			.004/.001
12			.003/.001

Whitworth, External, and Internal Thread Cutting

pitch, TPI	28	20	19	16	14	12	11	10	9	8	7	6	5
depth	.023	.032	.032	.034	.040	.053	.058	.064	.071	.080	.091	.107	.128
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	.007/-	.008/-	.009/-	.008/-	.009/-	.009/-	.01/-	.009/-	.009/-	.01/-	.008/-	.008/-	.008/-
2	.005/.003	.007/.004	.007/-	.007/.004	.008/.004	.009/.005	.01/5.236	.01/.005	.011/.006	.012/.006	.013/.007	.014/.007	.017/.009
3	.004/.002	.005/.003	.005/.003	.006/.003	.006/.003	.007/.004	.008/.004	.008/.004	.009/.004	.009/.005	.01/.005	.011/.006	.013/.007
4	.003/.002	.004/.002	.005/.002	.005/.002	.005/.003	.006/.003	.006/.003	.007/.004	.007/.004	.008/.004	.008/.004	.009/.005	.011/.006
5	.003/.002	.004/.002	.004/.002	.006/.002	.005/.002	.005/.003	.006/.003	.006/.003	.006/.003	.007/.004	.007/.004	.008/.004	.009/.005
6		.004/.002	.004/.002	.004/.002	.004/.002	.005/.002	.005/.003	.005/.003	.006/.003	.006/.003	.007/.003	.007/.004	.009/.004
7				.003/.002	.004/.002	.004/.002	.005/.002	.005/.003	.005/.003	.006/.003	.006/.003	.007/.004	.008/.004
8				.003/.002	.004/.002	.004/.002	.004/.002	.005/.002	.005/0	.005/.003	.006/.003	.006/.003	.007/.004
9						.038/.002	.004/.002	.004/.002	.005/.002	.005/.003	.005/.003	.006/.003	.007/.004
10								.004/.002	.004/.002	.005/.002	.005/.003	.005/.003	.006/.003
11									.004/.002	.004/.002	.005/.002	.005/.003	.006/.003
12										.004/.002	.004/.002	.005/.003	.006/.003
13											.004/.002	.005/.003	.006/.003
14											.004/.002	.005/.002	.005/.003
15												.005/.002	.005/.003
16													.005/.003

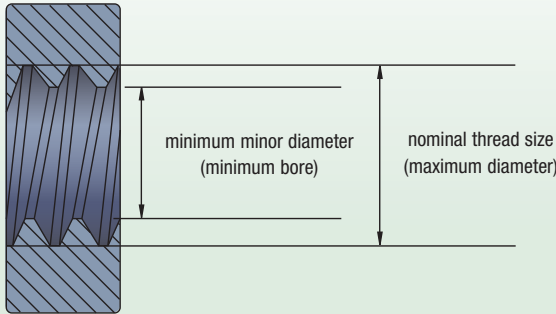
Multi-Tooth Threads, Internal

type	ISO metric						ISO UN					Whitworth	NPT		
	3M	2M	3M	2M	3M	2M	2M	3M	2M	3M	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	.024	.033	.033	.460	.460	.070	.037	.037	.490	.490	.740	.620	.690	.690	.100
1	.013	.015	.020	.020	.028	.022	.017	.022	.022	.030	.023	.029	.023	.032	.035
2	.011	.010	.013	.015	.018	.019	.012	.015	.016	.019	.020	.019	.020	.022	.025
3	—	.008	—	.011	—	.017	.008	—	.011	—	.017	.014	.014	.015	.022
4	—	—	—	—	—	.012	—	—	—	—	.014	—	.012	—	.018

Recommendations for Steel Workpieces (<300 BHN)

catalog number	insert size	TPI profile	total depth — on radius		
			1st pass	2nd pass	3rd pass
NTC-8R/L8EM	8	8 UN	.048	.064	.079
NTC-8R/L8IM	8	8 UN	.047	.061	.074
NTC-8R/L10EM	8	10 UN	.036	.050	.063
NTC-8R/L10IM	8	10 UN	.035	.048	.060
NTC-8R/L12EM	8	12 UN	.030	.041	.052
NTC-8R/L12IM	8	12 UN	.030	.037	.047
NTC-8R/L14EM	8	14 UN	.027	.037	.044
NTC-8R/L14IM	8	14 UN	.024	.031	.041
NTC-8R/L16EM	8	16 UN	.023	.032	.038
NTC-8R/L16IM	8	16 UN	.020	.027	.037
NTC-8R/L18EM	8	18 UN	.019	.026	.034
NTC-8R/L18IM	8	18 UN	.019	.024	.033
NDC-68RDR/L-75M	8	8 round	.058	.065	.073
NDC-61RDR/L-75M	8	10 round	.044	.051	.057
NDC-88RDR/L-75M	8	8 round	.051	.069	.073
NDC-88VR/L-75M	8	8 NPT	.040	.068	.096
NDC-8115VR/L-75M	8	11.5 NPT	.038	.054	.067
NDN-814VR/L-75M	8	14 NPT	.038	.048	.054

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.



Inch-Sized 60° V-Threading Limits

internal threading limitations
NT-1, NT-2 V-threading inserts

TPI	nominal thread size		minimum minor diameter (inch)	
	NT-1	NT-2	NT-1	NT-2
6	1-7/8	—	1.695	—
7	1-3/4	—	1.595	—
8	1-5/8	—	1.490	—
9	1-9/16	—	1.442	—
10	1-1/2	15/16	1.392	.830
11	1-7/16	15/16	1.339	.830
11-1/2	1-3/8	15/16	1.281	.830
12	1-3/8	9/16	1.285	.472
13	1-5/16	9/16	1.229	.472
14	1-1/4	9/16	1.173	.472
16	1-1/4	9/16	1.182	.472
18	1-1/8	9/16	1.065	.472
20	1-1/8	1/2	1.071	.440
24*	1-1/16	1/2	1.017	.440

*Twenty-four threads per inch and finer can be cut with an NT-2 insert provided the minor diameter is 1.000" or larger (.440" or larger with NT-1).

internal threading limitations
NT-3 and- 4 V-threading inserts

TPI	nominal thread size	minimum minor diameter (inch)
4-1/2**	2-7/8	2.634
5	2-3/4	2.534
6	2-1/2	2.320
7	2-1/4	2.095
8	2	1.865
9	1-15/16	1.817
10	1-7/8	1.767
11	1-13/16	1.714
11-1/2	1-3/4	1.656
12	1-3/4	1.660
13	1-5/8	1.542
14	1-9/16	1.485
16*	1-7/16	1.370

*Sixteen threads per inch and finer can be cut provided minor diameter is 1.370" or larger.

**NT-4 insert only.

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.

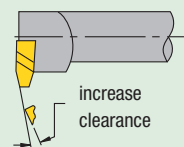
Acme Threading Limits

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

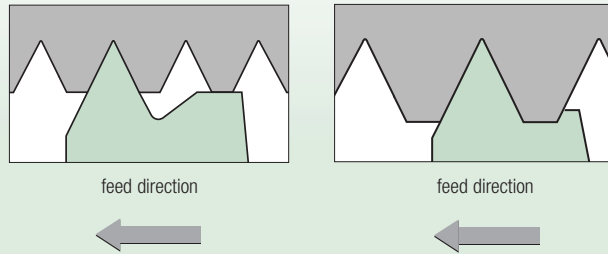
*Sixteen threads per inch and finer can be cut provided minor diameter is 36,5mm (1.438") or larger.

**NA-6 insert only.



Additional secondary clearance can be ground on leading edge of insert to provide sufficient helical clearance for machining coarser threads and multiple start threads. Modified standard inserts may be furnished for machining threads outside of the limits shown.

60° V-Thread Crest Turning Application Data



NTC crest turning insert for 12 threads per inch and finer ($P \leq 2,0\text{mm}$)

NTC crest turning insert for 11 threads per inch and coarser ($P \geq 3,0\text{mm}$)

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 catalog number	nose radius on insert (inch)	thread radius per MIL-S-8879A (inch)
NJ-3014R/L12	.0125/.0135	.0125/.0150
NJK-3008R/L20	.0075/.0085	.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** (inch)	E** (inch)	recommended TPI		recommended TP	
				external	internal	external	internal
 NT-NTP-	NT-1	.075	.044	—	24–12	—	1,00–2,00
	NT-2	.113	.075	36–8	20–7	0,70–3,00	1,25–3,50
	NT-2-K	.113	.075	36–8	20–7	0,70–3,00	1,25–3,50
	NTF-2	.062	.040	44–14	24–12	0,60–1,75	1,00–2,00
	NTK-2	.062	.040	44–14	24–12	0,60–1,75	1,00–2,00
	NTP-2	.113	.075	36–8	20–7	0,70–3,00	1,25–3,50
	NT-3	.148	.097	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-K	.148	.097	20–6	12–5	1,25–4,00	2,00–5,00
	NT-3-C	.148	.097	11–6	6 (only)	2,50–4,00	4,00 (only)
	NT-3-CK	.148	.097	11–6	6 (only)	2,50–4,00	4,00 (only)
 NTF-NTK-	NTF-3	.083	.054	44–10	24–9	0,60–2,50	1,00–2,50
	NTK-3	.083	.054	44–10	24–9	0,60–2,50	1,00–2,50
	NTP-3	.148	.097	20–6	12–5	1,25–4,00	2,00–5,00
	NT-4	.196	.127	20–4	12–4	1,25–6,25	2,00–6,25
	NT-4-K	.196	.127	20–4	12–4	1,25–6,25	2,00–6,25
	NTP-4	.196	.127	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.

**For metric D and E dimensions, multiply by 25,4.

API Thread Forms • Insert Applications Chart for API Rotary Shouldered Connections

thread form	WIDIA™ insert		tool joint application	minimum box size*
	cresting	non-cresting		
V-.038R 2" TPF 4 TPI	NDC-4038R/L2 4-E/IR4API382	ND-3038R/L	2-3/8 API internal flush 2-7/8 API internal flush 3-1/2 API internal flush 4 API internal flush 4-1/2 API internal flush 5-1/2 API internal flush 6-5/8 API internal flush 4 API full hole API #23, API #26, API #31, API #35, API #38, API #40, API #44, API #46, API #50	API #31 2-7/8 IF
V-.038R 3" TPF 4 TPI	NDC-4038R/L3 4-E/IR4API383	ND-3038R/L	API #56 API #61 API #70 API #77	API #56
V-.050 2" TPF 4 TPI	NDC-4050R/L2 4-E/IRAPI502	ND-4050R/L	5-1/2 API full hole 6-5/8 API regular 6-5/8 API full hole	5-1/2 API full hole
V-.050 3" TPF 4 TPI	NDC-4050R/L3 4-E/IR4API503	ND-4050R/L	5-1/2 API regular 7-5/8 API regular 8-5/8 API regular	5-1/2 API regular
V-.040 3" TPF 5 TPI	NDC-3040R/L3 NDC-4040R/L3 4-E/IR5API403	ND-3040R/L ND-4040R/L	2-3/8 API regular 2-7/8 API regular 3-1/2 API regular 4-1/2 API regular	3-1/2 API regular

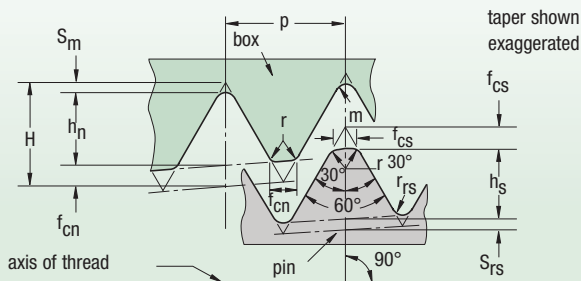
*Minimum box size that can be threaded with a standard TopThread insert due to minimum bore equipment.

API Thread Forms
Product Thread Dimensions • Rotary Shouldered Connections (Inch)

threadform	taper inch per ft.	thread height, not truncated H	thread height, truncated h _n =h _s	root truncation S _m =S _{rs} f _m =f _{rs}	crest truncation f _{cn} =f _{cs}	width of flat		root radius r _m =r _{rs}	radius at thread corners r	pitch p
						crest f _{cn} =f _{cs}	crest f _m =f _{rs}			
V-.038R	2	.216005	.121844	.038000	.056161	.065	—	.038	.015	.250
V-.038R	3	.215379	.121381	.038000	.055998	.065	—	.038	.015	.250
V-.040	3	.172303	.117842	.020000	.034461	.040	—	.020	.015	
V-.050	3	.215379	.147303	.025000	.043076	.050	—	.025	.015	.250
V-.050	2	.216005	.147804	.025000	.043201	.050	—	.025	.015	

NOTE: All dimensions in inches.

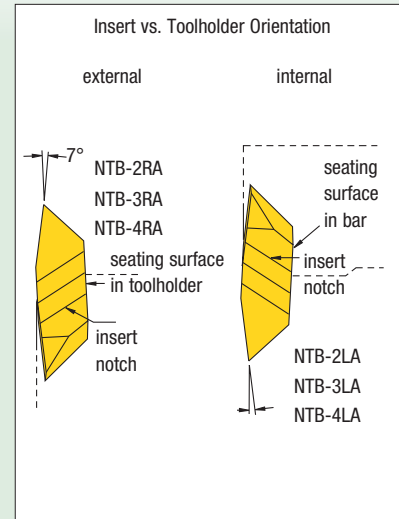
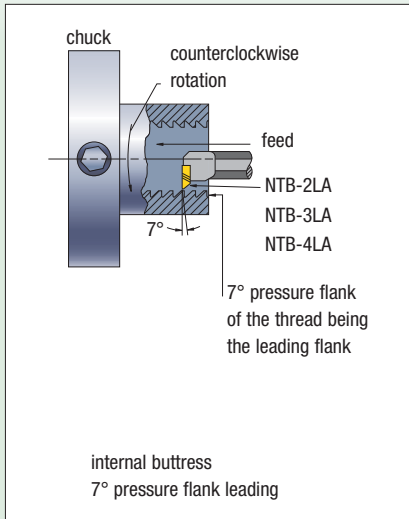
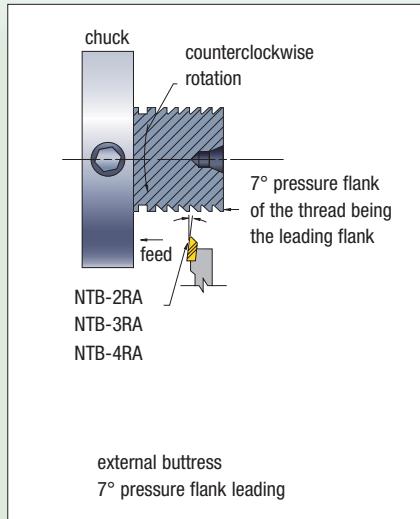
V-.040 and V-.050 Product Thread Form



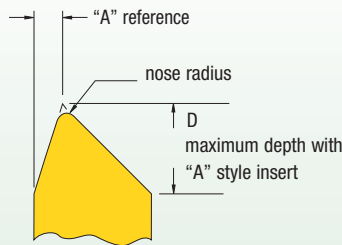
Casing and Tubing Round Thread (Height Dimensions)

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



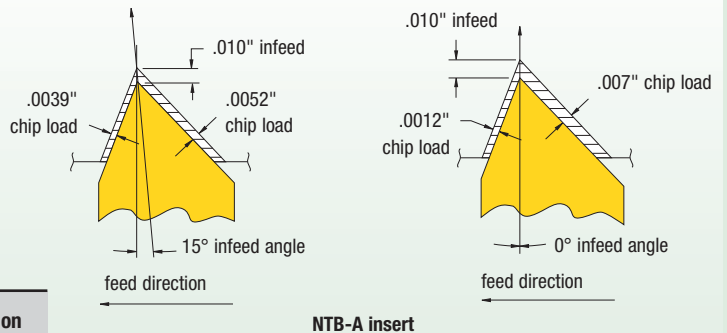
Reference Dimensions



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.

Infeed Angle vs. Chip Load: 7° Pressure Flank Leading



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.

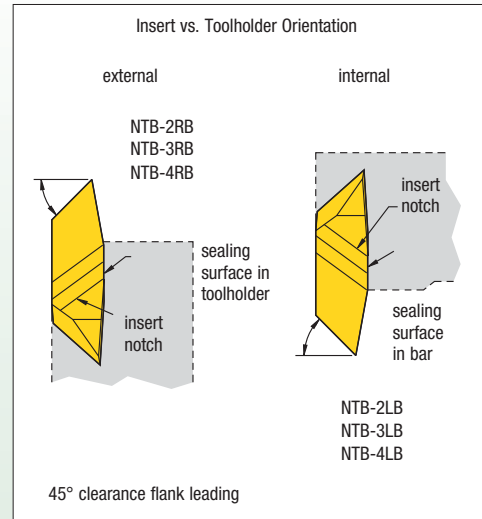
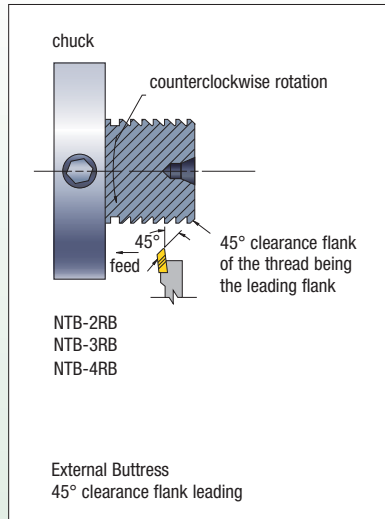
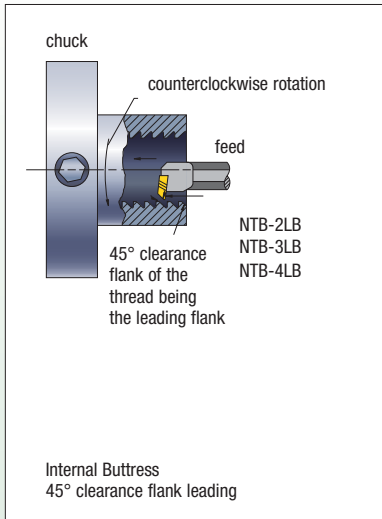
**Can cut 16 or 20 threads per inch provided minor diameter is 1.375" or larger.

Threads per Inch vs. Maximum Root Radius Chart (Inch)

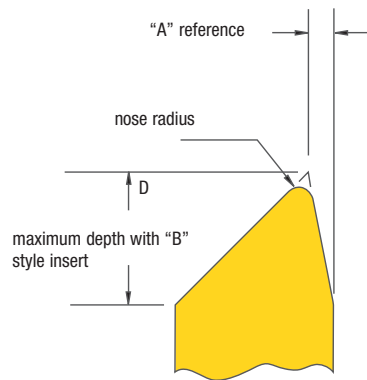
TPI	20	16	12	10	8	6	5	4	3	2-1/2	2	1-1/2	1-1/4	1
maximum root radius	.0036	.0045	.0059	.0071	.0089	.0119	.0143	.0179	.0238	.0286	.0375	.0476	.0572	.0714

NOTE: Special Buttress forms are available upon request.

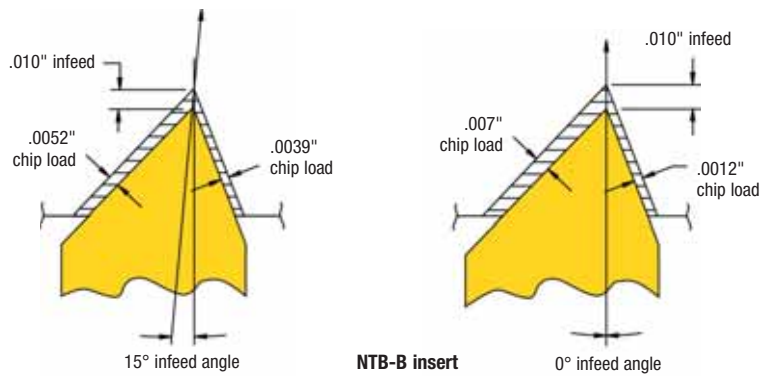
American Buttress (45° Clearance Flank Leading): NTB-B Inserts • PULL-type



Reference Dimensions



Infeed Angle vs. Chip Load: 45° Clearance Flank Leading



insert	D (inch)	"A" reference (inch)	nose radius (inch)	pitch based on maximum radius
NTB-3B	.171	.031	.005-.004	8-16 TPI

NOTE: For balanced chip load, a reverse 15° infeed angle is suggested.

Internal Threading Limitations

internal threading limitations NTB-2B Buttress threading inserts		
TPI	nominal thread size	minimum minor diameter (inch)
8	1-3/4	1.600
10	1-5/8	1.505
12	1-1/2	1.400
16	1-1/4	1.175
20	1-1/16	1.002

internal threading limitations NTB-3 and NTB-4B Buttress threading inserts		
TPI	nominal thread size	minimum minor diameter (inch)
4*	2-7/8	2.575
5	2-3/4	2.510
6	2-3/8	2.175
8	2-1/8	1.975
10	1-7/8	1.755
12	1-5/8	1.525
16	1-1/2	1.407
20	1-7/16	1.378

*NTB-4B insert only.

WIN WITH WIDIA™

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TopThread™ System

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- Rigid insert clamping design ensures the best tool life, surface finish, and workpiece quality.
- Minimizes built-up edges, reduces cutting forces, and precisely cuts most common materials.
- Ensures accurate, high-quality threads. Excellent for internal threading operations.

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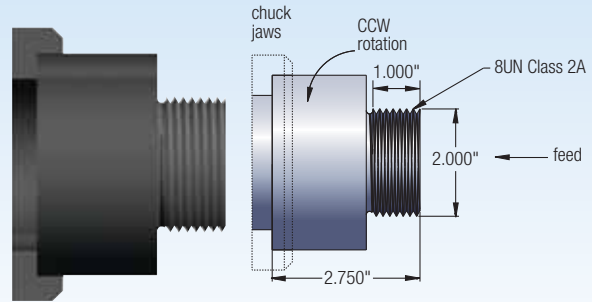
Required Information

From Part Drawing:

- material: 316SS, 200 HB
- thread form: 8UN Class 2A
- operation: external threading
- pitch diameter: 2.00" x 1.00" deep

From Machine Set-Up Data:

- tooling: .750" x .750"
- spindle rotation: counterclockwise
- feed: toward chuck

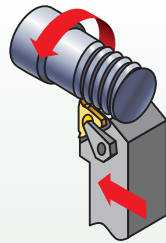


Steps for a Successful Threading Operation

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 (8 UN Class 2A).
- Hand of insert (right hand — ER).

Choose the High-Performance Solution

catalog number	insert size	TN6025
3ER8UN	3"	●

High-Performance Selection

NOTE: Use insert with largest IC available.

- insert: 3ER8UN
- grade: TN6025
- speed: 500 SFM

Step 3 • Select the Grade and Speed

Need to Know:

- Workpiece material (316SS-200HB).
- Operation (external).

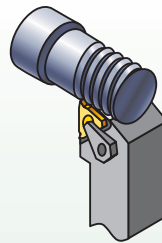
Options: Grade and Speed
Selection Guidelines

threading operation	stainless steel
external	general purpose and high performance
	TN6025
	150–450 SFM

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 (3/8").



Options:

catalog number	insert size	shim
LSASR-123	3"	SM-YE3

First choice: LSASR-123 holder

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (8 TPI).
- Pitch diameter (2").
- Helix method (standard).
See LT shim selection chart.

Select SM-YE3 shim

NOTE: The SM-YE3 shim is supplied with the selected toolholder.

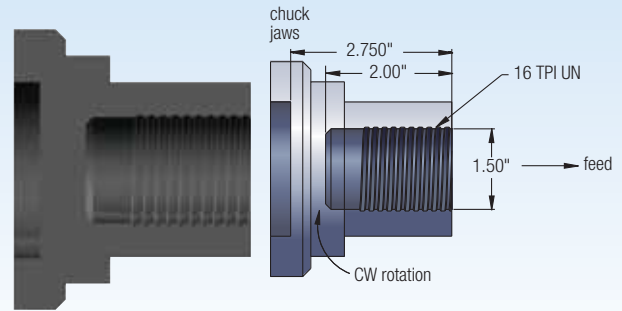
Required Information

From Part Drawing:

- material: 4140 steel
- thread form: 16 TPI UN
- operation: internal threading
- pitch diameter: 1.5" x 2" deep

From Machine Set-Up Data:

- tooling: .075" boring bar
- spindle rotation: clockwise
- feed: away from chuck

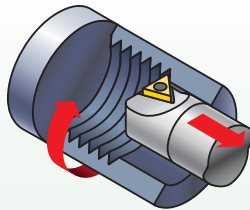


Steps for a Successful Threading Operation

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 (16UN Class 2A).
- Hand of insert (left hand — NL).

Choose the High-Performance Solution

catalog number	insert size	TN6025
2ILA60	2"	●
3ILA60	3"	●

High-Performance Selection

NOTE: Use insert with largest possible IC to go into the bore.

insert: 3ILA60
grade: TN6025
speed: 450 SFM

Step 3 • Select the Grade and Speed

Need to Know:

- Workpiece material (4010 steel).
- Operation (internal).

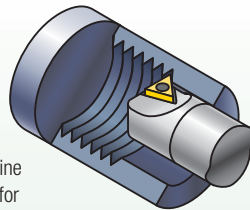
Options: Grade and Speed
Selection Guidelines

threading operation	steel
internal	general purpose and high performance
	TN6025
	100–550 SFM

Step 4 • Select Toolholder

Need to Know:

- External or internal operation (internal).
- Pitch diameter to determine minimum bore diameter for internal operations (1.5").
- Type of tooling — toolholder, boring bar (boring bar).
- Hand of tool (left hand).
- Insert size (3/8").



Options:

catalog number	insert size	minimum bore diameter	shim
S1212-LSEL3	3"	.90	SM-YE3
S0812-LSEL2	2"	.65	—

First choice: S1212-LSEL3 bar

Step 5 • Select Shim

Need to Know:

- Thread form — TPI or pitch (16 TPI).
- Pitch diameter (1.5").
- Helix method (reverse).
See LT shim selection chart.

Select SM-YE3-2N shim

NOTE: For this application, the standard shim supplied should be replaced with the recommended shim, SM-YE3-2N.

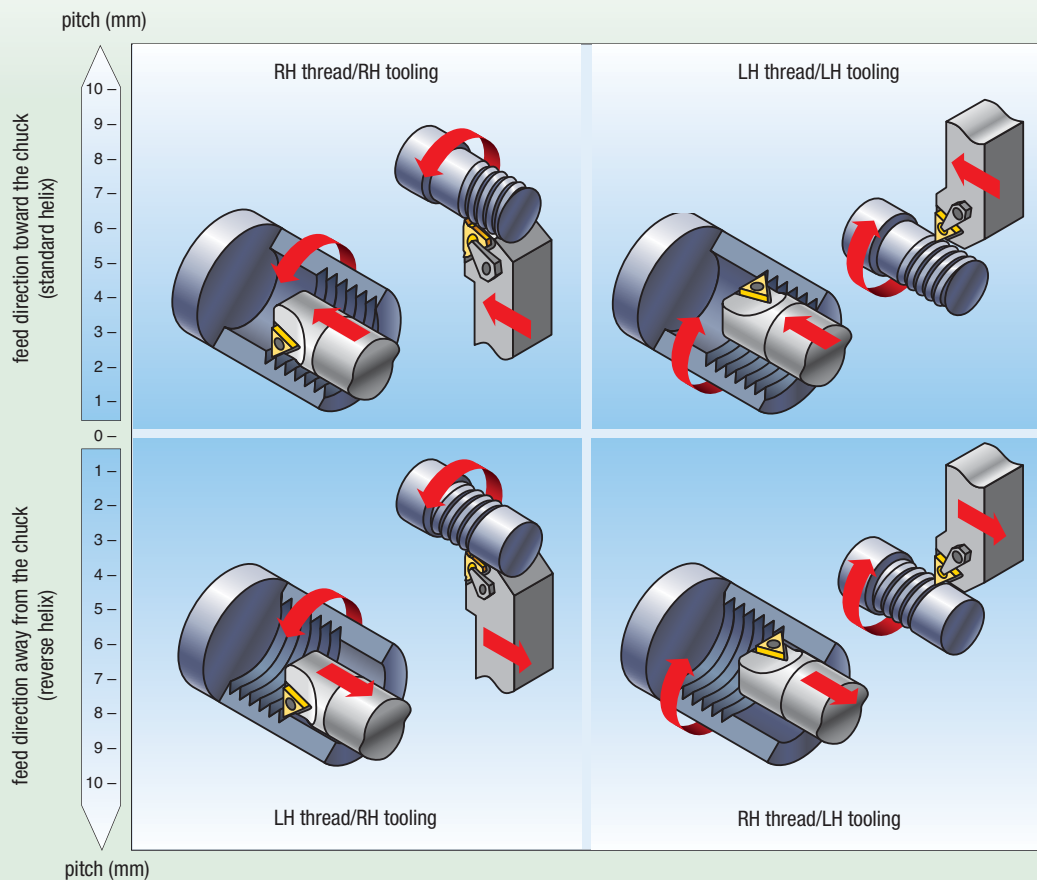
Laydown Threading Shim Selection Guidelines

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

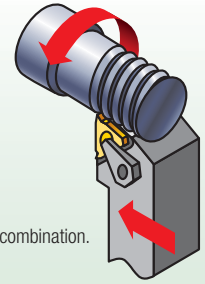
To calculate the lead angle of a given thread, use this formula:

$$\beta = \text{Arctan} \frac{P \cdot S}{\pi D_e}$$

β = thread lead angle
 D_e = effective pitch diameter of thread wear
 $P = 1/\text{TPI}$
 TPI = threads per inch
 S = number of starts
 single-start, lead = pitch
 multiple-start, lead = pitch (x) number of starts

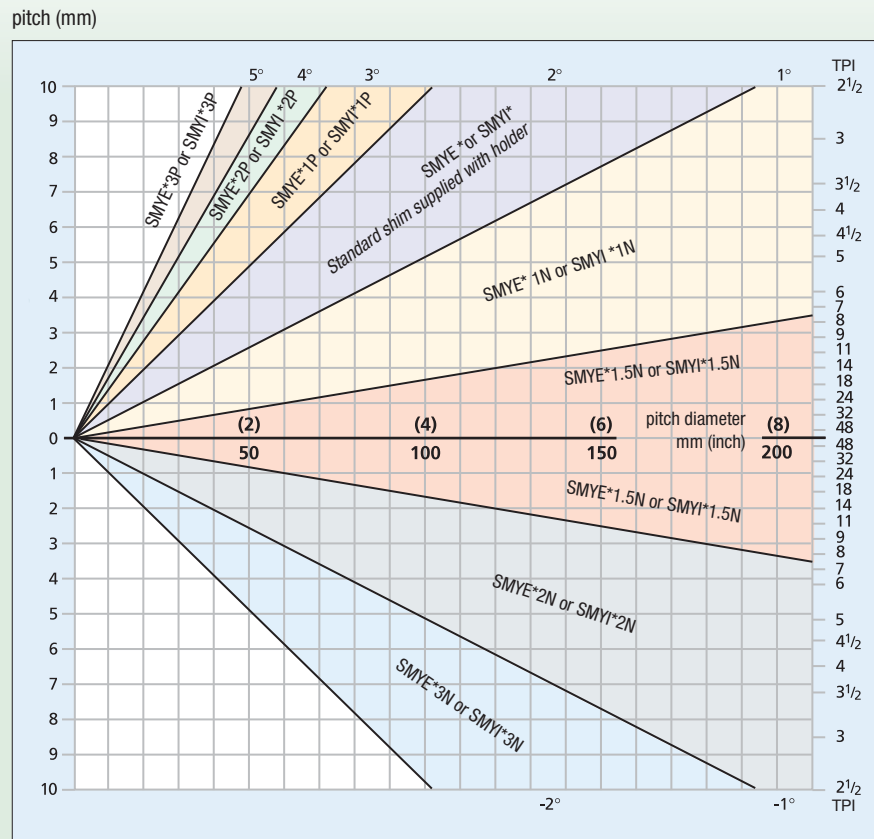
All toolholders are designed with an inclination angle = 1.5°. When turning standard threads with a lead angle of 1–2°, this guarantees adequate clearance at the flanks of the insert's thread tooth. The thread lead angle and the required inclination angle of the insert are given by β .

Cutting edge height is constant at every shim and insert combination. All toolholders are supplied with 1-1/2° lead angle.



NOTE: Arctan equals Tan⁻¹ (see chart below for approximate lead angles).

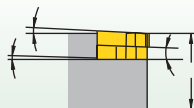
Laydown Selection Chart



*denotes shim size: 3 = insert size 16 (3/8" D)
4 = insert size 22 (1/2" D)

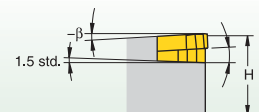
standard helix method:

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 • Inch

insert size	toolholder		shim ordering code (inch)							
	external	internal	standard				reverse			
3 (3/8")	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 (3/8")	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 (1/2")	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 (1/2")	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 (inch)							
72	—	—	—	—	—	0.12-0.31	0.32-0.84	>0.84	0.84-0.32	0.31-0.12
—	0,35	—	—	—	—	0.12-0.3	0.31-0.84	>0.84	0.84-0.31	0.3-0.12
64	—	—	—	—	—	0.14-0.35	0.36-0.95	>0.95	0.95-0.36	0.35-0.14
—	0,40	—	—	—	—	0.14-0.35	0.36-0.96	>0.96	0.96-0.36	0.35-0.14
56	0,45	—	—	—	—	0.16-0.4	0.41-1.09	>1.09	1.09-0.41	0.4-0.16
—	0,50	—	—	—	0.11-0.16	0.17-0.44	0.45-1.2	>1.20	1.2-0.45	0.44-0.17
48	—	—	—	—	0.12-0.17	0.18-0.46	0.47-1.27	>1.27	1.27-0.47	0.46-0.18
44	—	—	—	—	0.13-0.19	0.2-0.51	0.52-1.38	>1.38	1.38-0.52	0.51-0.2
—	0,60	—	0.1-0.12	0.13-0.2	0.21-0.53	0.54-1.44	>1.44	1.44-0.54	0.53-0.21	
40	—	—	0.11-0.13	0.14-0.21	0.22-0.56	0.57-1.52	>1.52	1.52-0.57	0.56-0.22	
—	0,70	—	0.12-0.15	0.16-0.23	0.24-0.62	0.63-1.68	>1.68	1.68-0.63	0.62-0.24	
36	—	—	0.12-0.15	0.16-0.23	0.24-0.62	0.63-1.69	>1.69	1.69-0.63	0.62-0.24	
—	0,75	0.11-0.12	0.13-0.16	0.17-0.25	0.26-0.66	0.67-1.8	>1.80	1.8-0.67	0.66-0.26	
32	—	0.12-0.13	0.14-0.17	0.18-0.26	0.27-0.7	0.71-1.9	>1.90	1.9-0.71	0.7-0.27	
—	0,80	0.12-0.13	0.14-0.17	0.18-0.26	0.27-0.71	0.72-1.91	>1.91	1.91-0.72	0.71-0.27	
28	—	0.14-0.14	0.15-0.19	0.2-0.3	0.31-0.8	0.81-2.17	>2.17	2.17-0.81	0.8-0.31	
27	—	0.14-0.15	0.16-0.2	0.21-0.31	0.32-0.83	0.84-2.25	>2.25	2.25-0.84	0.83-0.32	
—	1,00	0.15-0.16	0.17-0.21	0.22-0.33	0.34-0.89	0.9-2.39	>2.39	2.39-0.9	0.89-0.34	
24	—	0.16-0.17	0.18-0.23	0.24-0.35	0.36-0.94	0.95-2.53	>2.53	2.53-0.95	0.94-0.36	
—	1,25	0.19-0.2	0.21-0.27	0.28-0.42	0.43-1.11	1.12-2.99	>2.99	2.99-1.12	1.11-0.43	
20	—	0.19-0.21	0.22-0.27	0.28-0.42	0.43-1.13	1.14-3.04	>3.04	3.04-1.14	1.13-0.43	
18	—	0.21-0.23	0.24-0.31	0.32-0.47	0.48-1.26	1.277-3.38	>3.38	3.38-1.27	1.26-0.48	
—	1,50	0.22-0.25	0.26-0.33	0.34-0.5	0.51-1.34	1.35-3.59	>3.59	3.59-1.35	1.34-0.51	
16	—	0.24-0.26	0.27-0.35	0.36-0.53	0.54-1.41	1.42-3.8	>3.80	3.8-1.42	1.41-0.54	
—	1,75	0.26-0.29	0.3-0.38	0.39-0.59	0.6-1.56	1.57-4.19	>4.19	4.19-1.57	1.56-0.6	
14	—	0.27-0.3	0.31-0.4	0.41-0.61	0.62-1.62	1.63-4.34	>4.34	4.34-1.63	1.62-0.62	
13	—	0.29-0.32	0.33-0.43	0.44-0.66	0.67-1.74	1.75-4.68	>4.68	4.68-1.75	1.74-0.67	
—	2,00	0.3-0.33	0.34-0.44	0.45-0.67	0.68-1.78	1.79-4.79	>4.79	4.79-1.79	1.78-0.68	
12	—	0.32-0.35	0.36-0.46	0.47-0.71	0.72-1.89	1.9-5.07	>5.07	5.07-1.9	1.89-0.72	
11.5	—	0.33-0.37	0.38-0.49	0.5-0.74	0.75-1.97	1.98-5.29	>5.29	5.29-1.98	1.97-0.75	
11	—	0.34-0.38	0.39-0.51	0.52-0.78	0.79-2.06	2.07-5.53	>5.53	5.53-2.07	2.06-0.79	
—	2,50	0.37-0.42	0.43-0.55	0.56-0.84	0.85-2.23	2.24-5.98	>5.98	5.98-2.24	2.23-0.85	
10	—	0.38-0.42	0.43-0.56	0.57-0.86	0.87-2.27	2.28-6.08	>6.08	6.08-2.28	2.27-0.87	
9	—	0.42-0.47	0.48-0.62	0.63-0.95	0.96-2.52	2.53-6.75	>6.75	6.75-2.53	2.52-0.96	
—	3,00	0.45-0.5	0.51-0.66	0.67-1.02	1.03-2.68	2.69-7.18	>7.18	7.18-2.69	2.68-1.03	
8	—	0.47-0.53	0.54-0.7	0.71-1.08	1.09-2.84	2.85-7.6	>7.60	7.6-2.85	2.84-1.09	
—	3,50	0.52-0.59	0.6-0.77	0.78-1.19	1.2-3.13	3.14-8.38	>8.38	8.38-3.14	3.13-1.2	
7	—	0.524-0.61	0.62-0.8	0.81-1.23	1.24-3.25	3.26-8.68	>8.68	8.68-3.26	3.25-1.24	
—	4,00	0.6-0.67	0.68-0.89	0.9-1.36	1.37-3.58	3.59-9.57	>9.57	9.57-3.59	3.58-1.37	
6	—	0.63-0.71	0.72-0.94	0.95-1.44	1.45-3.79	3.8-10.13	>10.13	10.13-3.8	3.79-1.45	
—	5,00	0.75-0.84	0.85-1.11	1.12-1.7	1.71-4.48	4.49-11.97	>11.97	11.97-4.49	4.48-1.71	
5	—	0.76-0.86	0.87-1.13	1.14-1.73	1.74-4.55	4.56-12.16	>12.16	12.16-4.56	4.55-1.74	
4.5	—	0.84-0.95	0.96-1.26	1.27-1.92	1.93-5.06	5.07-13.51	>13.51	13.51-5.07	5.06-1.93	
—	6,00	0.9-1.01	1.02-1.33	1.34-2.04	2.05-5.37	5.38-14.36	>14.36	14.36-5.38	5.37-2.05	
4	—	0.95-1.07	1.08-1.41	1.42-2.16	2.17-5.69	5.7-15.2	>15.20	15.2-5.7	5.69-2.17	
inclination angle			4.5	3.5	2.5	1.5	0.5	0.0	-0.5	-1.5
			standard helix (feed toward the chuck)					reverse helix (feed away from the chuck)		

1. Select TPI or pitch from the left-hand columns.
2. Follow row to specified pitch diameter and the correct feed direction.
3. Follow the column to the top for the required shim based on the toolholder and insert size.

WIN WITH WIDIA™

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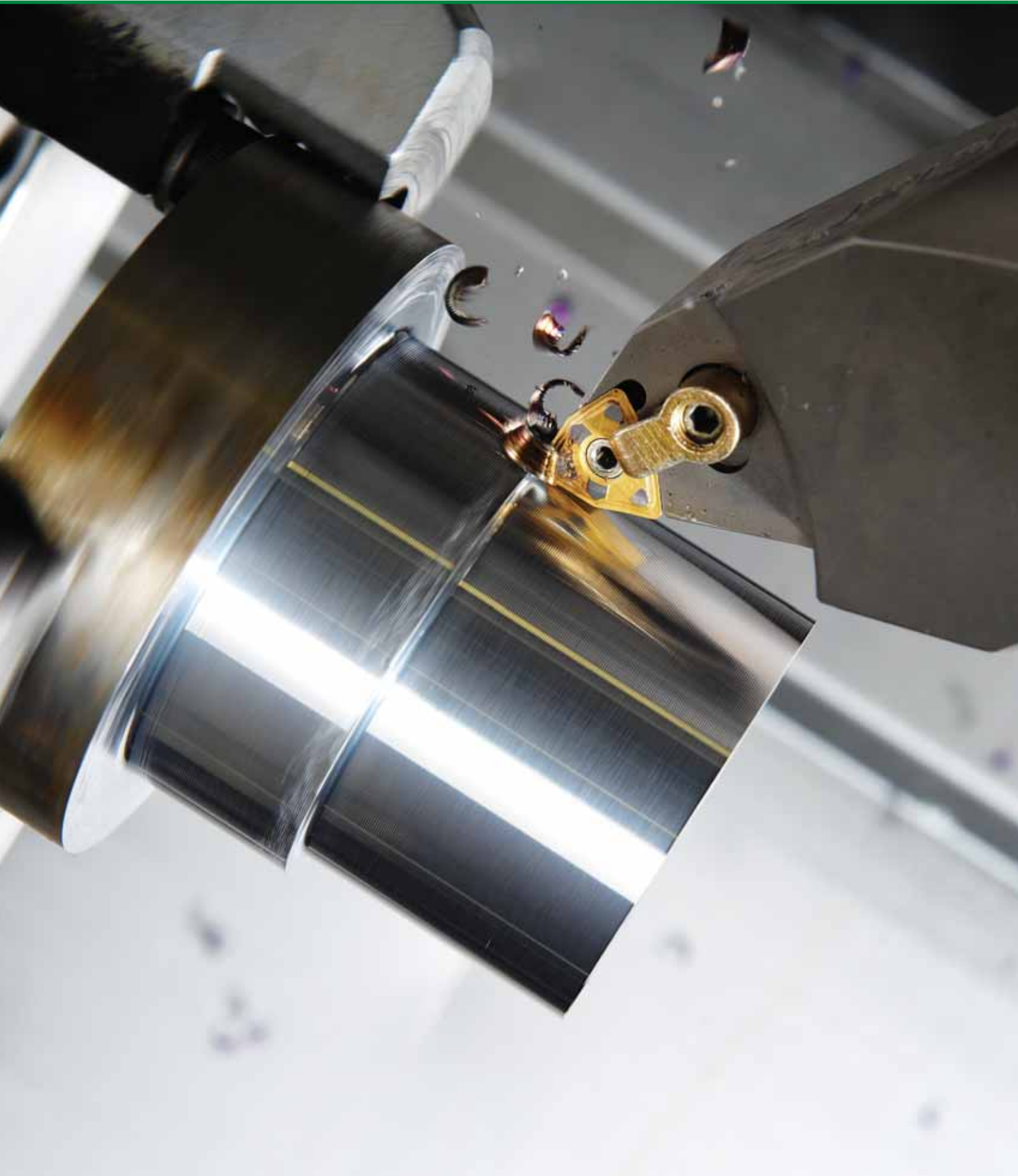
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The specially engineered WIDIA Laydown Threading System ensures the highest accuracy and quality available to meet all modern production standards. With an extensive range of inserts and toolholders available, the Laydown Threading platform is ideal for all of your internal and external threading applications.

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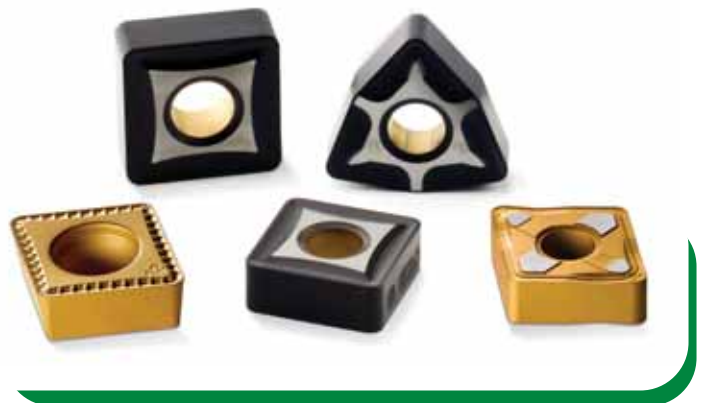
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WIDIA™ Value

Chipbreaker Geometry • Negative	F2-F3
Chipbreaker Geometry • Positive	F3
Grades and Grade Descriptions	F4
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Carbide Inserts	F10-F21

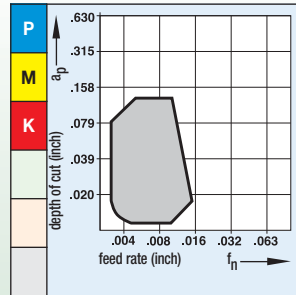


Double-Sided, Negative Inserts

22



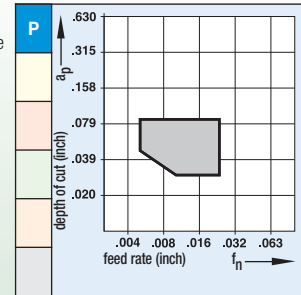
For finish turning, producing smooth, accurate surfaces. Very good chip control, especially at low depths of cut.



FL



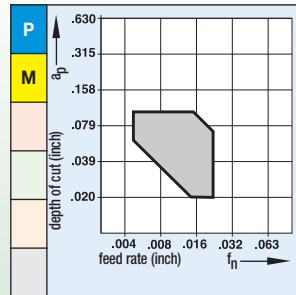
Double-sided insert with adjusted inclination angle for good chip control at low depths of cut.



FM



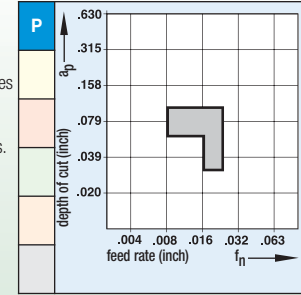
For medium-duty turning operations. Soft-cutting chipbreaker. Used in applications producing varying chip sections, such as profile or copy turning. Good dimensional accuracy. For soft steel materials and stainless steels.



FR



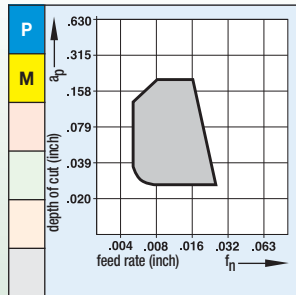
Double-sided insert with medium positive geometry. Adjusted inclination angle. Reduces cutting forces. Provides good chip control over wide range of feed rates.



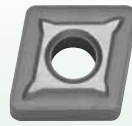
49



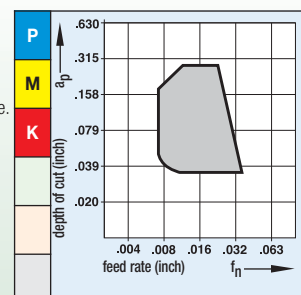
For medium to rough turning. Outstanding chip control due to specially configured chipbreaker element in corner area. Good chip forming with low depths of cut.



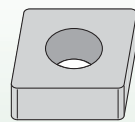
5



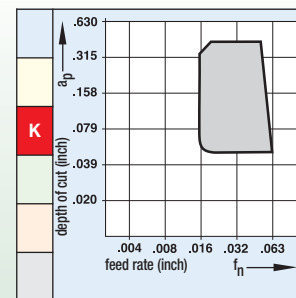
For medium-duty to roughing. Outstanding chip control. High edge strength for interrupted cuts, forging skin or scale. Preferred for all cast iron such as gray, malleable, and nodular.



..MA



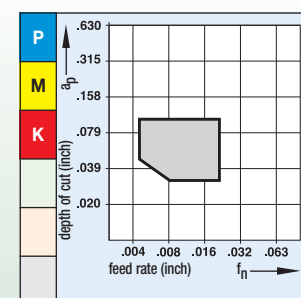
Flat top geometry for machining cast iron. For finishing to roughing applications.



..MG



For light machining to light roughing.



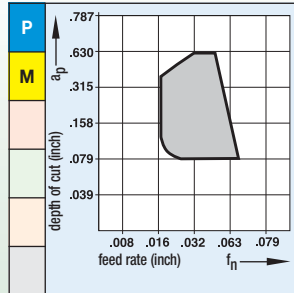
P	Steel
M	Stainless Steel
K	Cast Iron
N	Non-Ferrous Materials
S	High-Temp Alloys
H	Hardened Materials

Single-Sided, Negative Inserts

8

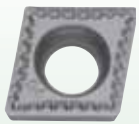


Stable cutting edge for heaviest chip sections and highest metal removal rates. For interrupted cuts and applications involving high cutting edge loading. Depths of cut up to .630", feeds up to .063".

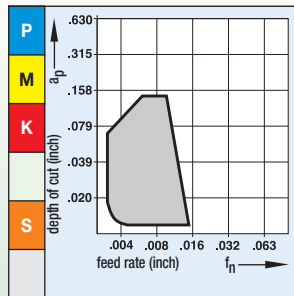


Single-Sided, Positive Inserts

MU



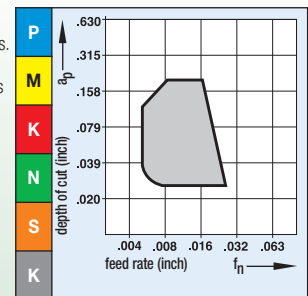
Medium universal turning includes rough machining with medium chip loads and finish machining with low chip loads.



..MT



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

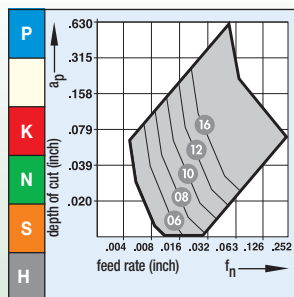


Round, Positive Inserts

RCMT/RCMX



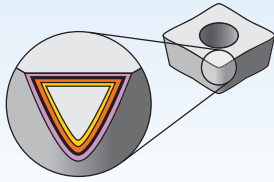
For straight turning, facing, and profile turning. Used at small depths of cut and high feeds up to 0.1 x D.



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

Grades and Grade Descriptions

Inserts



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	Speed (m/min)																		
	Coating	Grade Description		05	10	15	20	25	30	35	40	45										
TN1000		Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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 ₂ O ₃ for crater resistance. TN1000 is a highly wear-resistant carbide grade, recommended for finishing and medium machining of steels and cast iron.	P																			
	HC-P10		K																			
TN2000		Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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																			
	HC-P20																					
TN4000		Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. CVD-coated hard metal substrate with higher cobalt content imparting good toughness required for roughing application. 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																			
	HC-P35		M																			
HK1500		Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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 discontinuous chips such as cast iron. TN1500 is suitable for machining cast iron. Finds applications in light and medium machining of cast irons.	K																			
	HC-K15																					
TTS		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																			
	HW-P25																					
TTR-X		Very tough, uncoated grade. Suitable for rough machining of steel and stainless steel. Also for difficult-to-machine conditions with low cutting speeds.	P																			
	HW-P25		M																			
THM-X		Uncoated grade with good edge stability. Ideal grade for medium machining of cast irons and non-ferrous materials.	K																			
	HW-K15		N																			
THMF-X		Micro, fine-grain with good compressive strength. Used for light- to medium-duty machining of hard iron materials and alloy gray cast iron. Also suitable for non-ferrous metals and hard plastics. Ideal for finish machining of cast iron.	K																			
	HW-K10		N																			

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Speed and Feed Chart

Negative Inserts • Inch



DIN ISO 513	VDI 3323	A • Finishing (ap x f = .0394 x .0039)			B • Medium (ap x f = .0787 x .0079)			C • Roughing (ap x f = .1575 x .0098)								
Material Group		Cutting Speed • vc SFM														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
		- / -FL / -FR			-22 / -49 / - / -FR / -FM / -5			-49 / - / -5 / -8								
ap [inch]		.0315-.0787			.0118-.0984			.0118-.0984								
f [inch]		.0020-.0137			.0039-.0157			.0039-.0157								
P		TN1000			TN1000			TN2000			TN2000			TN4000		
	1	1115	1605	1935	915	1310	1570	820	1180	1410	655	950	1145	590	850	1015
	2	1115	1570	1900	850	1210	1440	785	1115	1345	620	885	1045	425	620	750
	3	950	1375	1640	590	850	1015	555	785	950	520	750	915	425	590	720
	4	850	1210	1440	620	885	1045	590	820	980	425	620	750	360	490	590
	5	655	915	1115	455	655	785	425	620	750	295	425	520	245	360	425
	6	885	1275	1540	655	950	1145	620	885	1045	455	655	785	360	520	620
	7	850	1210	1440	620	885	1045	590	820	980	425	620	750	360	490	590
	8	720	1045	1245	520	750	915	490	685	820	360	490	590	275	390	455
	9	655	915	1115	455	655	785	425	620	750	295	425	520	245	360	425
	10	885	1275	1540	655	950	1145	620	885	1045	455	655	785	360	520	620
	11	655	915	1115	425	620	750	390	555	655	295	425	520	245	360	425
	12	490	720	850	455	655	785	425	590	720	390	555	655	360	520	620
	13.1	425	620	750	390	555	655	360	490	590	325	455	555	295	425	520
13.2	210	310	375	195	275	325	180	245	295	160	225	275	145	210	260	
K	ap [inch]	-22														
	f [inch]	.0079-.0787														
		.0020-.0079														
		HK1500														
	15	590	850	1015												
	16	455	655	785												
	17	590	820	980												
18	490	685	820													
19	785	1115	1345													
20	590	850	1015													
N	ap [inch]	.0394-.1575			.0394-.1575						.0394-.1575					
	f [inch]	.0039-.0157			.0039-.0157						.0039-.0157					
		THM-X			THM-X						THM-X					
	21	2620	3280	9840	1640	3280	8200				980	3280	6560			
	22	1310	3280	6560	980	3280	5905				980	3280	4920			
	23	1965	3280	4920	1640	2620	4265				655	2295	3935			
	24	1965	3280	4920	1640	2620	4265				655	2295	3935			
	25	1310	2295	3280	980	1965	2620				655	1640	2295			
	26	1310	1640	1965	980	1310	1640				820	1145	1310			
	27	1310	1640	1965	980	1310	1640				655	980	1310			
	28	655	980	1310	490	820	1145				325	655	980			
	29	325	490	655	325	455	590				260	390	490			
30	490	655	820	390	590	720				325	490	655				

WIDIA Value • Speed and Feed Chart

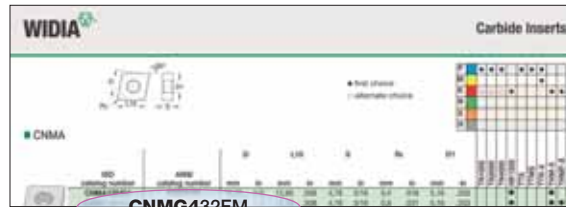


DIN ISO 513	VDI 3323	A • Finishing (ap x f = .0394 x .0039)			B • Medium (ap x f = .0787 x .0079)						C • Roughing (ap x f = .1575 x .0098)					
Material Group		Cutting Speed • vc SFM														
		min	Start	max	min	Start	max	min	Start	max	min	Start	max	min	Start	max
P	ap [inch]	- / -R / -MU .0118-.0787			- / - 2 / -MU .0118-.0984						- / -MU .0276-.1969					
	f [inch]	.0020-.1378			.0039-.0157						.0047-.0157					
		TN1000			TN1000			TN2000			TN2000			TN4000		
	1	1115	1605	1935	280	400	480	915	1310	1570	655	950	1145	590	850	1015
	2	1115	1570	1900	260	370	440	850	1210	1440	620	885	1045	425	620	750
	3	950	1375	1640	180	260	310	590	850	1015	520	750	915	425	590	720
	4	850	1210	1440	190	270	320	620	885	1045	425	620	750	360	490	590
	5	655	915	1115	140	200	240	455	655	785	295	425	520	245	360	425
	6	885	1275	1540	200	290	350	655	950	1145	455	655	785	360	520	620
	7	850	1210	1440	190	270	320	620	885	1045	425	620	750	360	490	590
	8	720	1045	1245	160	230	280	520	750	915	360	490	590	275	390	455
	9	655	915	1115	140	200	240	455	655	785	295	425	520	245	360	425
	10	885	1275	1540	200	290	350	655	950	1145	455	655	785	360	520	620
	11	655	915	1115	130	190	230	425	620	750	295	425	520	245	360	425
12	490	720	850	140	200	240	455	655	785	390	555	655	360	520	620	
13.1	425	620	750	120	170	200	390	555	655	325	455	555	295	425	520	
13.2	210	310	375	60	85	100	195	275	325	160	225	275	145	210	260	
K	ap [inch]	- / -MU .0079-.0787			- / -MU .0118-.1772											
	f [inch]	.0020-.0079			.0031-.0138											
		HK1500			HK1500											
	15	950	1345	1605	750	1080	1310									
	16	750	1080	1310	590	820	980									
	17	820	1180	1410	685	980	1180									
	18	785	1115	1345	620	885	1045									
19	1115	1605	1935	950	1345	1605										
20	950	1345	1605	750	1080	1310										
N	ap [inch]	.0394-.1575			.0394-.1575						1.0394-.1575					
	f [inch]	.0039-.0079			.0039-.0079						.0039-.0157					
		THM-X			THM-X						THM-X					
	21	2620	3280	9840	1640	3280	8200				980	3280	6560			
	22	1310	3280	6560	980	3280	5905				980	3280	4920			
	23	1965	3280	4920	1640	2620	4265				655	2295	3935			
	24	1965	3280	4920	1640	2620	4265				655	2295	3935			
	25	1310	2295	3280	980	1965	2620				655	1640	2295			
	26	1310	1640	1965	980	1310	1640				820	1145	1310			
	27	1310	1640	1965	980	1310	1640				655	980	1310			
	28	655	980	1310	490	820	1145				325	655	980			
29	325	490	655	325	455	590				260	390	490				
30	490	655	820	390	590	720				325	490	655				

WIDIA Value • Speed and Feed Chart

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.



CNMG432FM

C

Insert Shape

H Hexagon
120°



O Octagon
135°



P Pentagon
108°



R Round



S Square
90°



T Triangular
60°



C Rhomboid
80°



D 55°

E 75°

M 86°

V 35°



W Trigon
80°
with enlarged
corner angles



L Rectangular
90°



A Parallelogram
85°

B 82°

N/K 55°



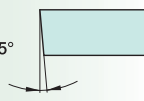
N

Insert Clearance
Angle

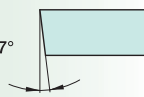
A 3°



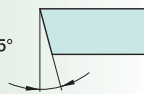
B 5°



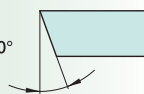
C 7°



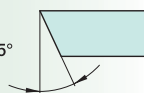
D 15°



E 20°



F 25°



G 30°



N 0°



P 11°

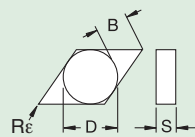
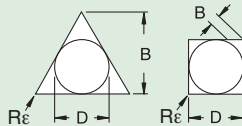


O Indicated for other
clearance angles
requiring descriptions.

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

4

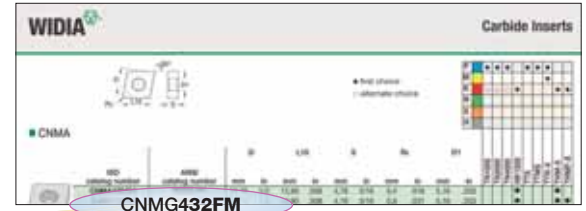
Size

Code for metric
cutting edge length "L10"

inch	"D"	C	D	R	S	T	V	W
1.2 (5)	5/32	S4	04	03	03	06	—	—
1.5 (6)	3/16	04	05	04	04	08	08	S3
1.8 (7)	7/32	05	06	05	05	09	09	03
—	.236	—	—	06	—	—	—	—
2	1/4	06	07	06	06	11	11	04
2.5	5/16	08	09	07	07	13	13	05
—	.315	—	—	08	—	—	—	—
3	3/8	09	11	09	09	16	16	06
—	.394	—	—	10	—	—	—	—
3.5	7/16	11	13	11	11	19	19	07
—	.472	—	—	12	—	—	—	—
4	1/2	12	15	12	12	22	22	08
4.5	9/16	14	17	14	14	24	24	09
5	5/8	16	19	15	15	27	27	10
—	.630	—	—	16	—	—	—	—
5.5	11/16	17	21	17	17	30	30	11
6	3/4	19	23	19	19	33	33	13
—	.787	—	—	20	—	—	—	—
7	7/8	22	27	22	22	38	38	15
—	.984	—	—	25	—	—	—	—
8	1	25	31	25	25	44	44	17
10	1-1/4	32	38	31	31	54	54	21
—	1.260	—	—	32	—	—	—	—

tolerance class	tolerance on "D"	tolerance on "B"	tolerance on "S"
C	±.0010"	±.0005"	±.001"
H	±.0005"	±.0005"	±.001"
E	±.0010"	±.0010"	±.001"
G	±.0010"	±.0010"	±.005"
M	See table in size column		±.005"
U	See table in size column		±.005"

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



3

Thickness
shown as "S"

symbol inch	thickness inch
.5 (1)	1/32
.6	.040
1 (2)	1/16
1.2	5/64
1.5 (3)	3/32
2	1/8
2.5	5/32
3	3/16
3.5	7/32
4	1/4
5	5/16
6	3/8
7	7/16
18	1/2

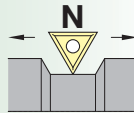
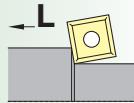
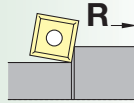
2

Corner Radius
shown as "Rε"

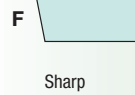
symbol inch	corner radius inch
X0	.0015
0	.004
.5	.008
1	1/64
2	1/32
3	3/64
4	1/16
5	5/64
6	3/32
7	7/64
8	1/8
—	round insert

Hand of Insert
(optional)

R = Right hand
L = Left hand
N = Neutral



Cutting Edge
(optional)



Sharp



Rounded



Chamfered



Chamfered
and Rounded



Double-Chamfered



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



WIDIA™ Specialty Toolholders

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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 specialty.



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.

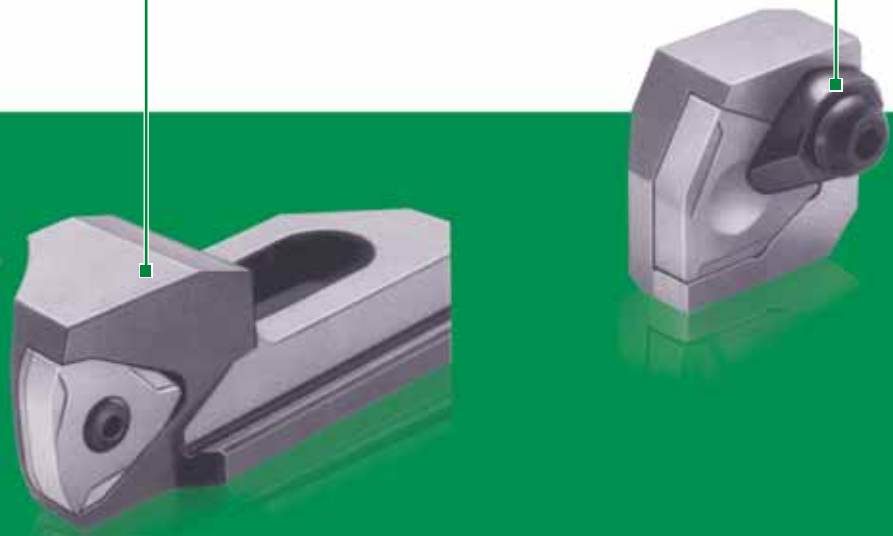
Compact design using a minimum of spare parts for high reliability and cost efficiency.

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.

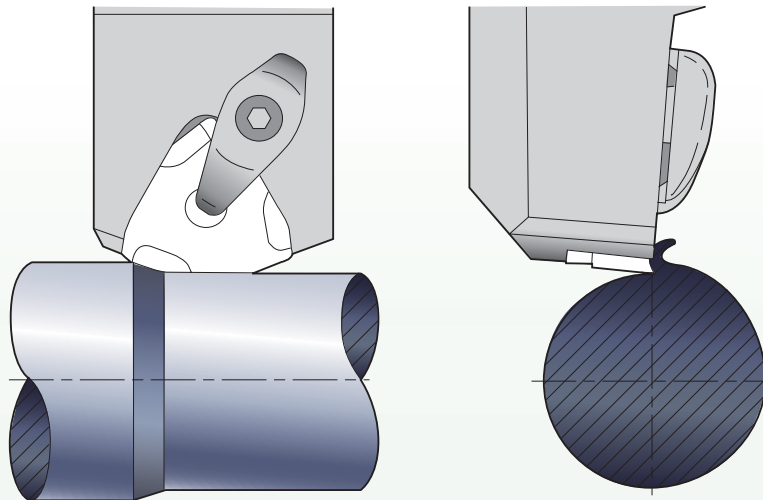


WIDIA can offer bar peeling toolholders, tool heads, inserts, and accessories for all your bar peeling needs.

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 favorable 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.

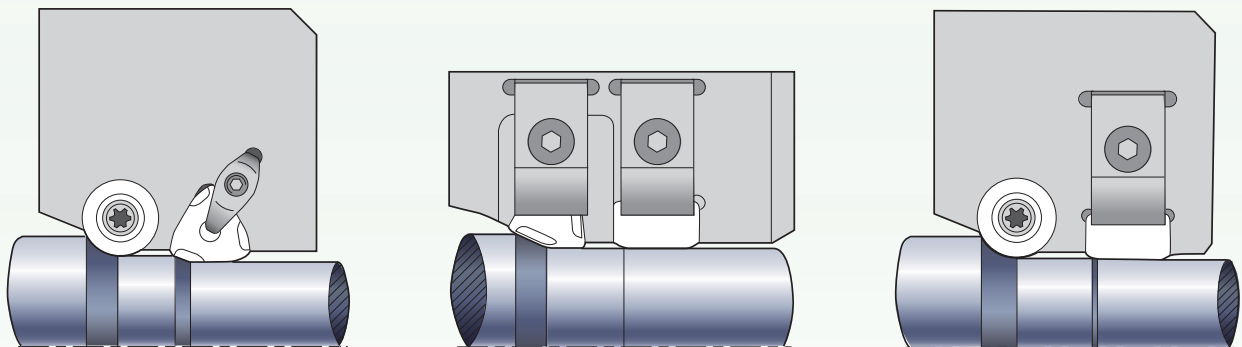
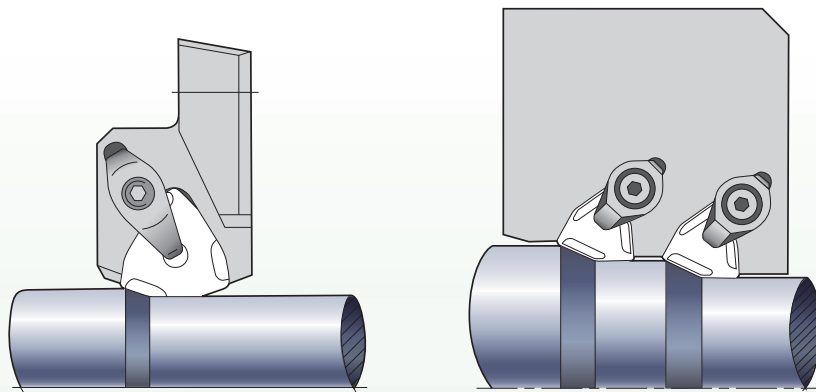
Because of peeled bars, better and more consistent conditions for further metal removal operations are being achieved.

Application Range of WIDIA™ Bar Peeling Tools

New bar peeling machines require a high level of utilization 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.



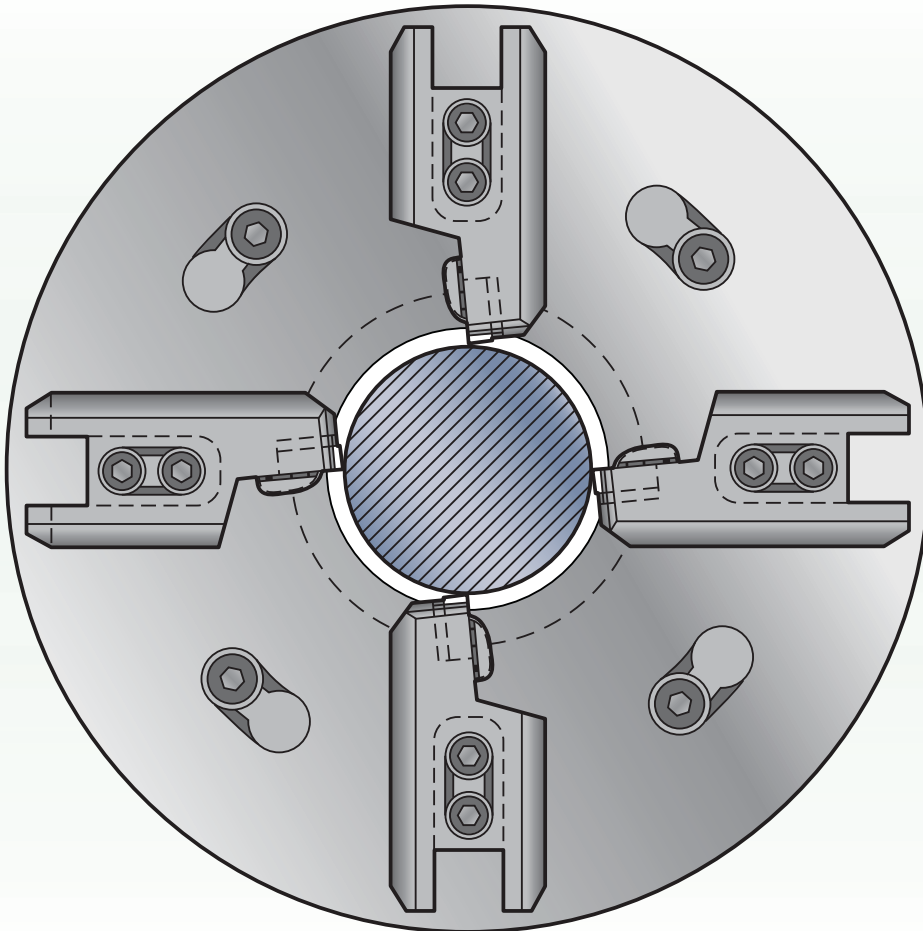
(continued)

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 unfavorable machining conditions (i.e., unstable, bad bar conditioning), carbide grades with high toughness need to be applied.

Under favorable 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 utilization 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 optimized 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 favorable 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 unfavorable 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 favorable machining conditions. Excellent wear resistance for extended tool life and reduced friction for better surface finishes.

WIDIA TN7125, HC-P25

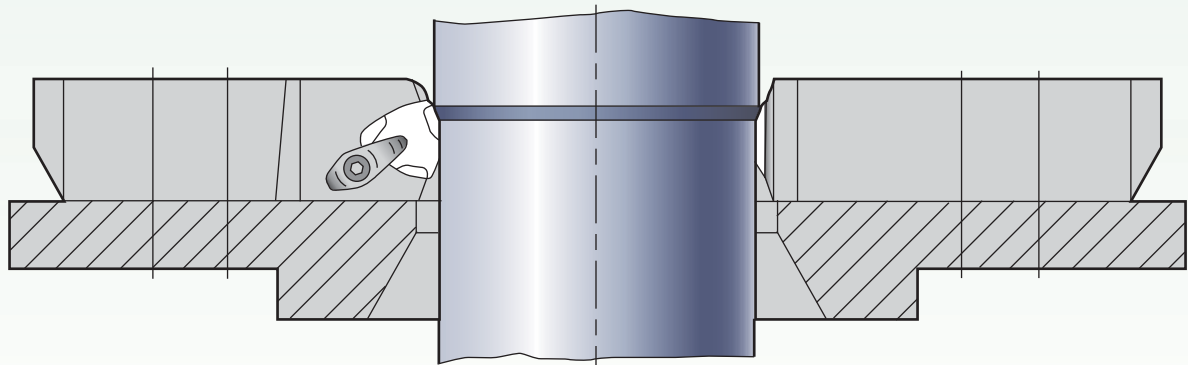
TiN-TiCN (MT)-TiOCN-alpha Al_2O_3 -TiN coating

Supplement for TN7115 with extra edge strength and toughness for bar peeling of alloyed and unalloyed, as well as cast steel, under unfavorable machining conditions.

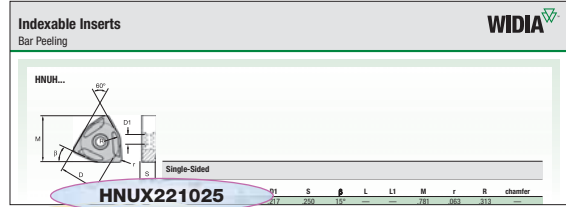
WIDIA TN8025, HC-M25

MT-CVD/CVD — TiN-TiCN- Al_2O_3 -ZrCN coating

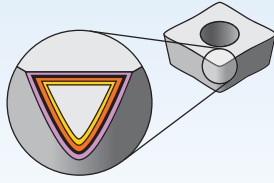
Good balance of wear resistance and toughness properties. Light and medium machining for austenitic stainless steel AISI 300 series.



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	N 0°					H	-1 -10
L	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					L	-11 -12 -13
N						N	-1A -1B -1C -1D
R	N					R	
S	R Without bore F					S	
T	A With cylindrical bore M With cylindrical bore G					T	
O	T With countersink bore for screws with 40–60° taper single-sided countersink. W With countersink bore for screws with 40–60° taper double-sided countersink.					O	
Z	U With countersink bore for screws with 40–60° taper double-sided countersink. Q With countersink bore for screws with 70–90° taper single-sided countersink. H With countersink bore for screws with 70–90° taper double-sided countersink. J With countersink bore for screws with 70–90° taper single-sided countersink. C With countersink bore for screws with 70–90° taper double-sided countersink.					Z	
X	X Indexable inserts with special design features.						



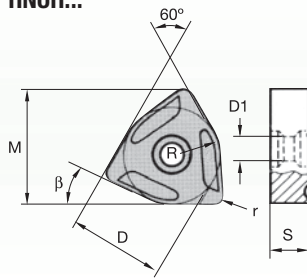
Coatings provide high-speed capability and are engineered for finishing to light roughing.

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 ₂ O ₃ -ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI 300 series.	M								
TN7125 HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good toughness properties. Medium and heavy machining. For steels.	P								
		M								
TN7115 HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P								
TN5120 HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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.	S								
TN6025 HC-S25	Coated carbide. PVD — TiAlN Nano-multi-layer. Light and medium machining. For difficult-to-machine alloys.	S								
TTX HW-P35	Uncoated carbide. Very wear-resistant grade. Light machining. To be used in favorable conditions.	P								
		M								
TTM HW-K15	Uncoated carbide. Medium machining. For steels and nodular cast iron.	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 unfavorable conditions.	K								
		N								
		S								
		H								

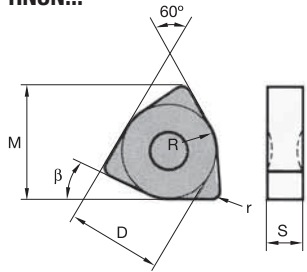
HNUH...



Single-Sided

	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUH160615	.625	.217	.250	15°	—	—	.781	.063	.313	—
22	HNUH220725	.866	.276	.276	25°	—	—	1.024	.079	.433	—
32	HNUH321425	1.250	.354	.551	25°	—	—	1.493	.079	.433	.024

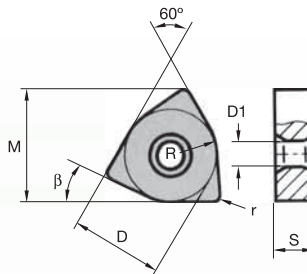
HNUN...



Double-Sided

	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUN160615	1.625	—	.250	15°	—	—	.781	.063	.313	.024
22	HNUN221015	.866	—	.394	15°	—	—	1.089	.079	.433	—
	HNUN221025	.866	—	.394	25°	—	—	1.024	.079	.433	—

HNUQ...

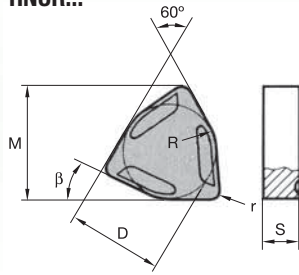


Double-Sided

	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
16	HNUQ160612	.625	.217	.250	15°	—	—	.781	.063	.313	—

NOTE: Products available upon request.

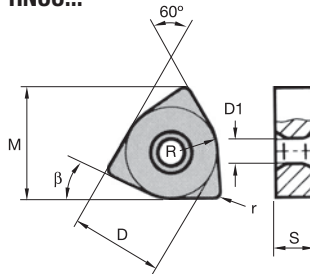
HNUR...



Single-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
22 HNUR220725	.866	—	.276	25°	—	—	1.024	.079	.433	—
HNUR221025	.866	—	.394	25°	—	—	1.024	.079	.433	—

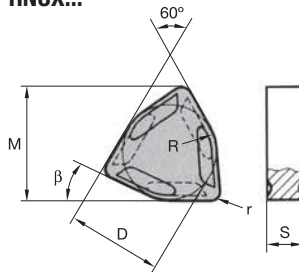
HNUU...



Double-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
12 HNUU120625	.500	.173	.250	25°	—	—	.590	.047	.250	—
16 HNUU160615	.625	.217	.250	15°	—	—	.781	.063	.313	.020

HNUX...



Double-Sided

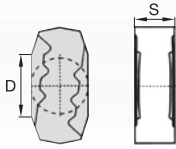
ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
12 HNUX120625	.500	—	.250	25°	—	—	.590	.047	.250	—
16 HNUX160615	.625	—	.250	15°	—	—	.781	.063	.313	.020
HNUX160625	.625	—	.250	25°	—	—	.736	.063	.313	.020
HNUX160725	.625	—	.313	25°	—	—	.736	.063	.313	.008
22 HNUX221015	.866	—	.394	15°	—	—	1.089	.079	.433	—
HNUX221025-1A	.866	—	.394	25°	—	—	1.024	.079	.433	.024
HNUX221025	.866	—	.394	25°	—	—	1.024	.079	.433	.043
28 HNUX280930	1.125	—	.352	30°	—	—	1.312	.047	.300	—

Single-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
22 HNUX221025-10	.866	—	.394	25°	—	—	1.024	.079	.433	.020
28 HNUX280930-10	1.125	—	.380	30°	—	—	1.312	.047	.300	.014

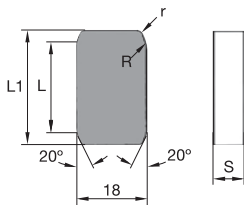
NOTE: Products available upon request.

LNMX...



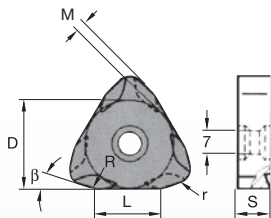
Double-Sided											
	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
18	LNMX181220-HP	.709	—	.492	—	.787	—	—	—	—	.020
	LNMX181220-SP	.709	—	.492	—	.787	—	—	—	—	.040

LNUN...



Double-Sided											
	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
30	LNUN301020	—	—	.394	20°	.945	1.181	—	.031	.394	—
38	LNUN381020	—	—	.394	20°	1.181	1.496	—	.031	.394	—
40	LNUN401020	—	—	.394	20°	1.181	1.496	—	.031	.394	—
50	LNUN501020	—	—	.394	20°	1.260	1.969	—	.031	.394	—

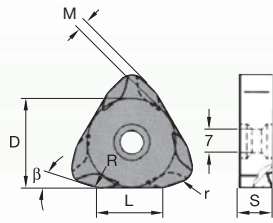
NNGJ...



Double-Sided											
	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
28	NNGJ281020	1.102	.276	.394	20°	—	—	.114	.197	.394	.020
	NNGJ281020-1A	1.102	.276	.394	20°	—	—	.114	.197	.394	.020
	NNGJ281020-1D	1.102	.276	.394	20°	—	—	.114	.197	.394	.040
	NNGJ281020-HP	1.102	.276	.394	20°	—	—	.114	.197	.394	.020
	NNGJ281020-SP	1.102	.276	.394	20°	—	—	.114	.197	.394	.040

NOTE: Products available upon request.

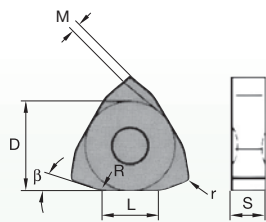
NNUJ...



Double-Sided

	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
22	NNUJ220820-11	.866	—	.315	20°	—	—	.083	.039	.394	.024
	NNUJ220820-12	.866	—	.315	20°	—	—	.083	.039	.394	.024
	NNUJ221020-12	.866	—	.394	20°	—	—	.083	.039	.394	.024
28	NNUJ280820	1.102	.276	.315	20°	—	—	.083	.039	.394	.020
	NNUJ281020-1A	1.102	.276	.394	20°	—	—	.114	.197	.394	.040
	NNUJ281020-10	1.102	.276	.394	20°	—	—	.114	.197	.394	.040
	NNUJ281020-1B	1.102	.276	.394	20°	—	—	.114	.197	.394	.040

NNUN...

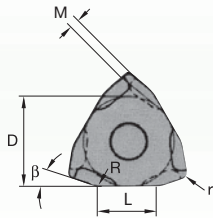


Double-Sided

	ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
22	NNUN220820	.866	—	.315	20°	—	—	.083	.039	.394	.020
	NNUN221020	.866	—	.394	20°	—	—	.083	.039	.394	.020
28	NNUN281020	1.102	—	.394	20°	—	—	.114	.197	.394	.020

NOTE: Products available upon request.

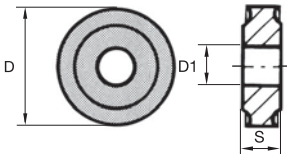
NNUX...



Double-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
22 NNUX220820	.866	—	.315	20°	—	—	.083	.039	.394	.024
NNUX220820-10	.866	—	.315	20°	—	—	.083	.039	.394	.024
NNUX220820-11	.866	—	.315	20°	—	—	.083	.039	.394	.024
NNUX221020	.866	—	.394	20°	—	—	.083	.039	.394	—
NNUX221020-1	.866	—	.394	20°	—	—	.083	.039	.394	.024
28 NNUX281020	1.102	—	.394	20°	—	—	.114	.197	.394	—

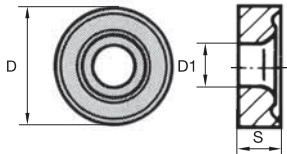
RNMG...



Double-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
09 RNMG090300	.375	.150	.125	—	—	—	—	—	—	—
12 RNMG120400	.500	.203	.187	—	—	—	—	—	—	—
15 RNMG150600	.625	.250	.250	—	—	—	—	—	—	—
19 RNMG190600	.750	.313	.250	—	—	—	—	—	—	—
28 RNMG250900	1.002	.359	.375	—	—	—	—	—	—	—

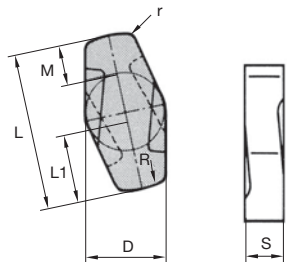
RNM...



Single-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
28 RNMH281000	1.122	.346	.413	—	—	—	—	—	—	—
38 RNMH381200-11	1.500	.500	.500	—	—	—	—	—	—	—
RNMH381200-13	1.500	.500	.500	—	—	—	—	—	—	—
RNMM381200	1.500	.500	.500	—	—	—	—	—	—	—
50 RNMH501800	1.969	.500	.709	—	—	—	—	—	—	—

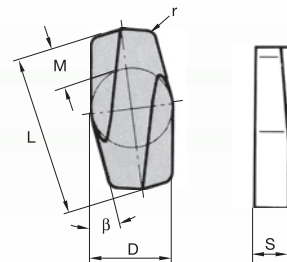
ZNU...



Double-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
12 ZNUX120715L	.472	—	.276	15°	1.201	0.531	—	—	—	.020
18 ZNUG181215	1.709	—	.472	15°	1.457	0.571	—	—	—	—
ZNUN181215	.709	—	.472	15°	1.457	0.571	—	—	—	—
ZNUG181215-1	.709	—	.472	15°	1.457	0.571	—	—	—	.024
ZNUX181215L	.709	—	.472	15°	1.417	0.622	—	—	—	—
25 ZNUG251815L	.984	—	.709	15°	1.874	0.768	—	—	—	—
30 ZNUG302020-1	1.181	—	.787	20°	2.205	1.102	—	—	—	.043

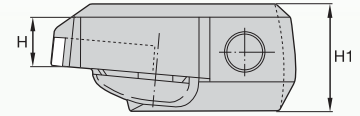
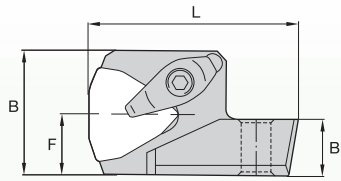
ZNUR...



Single-Sided

ANSI catalog number	D	D1	S	β	L	L1	M	r	R	chamfer
ZNUR181215	.709	—	.472	15°	1.457	.571	—	—	—	—

NOTE: Products available upon request.

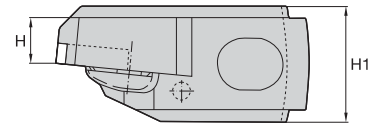
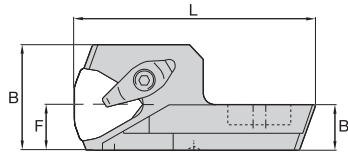


Catalog Number

diameter	WDHF 20	WDH 20
.315-.787	219.40.801	—
.315-.512	—	219.40.601
.394-.591	—	...602
.591-.787	—	...603

Technical Dimension

B	B1	F	H	H1	L	indexable inserts
1.654	.689	.709	.512	1.315	2.677	NNU...220820
1.496	.689	.709	.492	1.122	2.530	
1.496	.689	.709	.492	1.122	2.467	
1.496	.689	.709	.492	1.122	2.368	

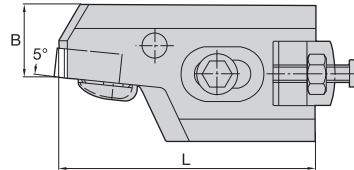
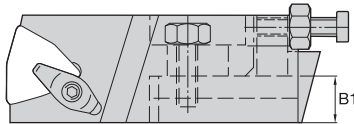


Catalog Number

diameter	WDH 50 T
.315-.787	219.40.520
.315-1.181	...521
1.102-1.575	...522
1.496-1.968	...523

Technical Dimension

B	B1	F	H	H1	L	indexable inserts
1.575	.709	.925	.689	1.732	4.449	NNU...220820
1.575	.709	.925	.689	1.732	4.252	
1.575	.709	.925	.689	1.732	4.055	
1.575	.709	.925	.689	1.732	3.858	



Catalog Number

diameter	WDH 50 Adjustable
.315-.866	219.40.554

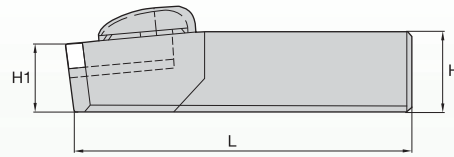
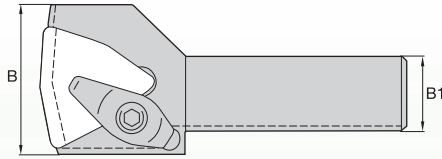
Technical Dimension

B	B1	L	indexable inserts
1.181	.512	3.717	HNUX...160615

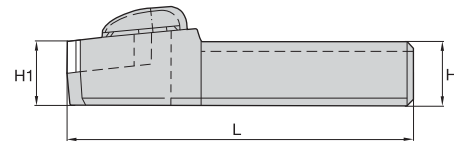
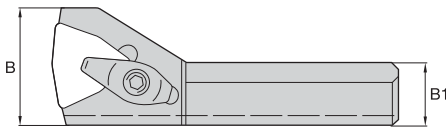
Catalog Number • Spare Parts

	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.



Catalog Number		Technical Dimension					
diameter	WDH 50 with offset shank	B	B1	H	H1	L	indexable inserts
1.496-1.968	219.40.562	1.024	.500	.591	.500	2.480	HNUX...120625



Catalog Number		Technical Dimension					
	WDH 50	B	B1	H	H1	L	indexable inserts
	219.40.730	.787	.472	.472	.472	2.441	HNUX...120625

Catalog Number • Spare Parts



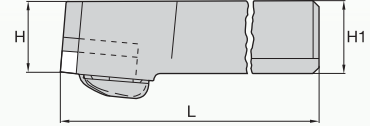
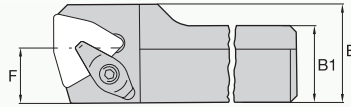
retention clamp



clamping screw

219.40.562	214.80.447	214.80.448
219.40.730	...447	...448

NOTE: Products available upon request.

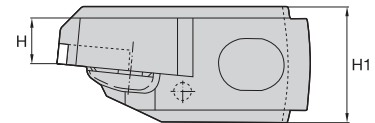
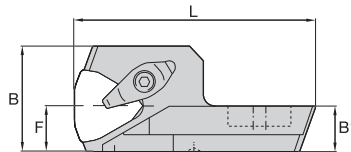


Catalog Number

diameter	WDH 50 K
.276–1.968	219.40.560

Technical Dimension

B	B1	F	H	H1	L	indexable inserts
1.126	.866	.630	.807	.807	3.228	HNU...160615








Catalog Number

diameter	WDH 75 T
.315–.787	219.40.700
.748–1.260	...701
1.220–1.732	...703
1.693–2.205	...704
2.165–2.677	...705
2.638–3.150	...706

Technical Dimension

B	B1	F	H	H1	H2	L	indexable inserts
1.752	.787	.748	.965	2.008	1.650	4.472	NNU...220820
1.752	.787	.748	.965	2.008	1.650	4.236	
1.752	.787	.748	.965	2.008	1.650	4.000	
1.752	.787	.748	.965	2.008	1.650	3.764	
1.752	.787	.748	.965	2.008	1.650	3.528	
1.752	.787	.748	.965	2.008	1.650	3.291	

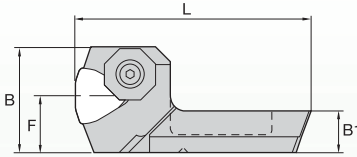
Catalog Number • Spare Parts

					
	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

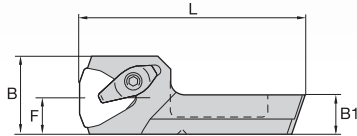
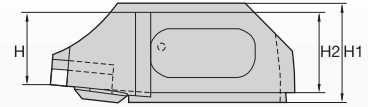
NOTE: Products available upon request.

Bar Peeling Toolholders

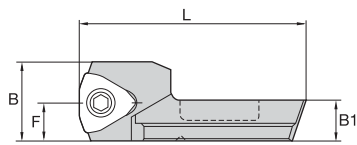
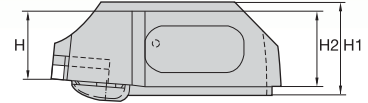
WDHE 80 with Retention Screw, Retention Clamp, and Screw



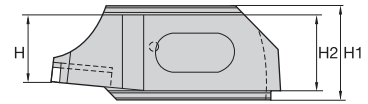
With Retention Screw



With Retention Clamp



With Screw



Catalog Number

diameter	WDHE 80
----------	---------

with retention screw

.472-.787	219.40.810
.748-1.260	...811
1.220-1.732	...813
1.692-2.205	...814
2.165-2.677	...815
2.637-3.150	...816

with retention clamp

3.15-.787	219.40.820
.748-1.260	...821
1.220-1.732	...823
1.692-2.205	...824
2.165-2.677	...825
2.637-3.150	...826

with screw

.472-.787	219.40.830
.748-1.260	...831

Technical Dimension







B	B1	F	H	H1	H2	L	indexable inserts
---	----	---	---	----	----	---	-------------------

2.047	.787	1.102	1.339	1.850	1.496	4.472	NNU...220820
2.047	.787	1.102	1.339	1.850	1.496	4.236	
2.047	.787	1.102	1.339	1.850	1.496	4.000	
2.047	.787	1.102	1.339	1.850	1.496	3.764	
2.047	.787	1.102	1.339	1.850	1.496	3.528	
2.047	.787	1.102	1.339	1.850	1.496	3.291	

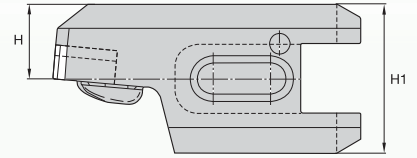
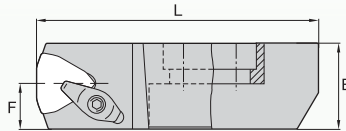
1.575	.787	.748	1.339	1.850	1.496	4.472	NNU...220820
1.575	.787	.748	1.339	1.850	1.496	4.236	
1.575	.787	.748	1.339	1.850	1.496	4.000	
1.575	.787	.748	1.339	1.850	1.496	3.764	
1.575	.787	.748	1.339	1.850	1.496	3.528	
1.575	.787	.748	1.339	1.850	1.496	3.291	

1.575	.787	.748	1.339	1.850	1.496	4.472	NNUX...220820
1.575	.787	.748	1.339	1.850	1.496	4.236	

Catalog 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.

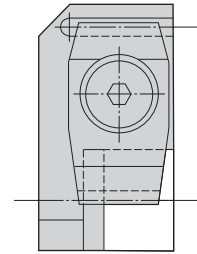
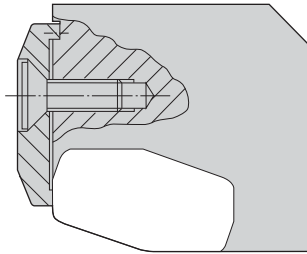
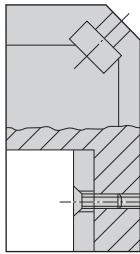


Catalog Number

diameter	WDH 100
.787–2.362	219.40.100
2.362–4.134	...105

Technical Dimension

F	H	H1	L	indexable inserts
.866	1.280	2.559	6.181	NNU...221020
.866	1.280	2.559	5.276	



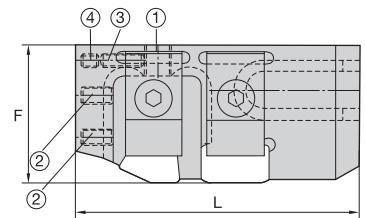
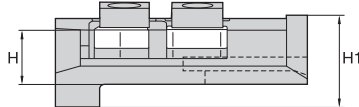
Catalog Number

WDH 360
219.40.732

Technical Dimension

indexable inserts
ZNU...302020

Technical details available upon request.



Catalog Number

diameter	S 80
.787–2.362	219.40.100
2.362–4.134	...105

Technical Dimension

F	H	H1	L	indexable inserts
2.835	1.102	1.850	4.961	NNU...221020
2.441	1.102	1.850	4.961	

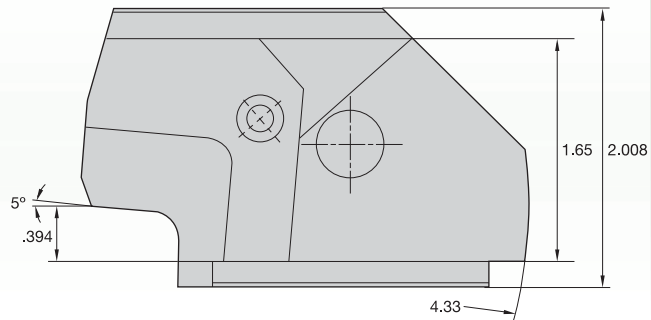
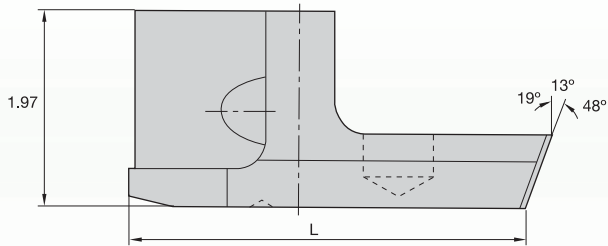
Catalog Number • Spare Parts

	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

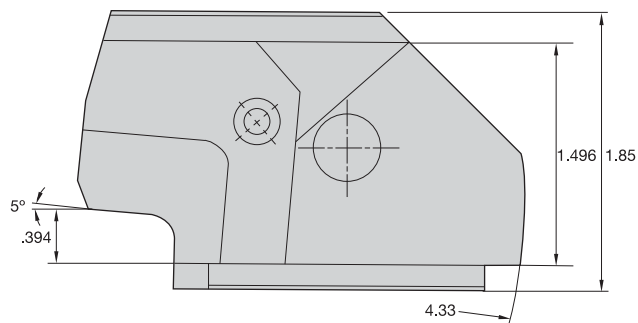
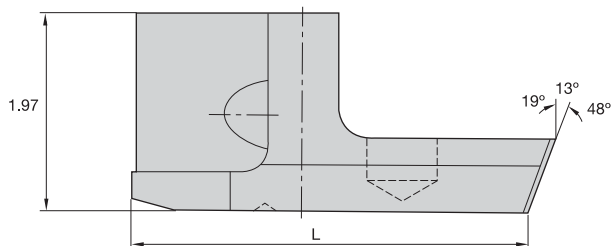
NOTE: Products available upon request.

Basic Toolholders

For Cassettes and Tension Screw WHD 75 T and WDHE 80



Catalog Number		Technical Dimension	
diameter	WHD 75 T	L	for cassettes
1.220-1.732	219.49.010	3.726	HNUX...120625
1.692-2.205	...011	3.489	
2.165-2.677	...012	3.253	
2.637-3.150	...013	3.017	



Catalog Number		Technical Dimension	
diameter	WHD 75 T	L	for cassettes
1.220-1.732	219.49.015	3.726	WDH 75 WDHE 80
1.692-2.205	...016	3.489	
2.165-2.677	...017	3.253	
2.637-3.150	...018	3.017	

Catalog Number • Spare Parts



tension
screw

219.40.562

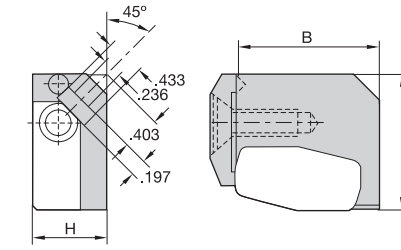
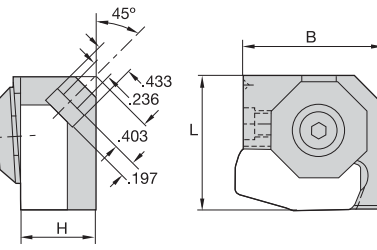
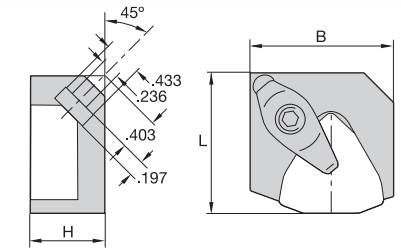
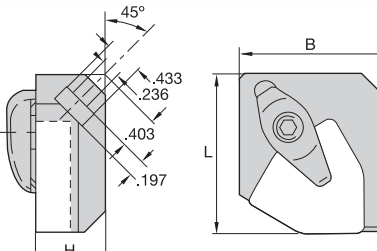
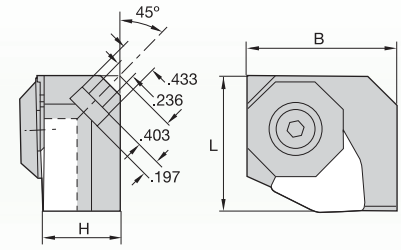
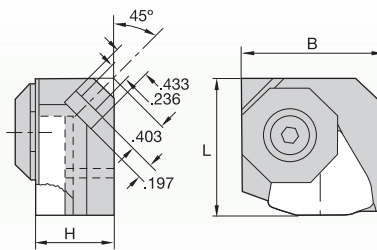
214.77.512



clamping
screw

214.77.511







NOTE: Products available upon request.



Catalog Number
WDH cassettes
219.40.716
...718
...722
...724
...726
...728

Technical Dimension			for basic holder	indexable inserts
H	B	L		
.866	1.654	1.535	WDH 75 T and WDHE 80	NNUX...220820
.965	1.713	1.535		HNU...221025
.866	1.272	1.752		HNU...280930
.866	1.646	1.528		ZNUX...181215
.866	1.654	1.535		ZNUX...181215
.866	1.654	1.535		NNU...220820

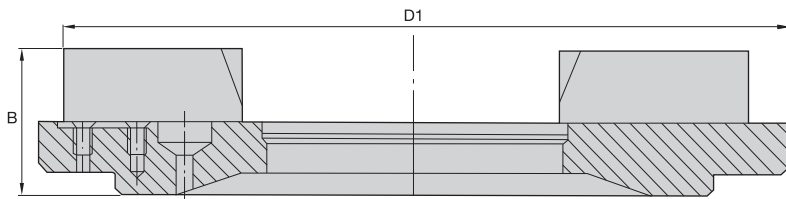
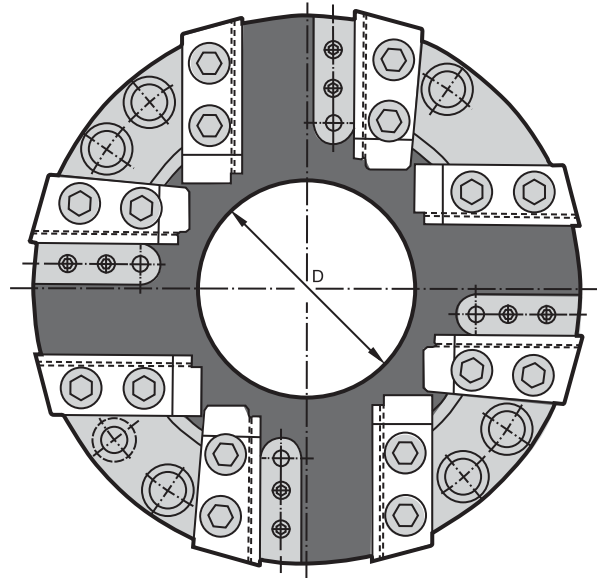
Catalog Number • Spare Parts

						
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.






Bar Peeling Head

WDH 75 T

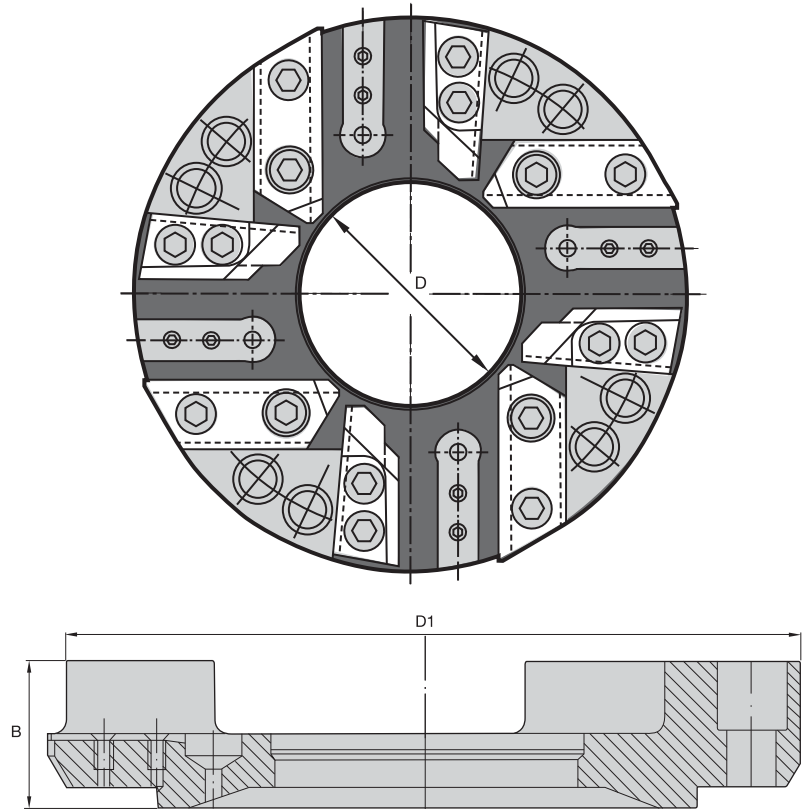


Specialty • Bar Peeling Head

Catalog Number		Technical Dimension			
WDH 75 T		D	D1	B	for bar peeling holder
219.46.200		3.346	8.465	1.614	WDH 75 T






Catalog 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.



Specialty • Bar Peeling Head

Catalog Number	Technical Dimension			
WDHE 80	D	D1	B	for bar peeling holder
219.46.200	3.346	8.268	1.614	WDHE 80

Catalog 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.
- Accidental torch burns.
- Overheating of spinning wheels.
- 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:

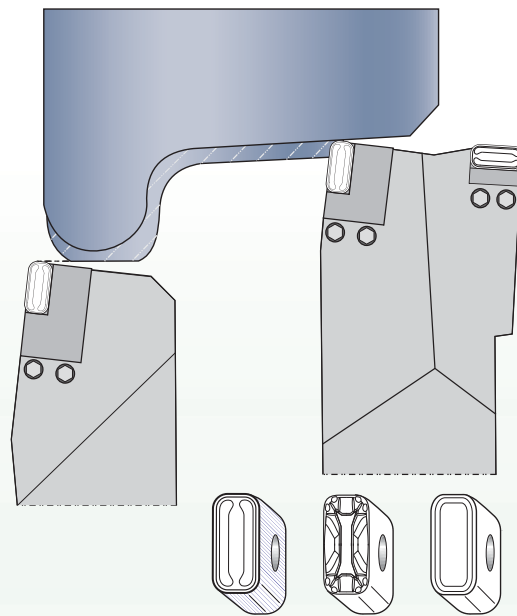
- Heavy-duty steel locking unit design ensures longer life and reduces operating costs.
- No top clamp to wear out or interfere with chip flow. Insert locks against two walls in the toolholder to prevent insert movement under heavy cutting loads.
- Hardened-steel locking unit provides positive insert 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.
- Toolholders and steel locking units, made from heat-treated alloy steel, provide support to withstand severe roughing cuts on work-hardened wheels.
- Fewer parts to inventory.

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.

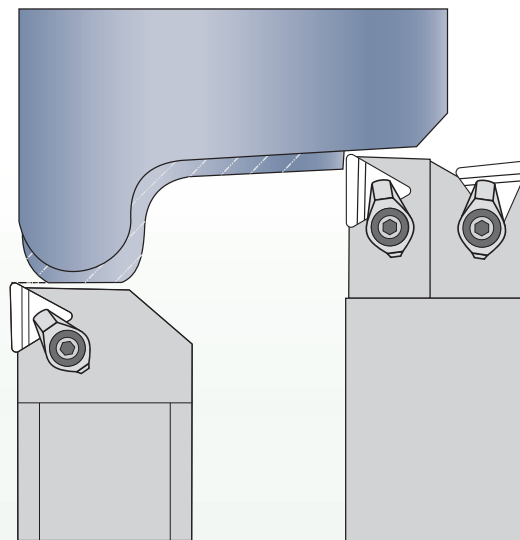
The WIDIA Products Group toolholders for wheel set machining adopts the robust LS-system of clamping. The insert has a built-in chipbreaker and is clamped onto the toolholder by means of a lever and clamp screw. For heavy-duty wheel re-turning operations, the inserts are of upended design, enhancing 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 standardizing 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 minimize the damage to the precision insert pocket on the toolholder. The KS-system is also adopted for tire 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.

- Standardized 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

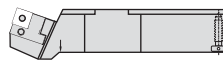
(under floor lathe)



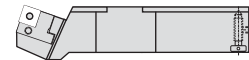
Compound Toolholder

HEC Hegenscheidt LUW 160B

(under floor lathe)

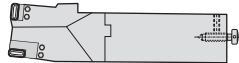


Compound Toolholder



Chopper Toolholder

Hegenscheidt 166 and HEC Hegenscheidt LW 110B, LW 140B, LW 110M, LW 140M



Compound Toolholder

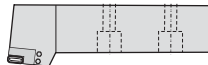


Chopper Toolholder

Rafamet UBB 112/2



Compound Toolholder



Chopper Toolholder

Rafamet UGB 150

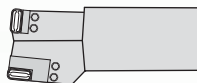
(under floor lathe)



Compound Toolholder

Sculfort

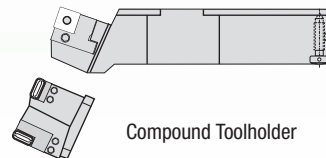
(under floor lathe)



Compound Toolholder

Hegenscheidt 102

(under floor lathe)



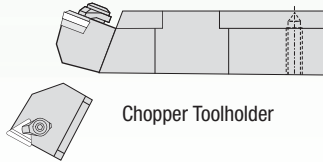
Compound Toolholder

NOTE: Products available upon request.

Clamping System C for Models:

Hegenscheidt 102

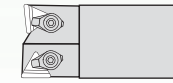
(under floor lathe)



Chopper Toolholder

Sculfort

(under floor lathe)

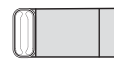


Compound Toolholder

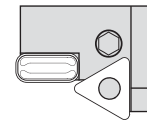
Cassettes for WIDIA™-LS Toolholders



Turning Cassette



Facing Cassette



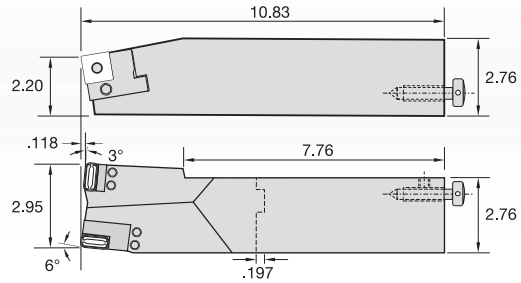
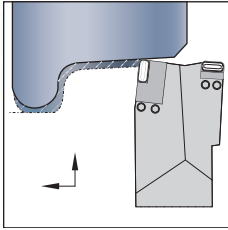
Turning Cassette

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

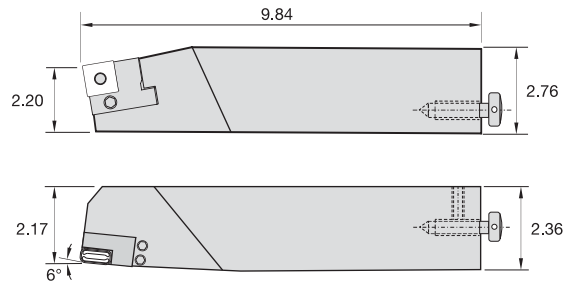
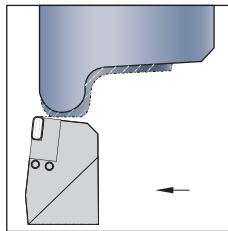


Compound Toolholder

Catalog 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

Specialty • Toolholders



Chopper Toolholder

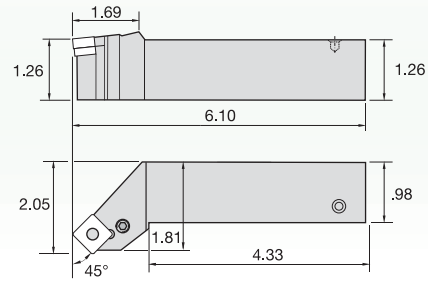
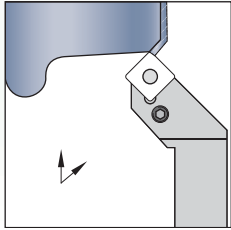
Catalog Number • Spare Parts

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)



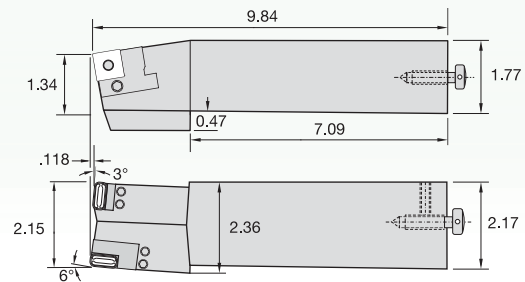
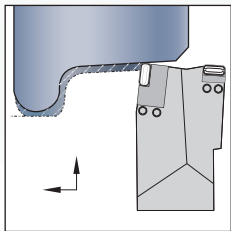
Facing Toolholder

Catalog Number • Spare Parts

toolholder	lever	shim	shim pin	shim pin punch	clamp screw	hex
63.391.492.10	73.085.603	214.85.615	214.85.610	73.398.941	214.85.628	214.80.412
63.391.492.10	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)



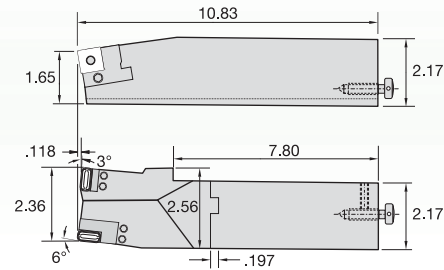
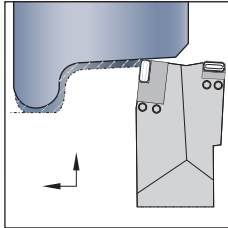
Compound Toolholder

Catalog 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
69.391.431.20	69.393.186.20	—	LNUX301940	73.085.863	73.398.965
69.391.431.10	69.393.187.10	69.393.190.10	LNUX191940	73.085.863	73.398.965
69.391.431.20	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 166, HEC Hegenscheidt LW 110B, LW 140B, LW 110M, LW 140M

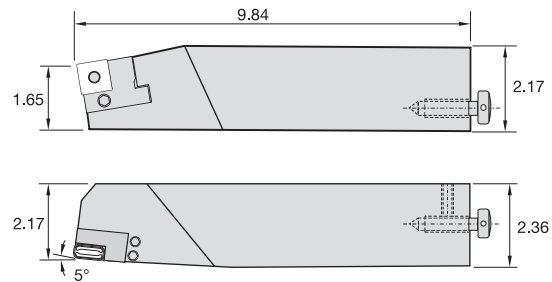
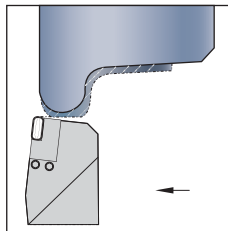


Compound Toolholder

Catalog 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

Specialty • Toolholders



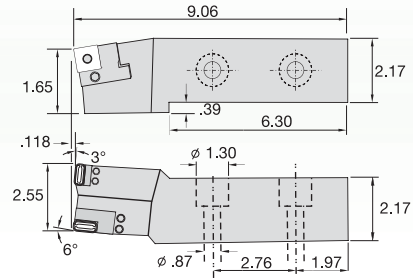
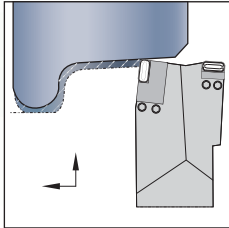
Chopper Toolholder

Catalog 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.

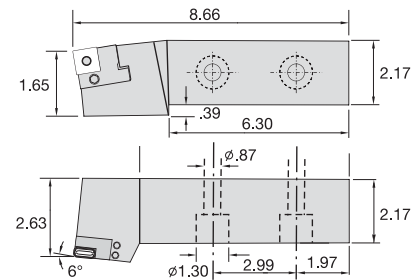
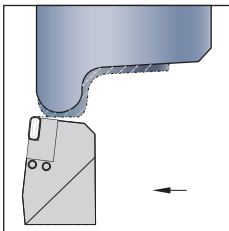
Rafamet UBB 112/2



Compound Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	facing cassette	LNUX301940	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

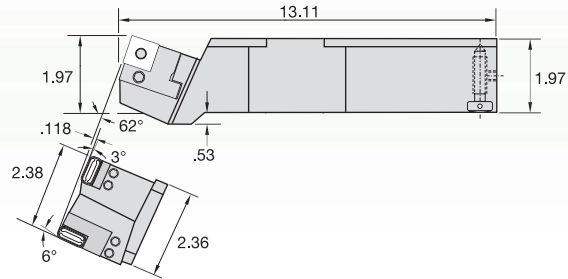
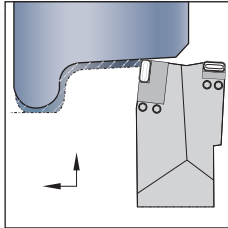
Catalog Number • Spare Parts

toolholder	turning cassette	LNUX301940	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 inquiry 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)

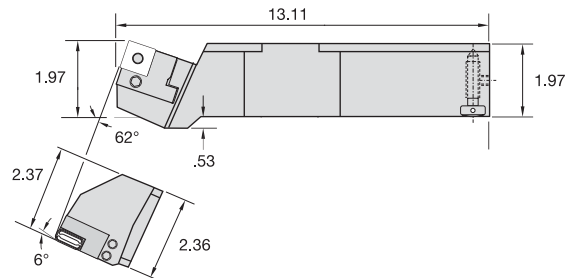
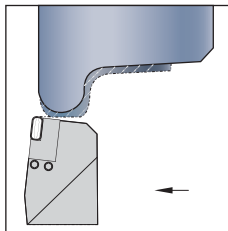


Compound Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	facing cassette	retaining screw	hex
69.391.465.10	69.393.186.10	—	LNUX301940	73.398.965
69.391.465.20	69.393.186.20	—	LNUX301940	73.398.965
69.391.465.10	69.393.187.10	69.393.190.10	LNUX191940	73.398.965
69.391.465.20	69.393.188.20	69.393.189.20	LNUX191940	73.398.965

Specialty • Toolholders



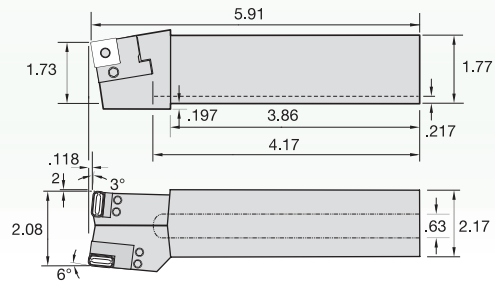
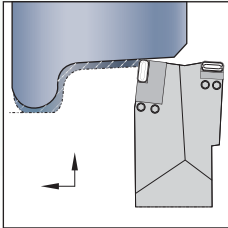
Chopper Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	retaining screw	hex
69.391.488.10	69.393.186.10	LNUX301940	73.398.965
69.391.488.20	69.393.186.20	LNUX301940	73.398.965
69.391.488.10	69.393.187.10	LNUX191940	73.398.965
69.391.488.20	69.393.188.20	LNUX191940	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)



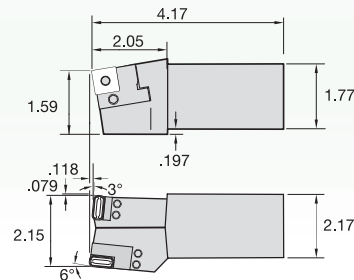
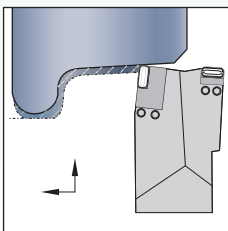
Compound Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	facing cassette	retaining screw	hex
69.391.391.10	69.393.186.10	—	LNUX301940	73.398.965
69.391.391.20	69.393.186.20	—	LNUX301940	73.398.965
69.391.391.10	69.393.187.10	69.393.190.10	LNUX191940	73.398.965
69.391.391.20	69.393.188.20	69.393.189.20	LNUX191940	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 inquiry along with the drawing for necessary action.

Sculfort
(under floor lathe)



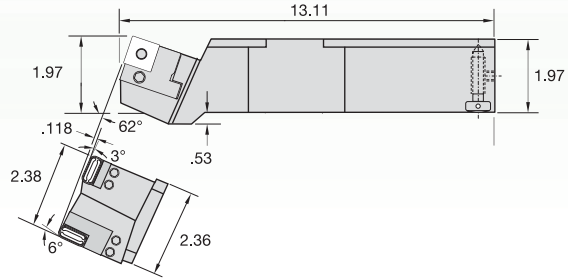
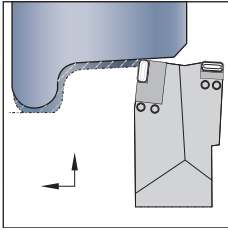
Compound Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	facing cassette	retaining screw	hex
69.391.392.10	69.393.186.10	—	LNUX301940	73.398.965
69.391.392.20	69.393.186.20	—	LNUX301940	73.398.965
69.391.392.10	69.393.187.10	69.393.190.10	LNUX191940	73.398.965
69.391.392.20	69.393.188.20	69.393.189.20	LNUX191940	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)



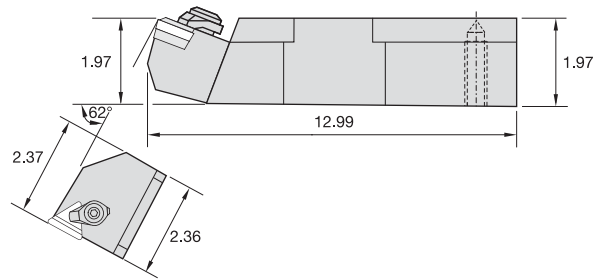
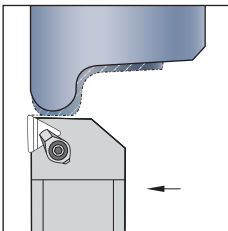
Compound Toolholder

Catalog Number • Spare Parts

toolholder	turning cassette	facing cassette	retaining screw	hex
69.391.465.10	69.393.186.10	—	LNUX301940	73.398.965
69.391.465.20	69.393.186.20	—	LNUX301940	73.398.965
69.391.465.10	69.393.187.10	69.393.190.10	LNUX191940	73.398.965
69.391.465.20	69.393.188.20	69.393.189.20	LNUX191940	73.398.965

NOTE: The toolholders are supplied without the cassettes and inserts.

KS — Hegenscheidt 102
(under floor lathe)



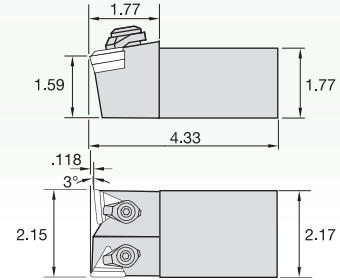
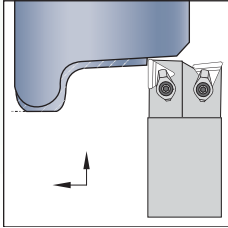
Chopper Toolholder

Catalog 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
63.388.005.20	44.315.983	73.085.999	73.080.215	73.332.001	73.080.245	73.085.971








NOTE: The chipbreaker used on the above holder is 73.398.272.
Products available upon request.

Sculfort
(under floor lathe)



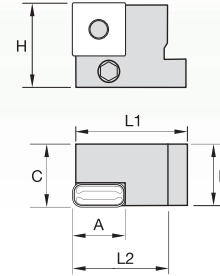
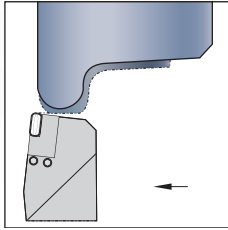
Compound Toolholder

Catalog 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

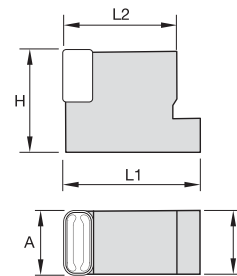
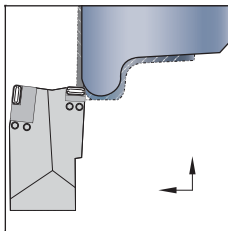


Turning Cassette

Catalog Number • Spare Parts






cassette	H	B	L1	L2	C	A				
								lever	clamp screw	hex
69.393.186.10	1.26	.89	1.66	1.38	.91	1.18	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.186.20	1.26	.89	1.66	1.38	.91	1.18	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.187.10	1.26	.89	1.66	1.38	.91	.75	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.188.20	1.26	.89	1.66	1.38	.91	.75	LNUX191940	214.85.667	214.85.627	73.398.965

Specialty • Cassettes for Toolholders



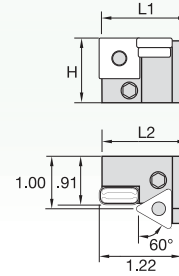
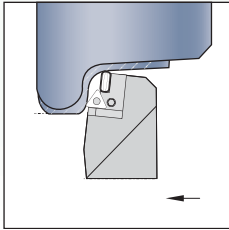
Facing Cassette

Catalog Number • Spare Parts

cassette	H	B	L1	L2	A				
							lever	clamp screw	hex
69.393.220.10	1.26	1.36	1.19	.91	1.18	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.221.20	1.26	1.36	1.19	.91	1.18	LNUX301940	214.85.667	214.85.627	73.398.965
69.393.189.10	1.26	.73	1.66	1.38	.75	LNUX191940	214.85.667	214.85.627	73.398.965
69.393.190.20	1.26	.73	1.66	1.38	.75	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



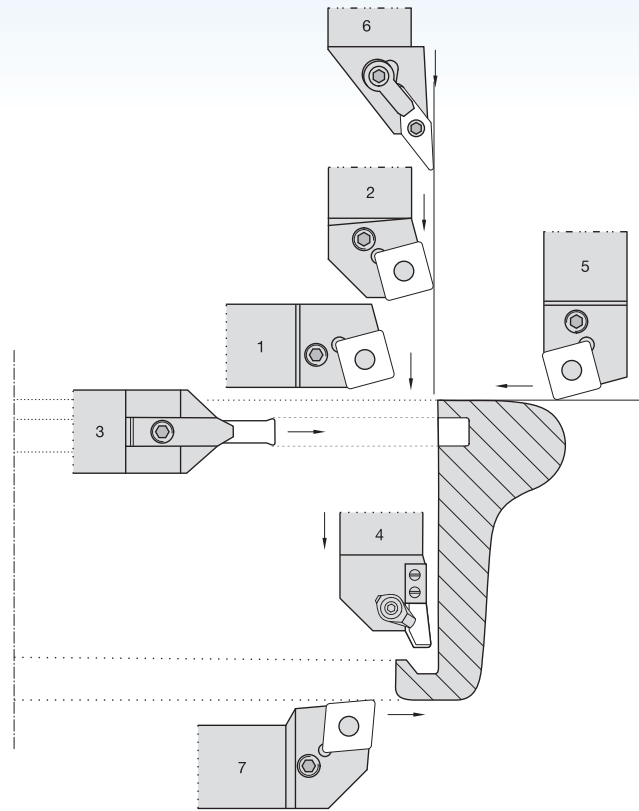
Turning Cassette

Catalog Number • Spare Parts

cassette	H	L1	L2								
						lever	clamp screw	hex	shim	shim pin	shim pin punch
69.393.167.10	1.26	1.66	1.38	LNUX191940	TNMM434	214.85.667	214.85.627	73.398.965	—	—	—
69.393.167.20	1.26	1.66	1.38	LNUX191940	TNMM434	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



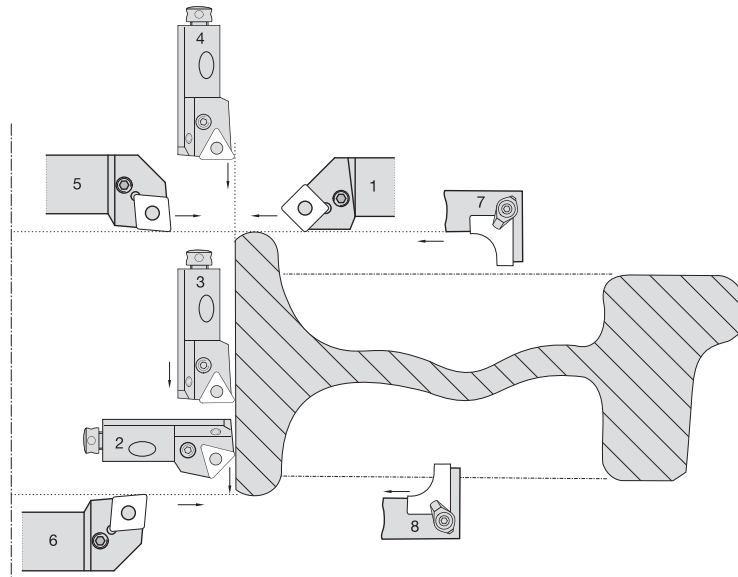
Catalog Number • Spare Parts



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	L	1 and 5	1.57	.57	8.66							
69.391.785.10	R	2	1.57	1.97	11.81	SNMG.854	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.327.477	N	3	1.26	1.26	9.84							
69.497.834.10	R	4	1.57	1.57	7.87	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	1.57	1.57	7.87	VCMT.3253	73.332.177	214.80.083	73.331.361	73.498.544	73.398.615	214.80.411
69.391.413.10	R	7	.98	.98	5.91	CNMG.433	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



Catalog Number • Spare Parts

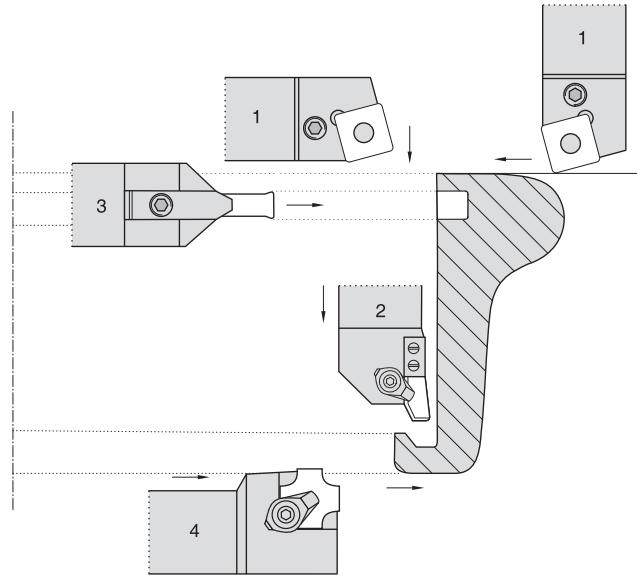


toolholder	hand	tool number	H	B	L	insert	shim	shim pin	lever/clamp	clamp screw	shim pin punch/washer	hex
69.391.735.10	R	1	1.57	1.57	9.06	SNMG.854	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.391.474.20	L	2	.98	.79	2.76	TNMG.433	214.85.620	214.85.608	214.85.601	214.85.626	73.398.917	214.80.411
69.391.461.10	R	3 and 4	.98	.79	2.76							
69.391.736.20	L	5	.79	.79	4.72	CNMG.433	214.85.622	214.85.608	214.85.601	214.85.626	73.398.917	214.80.411
69.391.736.10	R	6	.79	.79	4.72							
69.497.825.20	L	7	.98	.79	5.51	44.415.646	—	—	73.085.869	73.080.210	73.080.248	214.80.412
69.497.825.10	R	8	.98	.79	5.51							

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



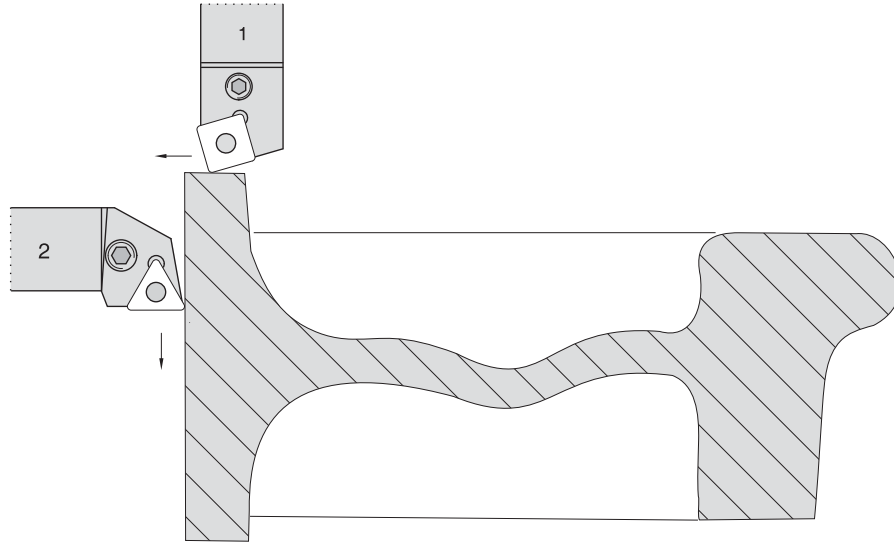
Catalog Number • Spare Parts



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	1.26	1.26	6.69	SNMG.544	214.85.615	214.85.610	214.85.603	214.85.628	73.398.941	214.80.412
70.67.4040	L	1A	1.57	1.57	250	SNMG.854	214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.497.757.10	R	2	1.26	1.57	7.09	44.415.588	73.331.120	73.498.549	73.085.999	73.080.215	73.085.971	214.80.414
69.497.834.10	R	2A	1.57	1.57	7.87	44.325.368	73.334.757	73.080.245	73.334.758	73.498.697	73.498.950	214.80.412
69.327.477	N	3	1.26	1.26	9.84	44.315.690	73.332.078	73.080.245	73.085.999	73.080.215	73.085.971	214.80.414
69.327.478	N	3A	1.57	1.57	9.84	44.315.690	73.332.078	73.080.245	73.085.999	73.080.215	73.085.971	214.80.414
69.397.973.10	R	4	1.26	1.26	5.91	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



Catalog 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	1.26	1.26	6.69		214.85.615	214.85.610	214.85.603	214.85.628	73.398.941	214.80.413
70.67.4040	L	1	1.57	1.57	9.84		214.85.616	214.85.611	214.85.604	73.398.545	73.398.918	214.80.413
69.391.958.20	L	2	.98	.98	5.91		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

Catalog Number • Spare Parts



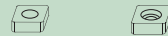
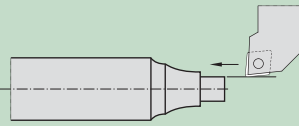
		toolholder	insert	shim	shim pin	lever/ clamp	clamp screw	shim pin punch/washer	hex
1(a)	Roughing (to turn from bloom)	PCLN R 3232 P19	CNMG 643 	214.85.623 	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412
1(b)	Roughing (to turn from forged axle)	PDJN R 3225 P15	DNMG 443 	73.332.094 	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
2	Finishing	PTGN R 3232 P22	TNMG 432 	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 443 	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 432 	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 432 	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

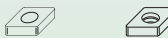
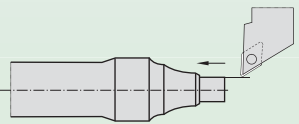
Catalog Number • Spare Parts



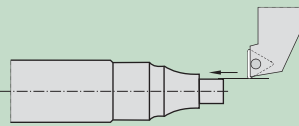
		toolholder	insert	shim	shim pin	lever	clamp screw	shim pin punch	hex
1(a)	Roughing (to turn from bloom)	PCLN R 3232 P19	CNMG 643	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412



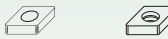
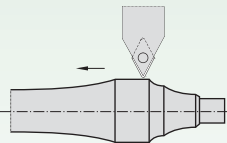
1(b)	Roughing (to turn from forged axle)	PDJN R 3225 P15	DNMG 443	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
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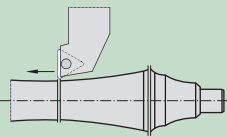
2	Finishing	PTGN R 3232 P22	TNMG 432	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
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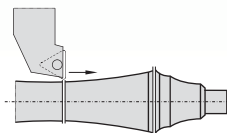
3	Roughing of body	PDNN R 3225 P15	DNMG 443	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
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4	Finishing of body	PTGN R 3232 P22	TNMG 432	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
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5	Finishing of body	PTGN L 3232 P22	TNMG 432	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
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Tooling Recommendations

Machining Roller Bearing Axle



For EMU Trailer Coach on TAKISAWA® CNC Lathe — TS 40

Catalog 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 643	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 443	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 432	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 443	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 432	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 432	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
6	Grooving	276 STP 3218	TPUN 432	73.080.320	73.080.245	73.085.869	73.085.211	73.080.248	214.80.412

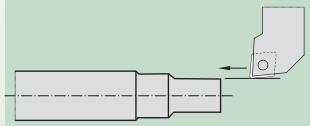
NOTE: Grooving tool 276 STP 3218 will use chipbreakers 73.085.804 and 73.085.805.

On TAKISAWA® CNC Lathe — TS 40

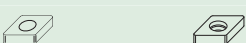
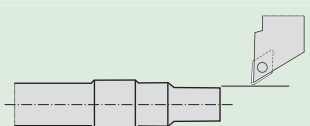
Catalog Number • Spare Parts



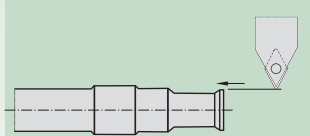
		toolholder	insert	shim	shim pin	lever	clamp screw	shim pin punch	hex
1(a)	Roughing (to turn from bloom)	PCLN R 3232 P19	CNMG 643	214.85.623	214.85.610	73.085.603	214.85.628	73.398.941	214.80.412



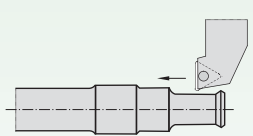
1(b)	Roughing (to turn from forged axle)	PDJN R 3225 P15	DNMG 443	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
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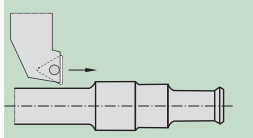
2	Roughing	PTGN R 3232 P22	TNMG 443	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
----------	----------	------------------------	----------	------------	------------	------------	------------	------------	------------



3	Finishing	PDNN R 3225 P15	DNMG 432	73.332.094	214.85.608	73.085.645	214.85.627	73.398.917	214.80.411
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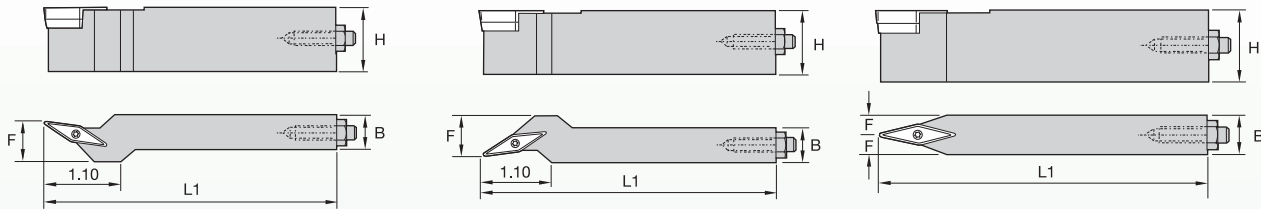


4	Finishing	PTGN R 3232 P22	TNMG 432	214.85.620	214.85.608	73.085.601	214.85.626	73.398.917	214.80.411
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Specialty • Tooling Recommendations

On AJTB Hegenscheidt



Catalog Number • Spare Parts

toolholder	Sl. No.	H	B	L1	F		shim	shim screw	insert screw	hex 1	hex 2	
69.395.143	1	32	13	90	11		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.149	1	32	13	90	11		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.154	2	32	13	67	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.144	2	32	13	71	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.153	2	32	13	90	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.150	2	32	13	67	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.151	2	32	13	71	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.152	2	32	13	90	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.178	3	32	13	67	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.179	3	32	13	71	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.180	3	32	13	90	15		VCMT3253	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.169	3	32	13	67	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.170	3	32	13	71	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709
69.395.171	3	32	13	90	15		VBMT333-T	73.332.177	214.80.083	214.80.388	73.398.999	214.76.709

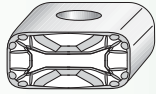
NOTE: The cassettes are supplied without the inserts, which should be ordered separately.
Products available upon request.

LNUX



ANSI catalog number	L	S	r	d	M	D1	t
LNUX191940	.750	.750	.157	—	—	.250	.394
LNUX301940	1.181	.750	.157	—	—	.250	.472
LNUX381240	1.496	.866	.157	—	—	.250	.472

LNUX-13



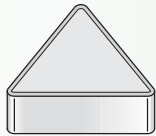
ANSI catalog number	L	S	r	d	M	D1	t
LNUX191940-13	.750	.750	.157	—	—	.250	.394
LNUX301940-13	1.181	.750	.157	—	—	.250	.394

LNUX-16



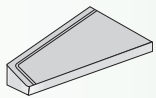
ANSI catalog number	L	S	r	d	M	D1	t
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LNUX301940-16	1.181	.750	.157	—	—	.250	.472

4431598



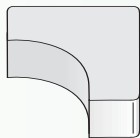
ANSI catalog number	L	S	r	d	M	D1	t
44315983	—	.394	.157	.750	.967	—	—
44315986	—	.236	.197	.638	.760	—	—

4441558



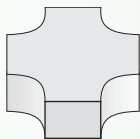
ANSI catalog number	L	S	r	d	M	D1	t
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44415646



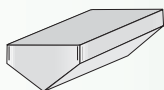
ANSI catalog number	L	S	r	d	M	D1	t
44415646	.750	.250	.394	—	—	—	—

44415690



ANSI catalog number	L	S	r	d	M	D1	t
44415690	1.102	.250	.394	—	—	—	—

44415690



ANSI catalog number	L	S	r	d	M	D1	t
44415690	1.102	.250	.394	—	—	—	—

L = Overall Length
 S = Insert Thickness
 r = Radius

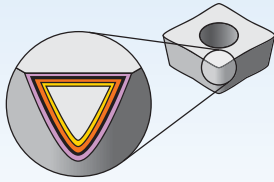
d = I.C.D.
 M = I.C.

D1 = Diameter of Screw or Pin Hole
 t = Thickness of LNUX Inserts
 ("t" is unique for LNUX inserts)

Products available upon request.

Grades and Grade Descriptions

Inserts



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

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Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
TN2000 HC-P20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O 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 ₂ O 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								
TN5120 HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ . Light and medium machining. For cast irons.									
TN7115 HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P								
TN7125 HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good toughness properties. Medium and heavy machining. For steels.	P								
ATM HW-M20	Uncoated carbide. Special substrate with alloying elements to give extra toughness and hardness. Especially suitable for machining of railway wheels.	P								
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. Effective in unfavorable conditions.	P								

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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.

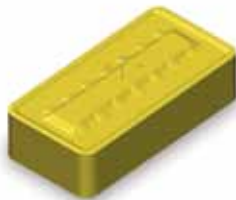
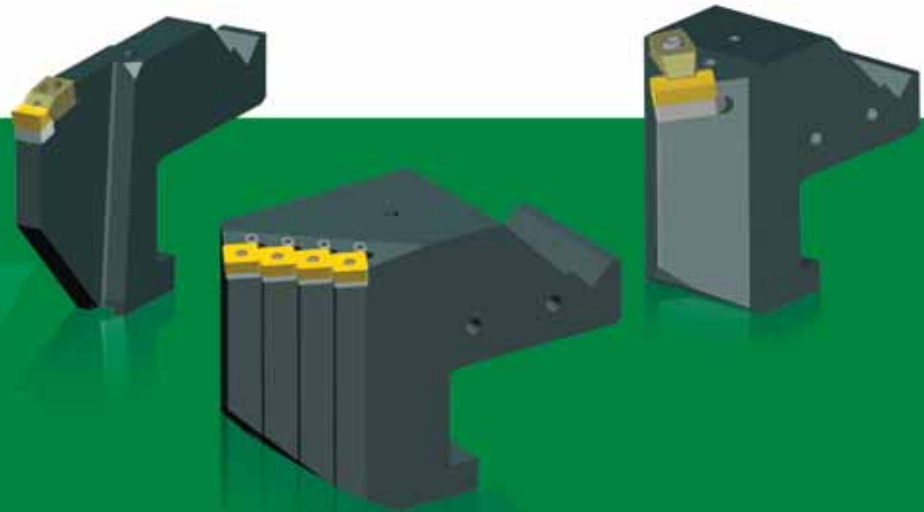


WIDIA, your partner for Heavy-Duty Machining delivers:

- Experience
- Confidence
- Reliability
- Chip control
- Results

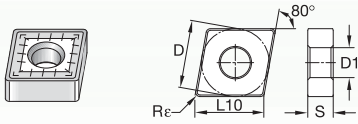
Let WIDIA put our expertise in Heavy-Duty Machining to work for you.

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 3.94".



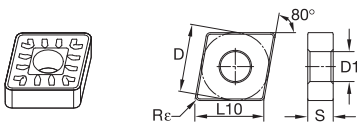
The combination of new geometries -HD and -SR with new grades such as TN6515 and TN7125 are proven solutions in the heavy-duty turning industry, providing outstanding chip control at large depth of cuts and high feed rates.

CNMM-8



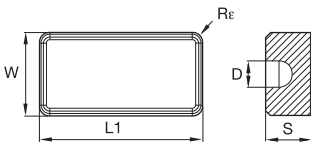
ANSI catalog number	D	L10	S	Re	D1
CNMM4328	.500	.508	.187	.031	.203
CNMM4338	.500	.508	.187	.047	.203
CNMM5438	.625	.635	.250	.047	.250
CNMM5448	.625	.635	.250	.063	.250
CNMM6438	.750	.761	.250	.047	.312
CNMM6448	.750	.761	.250	.063	.312
CNMM6468	.750	.761	.250	.094	.312
CNMM8668	1.000	1.015	.375	.094	.359

CNMM-SR



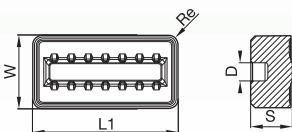
ANSI catalog number	D	L10	S	Re	D1
CNMM644SR	.750	.761	.250	.063	.312
CNMM646SR	.750	.761	.250	.094	.312
CNMM864SR	1.000	1.015	.375	.063	.359
CNMM866SR	1.000	1.015	.375	.094	.359
CNMM866SRL	1.000	1.015	.375	.094	.359

LNMR...



ANSI catalog number	D	L1	S	Re	W
LNMR351432	.250	1.000	.571	1.378	.125
LNMR501432	.250	1.000	.571	2.000	.125

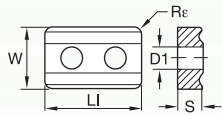
LNMR-HD



ANSI catalog number	D	L1	S	Re	W
LNMR501432HD	.250	1.000	.571	2.000	.125

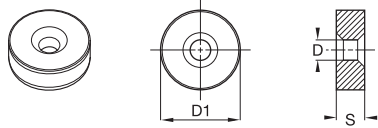
NOTE: Products available upon request.

LNUX...



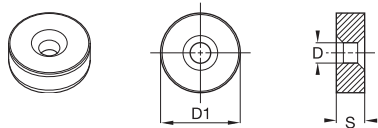
ANSI catalog number	D1	L1	S	Re	W
LNUX400924EN95	.359	1.575	.375	.094	1.000

RNGC...



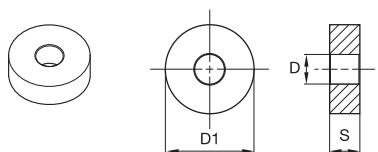
ANSI catalog number	D	D1	S
RNGC501800	.500	1.968	.709
RNGC501800T	.500	1.968	.709

RNMC...



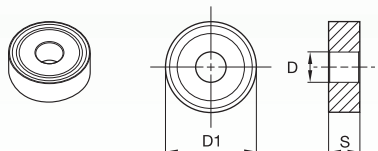
ANSI catalog number	D	D1	S
RNMC501800	.500	1.968	.709

RNMA...



ANSI catalog number	D	D1	S
RNMA86	.359	1.000	.375
RNMA86T	.359	1.000	.375

RNMG...

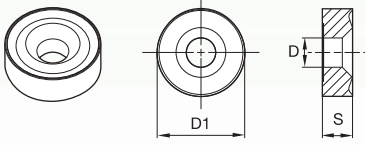


ANSI catalog number	D	D1	S
RNMG86	.359	1.000	.375

NOTE: Products available upon request.

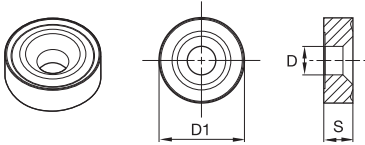
Specialty • Indexable Inserts

RNMH...



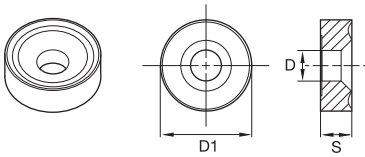
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RNMH281000	.346	1.122	.413

RNMH-11



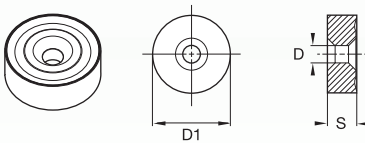
ANSI catalog number	D	D1	S
RNMH38120011	.500	1.500	.500

RNMH-13



ANSI catalog number	D	D1	S
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RNMH-M0

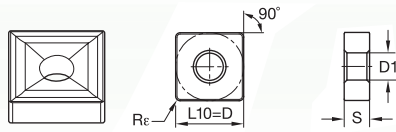


ANSI catalog number	D	D1	S
RNMH5018M0	.500	1.968	.709

NOTE: Products available upon request.

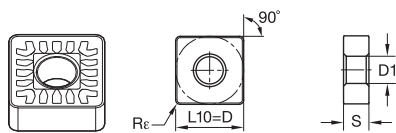
Specialty • Indexable Inserts

SNMM-8



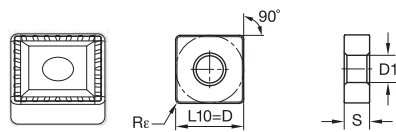
	ANSI catalog number	D	L10	S	Re	D1
8	SNMM4338	.500	.500	.187	.047	.203
	SNMM5438	.625	.625	.250	.047	.250
	SNMM6438	.750	.750	.250	.047	.312
	SNMM6448	.750	.750	.250	.063	.312
	SNMM6468	.750	.750	.250	.094	.312
B	SNMM8568	1.000	1.000	.312	.094	.359
	SNMM8568	1.000	1.000	.312	.094	.359

SNMM-SR



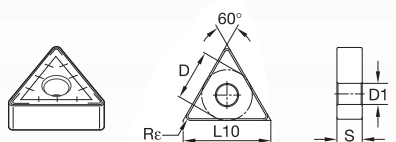
	ANSI catalog number	D	L10	S	Re	D1
SR	SNMM644SR	.750	.750	.250	.063	.312
	SNMM646SR	.750	.750	.250	.094	.312
	SNMM864SR	1.000	1.000	.375	.063	.359
	SNMM866SR	1.000	1.000	.375	.063	.359
	SNMM856SR	1.000	1.000	.312	.094	.359
SRL	SNMM856SRL	1.000	1.000	.312	.094	.359
	SNMM856TSR	1.000	1.000	.312	.094	.359

SNMX...



	ANSI catalog number	D	L10	S	Re	D1
	SNMX381224	1.500	.375	.476	1.500	.094

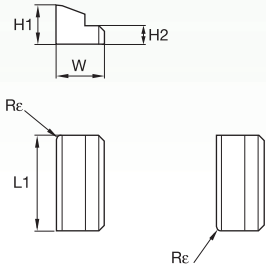
TNMM-8



	ANSI catalog number	D	L10	S	Re	D1
	TNMM3338	.375	.650	.187	.047	.150
	TNMM4328	.500	.866	.187	.031	.203
	TNMM4338	.500	.866	.187	.047	.203
	TNMM4348	.500	.866	.187	.063	.203
	TNMM5438	.625	1.083	.250	.047	.250
	TNMM5468	.625	1.083	.250	.094	.250

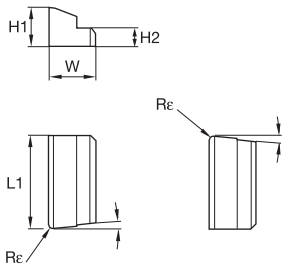
NOTE: Products available upon request.

SVN71/72...RL



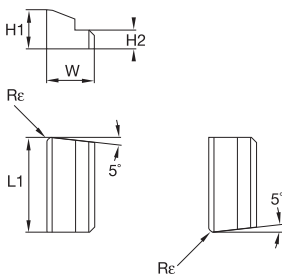
ANSI catalog number	L1	W	H1	H2	Re
SVN71/72...R/L	.984	.709	.602	.283	.079
SVN71/72...R/L	1.181	.709	.608	.283	.079
SVN71/72...R/L	1.378	.709	.602	.283	.079
SVN71/72...R/L	1.575	.709	.602	.283	.079
SVN71/72...R/L	1.968	.709	.602	.283	.079
SVN71/72...R/L	2.362	.709	.602	.283	.079
SVN71/72...R/L	2.756	.709	.602	.283	.079

SVN77...RL



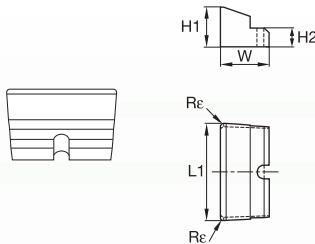
ANSI catalog number	L1	W	H1	H2	Re
SVN77...R/L	.984	.709	.602	.283	.079
SVN77...R/L	1.181	.709	.608	.283	.079
SVN77...R/L	1.378	.709	.602	.283	.079
SVN77...R/L	1.575	.709	.602	.283	.079
SVN77...R/L	1.968	.709	.602	.283	.079
SVN77...R/L	2.362	.709	.602	.283	.079
SVN77...R/L	2.756	.709	.602	.283	.079

SVN80...RL



ANSI catalog number	L1	W	H1	H2	Re
SVN80...R/L	.984	.709	.602	.283	.079
SVN80...R/L	.984	.709	.608	.283	.079
SVN80...R/L	.984	.709	.602	.283	.079
SVN80...R/L	.984	.709	.602	.283	.079
SVN80...R/L	.984	.709	.602	.283	.079
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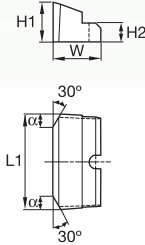
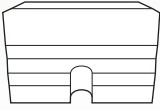
SVN...F1



ANSI catalog number	L1	W	H1	H2	Re
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SVN76...F1	.866	.709	.608	.283	.047
SVN76...F1	.984	.709	.602	.283	.047
SVN76...F1	1.181	.709	.602	.283	.047
SVN76...F1	1.378	.709	.602	.283	.047
SVN76...F1	1.575	.709	.602	.283	.047
SVN76...F1	1.771	.709	.602	.283	.047
SVN76...F1	1.968	.709	.602	.283	.047
SVN76...F1	2.165	.709	.602	.283	.047
SVN76...F1	2.362	.709	.602	.283	.047
SVN76...F1	2.559	.709	.602	.283	.047
SVN76...F1	2.756	.709	.602	.283	.047

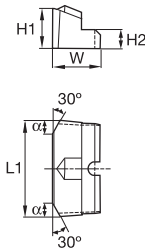
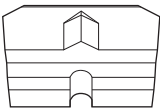
NOTE: Products available upon request.

SVN...F2



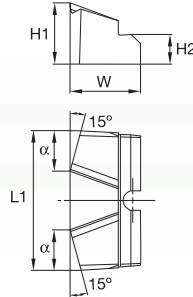
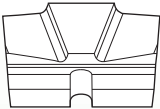
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SVN76...F2	.984	.709	.602	.283	.197
SVN76...F2	1.181	.709	.602	.283	.236
SVN76...F2	1.378	.709	.602	.283	.236
SVN76...F2	1.575	.709	.602	.283	.236
SVN76...F2	1.771	.709	.602	.283	.236
SVN76...F2	1.968	.709	.602	.283	.236
SVN76...F2	2.165	.709	.602	.283	.236
SVN76...F2	2.362	.709	.602	.283	.236
SVN76...F2	2.559	.709	.602	.283	.236
SVN76...F2	2.756	.709	.602	.283	.236

SVN...F3



ANSI catalog number	L1	W	H1	H2	a
SVN76...F3	.787	.709	.602	.283	.197
SVN76...F3	.866	.709	.608	.283	.197
SVN76...F3	.984	.709	.602	.283	.197
SVN76...F3	1.181	.709	.602	.283	.236
SVN76...F3	1.378	.709	.602	.283	.236
SVN76...F3	1.575	.709	.602	.283	.236
SVN76...F3	1.771	.709	.602	.283	.236
SVN76...F3	1.968	.709	.602	.283	.236
SVN76...F3	2.165	.709	.602	.283	.236
SVN76...F3	2.362	.709	.602	.283	.236
SVN76...F3	2.559	.709	.602	.283	.236
SVN76...F3	2.756	.709	.602	.283	.236

SVN...F4



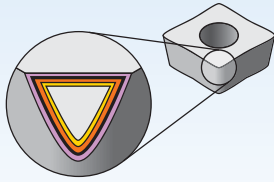
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SVN76...F4	.866	.709	.608	.283	.197
SVN76...F4	.984	.709	.602	.283	.236
SVN76...F4	1.181	.709	.602	.283	.295
SVN76...F4	1.378	.709	.602	.283	.335
SVN76...F4	1.575	.709	.602	.283	.394
SVN76...F4	1.771	.709	.602	.283	.433
SVN76...F4	1.968	.709	.602	.283	.492

NOTE: Products available upon request.

Specialty • Indexable Inserts

Grades and Grade Descriptions

Inserts



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

NEW!

NEW!

NEW!

Grade

Coating	Grade Description	05	10	15	20	25	30	35	40	45
TN5120 HC-K20	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ . Light and medium machining. For cast irons.			K	K	K				
TN6515 HC-P15	Coated carbide. PVD — TiAlN multi-layer medium and heavy machining. For steels and nodular cast iron.	P		K	K	K				
TN7115 HC-P15	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good balance of wear resistance and toughness properties. Light and medium machining. For steels.	P	P	P	P					
TN7125 HC-P25	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -TiN. Good toughness properties. Medium and heavy machining. For steels.	P M			P	M				
TN8025 HW-P35	Coated carbide. MT-CVD/CVD — TiN-TiCN-Al ₂ O ₃ -ZrCN. Good balance of wear resistance and toughness properties. Light and medium machining. For austenitic stainless steel AISI 300 series.	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 unfavorable conditions.	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				
TTR HW-P35	Uncoated carbide. Light and medium machining. For steels and nodular cast iron. To be used at low cutting speeds. Effective in unfavorable conditions.	P M					P	M		

WIN WITH WIDIA™

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 39.3" (100,0mm).

To learn more about our innovations, contact your local Authorized 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 optimizing an application, our world-renowned Advanced Engineering Team is available.

Our engineering departments are fully integrated with specialized 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 Solutions



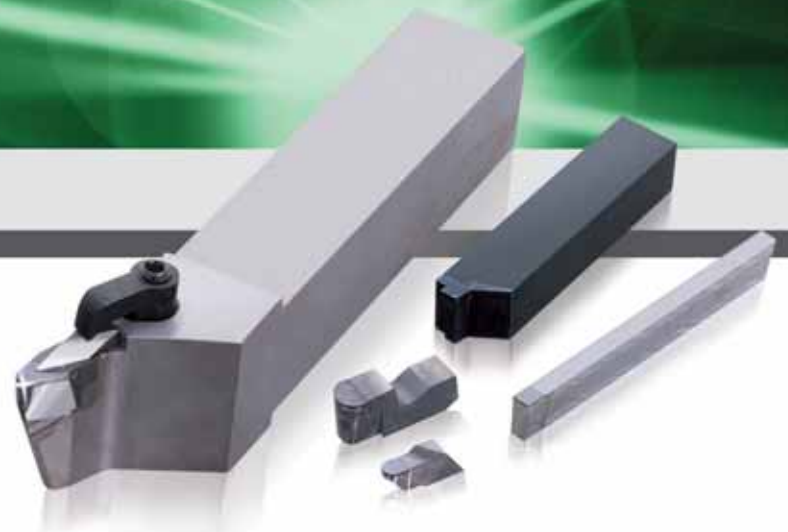
Custom Solution Services:

- Blueprint specials
- Complex geometries
- Form tools
- Modified standards
- Application engineering and optimization
- Tool design
- Project development

Contact your local Authorized 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 Program (FTCS) provides immediate customized insert solutions to meet your specific needs.
- A wide range of standard CBM turning inserts also available.
- Local Authorized WIDIA™ Sales Representatives at your fingertips for personal, immediate attention.

To learn more about our innovations, contact your local Authorized Distributor or visit www.widia.com.

WIDIA 

Turning and Boring Bar Custom Solutions

We specialize in designing and manufacturing the exact drill for your needs.

Value-Added Programs

WIDIA-CLAPP DICO™ offers a number of value-added programs 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 Programs

Customer- and tool-specific inventory stocking programs are available and managed effectively with weekly communication of inventory balances and usage information.

Commodity Management

An encompassing PCD and PCBN tool supply management program combines our expertise in tool fabrication, inventory management, technical application, and process improvement.

Custom Solutions



Our complete portfolio. Your complete satisfaction.

WIDIA[™]
HANITA[™]

WIDIA[™]
MANCHESTER[™]

WIDIA[™]
CIRCLE[™]

WIDIA[™]

WIDIA[™]
CLAPDICO[™]

WIDIA[™]
GTD[™]

WIDIA[™]
RÜBIG[™]

From turning, holmaking, 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, specialized network of Authorized 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.

To learn more, contact your local Authorized Distributor or visit www.widia.com.

WIDIA[™]
www.widia.com

PCD-Tipped Custom Solutions

Increase tool life up to 300 times part per tool with PCD solutions!

Our PCD-tipped tools are ideal for machining aluminum and magnesium alloys, copper, and brass, as well as glass-fiber and carbon-fiber reinforced plastics — with cutting speeds between 9,700–117,000 IPM (250–3,000 m/min).

The utilization 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 utilizing PCD tooling for machining non-ferrous materials can be categorized in five key areas:

- Longer tool life, enabling increased machine utilization 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.

Custom Solutions



In most cases where PCD tools have been evaluated against carbide tooling, customers have realized significant increases in tool life up to 300 times part 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 utilizes PCD and PCBN tooling in the machining of aluminum, powdered metals, hardened steel, and iron materials.



Telecommunications

A swiftly growing industry that incorporates the usage of PCD in the machining of plastics, fiberboard, bronze, brass, and zinc materials.



Electronics

A growing and competitive industry that incorporates the usage of PCD in the machining of plastics, aluminum, glass, and copper materials.



Aerospace

An industry that has just begun to unlock the economic potential of PCD and PCBN tooling in the machining of target materials such as phenolics, graphite composites, and aluminums.



Custom Solutions

Contact your local Authorized Distributor for more information.

WIDIA-CIRCLE™ Small Hole Tooling

For over 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 realize 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 C164–C165) where you will find detailed special ordering information. Please utilize 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 enable you to perform the required job most economically.

Thank you for trusting WIDIA-CIRCLE for all of your indexable tooling needs.



Global Capabilities and Local Service

WIN WITH WIDIA™

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 Authorized Distributor or visit www.widia.com.

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, specializing in specific product groups (end mills, drills, reamers, etc.), work with our customers to optimize 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 program services that will earn, and keep, your business.



WIN WITH WIDIA™

WIDIA 



Best-in-Class Service and Support

With WIDIA™, you get it all — superior product, reliable performance, and unsurpassed support and program services.

- Highly qualified Customer Service and Customer Application Support (CAS) teams support clients through strong product and market knowledge.
- Advanced Engineering teams specialize in specific product groups to help customers optimize 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 Authorized Distributor or visit www.widia.com.

WIDIA 



Service and Support

WIDIA™ ToolBOSS™ .....	.12-13
Advance Tool Management Software .....	.14-15
WIDIA Tool Recycling .....	.16
WIDIA Tool Reconditioning .....	.17
Customer Application Support .....	.18-19



“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, minimizing 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.

Maximize 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 customizable 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 Authorized Distributor or visit www.widia.com.

Get Cash or Credit for Your Used Carbide



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.

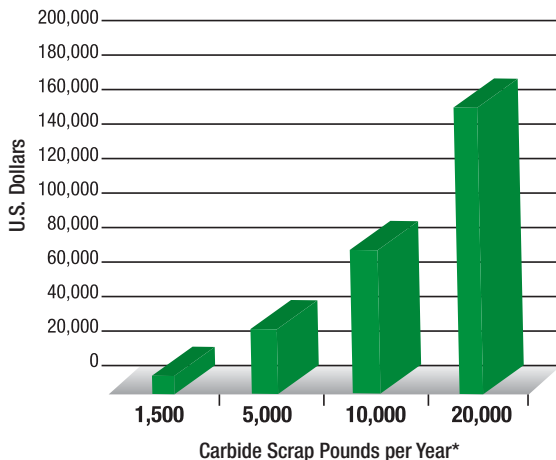
Through our Carbide Recycling Program, get the full value of your investment in metalcutting tools, improve profitability, and reduce your overall tooling spend. When you send us your used carbide, we will reward you with cash or credit. *(Credit offer valid in U.S.A. only.)*

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 Authorized Distributor.

Your Potential Annual Returns*



**Actual returns may vary based on current market value for recycled carbide materials.*



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 authorized 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 optimize 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
 - AsiaShip the tools with the instructions from Customer Service.
4. Reconditioned tools will be returned to you from the reconditioning center.

Contact your local Authorized 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 optimization.
- 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:

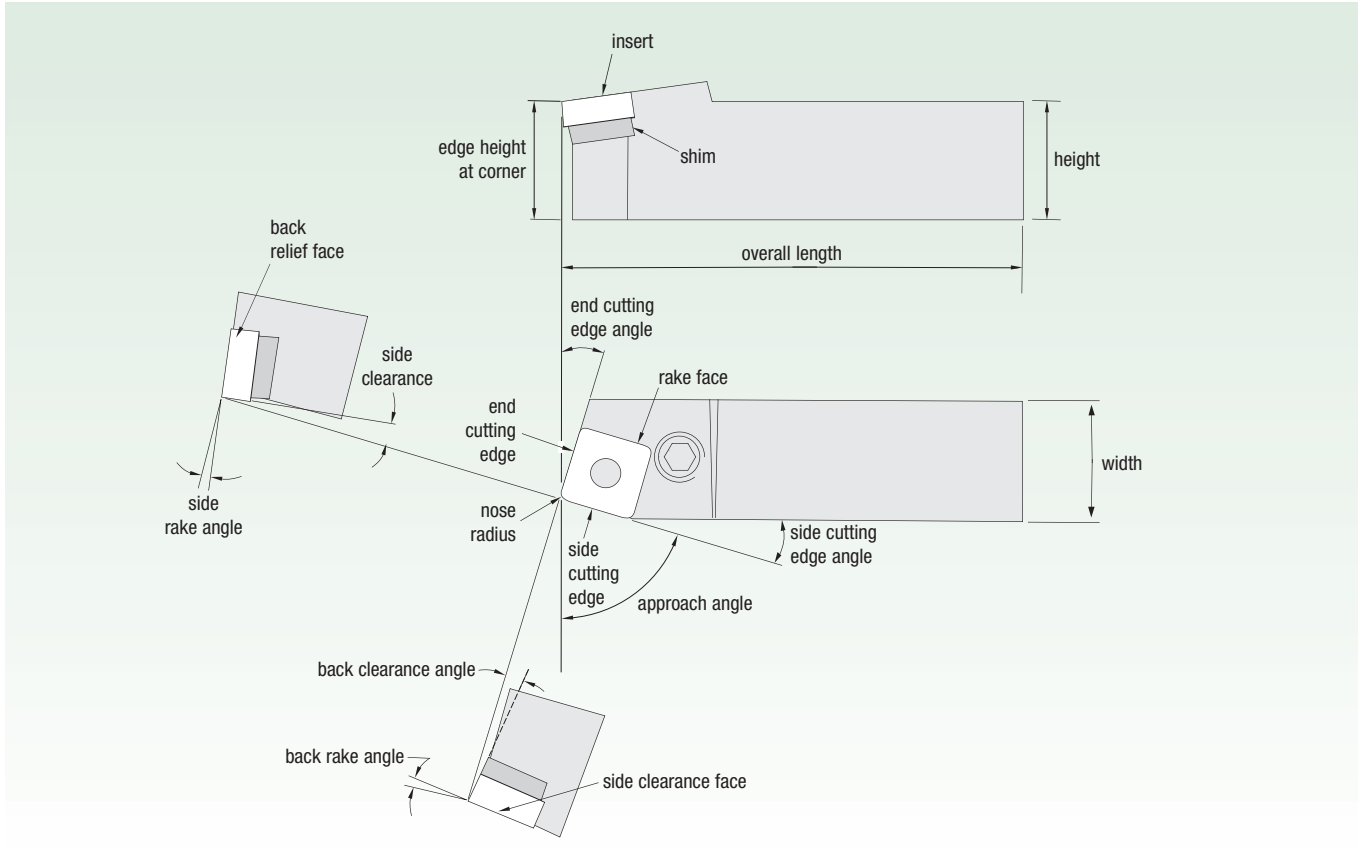
Originating Country	Language	Phone	Fax	E-mail
Australia	English	001-724-539-6921	001-724-539-6830	ap.techsupport@widia.com
Austria	German	0800 291630*	0800 291631*	eu.techsupport@widia.com
Belgium	English/French	0800 80410*	0800 80411*	eu.techsupport@widia.com
China	English	400 889 2136	001-724-539-6830	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.

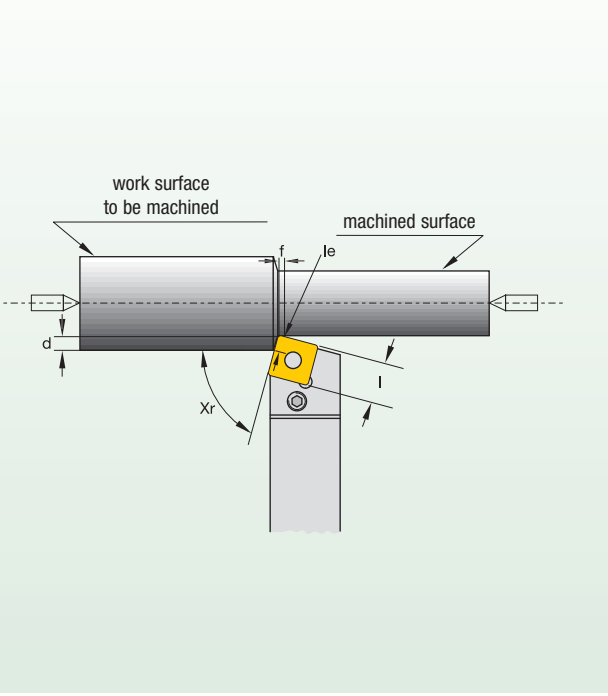


Technical Information

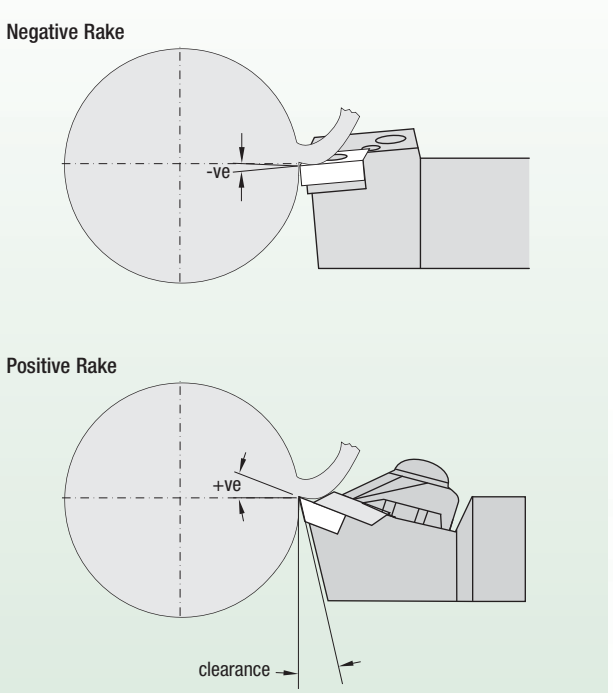
Toolholder Application Data	J2
Approach Angle	J3
Selection of Toolholder	J4–J5
Insert Selection	J6–J7
Surface Roughness	J8–J10
Dimensions and Tolerances	J12
Mounting Dimensions for Cartridges	J13
Troubleshooting	J14–J15
Hardness Cross Reference	J16–J17
Equations	J18
Decimal Equivalent Chart	J19
Material Technical Information	J20–J25
Material Overview	J26–J27



Nomenclature with Respect to Workpiece

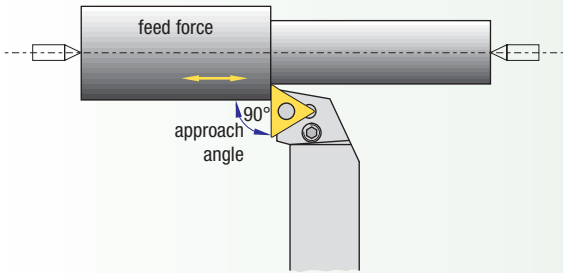


Insert Orientation with Respect to Workpiece

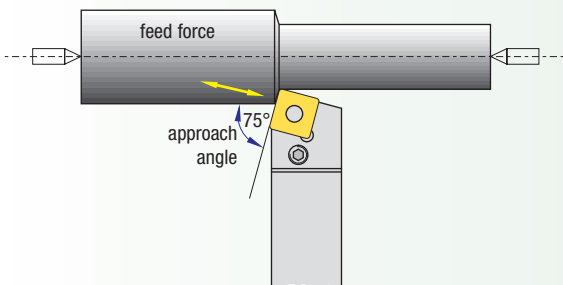


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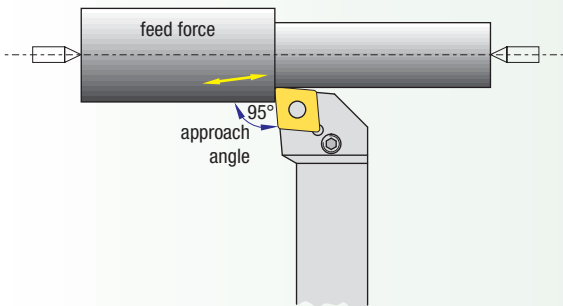
d =	Depth of Cut	Xr =	Approach Angle
le =	Diameter	f =	Feed
		l =	Insert Cutting Edge Length



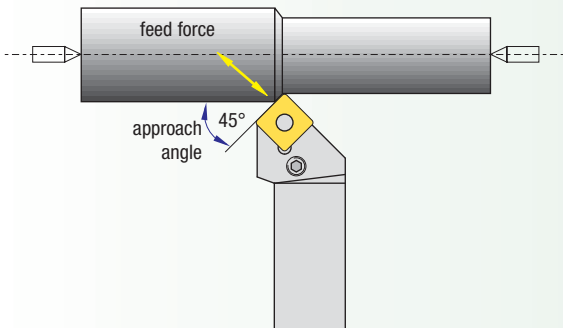
90° approach angle toolholders are generally preferred for machining slender jobs and for workpieces held between centers.



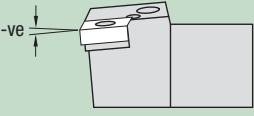
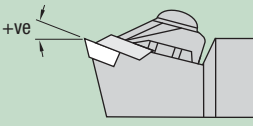
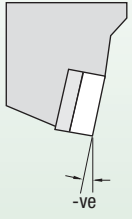
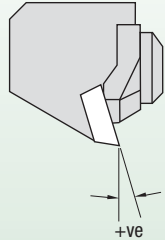
75° approach angle toolholders are preferred for machining barrel-type components and operations with slight interruptions.



95° approach angle toolholders are preferred for versatile operations like OD turning and facing.

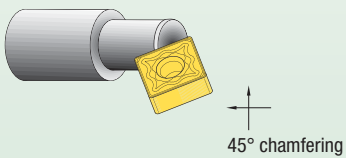
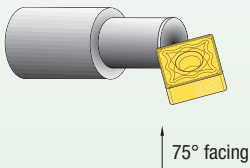
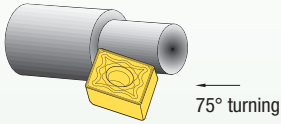


45° approach angle toolholders are preferred for rough machining and for chamfering operations with heavy interruptions.

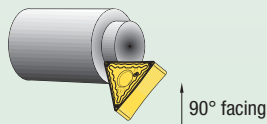
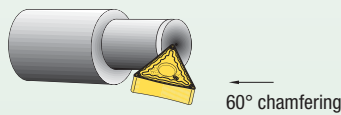
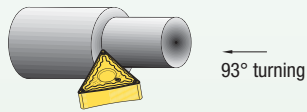
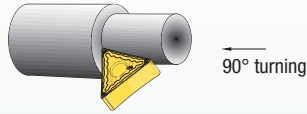
feature	negative rake	positive rake
back rake	<ul style="list-style-type: none"> Moves chips towards the machined surface. 	<ul style="list-style-type: none"> Moves chips away from the machined surface. 
side rake	<ul style="list-style-type: none"> Moves chips towards the job shoulder. 	<ul style="list-style-type: none"> Moves chips away from the job shoulder. 
advantages	<ul style="list-style-type: none"> Cutting edge is stronger. Can sustain higher cutting forces. Ideal for machining interrupted cuts. Has higher number of cutting edges. 	<ul style="list-style-type: none"> Free cutting action. Generates less heat. Consumes less horsepower. Directs chips away from the job.
disadvantages	<ul style="list-style-type: none"> Compresses the metal. Consumes more horsepower. Directs chips towards the job. Generates more heat while cutting. 	<ul style="list-style-type: none"> Has fewer cutting edges. Cutting edge is not strong.

80° Diamond Insert Versatility

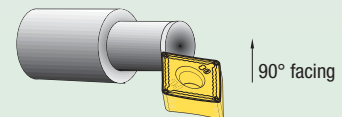
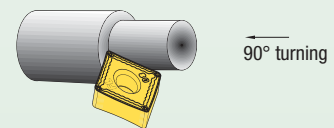
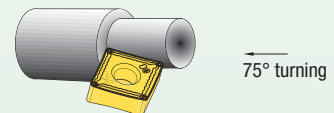
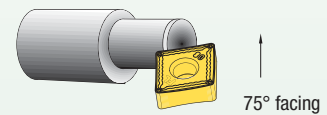
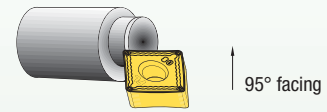
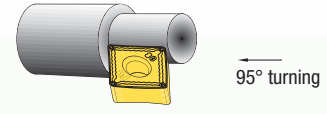
SNMG



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°).

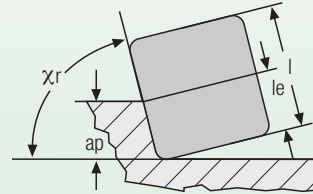
Where applicable, the trigon shape W (80°) should be preferred to the C insert, as more cutting edges are available. Round inserts of shape R are an alternative to S inserts, and may also be suitable for use in form turning.

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 (a_p), the cutting edge angle χ_r , 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.



$$l_e = \frac{a_p}{\sin \chi_r}$$

a_p = Depth of cut

l_e = Effective cutting edge length (width of cut)

l = Insert cutting edge length

χ_r = Cutting edge angle

Maximum Effective Lengths l_e of Cutting Edges:

geometry	S	C	T	D	V	W	R
-2, -22	.012 l	.012 l	.008 l	.008 l	—	—	—
-4, -41, -48, -AP	.020 l	.020 l	.012 l	.012 l	—	.016 l	—
-MT..., -49, -5, -65, -8	.028 l	.028 l	.020 l	.020 l	.008 l	.020 l	.016 d

Cutting edge length/effective length

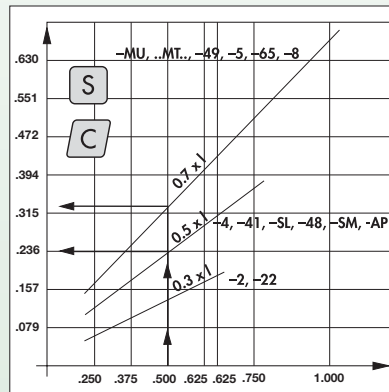
Corner radius

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.

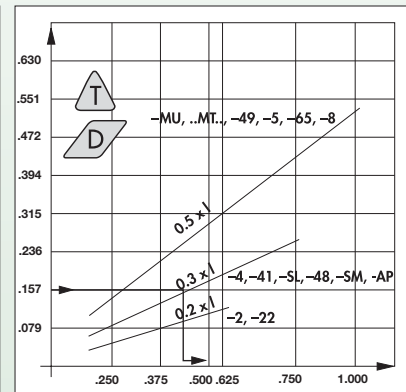
Roughing

The following minimum radii, depending on feed, are recommended for rough turning.

Radius $r \geq .063 \times \text{feed } f$ for insert shapes C and S
Radius $r \geq .098 \times \text{feed } f$ for insert shapes D and T



Cutting edge length l (inch)



Cutting edge length l (inch)

Recommended Maximum Feeds

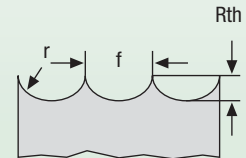
The recommended maximum feeds are based on cutting edge angles 75–105°. Higher feed values are possible under favorable conditions. Under non-rigid conditions, lower values should be applied or smaller radii selected, especially if vibration occurs. Larger radii are generally recommended for cast iron, 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 > .0039", the following formula for theoretical roughness height R_{th} can be used.

If the theoretical roughness height R_{th} is assumed to be roughly equal to R_z , the roughness average R_a can be inferred, which does not show a fixed relationship to R_z . A conversion ratio of $R_z:R_a = 4:1$ is generally appropriate.

$$R_{th} = \frac{125000 \times f^2}{r} \quad [\mu\text{in}]$$



Maximum Feed for Radius r

insert shape	.015" (0,4)	.032" (0,8)	.047" (1,2)	.062" (1,6)	.094" (2,4)
	.010" (0,25)	.020" (0,5)	.031" (0,8)	.039" (1,0)	.063" (1,6)
	.006" (0,16)	.013" (0,32)	.020" (0,5)	.025" (0,63)	.039" (1,0)

Theoretical Roughness Height R_{th} [μin] for Feed f

radius ANSI (ISO)	.004" (0,10)	.005" (0,12)	.006" (0,16)	.008" (0,20)	.010" (0,25)	.012" (0,32)
.015" (0,4)	.125" (3,2)	.200" (4,5)	.300" (8,0)	.500" (12,5)	.800" (20,0)	—
.032" (0,8)	.063" (1,6)	.100" (2,2)	.150" (4,0)	.250" (6,3)	.400" (10,0)	.700" (16,0)
.047" (1,2)	—	.063" (1,5)	.100" (2,8)	.175" (4,2)	.250" (6,3)	.450" (10,7)
.062" (1,6)	—	—	.075" (2,0)	.125" (3,2)	.200" (5,0)	.350" (8,0)

Approximate Reference Values for the Ratio R_z to R_a

R_z [μin]	.063" (1,6)	.098" (2,5)	.157" (4,0)	.248" (6,3)	.394" (10,0)	.630" (16,0)	.984" (16,0)
R_a [μin]	.016" (0,4)	.024" (0,6)	.039" (1,0)	.063" (1,6)	.098" (2,5)	.157" (4,0)	.248" (6,3)

Good surfaces are achieved with:

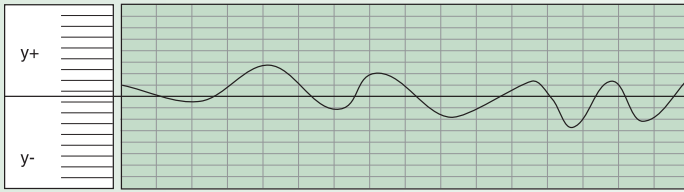
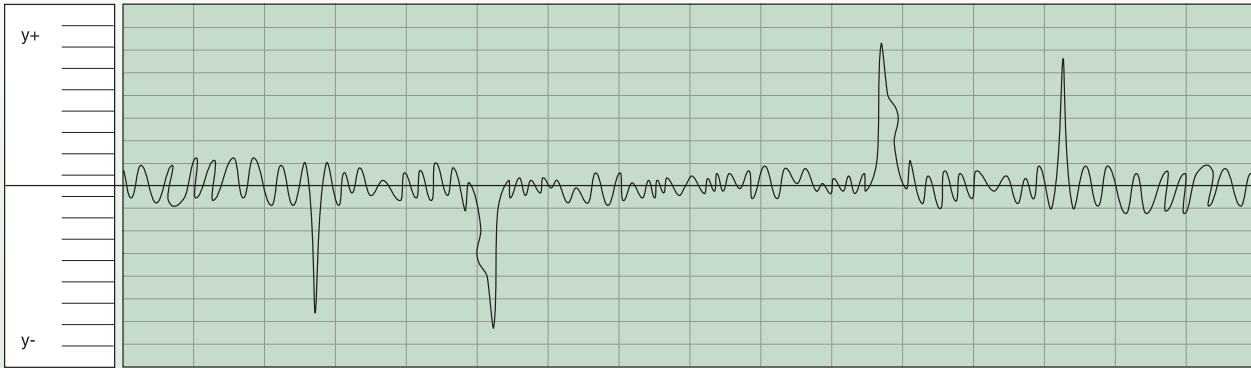
- Higher cutting speeds.
- Inserts with sharp cutting edges.
- Positive rake angles and positive chipbreaker geometries.
- Use of cermets.
- Rigid machining setups.
- Use of easily machinable work materials.
- Use of cutting fluid.

Surface characteristics:

- AA $\hat{=}$ arithmetic average R_a
- CLA $\hat{=}$ centerline average R_a
- RMS $\hat{=}$ 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)

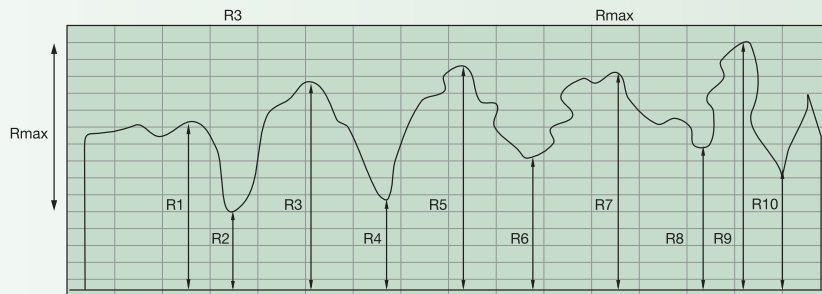


Secondary Texture (Waviness)

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.

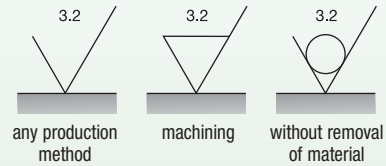
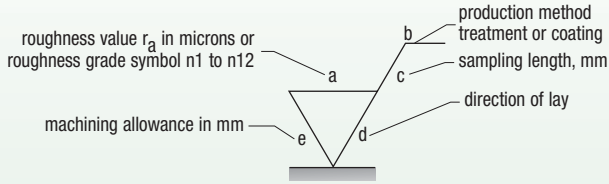
R_{max} = Distance between two lines parallel to the mean line and touching the profile at the highest and lowest points within the sampling length.

R_z = 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.

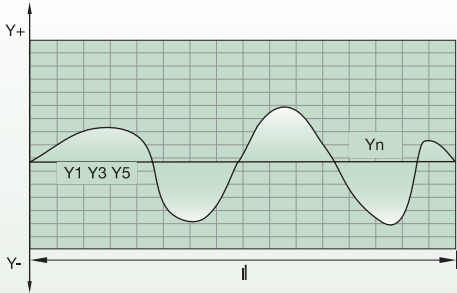
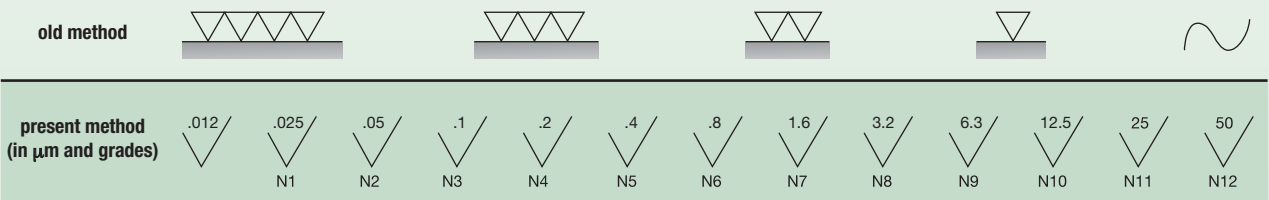


$$R_z = (R_1 + R_3 + R_5 + R_7 + R_9) - (R_2 + R_4 + R_6 + R_8 + R_{10}) / 5$$

Machining Symbol



Symbols to Denote Surface Roughness



Ra = Average value of ordinates (Y1, Y2...Yn) from their mean line.

$$Ra = 1/l \int_0^l |y| dx$$

$$Ra = \frac{\sum |y_i|}{n}$$

Table gives approximate values only.

1 μm = 0,001mm = 39 μ²
1 μ² = .00001"

Surface FOMOSJ grade (OS 3073)

Surface Roughness

Rt/max μm	CLA μm	CLA μ²	RMS μm	RMS μ²	UDSSR class	CCCP μm Rt
.06	.02	.75	.02	.08	14	.06-.12
.10	.03	1.20	.04	1.3	13	.06-.12
.20	.06	2.50	.08	2.8	12	.12-.25
.30	.09	3.70	.10	4.2	11	.25-.50
.40	.13	5.00	.14	5.6	—	—
.50	.16	6.70	.18	6.9	—	—
.60	.19	7.50	.21	8.3	10	.50-.80
.70	.2	8.70	.25	9.7	—	—
.80	.25	10.00	.28	11.1	—	—
.90	.28	11.20	.32	12.5	—	—
1.00	.31	12.50	.35	14.0	—	—
1.20	.38	15.80	.42	16.7	9	.80-1.60
1.50	.47	18.80	.53	20.9	—	—
1.80	.57	22.60	.64	25.5	—	—
2.00	.64	25.10	.78	27.9	8	1.60-3.20
2.40	.73	30.10	.85	33.4	—	—
2.80	.89	35.20	.99	39.0	—	—
3.00	.95	37.60	1.06	41.9	—	—
3.50	1.11	43.90	1.24	48.8	—	—
4.00	1.27	50.20	1.41	55.8	7	3.20-6.30
5.00	1.59	62.70	1.77	69.7	—	—
6.00	1.91	75.50	2.12	83.6	—	—
7.00	2.22	87.50	2.48	92.6	—	—
8.00	2.54	100.00	2.83	111.7	6	6.30-10.00
10.00	3.16	125.50	3.54	140.0	—	—
20.00	6.40	251.00	7.60	279.0	5	10.00-20.00
40.00	12.70	205.00	14.10	558.0	4	20.00-40.00
60.00	19.10	755.00	21.20	836.0	3	40.00-63.00
125.00	39.50	1560.00	43.50	750.0	2	63.00-125.00
200.00	64.00	2510.00	78.00	2790.0	1	125.00-200.00

Surface Roughness

Roughness Expected from Manufacturing Process



Technical Information

Sl. no.	manufacturing process	values in Ra and μm														
		.012	.025	.050	.10	.20	.40	.80	1.6	3.2	6.3	12.5	25	50	100	200
1	sand casting										5	10	20	50		
2	permanent mold casting							.80	1.6	3.2	6.3	12.5	25			
3	die casting							.80	1.6	3.2	6.3	12.5	25			
4	high-pressure casting						.32	.63	1.25	2.5	5	10	20			
5	hot rolling									2.5	5	10	20	50		
6	forging									1.6	3.2	6.3	12.5	25		
7	extrusion					.16	.32	.63	1.25	2.5	5	10	20			
8	flame cutting, sawing, and chipping										6.3	12.5	25	50	100	
9	radial cut-off sawing							1	2	4	8	16	32			
10	hand grinding										6.3	12.5	25			
11	disc grinding									1.6	3.2	6.3	12.5	25		
12	filing					.25	.5	1	2	4	8	16	32			
13	planing									1.6	3.2	6.3	12.5	25		
14	shaping									1.6	3.2	6.3	12.5	25		
15	drilling									1.6	3.2	6.3	12.5	20		
16	turning and milling							.32	.63	1.25	2.5	5	10	20		
17	boring							.40	.8	1.6	3.2	6.3	12.5			
18	reaming							.40	.8	1.6	3.2	6.3	12.5			
19	broaching							.40	.8	1.6	3.2	6.3	12.5			
20	hobbing							.40	.8	1.6	3.2	6.3	12.5			
21	surface grinding				.063	.125	.25	.5	1	2	4	8	16			
22	cylindrical grinding				.063	.125	.25	.5	1	2	4	8	16			
23	honing			.025	.05	.1	.2	.4	.8	1.6	3.2	6.3	12.5			
24	lapping		.012	.025	.05	.1	.2	.4	.8	1.6	3.2	6.3	12.5			
25	polishing			.040	.08	.16	.32	.63	1.25	2.5	5	10	20			
26	burnishing			.040	.08	.16	.32	.63	1.25	2.5	5	10	20			
27	superfinishing		.016	.032	.063	.125	.25	.5	1	2	4	8	16			



Our complete portfolio. Your complete satisfaction.



From turning, holmaking, 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, specialized network of Authorized 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.



To learn more about our innovations, contact your local Authorized Distributor or visit www.widia.com. www.widia.com

External Turning, Internal Turning

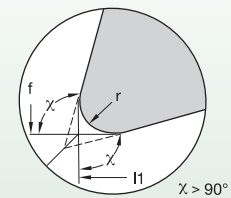
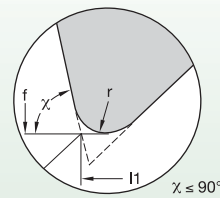
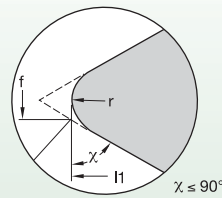
In shape, dimensions, and designations, WIDIA™ toolholders for indexable inserts conform with international standards. The dimensions f and l1 relate to the cutting points of gage inserts of inscribed circle d and corner radius r.

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	.188"–.313" (4,76–7,94)	.375"–.500" (9,52–12,7)	.625"–.750" (15,88–19,05)	1.00" (25,4)
circle radius r	.015" (0,4)	.032" (0,8)	.047" (1,2)	.094" (2,4)

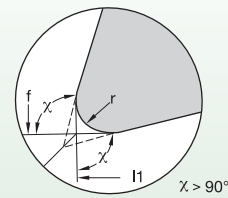
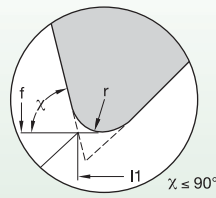
Standard Tolerances, External Turning

Cutting edge height h	=	js 13
Shank height h	=	h 13
Shank width b	=	h 13
Holder length l1	=	k 16
Dimension f	=	+ 0.20"
(± .010" 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	=	-.010"
Approach angle χ	=	± 1°
for χ	=	90° + 2°



**Mounting Dimensions for Cartridges
DIN 4985 and ISO 5611**

Fastening Screw and Spring Washer

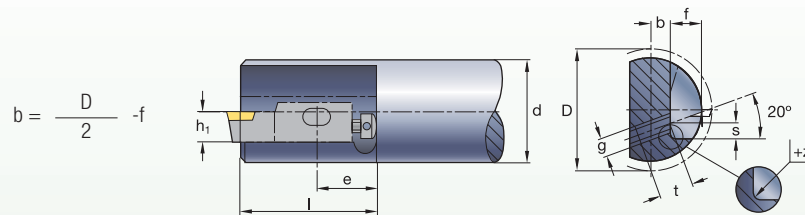
cartridge size	h1	D min	d	e	l1	g	s	t min	Z max	fastening screw	spring washer
06	.236	.787	.669	.472	.906	M 3,5 x 0,60	.138	.394	.012	MS2173	CSW 035 040
08	.315	.984	.866	.669	1.181	M 4,0 x 0,70	.177	.394	.012	MS2175	CSW 040 050
10	.394	1.575	1.457	.787	1.850	M 6,0 x 1,00	.197	.551	.016	191.405	CSW 060 050
12	.472	1.969	1.850	.787	2.047	M 6,0 x 1,00	.236	.551	.016	191.406	CSW 060 050
16	.630	2.362	2.244	.984	2.323	M 8,0 x 1,25	—	.591	.024	191.407	CSW 060 080
20	.787	2.756	2.638	1.181	2.598	M 8,0 x 1,25	—	.591	.024	191.407	CSW 060 080

¹ for holder shape K, S, and W I.

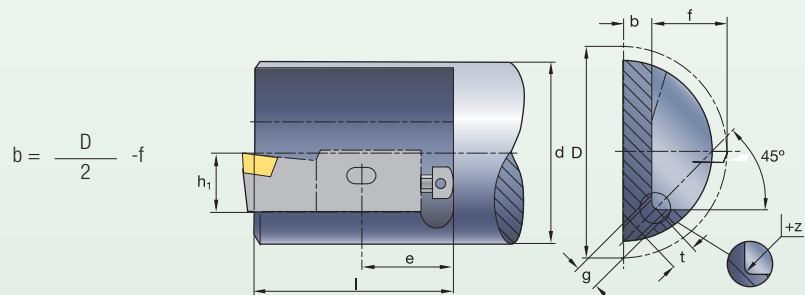
Holder Sizes

06,08 CA
Adjustment range
± 0,8mm

10,12 CA
Adjustment range
± 1,0mm



16,20 CA
Adjustment range
± 1,0mm



Introduction

Troubleshooting should be performed in a sequential method to identify and solve your machining problems. These problems can be recognized 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.

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.

The four key areas of concern are:

1. cutting tool material (grade)
2. machine
3. workpiece
4. set-up

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 localized 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 aluminum 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 (.015"-.020" flank wear is reached) and finishing (.008"-.012" flank wear or sooner).



cause	solution
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.
insert geometry	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	solution
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/mm ²
—	—	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/mm ²
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.	<ul style="list-style-type: none"> • 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 unfavorable chip flow call for special measures.	<ul style="list-style-type: none"> • 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 condition of the overall machine-part-tool setup.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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	$vc = (D \times \pi \times n) / 1000$ $vc = (d1 \times \pi \times n) / 1000$	cylindrical turning	D, B F
tc	min	$tc = \pi \times (Da^2 - Di^2) / (4 \times f \times vc \times 1000)$ $tc = (Da - Di) / (f \times n)$ $tc = lc / vf$ $tc = lc / (f \times n)$ $tc = lc / (fZ \times Z \times n)$	face turning vc = constant face turning cylindrical turning	D D D, F, B D, B F
vf	mm/min	$vf = f \times n$ $vf = fZ \times Z \times n$		D, B F
Q	cm ³ /min	$Q = ap \times f \times vc$ $Q = (ap \times ae \times vf) / 1000 = (ap \times ae \times fZ \times Z \times n) / 1000$ $Q = (D \times f \times vc) / 4$		D F B
P	kW	$P = X1 \times X2 \times (ap \times f \times vc \times kc) / (6 \times 10^4 \times \eta)$ $P = X1 \times X2 \times (ap \times ae \times vf \times kc) / (6 \times 10^7 \times \eta) = X1 \times X2 \times (Q \times kc) / (6 \times 10^4 \times \eta)$ $P = X1 \times X2 \times (D \times f \times vc \times kc) / (24 \times 10^4 \times \eta)$		D F B
Mc	Nm	$Mc = X1 \times X2 \times (D \times ap \times f \times kc) / 2000$ $Mc = X2 \times (D2 \times f \times kc) / 8000$		D 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
Ff	N	$Ff = X1 \times X2 \times ap \times fZ \times kc \times ZiE = X1 \times X2 \times b \times hm^{1-mc} \times kc1.1 \times ZiE$ $Ff = X1 \times X2 \times 0,35 \times D \times f \times kc = X1 \times X2 \times 0,35 \times D \times f^{1-mc} \times kc1.1$		F B
ZiE		$ZiE = (\Phi C \times Z) / 360$		F
φC	grade	$\gamma C = \phi1 + \phi2 = \phi A - \phi E$		F
φ1	grade	$\sin \phi1 = (2 \times ae1) / d1$		F
φ2	grade	$\sin \phi2 = (2 \times ae2) / d1$		F
hm	mm	$hm = (\sin \gamma_e \times fZ \times ae \times 360) / (\pi \times \phi C \times d1)$ $hm \approx \sin \gamma_e \times fZ \times \sqrt{(ae / d1)}$		F
Rth	μm	$Rth \approx (f2 \times 1000) / (8 \times Re)$	if $ae \leq (d1 / 3)$	F 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	.0019	57	.0430	9/64	.1406	6,60mm	.2598	7/16	.4375
106	.0023	1,10mm	.0433	3,60mm	.1417	G	.2610	11,20mm	.4409
105	.0027	1,15mm	.0453	27	.1440	6,70mm	.2638	11,50mm	.4528
104	.0031	56	.0465	3,70mm	.1457	17/64	.2656	29/64	.4531
103	.0035	3/64	.0469	26	.1470	6,75mm	.2657	11,80mm	.4646
102	.0039	1,20mm	.0472	3,75mm	.1476	H	.2660	15/32	.4688
101	.0043	1,25mm	.0492	25	.1495	6,80mm	.2677	12,00mm	.4724
100	.0047	1,30mm	.0512	3,80mm	.1496	6,90mm	.2717	12,20mm	.4803
99	.0051	55	.0520	24	.1520	I	.2720	31/64	.4844
98	.0055	1,35mm	.0531	3,90mm	.1535	7,00mm	.2756	12,50mm	.4921
97	.0059	54	.0550	23	.1540	J	.2770	1/2	.5000
96	.0063	1,40mm	.0551	5/32	.1562	7,10mm	.2795	12,80mm	.5039
95	.0067	1,45mm	.0571	22	.1570	K	.2810	13,00mm	.5118
94	.0071	1,50mm	.0591	4,00mm	.1575	9/32	.2812	33/64	.5156
93	.0075	53	.0595	21	.1590	7,20mm	.2835	13,20mm	.5197
92	.0079	1,55mm	.0610	20	.1610	7,25mm	.2854	17/32	.5312
0,20mm	.0079	1/16	.0625	4,10mm	.1614	7,30mm	.2874	13,50mm	.5315
91	.0083	1,60mm	.0630	4,20mm	.1654	L	.2900	13,80mm	.5433
90	.0087	52	.0635	19	.1660	7,40mm	.2913	35/64	.5469
0,22mm	.0087	1,65mm	.0650	4,25mm	.1673	M	.2950	14,00mm	.5512
89	.0091	1,70mm	.0669	4,30mm	.1693	7,50mm	.2953	14,25mm	.5610
88	.0095	51	.0670	18	.1695	19/64	.2969	9/16	.5625
0,25mm	.0098	1,75mm	.0689	11/64	.1719	7,60mm	.2992	14,50mm	.5709
87	.0100	50	.0700	17	.1730	N	.3020	37/64	.5781
86	.0105	1,80mm	.0709	4,40mm	.1732	7,70mm	.3031	14,75mm	.5807
85	.0110	1,85mm	.0728	16	.1770	7,75mm	.3051	15,00mm	.5906
0,28mm	.0110	49	.0730	4,50mm	.1772	7,80mm	.3071	19/32	.5938
84	.0115	1,90mm	.0748	15	.1800	7,90mm	.3110	15,25mm	.6004
0,30mm	.0118	48	.0760	4,60mm	.1811	5/16	.3125	39/64	.6094
83	.0120	1,95mm	.0768	14	.1820	8,00mm	.3150	15,50mm	.6102
82	.0125	5/64	.0781	13	.1850	O	.3160	15,75mm	.6201
0,32mm	.0126	47	.0785	4,70mm	.1850	8,10mm	.3189	5/8	.6250
81	.0130	2,00mm	.0787	4,75mm	.1870	8,20mm	.3228	16,00mm	.6299
80	.0135	2,05mm	.0807	3/16	.1875	P	.3230	16,25mm	.6398
0,35mm	.0138	46	.0810	4,80mm	.1890	8,25mm	.3248	41/64	.6406
79	.0145	45	.0820	12	.1890	8,30mm	.3268	16,50mm	.6496
0,38mm	.0150	2,10mm	.0827	11	.1910	21/64	.3281	21/32	.6562
1/64	.0156	2,15mm	.0846	4,90mm	.1929	8,40mm	.3307	16,75mm	.6594
0,40mm	.0157	44	.0860	10	.1935	Q	.3320	17,00mm	.6693
78	.0160	2,20mm	.0866	9	.1960	8,50mm	.3346	43/64	.6719
0,42mm	.0165	2,25mm	.0886	5,00mm	.1969	8,60mm	.3386	17,25mm	.6791
0,45mm	.0177	43	.0890	8	.1990	R	.3390	11/16	.6875
77	.0180	2,30mm	.0906	5,10mm	.2008	8,70mm	.3425	17,50mm	.6890
0,48mm	.0189	2,35mm	.0925	7	.2010	11/32	.3438	45/64	.7031
0,50mm	.0197	42	.0935	13/64	.2031	8,75mm	.3445	18,00mm	.7087
76	.0200	3/32	.0938	6	.2040	8,80mm	.3465	23/32	.7188
75	.0210	2,40mm	.0945	5,20mm	.2047	S	.3480	18,50mm	.7283
0,55mm	.0217	41	.0960	5	.2055	8,90mm	.3504	47/64	.7344
74	.0225	2,45mm	.0965	5,25mm	.2067	9,00mm	.3543	19,00mm	.7480
0,60mm	.0236	40	.0980	5,30mm	.2087	T	.3580	3/4	.7500
73	.0240	2,50mm	.0984	4	.2090	9,10mm	.3583	49/64	.7656
0,62mm	.0244	39	.0995	5,40mm	.2126	23/64	.3594	19,50mm	.7677
72	.0250	38	.1015	3	.2130	9,20mm	.3622	25/32	.7812
0,65mm	.0256	2,60mm	.1024	5,50mm	.2165	9,25mm	.3642	20,00mm	.7874
71	.0260	37	.1040	7/32	.2188	9,30mm	.3661	51/64	.7969
0,70mm	.0276	2,70mm	.1063	5,60mm	.2205	U	.3680	20,50mm	.8071
70	.0280	36	.1065	2	.2211	9,40mm	.3701	13/16	.8125
69	.0292	2,75mm	.1083	5,70mm	.2244	9,50mm	.3740	21,00mm	.8268
0,75mm	.0295	7/64	.1094	5,75mm	.2264	3/8	.3750	53/64	.8281
68	.0310	35	.1100	1	.2280	V	.3770	27/32	.8438
1/32	.0312	2,80mm	.1102	5,80mm	.2283	9,60mm	.3780	21,50mm	.8465
0,80mm	.0315	34	.1110	5,90mm	.2323	9,70mm	.3819	55/64	.8594
67	.0320	33	.1130	A	.2340	9,75mm	.3839	22,00mm	.8661
66	.0330	2,90mm	.1142	15/64	.2344	9,80mm	.3858	7/8	.8750
0,85mm	.0335	32	.1160	6,00mm	.2362	W	.3860	22,50mm	.8858
65	.0350	3,00mm	.1181	B	.2380	9,90mm	.3898	57/64	.8906
0,90mm	.0354	31	.1200	6,10mm	.2402	25/64	.3906	23,00mm	.9055
64	.0360	3,10mm	.1220	C	.2420	10,00mm	.3937	29/32	.9062
63	.0370	1/8	.1250	6,20mm	.2441	X	.3970	59/64	.9219
0,95mm	.0374	3,20mm	.1260	D	.2460	10,20mm	.4016	23,50mm	.9252
62	.0380	3,25mm	.1280	6,25mm	.2461	Y	.4040	15/16	.9375
61	.0390	30	.1285	6,30mm	.2480	13/32	.4062	24,00mm	.9449
1,00mm	.0394	3,30mm	.1299	E	.2500	Z	.4130	61/64	.9531
60	.0400	3,40mm	.1339	1/4	.2500	10,50mm	.4134	24,50mm	.9646
59	.0410	29	.1360	6,40mm	.2520	27/64	.4219	31/32	.9688
0,05mm	.0413	3,50mm	.1378	6,50mm	.2559	10,80mm	.4252	25,00mm	.9843
58	.0420	28	.1405	F	.2570	11,00mm	.4331	63/64	.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	—	Grade 120-90-02	U	18
—	—	—	GGG/AU	17
—	—	—	GGG/AU	17
—	—	—	GGG/AU	18
—	—	—	GGG/AU	17
—	—	—	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	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 SMn Pb 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 SMn Pb 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

Technical Information

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 CND A 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, C 40	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	Z 10 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
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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
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—	—	—	—	12
X 8 Cr 17	X 10 CrAl 18	430	—	12
—	—	—	—	31-32
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—	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
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—	—	EV 8	—	10
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—	F.1581	4320	var ¹	6-9
16 NiCrMo 12	F.1525	—	var ¹	6-9
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37 Cr 4	37 Cr 4, 38 Cr 4	5135	var ¹	6-9
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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
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20 MnCr 5	F.1523	—	var ¹	6-9
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25 CrMoS 4, 25 CrMo 4	25 CrMoS 4, 30 CrMo 4-1	—	var ¹	6-9
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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
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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/mm ²	Hardness HB 30	Examples	
P	1	Unalloyed steel/cast steel	C < 0,25%	G	420	125	1010, 1015, 1020, 1023, 1102, 1108, 1109, 1213, 1215
	2		0,25 ≤ C < 0,55%	G	650	190	1025, 1030, 1035, 1040, 1041, 1045, 1050, 1140, 1141, 1146, 1330
	3	Free cutting steel		V	850	250	1025, 1030, 1035, 1040, 1041, 1045, 1050, 1140, 1141, 1146, 1330
	4		0,55% ≤ C	G	750	220	1055, 1060, 1151
	5			V	1000	300	1055, 1060, 1151
	6	Low-alloyed steel/cast steel		G	600	180	4130, 4140, 4150, 4320, 4340, 5120, 5132, 5135, 5140, 5155, 6150, 8620, 8625, 9260, A 355/A, A 355/C, A 355/D, A485/2, A 485/3, E-3310
	7			V	930	275	
	8			V	1000	300	
	9			V	1200	350	
	10	High-alloyed steel/cast steel		G	680	200	440 C, 613, EV 8, M2 regular C, T1
	11	Tool steel		V	1100	325	440 C, 613, EV 8, M2 regular C, T1
	12	Stainless steel/cast steel		FE/MA	680	200	403, 405, 409, 410, 410 S, 416, 420, 430, 430 Ti, 439, 446,
13.1			MA	820	240	420, 430 F, 431, 434, 440 B, 440 C	
13.2			MA-PH	1060	330	630, 630	
14.1	Stainless steel/cast steel			AU	600	180	301, 303, 304, 304 L, 304 LN, 305, 309 S, 316, 316 L, 316 LN, 317 L, 317 LN
14.2				DU	740	230	201, 329, 2205
14.3			S-AU	680	200	310 mod	
14.4			AU-PH	1060	330	17-7 PH, 630	
K	15	Gray iron GG		FE/PE	180	Class 20 B, Class 25 B,	
	16			PE	260	Class 30 B, Class 40 B, Class 45 B, Class 50 B	
	17	Nodular iron GGG		FE	160	Class 50 B, Grade 60-40-18, Grade 65-45-12	
	18			PE	250	Grade 80-55-06, Grade 100-70-03, Grade 120-90-02	
	19		Malleable iron GTS/GTW	FE	130	Grade 22010, 32510	
20		PE	230	GTW-35-04, GTS-55-04, GTS-65-02			
N	21	Wrought aluminum alloys		NAG	60	6061, 2014-T6, 2011-T3, 2024-T4, A2, 7075, 1000, AlMg 1, AlCuMg 1, AlMgSiPb, AlMgSi 1	
	22			AG	100	6061, 2014-T6, 2011-T3, 2024-T4, A2, 7075, 1000, AlMg 1, AlCuMg 1, AlMgSiPb, AlMgSi 1	
	23	Cast aluminum alloys	Si < 12%	NAG	75	A380-1, A280, A390-1, G-AISI 10 Mg, G-AISI12, G-AlCu 5 Si 3, G-AISI 17, G-AISI 23	
	24			AG	90	A380-1, A280, A390-1, G-AISI 10 Mg, G-AISI12, G-AlCu 5 Si 3, G-AISI 17, G-AISI 23	
	25		Si > 12%		130	A380-1, A280, A390-1, G-AISI 10 Mg, G-AISI12, G-AlCu 5 Si 3, G-AISI 17, G-AISI 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, Fiber-reinforced plastics, Bakelit		
30					Hard rubber		
S	31	High-temperature alloys	Fe-based	G	200	A-286, 321, 321 H, 330, 409, EV 9, EV11, HNV3	
	32			AG	280	A-286, 321, 321 H, 330, 409, EV 9, EV11, HNV3	
	33		Ni-/Co-based	G	250	INCONEL® 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stellite	
	34				AG	350	INCONEL 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stellite
	35		GO	320	INCONEL 601/617/625/700/706/718, Nimonic 80 A, Hasteloy, Udimet, Haynes 25, Waspaloy, Rene41, Stellite		
	36	Titanium/titanium alloys, Alpha-/Beta-alloys			400	Titanium	
37			AG	1050	TiAl 64 V		
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	G — Annealed	NAG — Non-aged (non-aging)
AU — Austenitic, AISI 300	GG — Gray cast iron	PH — Precipitation hardened
BF — Heat treated to specified strength	GGG — Nodular cast iron	S-AU — Superaustenitic
BG — Heat treated to specified microstructure	GO — Cast	U — Untreated
BY — Heat treated to improved machinability	H — Hardened	V — Heat treated
DU — Stainless steel duplex (austenitic-ferritic)	MA — Martensitic	var ¹ — Variable
FE — Ferritic	N — Normalized	

DIN ISO 513	VDI 3323	Material	Condition	Rm N/mm ²	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 WCv 9 3, X 85 CrMoV 18 2
	11	Tool steel		V	1100	325	X 38 CrMoV 5 3, X 23 CrNi 17, X 155 CrV Mo 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	
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		
15	Gray 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 aluminum alloys		NAG		60	Al 99,5, AlMg 1
	22			AG		100	AlCuMg 1, AlMgSiPb, AlMgSi 1
	23	Cast aluminum 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, Fiber-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

Technical Information

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- | | | |
|---|-------------------------|-----------------------------|
| AG — Aged | G — Annealed | NAG — Non-aged (non-aging) |
| AU — Austenitic, AISI 300 | GG — Gray cast iron | PH — Precipitation hardened |
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| BG — Heat treated to specified microstructure | GO — Cast | U — Untreated |
| BY — Heat treated to improved machinability | H — Hardened | V — Heat treated |
| DU — Stainless steel duplex (austenitic-ferritic) | MA — Martensitic | var ¹ — Variable |
| FE — Ferritic | N — Normalized | |

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2559326CNMG644 TTSF11	2561590CNMG4335 HK1500F11	2563785VCMT3252 TN2000F20	2821104TPH3322L CG6C70
2559352CNMG643 HK1500F11	2561596CNMG4335 TN4000F11	2563826VCMT3251 THM-XF20	2821115TPH3322L CG5C70
2559372CNMG643 TN4000F11	2561634CNMG4325 HK1500F11	2563847TPMR222 TN4000F19	2821121TPH3322R CG5C70
2559377CNMG643 TN2000F11	2561661VNMG4335 HK1500F21	2563851TPMR222 TN2000F19	2821128TPH3321L TN7C70
2559382CNMG643 THM-XF11	2561686VNMG4335 TN2000F21	2563933TPMR322 TN2000F19	2821137TPH3321L CM1C70
2559397CNMG643 TTSF11	2561712VNMG4325 HK1500F21	2563965CCMT432 TN2000F10	2821150TPH3321L CG6C70
2559443CNMG433 TN2000F11	2561717VNMG4325 TN4000F21	2563990CCMT3252 HK1500F10	2821158TPH3321R CG6C70
2559448CNMG433 THMF-XF11	2561722VNMG4325 TN2000F21	2564000CCMT3252 TTSF10	2821162TPH3321L CG5C70
2559474CNMG432 HK1500F11	2561753TNMM4348 TN4000F12	2564010CCMT322 HK1500F10	2821168TPH3321R TN7C70
2559490CNMG432 TN4000F11	2561774CNMM6448 TN4000F12	2564015CCMT322 TN4000F10	2821174TPH33205L CM1C70
2559504CNMG432 TTR-XF11	2561794SNMM8568 TN4000F15	2564020CCMT322 THM-XF10	2821186TPH33205L CM1C70
2559520CNMG432 TTSF11	2561811SNMM6448 TN4000F15	2564044CCMT321 HK1500F10	2821191TPH33205R CM1C70
2559538CNMG431 HK1500F11	2561825SNMM4328 TN4000F15	2564058CCMT321 TN4000F10	2821197TPH33205L CG6C70
2559543CNMG431 TN4000F11	2561892SPU634 THM-XF16	2564068CCMT321 THM-XF10	2821208TPH33205L CM1C70
2559548CNMG431 TN2000F11	2561907SPU634 TTSF16	2564082CCMT321 TTSF10	2821213TPH33205R CG5C70
2559561CNMG431 THM-XF11	2561927SPU423 THM-XF16	2564132CCMT2151 HK1500F10	2821290TPH3322M CPD1C70
2559576CNMG431 TTSF11	2561932SPU423 TTSF16	2564157CCMT2151 TN4000F10	2821296TPH3321M CPD1C70
2559591TNMG434 TN4000F17	2561937SPU422 HK1500F16	2564167CCMT2151 THM-XF10	2821319TPH332524LF CG5C71
2559601TNMG433 HK1500F17	2561947SPU422 TN2000F16	2564187CCMT2151 TTSF10	2821325TPH3324 CG5C70
2559606TNMG433 TN4000F17	2561952SPU422 THMF-XF16	2564195CCMW432 THM-XF10	2821331TPH33	

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2821484	CPMT3252LF CG5	.C67	2822966	SSBI62570L WG	.C20	2824251	TPHB215X0 CG5	.C70	2825679	QSII5006251560R WG	.C51
2821494	CPMT3251LF CM1	.C67	2822980	SSBI62545R WG	.C20	2824266	TBHB2150 CG5	.C77	2825693	QSII375625112560R WG	.C51
2821499	CPMT3251LF CG5	.C67	2822987	SSBI62545L WG	.C20	2824302	TBHB2150 C25	.C77	2825700	QSII375625112560L WG	.C51
2821519	CPMT32505LF CG5	.C67	2823009	SSBI62540R WG	.C20	2824309	TBHB2150 CG6	.C77	2825707	QSII375625187560R WG	.C51
2821536	TPGT3251HP CG5	.C71	2823025	SSBI50065R WG	.C20	2824316	WPHT2151 CG5	.C72	2825720	QSB1625750255R WG	.C24
2821539	TPGT3251HP CM1	.C71	2823032	SSBI50065L WG	.C20	2824324	WPHT2151 CM1	.C72	2825727	QSB1625750250R WG	.C24
2821553	TPMT323LF CG5	.C72	2823039	SSBI50060R WG	.C20	2824331	WPHT21505 CG5	.C72	2825730	QSB1500625255R WG	.C24
2821559	TPMT322LF CG6	.C72	2823053	SSBI500255R WG	.C20	2824338	WPHT21505 CM1	.C72	2825747	QSB1500625250R WG	.C24
2821566	TPMT322LF CG5	.C72	2823061	SSBI500255L WG	.C20	2824344	WPHT2150 CG5	.C72	2825753	QSB1500625155R WG	.C24
2821571	TPMT321LF CG6	.C72	2823067	SSBI500250R WG	.C20	2824350	WPHT2150 CM1	.C72	2825760	QSB1500625155L WG	.C24
2821577	TPMT321LF CG5	.C72	2823073	SSBI1250125R WG	.C20	2824362	WPMT2151LF CG55	.C72	2825774	QSB150065R WG	.C19
2821602	TPHH312524LF CG6	.C71	2823081	SSBI1250125L WG	.C20	2824433	CPHH2121 CG6	.C67	2825781	QSB150065L WG	.C19
2821635	TPHH312513LF CG6	.C71	2823096	SSBI100055R WG	.C20	2824441	CPHH2121 CG5	.C67	2825788	QSB150060R WG	.C19
2821660	TPHH322LF TN7	.C71	2823121	SSBI1000105R WG	.C20	2824447	CPHH2121 CM1	.C67	2825801	QSB1375750155R WG	.C24
2821664	TPHH322LF CM1	.C71	2823128	SSBI1000105L WG	.C20	2824454	CPHH21205 CG6	.C67	2825816	QSB137562518755R WG	.C24
2821670	TPHH322LF CG6	.C71	2823142	SSBI1000100L WG	.C20	2824461	CPHH21205 CG5	.C67	2825819	QSB137562518750R WG	.C24
2821682	TPHH322LF C25	.C71	2823149	SSBIW75083L WG	.C36	2824468	CPHH21205 CM1	.C67	2825832	QSB137562511255R WG	.C24
2821688	TPHH322LF AL0	.C71	2823155	SSBIW75083R WG	.C36	2824474	CPT20052L CG5	.C74	2825838	QSB137562511255L WG	.C24
2821700	TPHH321LF CM1	.C71	2823161	SSBIW62573L WG	.C36	2824481	CPT20052L CM1	.C74	2825841	QSB137562511250R WG	.C24
2821705	TPHH321LF CG6	.C71	2823167	SSBIW62573R WG	.C36	2824488	CPG2062L CG5	.C73	2825854	QSB137550018755R WG	.C24
2821718	TPHH321LF C25	.C71	2823182	SKEY WG	.C104	2824495	CPG2062L CM1	.C73	2825864	QSB137550018755L WG	.C24
2821725	TPHH321LF AL0	.C71	2823189	STKEY WG	.C104	2824501	CPG2032L CG5	.C73	2825870	QSB137550018750R WG	.C24
2821749	TPHB321 TN7	.C70	2823196	STBIT WG	.C104	2824508	CPG2032L CM1	.C73	2825884	QSB137550011255R WG	.C24
2821772	TPHB321 CM1	.C70	2823203	STM31 WG	.C11, C15, C36, C38, C104	2824516	CPT20052R CG5	.C74	2825897	QSB137550011250R WG	.C24
2821778	TPHB321 CG6	.C70	2823227	SC30 WG	.C20-22, C29-32, C40-41, C46, C52, C104	2824523	CPT20052R CM1	.C74	2825910	QSB137555R WG	.C19
2821799	TPHB321 C2	.C70	2823236	SBIT WG	.C104	2824531	CPG2062R CG5	.C73	2825917	QSB137555L WG	.C19
2821806	TPHB321 AL0	.C70	2823259	TPT20033R CG5	.C76	2824539	CPG2062R CM1	.C73	2825923	QSB137550R WG	.C19
2821812	TPHB3205 TN7	.C70	2823566	TPT20033R CM1	.C76	2824546	CPG2032R CG5	.C73	2825941	QTM20 WG	.C35, C37-39, C104
2821816	TPHB3205 CM1	.C70	2823592	TPGT2151HP CG5	.C71	2824552	CPG2032R CM1	.C73	2825948	QTM26 WG	.C35, C37-39, C51, C104
2821822	TPHB3205 CG6	.C70	2823595	TPGT2151HP CM1	.C71	2824562	CPHB2121 CG5	.C67	2825952	QTKY WG	.C104
2821834	TPHB3205 C2	.C70	2823605	TPGT21505HP CG5	.C71	2824583	CPHB21205 CG5	.C67	2825963	QTBIT WG	.C104
2821840	TPHB32X0 TN7	.C70	2823612	TPGT21505HP CM1	.C71	2824590	CPHB21205 CM1	.C67	2825964	QBBIT WG	.C104
2821844	TPHB32X0 CM1	.C70	2823619	TPMT2151LF CG6	.C72	2824737	QCBM122540R WG	.C31	2825973	Q8KEY WG	.C104
2821849	TPHB32X0 CG6	.C70	2823625	TPMT2151LF CG5	.C72	2824747	QCBM122545R WG	.C31	2825982	QKEY WG	.C104
2821858	TPHB32X0 C2	.C70	2823638	TPMT21505LF CG6	.C72	2824769	QCBM102545L WG	.C31	2826005	QC15 WG	.C10, C15, C49, C53, C104
2821865	TPHB32X0 AL0	.C70	2823646	TPMT21505LF CG5	.C72	2824776	QCBM102545R WG	.C31	2826031	QC26 WG	.C19, C22, C24, C26, C31, C40-41, C104
2822085	SDBM162545R WG	.C32	2823673	TPHH2152R CM1	.C70	2824815	QSQM9516380R WG	.C41	2826038	QC21 WG	.C19, C22, C24, C26, C28, C31, C42, C51, C104
2822265	SDBIC750105R WG	.C15	2823681	TPHH2152L CG6	.C70	2824819	QSQM9516385R WG	.C41			
2822272	SDBIC750105L WG	.C15	2823697	TPHH2152L CG5	.C70	2824886	QSBM121520R WG	.C22			
2822277	SDBIC75065R WG	.C15	2823704	TPHH2152R CG5	.C70	2824898	QSBM121525R WG	.C22	2826045	QBIT WG	.C104
2822283	SDBIC75065L WG	.C15	2823710	TPHH2151L TN7	.C70	2824945	QSBM9920385L WG	.C26	2827471	WPHT1511 CG5	.C72
2822289	SDBIC625105R WG	.C15	2823724	TPHH2151L CM1	.C70	2824950	QSBM9920385R WG	.C26	2827477	WPHT1511 CM1	.C72
2822301	SDBIC62565R WG	.C15	2823739	TPHH2151L CG6	.C70	2824993	QSBM9916485R WG	.C26	2827483	WPHT15105 CG5	.C72
2822306	SDBIC62565L WG	.C15	2823746	TPHH2151R CG6	.C70	2825013	QSBM9912480R WG	.C26	2827490	WPHT15105 CM1	.C72
2822327	SCBI875125R WG	.C29	2823753	TPHH2151L CG5	.C70	2825019	QSBM9912485L WG	.C26	2827496	WPHT1510 CG5	.C72
2822433	SDBI62560L WG	.C30	2823760	TPHH2151R CG6	.C70	2825024	QSBM9912485R WG	.C26	2827506	WPHT1510 CM1	.C72
2822454	SCBI75065R WG	.C29	2823767	TPHH21505L TN7	.C70	2825052	QSBM9912295R WG	.C26	2827521	WPMT1512LF CG55	.C72
2822460	SCBI75065L WG	.C29	2823780	TPHH21505L CM1	.C70	2825083	QCBM625105L WG	.C15, C53	2827525	GCHT15151 CG5	.C68
2822467	SCBI75060R WG	.C29	2823792	TPHH21505L CG6	.C70	2825089	QCBM625105R WG	.C15, C53	2827531	GCHT15151 CM1	.C68
2822479	SCBI750105R WG	.C29	2823805	TPHH21505L CG5	.C70	2825094	QCBM50085L WG	.C15, C53	2827537	GCHT151505 CG5	.C68
2822485	SCBI750105L WG	.C29	2823812	TPHH21505R CG5	.C70	2825105	QCBM50085R WG	.C15, C53	2827542	GCHT151505 CM1	.C68
2822492	SCBI750100R WG	.C29	2823819	TPHH2151 TN7	.C71	2825112	QCBM37565L WG	.C15, C53	2827548	GPHT1211 CG5	.C68
2822500	SCBI62565R WG	.C29	2823826	TPHH2151 CM1	.C71	2825117	QCBM37565R WG	.C15, C53	2827554	GPHT1211 CM1	.C68
2822510	SCBI62560R WG	.C29	2823846	TPHH2151 C2	.C71	2825232	QCB1500105R WG	.C28	2827560	GPHT12105 CG5	.C68
2822515	SCBI625105R WG	.C29	2823851	TPHH2151 CG6	.C71	2825238	QCB1500100R WG	.C28	2827566	GPHT12105 CM1	.C68
2822522	SCBI625105L WG	.C29	2823858	TPHH2151 CG5	.C71	2825265	QCB1375105R WG	.C28	2827570	GCHW15151 CG6	.C68
2822527	SCBI625100R WG	.C29	2823870	TPHH21505 TN7	.C71	2825272	QCB150085R WG	.C28	2827577	GCHW15151 CG5	.C68
2822540	SCBI100065R WG	.C29	2823877	TPHH21505 CM1	.C71	2825278	QCB150085L WG	.C28	2827584	GCHW15151 CM1	.C68
2822547	SCBI100065L WG	.C29	2823908	TPHH21505 CG6	.C71	2825285	QCB150080R WG	.C28	2827589	GCHW151505 CG5	.C68
2822554	SCBI100060R WG	.C29	2823914	TPHH21505 CG5	.C71	2825290	QCB137565R WG	.C28	2827596	GCHW151505 CG6	.C68
2822561	SCBI1000125R WG	.C29	2823942	TPHB2151M CBN6	.C70	2825297	QCB137565L WG	.C28	2827601	GCHW151505 CM1	.C68
2822567	SCBI1000125L WG	.C29	2823949	TPHB21505M CBN6	.C70	2825304	QCB137560R WG	.C28	2827608	GPWH1211 CG6	.C68
2822574	SCBI1000120R WG	.C29	2823954	TPHB21505M CBN6	.C70	2825311	QCB137560L WG	.C28	2827615	GPWH1211 CG5	.C68
2822576	SCBI1000120L WG	.C29	2824008	TPHB2152M CPD1	.C70	2825318	QCB1W50083L WG	.C38	2827621	GPWH1211 CM1	.C68
2822583	SCBIW750103L WG	.C38	2824015	TPHB2151M CPD1	.C70	2825324	QCB1W50083R WG	.C38	2827625	GPWH12105 CG6	.C68
2822591	SCBIW750103R WG	.C38	2824022	TPHB21505M CPD1	.C70	2825327	QCB1W37563L WG	.C38	2827631	GPWH12105 CG5	.C68
2822595	SCBIW625103L WG	.C38	2824030	TPHB21505M CPD1	.C70	2825335	QCB1W37563R WG	.C38	2827637	GPWH12105 CM1	.C68
2822603	SCBIW625103R WG	.C38	2824037	TPHB2152 TN7	.C70	2825345	QSB1W50063L WG	.C35	2827644	GCPM162545L WG	.C48
2822626	SSBIC75085R WG	.C11	2824044	TPHB2152 CM1	.C70	2825351	QSB1W50063R WG	.C35	2827656	GCPM10254225R WG	.C48
2822631	SSBIC75085L WG	.C11	2824065	TPHB2152 C3	.C70	2825357	QSB1W37553L WG	.C35	2827688	GSPM101638225R WG	.C44
2822637	SSBIC62575R WG	.C11	2824071	TPHB2152 CG6	.C70	2825364	QSB1W37553R WG	.C35	2827699	GCBMW81523R WG	.C39
2822643	SSBIC62575L WG	.C11	2824077	TPHB2152 CG5	.C70	2825394	QSMI62565R WG	.C10, C49	2827705	GCBMW61523L WG	.C39
2822826	SSPI62575R WG	.C46	2824090	TPHB2151 TN7	.C70	2825449	QSMI50055L WG	.C10, C49	2827711	GCBMW61523R WG	.C39
2822843	SSOI5001000255R WG	.C40	2824104	TPHB2151 CM1	.C70	2825455	QSMI50055R WG	.C10, C49	2827727	GCBW31263L WG	.C38
2822850	SSOI5001000250R WG	.C40	2824122	TPHB2151 C3	.C70	2825457	QSMI37545L WG	.C10, C49	2827734	GCBW31263R WG	.C38
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3656134	250316 W	D12	3662865	SNMG5435 TN7110	B31	3663147	TCMT21505 TN7110	B35	3684645	CNMG432 TN7125	B16
3656135	250317 W	D12	3662866	SCMT3251MU TN7110	B28	3663148	SPU421 TN7110	B34	3684646	DNMM44365 TN7125	B25
3656136	250318 W	D12	3662867	CCMT322MU TN7110	B15	3663149	TNMG33222 TN7110	B37	3684647	DNMG44222 TN7125	B22
3656137	250319 W	D10	3662868	RCMT10T3M043 TN7110	B27	3663151	CCMT32512 TN7110	B14	3684648	CCMT2522 TN7125	B14
3656138	250320 W	D11	3662869	CNMG43348 TN7110	B17	3663152	WNMG4314 TN7110	B44	3684649	DNMG4414 TN7125	B22
3656139	250321 W	D12	3662870	CCMT21512 TN7110	B14	3663153	SNMG322 TN7110	B30	3684650	SCMT3251MU TN7125	B28
3656140	250322 W	D12	3662871	CNMM64365 TN7110	B19	3663154	CCMT2151MU TN7110	B15	3684651	WNMG33249 TN7125	B44
3656141	250323 W	D12	3662872	SCMT325141 TN7110	B28	3663155	CNMG6445 TN7110	B17	3684652	CIT523010002500R CM1	C156
3656142	250324 W	D12	3662874	VNMP3325M TN7110	B43	3663156	SCMT321 TN7110	B28	3731437	CB420010002500R CG5	C122
3656143	250325 W	D12	3662875	SNMG43322 TN7110	B30	3663157	CNMG32249 TN7110	B17	3733493	CB203010015000R CG5	C114
3656144	250326 W	D12	3662876	CNMG434SL TN7110	B18	3663158	CCMT32241 TN7110	B15	3733494	CB211050015004R CM1	C118
3656145	250327 W	D12	3662877	RCMT0803M043 TN7110	B27	3663159	DNMG4434P TN7110	B23	3733495	CB312035020006R CM1	C116
3656146	250328 W	D12	3662878	TCMT2151MU TN7110	B36	3663160	SPMR421 TN7110	B34	3733496	CFR50337502500R CG5	C141
3656147	251117 W	D13	3662879	TNMG4325 TN7110	B38	3663161	SNMG4325 TN7110	B31	3733497	CATR8490200030008R CM1	C152
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3656149	251119 W	D13	3662881	TNMG5435 TN7110	B38	3663163	SPMR422 TN7110	B34	3733499	CIT31207502000R CM1	C154
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3656152	251122 W	D13	3662884	SNMG6435 TN7110	B31	3663167	DNMM44365 TN7110	B25	3735102	CIT20803501500R CM1	C154
3656153	251123 W	D13	3662885	CNMG432SL TN7110	B18	3666803	CB201505015000R CM1	C114	3735390	CB21050015004R CM1	C116
3656154	251124 W	D13	3662886	CNMM43265 TN7110	B19	3666804	CB418035025000R CG5	C121	3735391	CHB318012502000R CM1	C135
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3762595	CB8490350060006R CM1	C130	3778974	CIT31405002000R CG5	C154	3781756	SNMG6445 TN7135	B31	3782076	CNMM5438 TN7135	B19
3762596	CB8490350060006R CG5	C130	3778976	CB31607502000R CG5	C120	3781758	CCMT3253 TN7135	B14	3782077	CNMM6468 TN7135	B39
3762597	CB849040060006R CM1	C130	3778977	CB63205002500R CM1	C126	3781759	CCMT4324 TN7135	B15	3782078	TNMM4326 TN7135	B19
3762598	CB849040060006R CG5	C130	3778978	CFR604020500R CG5	C142	3781760	CNMG431 TN7135	B16	3782080	CCMT325241 TN7135	B15
3762599	CB8490450060006R CM1	C130	3778979	COR6175750250015R CM1	C144	3781761	DNMG4425 TN7135	B23	3782081	TCMT3253 TN7135	B35
3762600	CB8490450060006R CG5	C130	3778980	CUG609312502500R CG5	C148	3781762	DNMM44265 TN7135	B25	3782376	CCPM15254R WG	C48
3762601	CFR40175002500R CM1	C141	3778981	CIT21006001500L CG5	C155	3781763	CNMM64465 TN7135	B19	3782377	CCPM102544L WG	C49
3762602	CFR60402502500R CM1	C142	3778982	CIT63205002500R CM1	C157	3781764	RCMT2006MT TN7135	B28	3782378	CCBMM102543R WG	C38
3762603	CRR60635002500R CM1	C146	3779368	CNMA431 TN5105	B16	3781766	SNMM6438 TN7135	B32	3782800	CB5230100025006L CM1	C124
3762604	CB206050015004R CM1	C114	3779369	CNMA432 TN5105	B16	3781768	DNMG33249 TN7135	B23	3782801	CCR50385002500R CG5	C145
3762605	CB206050015004R CG5	C114	3779370	CNMA433 TN5105	B16	3781769	RCMT1204M043 TN7135	B27	3782802	CIT63607502500L CG5	C157
3762606	CB4200130025006L CM1	C122	3779371	CNMA434 TN5105	B16	3781770	CNMG4335 TN7135	B17	3782843	CTR53127502500R CM1	C158
3762607	CFR60473752500R CM1	C142	3779372	DNMA442 TN5105	B22	3781772	SNMM43265 TN7135	B32	3783017	CB210030015004R CG5	C116
3762608	CFR605612502500R CM1	C142	3779423	DNMA443 TN5105	B22	3781783	SNMM43365 TN7135	B32	3783018	CB84907503000R CG5	C130
3762609	CFR60637502500R CM1	C142	3779424	DNMA432 TN5105	B22	3781784	SNMG322 TN7135	B30	3783019	CHB48025004000R CG5	C135
3762610	CCR50385002500R CM1	C145	3779425	DNMA433 TN5105	B22	3781786	CNMM54365 TN7135	B19	3783020	CFR80945003000R CG5	C143
3762611	CCR604010002500R CM1	C146	3779426	SNMA432 TN5105	B30	3781787	TCMT3252MU TN7135	B36	3783021	CRR809415003000R CG5	C147
3762612	CATS5290750250014R CG5	C153	3779427	SNMA433 TN5105	B30	3781788	SNMG6435 TN7135	B31	3783022	CF60300502500R CG5	C140
3763683	CATS52901000250014R CG5	C153	3779428	TNMA432 TN5105	B36	3781789	DNMG4424 TN7135	B22	3783143	CIT63607502500R CG5	C148
3763684	CIT31204002000R CM1	C154	3779429	TNMA433 TN5105	B36	3781791	CNMG4324 TN7135	B16	3783144	CUPG402010002500R CG5	C149
3763685	CIT31605002000R CM1	C154	3779430	TNMA432 TN5105	B36	3781792	SNMG643 TN7135	B30	3783145	CAT54200400250016R CG5	C153
3763686	CIT420010002500L CM1	C156	3779431	TNMA433 TN5105	B36	3781793	TPMR221 TN7135	B40	3783146	CAT86300500250012R CG5	C152
3763687	CIT529010002500R CM1	C156	3779432	TNMA434 TN5105	B36	3781794	SCMT3252MU TN7135	B28	3783147	CIT2040071500R CG5	C154
3763688	CRR81265003000R CM1	C147	3779433	WNMA432 TN5105	B44	3781795	CNMG5445 TN7135	B17	3783148	CIT6205002500R CG5	C157
3763689	CFG100931003500R CM1	C140	3779434	WNMA433 TN5105	B44	3781796	CCMT3252MU TN7135	B15	3783149	CTR12253751500R CG5	C158
3763691	CB206015015000R CG5	C114	3780390	CB206050015000R CM1	C114	3781797	SNMM64465 TN7135	B32	3783150	CTR6317520500R CG5	C158
3763692	CFR40176252500R CM1	C141	3781269	CB211040015004L CM1	C117	3781798	TNMG32249 TN7135	B37	3783151	CHB48045006000R CG5	C135
3764923	CIT42006002500R CG5	C156	3781270	CB632075025006L CM1	C127	3781799	TCMT21505 TN7135	B35	3783152	FSB1187355L WG	C19
3765195	CB52905002500R CM1	C125	3781271	CHB20805001500R CM1	C135	3781800	TCMT433 TN7135	B35	3783153	QSB10605255L WG	C24
3765196	CCR60707502500R CM1	C146	3781272	CRR50337502500R CM1	C145	3781802	TNMG4325 TN7135	B38	3783413	CFR312025020006L CM1	C119
3765749	CB31205002000R CM1	C118	3781393	CIT31205002000R CM1	C154	3781803	DNMG44249 TN7135	B23	3784314	CB632050025006L CM1	C127
3765750	CB31205002000R CG5	C118	3781693	SCMT432 TN7135	B28	3781804	CNMM4338 TN7135	B19	3784315	CB6360300040006L CM1	C129
3765751	CHB315010002000R CM1	C135	3781694	SCMT3252 TN7135	B28	3781805	CNMG643 TN7135	B16	3784316	CFR50335002500R CM1	C141
3765752	COR4097500250015R CG5	C144	3781695	CCMT322 TN7135	B14	3781806	DNMG441 TN7135	B22	3784317	CFR607502500R CM1	C142
3766683	CFG50300502500R CG5	C140	3781696	CCMT2151 TN7135	B14	3781807	SNMG4334 TN7135	B30	3784318	CFR818815003000R CM1	C143
3766684	CFG61251002500R CM1	C140	3781697	SCMT5353 TN7135	B28	3781808	CNMM6448 TN7135	B19	3784319	CRR40305002500R CM1	C145
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3766687	CATR52351250250014R CG5	C152	3781700	CCMT432 TN7135	B14	3781811	DNMM44365 TN7135	B25	3784322	CATR490200030006R CM1	C152
3766688	CIT31604002000R CM1	C154	3781701	TCMT3251 TN7135	B35	3781812	SNMG4325 TN7135	B31	3784323	CIT52306002500R CM1	C156
3766689	CTR31873752000R CG5	C158	3781702	TPMR322 TN7135	B40	3781813	CNMM64365 TN7135	B19	3784480	CB23040025006L CM1	C124
3766690	CATS5235750250014R CM1	C153	3781703	SCMT322 TN7135	B28	3781814	CCMT433 TN7135	B14	3784481	CUPG40305002500R CG5	C149
3766692	CRR60475002500R CM1	C146	3781704	SCMT434 TN7135	B28	3781815	CNMM43365 TN7135	B19	3784482	SCB110060L WG	C29
3767233	CIT316010002000R CG5	C154	3781705	TNMG331 TN7135	B37	3781816	CNMG6425 TN7135	B17	3786518	FCBM6616635R WG	C34
3767860	CB31206002000R CM1	C118	3781706	TNMG3335 TN7135	B38	3781817	TNMG432 TN7135	B37	3786519	FCBM8216795R WG	C34
3767861	CB31606002000R CM1	C120	3781707	TCMT2151 TN7135	B35	3781818	SNMG431 TN7135	B30	3786522	CB204010015000R CM1	C114
3767862	CB41806002500R CM1	C121	3781708	CCMT3251 TN7135	B14	3781819	DNMG443 TN7135	B22	3786813	CB204015015000R CM1	C114
3768173	CB52306002500R CM1	C123	3781709	TCMT432 TN7135	B35	3781820	SNMM64365 TN7135	B32	3786814	CB204515015000R CM1	C114
3768174	CB52309002500R CM1	C123	3781710	TPMR332 TN7135	B42	3781821	TNMG433 TN7135	B37	3786815	CB205030015004L CM1	C115
3768175	CB6320110025000R CM1	C126	3781711	SPMR423 TN7135	B34	3781822	CNMG644 TN7135	B16	3786816	CB206020015004L CM1	C115
3768617	CFG60620752500R CG5	C140	3781712	SPMR422 TN7135	B34	3781827	TNMG5425 TN7135	B38	3786817	CB206030015004R CG5	C114
3768619	CB211050015004R CG5	C116	3781713	RCMT1606MU TN7135	B27	3781898	CNMG542 TN7135	B16	3786818	CB316040020006L CM1	C120
3768620	CRR40255002500R CM1	C145	3781714	SNMM8568 TN7135	B32	3781899	CNMG43248 TN7135	B17	3786819	CB208050015004R CG5	C116
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3771384	CRR60885002500R CM1	C146	3781716	TPMR321 TN7135	B40	3781901	RCMT10T3M043 TN7135	B27	3786821	CB210050015004R CG5	C116
3771386	CB203010015000R CM1	C114	3781718	CNMG4325 TN7135	B17	3781902	TNMM33265 TN7135	B39	3786822	CB2110510015004R CM1	C116
3771387	CFG101871503300R CG5	C140	3781719	CNMG43249 TN7135	B39	3782043	CNMM5438 TN7135	B32	3786823	CB211020015004R CM1	C116
3771388	CFG121871504000R CG5	C140	3781720	CCMT21505 TN7135	B14	3782044	SNMM5438 TN7135	B32	3786824	CB314080020006L CM1	C119
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3771392	CHB318010002000R CM1	C135	3781726	SNMM6448 TN7135	B32	3782048	RCMT0602M043 TN7135	B27	3786828	CB418075025006L CM1	C121
3772203	CFR607010002500R CM1	C142	3781728	DNMG4445 TN7135	B23	3782049	SPMR421 TN7135	B34	3786829	CB418090025006L CM1	C121
3772204	CFR81265003000R CM1	C143	3781729	SCMT321 TN7135	B28	3782050	TNMM43465 TN7135	B39	3786830	CB420040025006L CM1	C122
3772205	CFR81577503000R CM1	C143	3781730	RCMT1606M043 TN7135	B27	3782051	TCMT325141 TN7135	B35	3786831	CB420090025006L CM1	C122
3772206	CATR8490150030008R CM1	C152	3781731	SNMG543 TN7135	B30	3782052	CNMG433 TN7135	B16	3786832	CB523060025006L CM1	C124
3772207	CIT31407502000R CM1	C154	3781732	RCMT10T3M0 TN7135	B27	3782053	SNMM6468 TN7135	B32	3786833	CB523080025006L CM1	C124
3772208	CIT52307502500R CG5	C156	3781733	RCMT1204M0 TN7135	B27	3782054	SNMG6425 TN7135	B31	3786834	CB523090025006L CM1	C124
3772209	CIT52307502500L CM1	C156	3781734	CNMG5435 TN7135	B17	3782055	TNMG43249 TN7135	B37	3786835	CB529060025006R CM1	C125
3772210	CIT632018002500R CM1	C157	3781735	WNMG43349 TN7135	B44	3782056	TNMG5465 TN7135	B38	3786836	CB5290135025006L CM1	C125
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3786855	CFR60702502500R CM1	C142	3790959	CIT84907503000R CM1	C157	3795505	WNMG33122 TN5105	B44	3851293	MCKNR206D WG	A8
3786856	CFR60703752500R CM1	C142	3791776	CB31208002000R CG5	C158	3795506	WNMG33222 TN5105	B44	3851294	MCKNL124B WG	A8
3786857	CFR60883752500R CM1	C142	3791777	CIT21002501500R CM1	C154	3795507	WNMG431FW TN5105	B46	3851295	MCKNL164C WG	A8
3786858	CFR60885002500R CM1	C142	3792274	CFR60633752500R CM1	C146	3795508	WNMG432FW TN5105	B46	3851296	MCKNL164D WG	A8
3786859	CFR608810002500R CM1	C142	3792874	CB20806001500R CM1	C116	3795509	WNMG432MW TN5105	B46	3851297	MCKNL165D WG	A8
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3786861	CFR50382502500R CM1	C145	3792877	SSBI75080L WG	C20	3795511	WNMG433MW TN5105	B46	3851299	MCKNL206D WG	A8
3786862	CFR81885003000R CM1	C147	3793473	CIT20602001500R CG5	C154	3795512	DNMG43122 TN5105	B22	3851300	MCKNL103A WG	A9
3786863	CFR81887503000R CM1	C147	3793474	CIT52905002500R CM1	C156	3795513	DNMG43222 TN5105	B22	3851301	MCLNR123B WG	A9
3786864	CFR818810003000R CM1	C147	3793475	CIT529012502500R CM1	C156	3795514	DNMG43322 TN5105	B22	3851302	MCLNR163C WG	A9
3786865	CFG50620752500R CG5	C140	3794188	CB31406002000R CG5	C118	3799667	CB202007515000R CM1	C114	3851303	MCLNR244D WG	A9
3786866	CATS4200600250016R CM1	C153	3794189	CB31605002000L CM1	C120	3799668	CFR81575003000R CM1	C143	3851304	MCLNR854D WG	A9
3786867	CATS8490200030007R CM1	C153	3794190	CB42006002500L CM1	C122	3800416	CHB20351251500R CM1	C135	3851305	MCLNR245E WG	A9
3786868	CATR84902000300010R CM1	C152	3794191	CB5290150025006R CM1	C125	3800417	CHB20503121500R CM1	C135	3851306	MCLNR246E WG	A9
3786869	CATR849075030005R CM1	C152	3794192	CB6360115025006R CM1	C128	3800418	CFG40400502500R CG5	C140	3851307	MCLNR856D WG	A9
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3786871	CIT21005001500L CM1	C155	3794274	CHB313510002000R CM1	C135	3800420	CUPG403010002500R CM1	C149	3851309	MCLNL123B WG	A9
3786872	CIT3140400200L CM1	C155	3794275	CHB848015003000R CM1	C135	3800421	CATS4200750250016R CG5	C153	3851310	MCLNL244D WG	A9
3786873	CIT523010002500L CM1	C156	3794276	CFR40303752500R CM1	C141	3800422	CIT52907502500R CG5	C156	3851311	MCLNL854D WG	A9
3786874	CIT63205002500L CM1	C157	3794277	CFR50385002500R CM1	C141	3811340	CB316060020006RM CBN6	C132	3851312	MCLNL165C WG	A9
3786875	CIT63207502500L CM1	C157	3794278	CFR809410003000R CM1	C147	3811341	CFR50332502500R CM1	C141	3851313	MCLNL165D WG	A9
3786876	CFR850010003000R CM1	C158	3794279	CFR82507503000R CM1	C147	3811342	CFR60632502500R CM1	C146	3851314	MCLNR245E WG	A9
3787186	C0B6242938250040R CM1	C144	3794280	CATR4200400250016R CM1	C152	3811383	CFR607012502500R CM1	C146	3851315	MCLNL246D WG	A9
3787808	CB4200100025000R CG5	C122	3794281	CIT52304002500L CM1	C156	3811384	CIT31206002000R CM1	C154	3851316	MCLNL246E WG	A9
3788148	CB204510015000R CM1	C114	3794282	CIT63607502500L CM1	C157	3811638	NWCG3R14E TN6025	E32	3851317	MCLNL856D WG	A9
3788149	CB31406002000L CM1	C119	3794283	CFR531212502500R CM1	C158	3811639	NWCG3R11E TN6025	E32	3851318	MCMMN124B WG	A10
3788150	CATR4200600250016R CM1	C152	3794284	CFR8500115003000R CM1	C158	3811640	NTU4R TN6025	E28	3851319	MCMMN164D WG	A10
3788151	CIT632010002500R CM1	C157	3794461	CIT529010002500R CG5	C156	3811641	NTU4L TN6025	E28	3851320	MCMMN166D WG	A10
3788152	CIT632012502500R CM1	C157	3794970	CCMT321MU TN5105	B15	3811893	CB211030015000R CG5	C116	3851321	MCMMN206D WG	A10
3788153	CATS52351750250014R CM1	C153	3794971	CCMT322MU TN5105	B15	3811894	CB211030015004R CG5	C116	3851322	MSSNR123B WG	A14
3788160	CFR81267503000R CM1	C147	3794972	CCMT3251MU TN5105	B15	3811895	CB418050025000R CG5	C121	3851323	MSSNR124B WG	A14
3788161	CIT52306002500L CG5	C156	3795063	CCMT3252MU TN5105	B15	3811896	CIT52304002500R CG5	C156	3851324	MSSNR854D WG	A14
3788162	CIT849020003000R CM1	C157	3795064	CCMW2151 TN5105	B15	3812344	CIT41805002500L CM1	C156	3851325	MSSNR165D WG	A14
3788898	CB418075025000R CM1	C121	3795065	CCMW321 TN5105	B15	3812793	CB211020015000R CG5	C116	3851326	MSSNR205D WG	A14
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3789336	CHB20805001500R CG5	C135	3795067	CCMW3251 TN5105	B15	3829729	CIT63607502500R CM1	C157	3851328	MSSNR246D WG	A14
3789337	CATR8490200030008R CG5	C152	3795068	CCMW3252 TN5105	B15	3830761	GCP62510225R WG	C47	3851329	MSSNL164D WG	A14
3789338	CIT3140500200L CM1	C155	3795069	CCMW431 TN5105	B15	3831524	CHB20630751500R CM1	C135	3851330	MSSNL854D WG	A14
3789669	CB21003001500L CM1	C117	3795070	CCMW432 TN5105	B15	3831525	CHB21005621500R CM1	C135	3851331	MSSNL165D WG	A14
3789670	CB210070015000R CG5	C116	3795078	SCMT321MU TN5105	B28	3831526	CFR40253752500R CM1	C141	3851332	MSSNL205D WG	A14
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3789883	CB21107001500L CM1	C117	3795081	SCMT3252MU TN5105	B28	3831788	MTMM116100 WG	C97	3851335	MSSNL103 WG	A13
3789884	CB31206002000L CM1	C119	3795082	SCMW321 TN5105	B29	3835685	CB210015015000R CG5	C116	3851336	MSDNN855 WG	A13
3789885	CB31207002000L CM1	C119	3795083	SCMW432 TN5105	B29	3835686	CB210030015004R CM1	C116	3851337	MSDNN246 WG	A13
3789886	CB41803502500L CM1	C121	3795084	TCMT3251MU TN5105	B36	3835687	CB31604002000R CG5	C120	3851338	MTFNR204D WG	A16
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3789888	CB42008002500L CM1	C122	3795086	TCMW2151 TN5105	B36	3835689	CATS8490200030005R CM1	C153	3851340	MTFNR205D WG	A16
3789889	CB4200120025006L CM1	C122	3795087	TCMW3251 TN5105	B36	3835690	CATR4200750250016R CM1	C152	3851341	MTFNR245D WG	A16
3789890	CB52907502500L CM1	C125	3795208	CFG60620752500R CM1	C140	3835691	CIT849015003000R CM1	C117	3851342	MTFNL163D WG	A16
3789891	CB52909002500L CM1	C125	3795209	CFG61251002500R CG5	C140	3836513	CB206040015004R CM1	C154	3851343	MTFNL204D WG	A16
3789892	CB6320100025006L CM1	C127	3795210	CFG101871503500R CM1	C140	3836514	CB31404002000R CM1	C118	3851344	MTFNL245D WG	A16
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3883230CNMA432S0420ST WBK45UB76	3883385CNMG43122 TN7105B16	3883562CCGW2151EFWC WBH25PB72	3883949DNGA431S0425MT WBH10UB81
3883231SCMW3252FST WBK45UB83	3883386CNMG43222 TN7105B16	3883573CCGW2151S0415C WBH25PB72	3883950TNGA331S0425MT WBH10UB81
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191.405	1131646	A44-45, A48-53, A56-61, A63, A65-73	235101	3538794	D109	333103	3539517	D88	440210	3539924	D110
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508323 GC	3541497	D133	581104 TN6031	3650385	D27	A12SSCFCR3 WG	3883421	A36	ABD09500R CPD1	2836700	C90
508324 C2	3541499	D133	581105 TN6016	3650413	D27	A12SSCLCL3 WG	2951391	A36	ABD125375R CG5	2836593	C90
508324 GC	3541499	D133	581105 TN6031	3650386	D27	A12SSCLCR3 WG	2951392	A36	ABD125375R CM1	2836588	C90
508325 C2	3541502	D133	582101 TN6016	3650414	D27	A12SSDUCR3 WG	2951393	A37	ABD125625R CG5	2836582	C90
508325 GC	3541503	D133	582101 TN6031	3650387	D27	A12SSDUCR3 WG	2951394	A37	ABD125625R CM1	2836579	C90
508326 C2	3541505	D133	582102 TN6016	3650415	D27	A12SSFCR2 WG	2951395	A37	ABD125625R CM1	2836579	C90
508326 GC	3541506	D133	582102 TN6031	3650388	D27	A12SSVUBL2 WG	3883422	A37	ABD156500R CG5	2836573	C90
508327 GC	3541509	D133	582103 TN6016	3650416	D27	A12SSVUBL2 WG	3883423	A37	ABD156500R CM1	2836567	C90
508328 C2	3541512	D133	582103 TN6031	3650389	D27	A12SSVUBR2 WG	3883423	A37	ABD156875R CG5	2836561	C90
508328 GC	3541513	D133	582104 TN6016	3650417	D27	A16NEL2 W	3632142	D42, E21	ABD156875R CM1	2836554	C90
508329 GC	3541516	D133	582104 TN6031	3650417	D27	A16NEL3 W	3632120	D42, E21	ABD156875R CM1	2836554	C90
508330 C5	3541519	D133	582105 TN6016	3650390	D27	A16NER2 W	3632130	D42, E21	ABD156875R CM1	2836679	C90
508330 GC	3866038	D133	582105 TN6031	3650391	D27	A16NER3 W	3632113	D42, E21	AGD09503 CG5	2836550	C90
508331 C2	3541520	D133	582106 TN6016	3650392	D27	A16TCTFPR3 WG	2951396	A35	AGD09503 CM1	2836545	C90
508331 GC	3541521	D133	582106 TN6031	3650392	D27	A16TMCNLR4 WG	2951397	A32	AGD12504 CG5	2836537	C90
508332 GC	3541524	D133	582107 TN6016	3650420	D27	A16TMCNLR4 WG	2993573	A32	AGD12504 CM1	2836531	C90
508333 C2	3541526	D133	582107 TN6031	3650393	D27	A16TMCNLR4 WG	2951398	A34	AGD15605 CG5	2836524	C90
508333 C5	3541530	D133	582108 TN6016	3650421	D27	A16TNSL3 W	3632137	D43	AGD15605 CM1	2836517	C90
508333 GC	3541527	D133	582108 TN6031	3650422	D27	A16TNSR3 W	3632129	D43	AGD15605 CM1	2836517	C90
508333 M40	3541528	D133	582108 TN6031	3650394	D27	A16TSCLCR3 WG	2951399	A36	AGD15605 CM1	2836517	C90
508334 C2	3541531	D133	582110 TN6016	3650425	D27	A16TSVUBL3 WG	3883424	A37	AGD15605 CM1	2836517	C90
508334 M40	3541533	D133	582110 TN6031	3650395	D27	A16TSVUBR3 WG	3883425	A37	AGD15605 CM1	2836517	C90
508334 M50	3541534	D133	582125 TN6016	3650423	D27	A20NEL3 W	3632124	D42, E21	AGD15605 CM1	2836517	C90
508337 GC	3541541	D133	582125 TN6031	3650396	D27	A20NER3 W	3632116	D42, E21	AGD15605 CM1	2836517	C90
508338 GC	3541544	D133	582126 TN6016	3650424	D27	A20UCTFPR3 WG	2951400	A35	AGD15605 CM1	2836479	C91
508339 GC	3541547	D133	582126 TN6031	3650397	D27	A20UCLNLR4 WG	2951401	A32	AGD15605 CM1	2836473	C91
508340 GC	3866038	D132	582148 TN6016	3650425	D27	A20UMCLNR4 WG	2951402	A32	AS832 WG	2840186	C83, C104
508340 M24	3541549	D132	582148 TN6031	3650398	D27	A20UMDUNL4 WG	2951403	A32	ATB10004 WG	2839821	C83
508403 M40	3541552	D134	583106 TN6016	3650426	D25	A20UMDUNR4 WG	2951404	A32	ATB137515 WG	2839848	C83
508403 M53	3541554	D134	583106 TN6031	3650399	D25	A20UMTFNR3 WG	2951405	A33	ATB15005 WG	2839842	C83
508404 M40	3541555	D134	583107 TN6016	3650427	D25	A20UMVUNL3 WG	3883411	A34	ATB15004 WG	3896119	C83
508404 M53	3541557	D134	583107 TN6031	3650428	D25	A20UMVUNR3 WG	3883412	A34	ATB16254 WG	2839830	C83
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CB211020015004R CM1	3786823	C116	CB312070020000L CM1	3893044	C119	CB3160100020006L CM1	3893166	C120	CB418035025006RM CPD1	3893115	C133
CB211020015004RM CBN6	3887043	C132	CB312070020000R CG5	3750432	C118	CB3160100020006R CG5	3762489	C120	CB418050025000L CG5	3893208	C121
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CCGT4305AL1 HWK10	2005305	B47	CCMT2152 TN7125	3745316	B14	CCMT3252 TN4000	2581349	F10	CCMW322 THM	2027509	B15
CCGT4305AL3 HWK15	2022859	B47	CCMT2152 TN8025	2021949	B14	CCMT3252 TN5120	3558332	B14	CCMW321 THM-X	2564211	F10
CCGT431AL1 HCK10	2002459	B47	CCMT2152MU TN5120	3558220	B15	CCMT3252 TN7105	3883372	B14	CCMW321 THM	2027509	B15
CCGT431AL1 HWK10	2021540	B47	CCMT2152MU TN7110	3642385	B15	CCMT3252 TN7110	3650175	B14	CCMW321 THM-X	2564211	F10
CCGT431AL3 HCK10	2022323	B47	CCMT2152MU TN7125	3875111	B15	CCMT3252 TN7115	3636910	B14	CCMW321 TN5105	3795066	B15
CCGT431AL3 HWK15	2022324	B47	CCMT2152MU TN8025	2282436	B15	CCMT3252 TN7125	3745318	B14	CCMW321 TN5120	3576566	B15
CCGT432AL1 HCK10	2002461	B47	CCMT2152R TN2000	2050435	F10	CCMT3252 TN7135	3781740	B14	CCMW322 THM-X	2564202	F10
CCGT432AL1 HWK10	2014118	B47	CCMT2521 TN7125	3745845	B14	CCMT3252 TN8025	2951906	B14	CCMW322 THM	2027512	B15
CCGT432AL3 HCK10	2022325	B47	CCMT2522 TN7125	3684648	B14	CCMT3252 TTI15	2027431	B14	CCMW322 THM-X	2564211	F10
CCGT432AL3 HWK15	2022326	B47	CCMT321 HK1500	2564044	F10	CCMT3252 TTR	2027443	B14	CCMW322 THM	2027509	B15
CCGW21505EC WBH25P	3883561	B72	CCMT321 THM	2031693	B14	CCMT3252 TTS	2564000	F10	CCMW321 THM-X	2564211	F10
CCGW21505EFGC WBH25P	3883560	B72	CCMT321 THM-X	2564068	F10	CCMT3252 TTR	2027444	B14	CCMW321 TN5105	3795067	B15
CCGW21505EFGM WBH25P	3883344	B72	CCMT321 TN2000	2048347	F10	CCMT3252 TTS	2564000	F10	CCMW321 TN5120	3576568	B15
CCGW21505EM WBH25P	3883897	B73	CCMT321 TN4000	2564058	F10	CCMT325241 TN7110	3652871	B15	CCMW3251FST WDN25U	3883134	B73
CCGW21505S0415C WBH10P	3883505	B72	CCMT321 TN5120	3558329	B14	CCMT325241 TN7115	3642381	B15	CCMW3252 THM	2027512	B15
CCGW21505S0415C WBH10U	3883918	B72	CCMT321 TN7105	3883368	B14	CCMT325241 TN7125	3745861	B15	CCMW3252 THM-X	2027512	B15
CCGW2151EFGC WBH25P	3883562	B72	CCMT321 TN7110	3649207	B						

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CCPI3126225L WG	2831733	.C46	CFG50050502500R CM1	3886289	.C140	CFR60567502500R CM1	3786852	.C142	CHB20301251500R CG5	3885083	.C135
CCPI312625R WG	2831739	.C46	CFG50620752500R CG5	3786865	.C140	CFR606310002500R CG5	3884982	.C142	CHB20301251500R CM1	3885084	.C135
CCPI31265L WG	2831755	.C46	CFG50620752500R CM1	3800419	.C140	CFR606310002500R CM1	3790218	.C142	CHB20301871500R CG5	3885085	.C135
CCPI31265R WG	2831762	.C46	CFG60300502500R CG5	3783022	.C140	CFR606312502500R CG5	3743654	.C142	CHB20301871500R CM1	3885086	.C135
CCPM6152225L WG	2831004	.C48	CFG60300502500R CM1	3886290	.C140	CFR606312502500R CM1	3786854	.C142	CHB20301251500R CG5	3885087	.C135
CCPM6152225R WG	2831010	.C48	CFG60620752500R CG5	3768617	.C140	CFR60632502500R CG5	3884984	.C142	CHB20301251500R CM1	3800416	.C135
CCPM61525R WG	3897899	.C48	CFG60620752500R CM1	3795208	.C140	CFR60632502500R CM1	3884983	.C142	CHB20351871500R CG5	3885088	.C135
CCPM61525L WG	2831020	.C48	CFG60931002500R CG5	3886291	.C140	CFR60633752500R CG5	3884985	.C142	CHB20351871500R CM1	3789898	.C135
CCPM8152225L WG	2830980	.C48	CFG60931002500R CM1	3735101	.C140	CFR60633752500R CM1	3786853	.C142	CHB20401871500R CG5	3885089	.C135
CCPM8152225R WG	2830986	.C48	CFG61251002500R CG5	3795209	.C140	CFR60635002500R CG5	3884986	.C142	CHB20401871500R CM1	3853569	.C135
CCPM81525L WG	3896022	.C48	CFG61251002500R CM1	3766684	.C140	CFR60635002500R CM1	3752292	.C142	CHB20402501500R CG5	3885090	.C135
CCPM81525R WG	3782376	.C48	CFG80620753000R CG5	3886292	.C140	CFR60635002500R CM1	3747942	.C142	CHB20402501500R CM1	3786842	.C135
CDG50152R CG5	2830555	.C73	CFG80620753000R CM1	3886293	.C140	CFR60637502500R CM1	3762609	.C142	CHB20503121500R CG5	3885091	.C135
CDG50152R CM1	2830561	.C73	CFG80931003000R CG5	3886294	.C140	CFR607010002500R CG5	3884987	.C142	CHB20503121500R CM1	3800417	.C135
CDG50252R CG5	2830541	.C73	CFG80931003000R CM1	3790219	.C140	CFR607010002500R CM1	3772203	.C142	CHB20603751500R CG5	3885092	.C135
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CDG50302R CG5	2830529	.C73	CFG81251003000R CM1	3886296	.C140	CFR607012502500R CM1	3757567	.C142	CHB20704371500R CG5	3885093	.C135
CDG50302R CM1	2830535	.C73	CFG81561003000R CG5	3886297	.C140	CFR60702502500R CG5	3862860	.C142	CHB20704371500R CM1	3786843	.C135
CDHB120601FST WDN25U	3898745	.B74	CFG81561003000R CM1	3886298	.C140	CFR60702502500R CM1	3786855	.C142	CHB20805001500R CG5	3789336	.C135
CDHB120605 ALO	2830870	.C66	CFR40172502500R CG5	3886299	.C141	CFR60703752500R CG5	3884989	.C142	CHB20805001500R CM1	3781271	.C135
CDHB120605 C25	2830864	.C66	CFR40172502500R CM1	3742202	.C141	CFR60703752500R CM1	3786856	.C142	CHB20905001500R CG5	3885094	.C135
CDHB120605 CG5	3884732	.C66	CFR40173752500R CG5	3886301	.C141	CFR60705002500R CG5	3884990	.C142	CHB20905001500R CM1	3885095	.C135
CDHB120605 CG6	2830853	.C66	CFR40173752500R CM1	3886300	.C141	CFR60705002500R CM1	3789902	.C142	CHB21005621500R CG5	3885096	.C135
CDHB120605 CM1	2830848	.C66	CFR40175002500R CG5	3886302	.C141	CFR6070502500R CG5	3884991	.C142	CHB21005621500R CM1	3831525	.C135
CDHB120605 TN7	2830843	.C66	CFR40175002500R CM1	3762601	.C141	CFR60707502500R CM1	3784317	.C142	CHB21001001500R CG5	3885097	.C135
CDHB120605FST WDN25U	3898744	.B74	CFR40176252500R CG5	3886303	.C141	CFR608810002500R CG5	3884992	.C142	CHB21201001500R CM1	3885098	.C135
CDHB120605M CBN6	2830741	.C66	CFR40176252500R CM1	3763872	.C141	CFR608810002500R CM1	3786859	.C142	CHB21206251500R CG5	3885099	.C135
CDHB120605M CPD1	2830774	.C66	CFR40252502500R CG5	3886304	.C141	CFR608812502500R CG5	3884993	.C142	CHB21206251500R CM1	3754613	.C135
CDHB12061 ALO	2830836	.C66	CFR40252502500R CM1	3742743	.C141	CFR60882502500R CG5	3755746	.C142	CHB313510002000R CG5	3773114	.C135
CDHB12061 C25	2830830	.C66	CFR40253752500R CG5	3886305	.C141	CFR60882502500R CM1	3884995	.C142	CHB313510002000R CM1	3794274	.C135
CDHB12061 CG5	2830788	.C66	CFR40253752500R CM1	3831526	.C141	CFR60882502500R CM1	3884994	.C142	CHB31357502000R CG5	3885100	.C135
CDHB12061 CG6	2830817	.C66	CFR40255002500R CG5	3886306	.C141	CFR60883752500R CG5	3884996	.C142	CHB31357502000R CM1	3754610	.C135
CDHB12061 CM1	2830813	.C66	CFR40255002500R CM1	3752288	.C141	CFR60883752500R CM1	3786857	.C142	CHB315010002000R CG5	3885101	.C135
CDHB12061 TN7	2830803	.C66	CFR40256252500R CG5	3886307	.C141	CFR60885002500R CG5	3884997	.C142	CHB315010002000R CM1	3767551	.C135
CDHB12061M CBN6	2830737	.C66	CFR40256252500R CM1	3742744	.C141	CFR60885002500R CM1	3786858	.C142	CHB315012502000R CG5	3885102	.C135
CDHB12061M CPD1	2830769	.C66	CFR40302502500R CG5	3886308	.C141	CFR60887502500R CG5	3884998	.C142	CHB315012502000R CM1	3885103	.C135
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CDHB12061M CM1	2830888	.C66	CFR40303752500R CM1	3794276	.C141	CFR809410003000R CM1	3789903	.C143	CHB318012502000R CG5	3735392	.C135
CDHB12061M TN7	2830881	.C66	CFR40305002500R CG5	3886310	.C141	CFR809412503000R CG5	3885000	.C143	CHB318012502000R CM1	3735391	.C135
CDHB12061M CBN6	2830737	.C66	CFR40305002500R CM1	3752289	.C141	CFR809412503000R CM1	3747332	.C143	CHB318015002000R CG5	3885104	.C135
CDHB12061M CPD1	2830769	.C66	CFR40306252500R CG5	3886311	.C141	CFR809415003000R CG5	3885001	.C143	CHB318015002000R CM1	3775026	.C135
CDHB12061M CG5	2830897	.C66	CFR40306252500R CM1	3757568	.C141	CFR809415003000R CM1	3747333	.C143	CHB421010002500R CG5	3885105	.C135
CDHB12061M CG6	2830817	.C66	CFR50332502500R CG5	3668606	.C141	CFR80945003000R CG5	3783020	.C143	CHB421010002500R CM1	3668605	.C135
CDHB12061M CM1	2830813	.C66	CFR50332502500R CM1	3811341	.C141	CFR80945003000R CM1	3786860	.C143	CHB421012502500R CG5	3885106	.C135
CDHB12061M TN7	2830803	.C66	CFR50333752500R CG5	3886313	.C141	CFR80945003000R CM1	3786861	.C143	CHB421012502500R CM1	3742201	.C135
CDHB12061M CBN6	2830737	.C66	CFR50333752500R CM1	3886312	.C141	CFR80947503000R CM1	3885002	.C143	CHB421015002500R CG5	3885107	.C135
CDHB12061M CPD1	2830769	.C66	CFR50335002500R CG5	3886314	.C141	CFR812610003000R CG5	3885004	.C143	CHB421015002500R CM1	3836518	.C135
CDHB12061M CG5	2830897	.C66	CFR50335002500R CM1	3784316	.C141	CFR812610003000R CM1	3789904	.C143	CHB421010002500R CG5	3885108	.C135
CDHB12061M CG6	3884731	.C66	CFR50337502500R CG5	3733496	.C141	CFR812612503000R CG5	3885005	.C143	CHB424010002500R CM1	3792875	.C135
CDHB12061M CM1	2830888	.C66	CFR50337502500R CM1	3742746	.C141	CFR812612503000R CM1	3885006	.C143	CHB424010002500R CM1	3885109	.C135
CDHB12061M TN7	2830881	.C66	CFR50382502500R CG5	3886316	.C141	CFR812615003000R CG5	3743655	.C143	CHB424015002500R CM1	3786844	.C135
CDHB12061M CBN6	2830737	.C66	CFR50382502500R CM1	3886315	.C141	CFR812615003000R CM1	3885007	.C143	CHB424017502500R CG5	3885110	.C135
CDHB12061M CPD1	2830769	.C66	CFR50383752500R CG5	3886317	.C141	CFR81265003000R CM1	3772204	.C143	CHB530010002500R CG5	3885112	.C135
CDHB12061M CG5	2830897	.C66	CFR50383752500R CM1	3747331	.C141	CFR81265003000R CM1	3885009	.C143	CHB530010002500R CM1	3786845	.C135
CDHB12061M CG6	2830817	.C66	CFR50385002500R CG5	3886318	.C141	CFR81267503000R CM1	3788989	.C143	CHB530015002500R CG5	3885113	.C135
CDHB12061M CM1	2830813	.C66	CFR50385002500R CM1	3794277	.C141	CFR815710003000R CG5	3885010	.C143	CHB530015002500R CM1	3889764	.C135
CDHB12061M TN7	2830803	.C66	CFR50387502500R CG5	3886319	.C141	CFR815710003000R CM1	3885011	.C143	CHB530017502500R CG5	3885114	.C135
CDHB12061M CBN6	2830737	.C66	CFR604010002500R CG5	3886320	.C142	CFR815712503000R CG5	3885012	.C143	CHB530017502500R CM1	3789899	.C135
CDHB12061M CPD1	2830769	.C66	CFR604010002500R CM1	3745074	.C142	CFR815712503000R CM1	3885013	.C143	CHB530010002500R CG5	3885115	.C135
CDHB12061M CG5	2830897	.C66	CFR604012502500R CG5	3886321	.C142	CFR815715003000R CG5	3885015	.C143	CHB630010002500R CM1	3747329	.C135
CDHB12061M CG6	3884731	.C66	CFR604012502500R CM1	3886322	.C142	CFR815715003000R CM1	3885016	.C143	CHB630010002500R CM1	3885117	.C135
CDHB12061M CM1	2830888	.C66	CFR60402502500R CG5	3777978	.C142	CFR81575003000R CG5	3885016	.C143	CHB630015002500R CM1	3885118	.C135
CDHB12061M TN7	2830881	.C66	CFR60402502500R CM1	3762602	.C142	CFR81575003000R CM1	3799668	.C143	CHB630017502500R CG5	3885119	.C135
CDHB12061M CBN6	2830737	.C66	CFR60403752500R CG5	3884963	.C142	CFR8157503000R CG5	3885017	.C143	CHB630017502500R CM1	3786846	.C135
CDHB12061M CPD1	2830769	.C66	CFR60403752500R CM1	3884964	.C142	CFR818810003000R CM1	3772205	.C143	CHB63002004000R CG5	3885119	.C135
CDHB12061M CG5	2830897</										

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CIT20501001500L CG5	3892357	C155	CIT31602502000R CG5	3896153	C154	CIT632018002500R CM1	3772210	C157	CNG431T0820 CW2015	2952551	B51
CIT20501001500L CM1	3892358	C155	CIT31602502000R CM1	3896154	C154	CIT63205002500L CG5	3892307	C157	CNG432T0820 CW3020	3869578	B51
CIT20501001500R CG5	3892360	C154	CIT31604002000L CG5	3896155	C155	CIT63205002500L CM1	3786874	C157	CNG432T0820 CW2015	2952552	B51
CIT20501001500R CM1	3892359	C154	CIT31604002000L CM1	3789915	C155	CIT63205002500R CG5	3783148	C157	CNG432T0820 CW5025	2952082	B51
CIT20501501500L CG5	3892361	C155	CIT31604002000R CG5	3896156	C154	CIT63205002500R CM1	3778982	C157	CNG433T0820 CW3020	3869579	B51
CIT20501501500L CM1	3892362	C155	CIT31604002000R CM1	3766688	C154	CIT63207502500L CG5	3892308	C157	CNG433T0820 CW2015	2952603	B51
CIT20501501500R CG5	3892364	C154	CIT31605002000L CG5	3789157	C155	CIT63207502500L CM1	3768875	C157	CNG433T0820 CW5025	2952113	B51
CIT20501501500R CM1	3892363	C154	CIT31605002000L CM1	3842577	C155	CIT63207502500R CG5	3768875	C157	CNG434T0420 CW3020	3869580	B51
CIT20502001500L CG5	3892365	C155	CIT31605002000R CG5	3896158	C154	CIT63207502500R CM1	3735775	C157	CNG434T0820 CW2015	2952604	B51
CIT20502001500L CM1	3892366	C155	CIT31605002000R CM1	3763865	C154	CIT63207502500R CG5	3735774	C157	CNG434T0820 CW5025	2952114	B51
CIT20502001500R CG5	3892368	C154	CIT31607502000L CG5	3896159	C155	CIT636010002500L CG5	3892309	C157	CNG435T0420 CW3020	3869581	B51
CIT20502001500R CM1	3892367	C154	CIT31607502000L CM1	3896160	C155	CIT636010002500L CM1	3789919	C157	CNG435T0820 CW2015	2952605	B51
CIT20602001500L CG5	3892369	C155	CIT31607502000R CG5	3896161	C154	CIT636010002500R CG5	3846873	C157	CNG435T0820 CW5025	2952115	B51
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CIT20602001500R CG5	3793473	C154	CIT418010002500L CG5	3896162	C156	CIT636012502500L CG5	3892310	C157	CNG454T0820 CW2015	2952606	B51
CIT20602001500R CM1	3892371	C154	CIT418010002500L CM1	3896163	C156	CIT636012502500L CM1	3836521	C157	CNG454T0820 CW5025	2952116	B51
CIT20602501500L CG5	3892372	C155	CIT418010002500R CG5	3896164	C156	CIT636012502500R CG5	3892311	C157	CNG455T0420 CW3020	3869582	B51
CIT20602501500L CM1	3892373	C155	CIT418010002500R CM1	3869769	C156	CIT636012502500R CM1	3747344	C157	CNG455T0820 CW2015	2952605	B51
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CIT20603001500L CM1	3892376	C155	CIT41803502500R CM1	3739876	C156	CIT636018002500R CM1	3754619	C157	CNG554T0820 CW2015	2952606	B51
CIT20603001500R CG5	3892378	C154	CIT41805002500L CG5	3756005	C156	CIT63605002500L CG5	3892313	C157	CNGA431EFWMT WBH25P	3883356	B74
CIT20603001500R CM1	3892377	C154	CIT41805002500L CM1	3812344	C156	CIT63605002500L CM1	3742760	C157	CNGA431EFWMT WBH25U	3898698	B74
CIT20802501500L CG5	3892379	C155	CIT41805002500R CG5	3896172	C156	CIT63605002500R CG5	3892314	C157	CNGA431FST WDN25U	3898726	B74
CIT20802501500L CM1	3892380	C155	CIT41805002500R CM1	3747933	C156	CIT63605002500R CM1	3869770	C157	CNGA431S0420MT WBH10C	3883493	B75
CIT20802501500R CG5	3892381	C154	CIT41807502500L CG5	3896168	C156	CIT63607502500L CG5	3782802	C157	CNGA431S0425FWMT WBH10P	3883512	B74
CIT20802501500R CM1	3892382	C155	CIT41807502500L CM1	3896169	C156	CIT63607502500L CM1	3794282	C157	CNGA431S0425T WBH25U	3898692	B74
CIT20803501500L CG5	3892383	C155	CIT41807502500R CG5	3896170	C156	CIT63607502500R CG5	3859394	C157	CNGA431S0425MT WBH10P	3883509	B75
CIT20803501500L CM1	3892383	C155	CIT41807502500R CM1	3742758	C156	CIT63607502500R CM1	3829729	C157	CNGA431S0425MT WBH10U	3883934	B75
CIT20803501500R CG5	3892384	C154	CIT420010002500L CG5	3896171	C156	CIT849015003000L CG5	3892315	C157	CNGA431S0425MT WBH25P	3883885	B75
CIT20803501500R CM1	3735102	C154	CIT420010002500L CM1	3736866	C156	CIT849015003000L CM1	3869771	C157	CNGA431S0425MT WBH25U	3898695	B75
CIT20805001500L CG5	3892385	C155	CIT420010002500R CG5	3668811	C156	CIT849015003000R CG5	3892316	C157	CNGA431S0425MT WBH25U	3898692	B75
CIT20805001500L CM1	3786870	C155	CIT420010002500R CM1	3743743	C156	CIT849015003000R CM1	3835691	C157	CNGA431T0820 CW2015	2952526	B51
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CIT20805001500R CM1	3775717	C154	CIT42004002500L CM1	3790220	C156	CIT849020003000L CM1	3789920	C157	CNGA432EFWMT WBH25U	3898699	B74
CIT21002501500L CG5	3892386	C155	CIT42006002500L CG5	3896173	C156	CIT849020003000R CG5	3812794	C157	CNGA432EMT WBH10C	3883496	B74
CIT21002501500L CM1	3789913	C155	CIT42006002500L CM1	3789917	C156	CIT849020003000R CM1	3788162	C157	CNGA432EMT WBH25P	3883363	B74
CIT21002501500R CG5	3892387	C154	CIT42006002500R CG5	3764923	C156	CIT84907503000L CG5	3892317	C157	CNGA432FST WDN25U	3898727	B74
CIT21002501500R CM1	3791777	C154	CIT42006002500R CM1	3862091	C156	CIT84907503000L CM1	3857723	C157	CNGA432S0420FWMT WBH10C	3883495	B74
CIT21003501500L CG5	3892388	C155	CIT42007502500L CG5	3896174	C156	CIT84907503000R CG5	3892318	C157	CNGA432S0420MT WBH10C	3883494	B75
CIT21003501500L CM1	3892389	C155	CIT42007502500L CM1	3789918	C156	CIT84907503000R CM1	3790959	C157	CNGA432S0420MT WBK45U	3898675	B75
CIT21003501500R CG5	3892390	C154	CIT42007502500R CG5	3846782	C156	CK10	1018331	A19-21, A35	CNGA432S0425FWMT WBH10P	3883523	B74
CIT21003501500R CM1	3869768	C154	CIT42007502500R CM1	3754618	C156	CK12	1018345	A8-10, A12-17, A32	CNGA432S0425FWMT WBH10U	3883938	B74
CIT21005001500L CG5	3892391	C155	CIT523010002500L CG5	3896175	C156	CK19	1018349	A8-11	CNGA432S0425MT WBH10P	3883510	B75
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CIT31202502000L CG5	3892395	C155	CIT52304002500L CM1	3794281	C156	CK9	1018329	A8, A10, A12-17, A19-20, A33	CNGA433EFWMT WBH25U	3898700	B74
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CPGW2152FST WDN25U	3898753	B77	CRR50337502500R CM1	3781272	C145	CRR812612503000R CM1	3747337	C147	CSBM5655R WG	2831441	C11
CPGW2152S0415C WBH25P	3883580	B77	CRR50382502500R CG5	3887210	C145	CRR812615003000R CG5	3887515	C147	CSBM6410195L WG	2831588	C13
CPGW2152S0415M WBH25P	3883907	B78	CRR50382502500R CM1	3768661	C145	CRR812615003000R CM1	3859393	C147	CSBM6410195R WG	2831595	C13
CPGW3251EC WBK45U	3898715	B77	CRR50383752500R CG5	3887211	C145	CRR81265003000R CG5	3887516	C147	CSBM6410325R WG	2831571	C13
CPGW3251FST WDN25U	3898754	B77	CRR50383752500R CM1	3747335	C145	CRR81265003000R CM1	3763868	C147	CSBM6412190R WG	2831477	C13
CPGW3251S0415C WBH25P	3883581	B77	CRR50385002500R CG5	3782801	C145	CRR81267503000R CG5	3887517	C147	CSBM6412195L WG	2831483	C13
CPGW3251S0415FWMT WBH10U	3883943	B77	CRR50385002500R CM1	3762610	C145	CRR81267503000R CM1	3788160	C147	CSBM6412195R WG	2831490	C13
CPGW3251S0415M WBH25P	3883348	B78	CRR50387502500R CG5	3887212	C145	CRR815710003000R CG5	3887518	C147	CSBM6412320R WG	2831462	C13
CPGW3251S0415M WBH10C	3883485	B78	CRR50387502500R CM1	3864296	C145	CRR815710003000R CM1	3742754	C147	CSBM6412325L WG	3898055	C13
CPGW3251S0415M WBH10P	3883526	B78	CRR604010002500R CG5	3887213	C146	CRR815712503000R CG5	3887519	C147	CSBM6412325R WG	2831468	C13
CPGW3251S0415M WBH10U	3883941	B78	CRR604010002500R CM1	3762611	C146	CRR815712503000R CM1	3856534	C147	CSBM6650L WG	3896207	C11
CPGW3252EC WBK45U	3898716	B77	CRR604012502500R CG5	3887215	C146	CRR815715003000R CG5	3887520	C147	CSBM6650R WG	2831676	C11
CPGW3252FST WDN25U	3898755	B77	CRR604012502500R CM1	3887214	C146	CRR815715003000R CM1	3856535	C147	CSBM6655L WG	3896208	C11
CPGW3252FWST WDN25U	3898759	B77	CRR60402502500R CG5	3887216	C146	CRR81575003000R CG5	3887521	C147	CSBM6655R WG	2831687	C11
CPGW3252S0415C WBH25P	3883584	B77	CRR60402502500R CM1	3775027	C146	CRR81575003000R CM1	3789909	C147	CSBM6760L WG	3896209	C11
CPGW3252S0415M WBH45U	3898710	B77	CRR60403752500R CG5	3858214	C146	CRR8157503000R CG5	3887522	C147	CSBM6760R WG	3518693	C11
CPGW3252S0415FWMT WBH10U	3883944	B77	CRR60403752500R CM1	3887217	C146	CRR81577503000R CM1	3747937	C147	CSBM8765L WG	3517652	C11
CPGW3252S0415M WBH25P	3883908	B78	CRR60405002500R CG5	3754615	C146	CRR818810003000R CG5	3887523	C147	CSBM8765R WG	2831666	C11
CPGW3252S0415M WBH10C	3883486	B78	CRR60405002500R CM1	3761676	C146	CRR818810003000R CM1	3786864	C147	CSBN1164DMX5 WG	3093690	A18
CPGW3252S0415M WBH10P	3883527	B78	CRR60407502500R CG5	3887218	C146	CRR818812503000R CG5	3887524	C147	CSDPN103 WG	2951032	A19
CPGW3252S0415M WBH10U	3883942	B78	CRR60407502500R CM1	3741434	C146	CRR818812503000R CM1	3887525	C147	CSDPN124 WG	2951284	A19
CPGW431FST WDN25U	3898756	B77	CRR604710002500R CG5	3887219	C146	CRR818815003000R CG5	3887526	C147	CSDPN164 WG	2951285	A19
CPGW432FST WDN25U	3898757	B77	CRR604710002500R CM1	3754289	C146	CRR818815003000R CM1	3869766	C147	CSH1000156 WG	2832775	C54
CPHB21205 CG6	2824583	C67	CRR604712502500R CG5	3887220	C146	CRR81885003000R CG5	3887527	C147	CSH1000187 WG	2832795	C54
CPHB21205 CM1	2824583	C67	CRR604712502500R CM1	3856511	C146	CRR81885003000R CM1	3786862	C147	CSH1000312 WG	2832785	C54
CPHB21205 CM1	2824590	C67	CRR60472502500R CG5	3775028	C146	CRR81887503000R CG5	3887528	C147	CSH1000375 WG	2832780	C54
CPHB2121 CG6	2824582	C67	CRR60472502500R CM1	3771383	C146	CRR825010003000R CG5	3887529	C147	CSH12501000 WG	2832910	C54
CPHB21205 CG5	2824461	C67	CRR60473752500R CG5	3887221	C146	CRR825010003000R CM1	3887530	C147	CSH1250375 WG	2832932	C54
CPHB21205 CG6	2824454	C67	CRR60473752500R CM1	3869765	C146	CRR825012503000R CG5	3887531	C147	CSH1250500 WG	2832926	C54
CPHB21205 CM1	2824468	C67	CRR60475002500R CG5	3887222	C146	CRR825012503000R CM1	3887532	C147	CSH1250625 WG	2832920	C54
CPHB2121 CG6	2824441	C67	CRR60475002500R CM1	3766692	C146	CRR825015003000R CG5	3887533	C147	CSH1250750 WG	2832914	C54
CPHB2121 CG6	2824433	C67	CRR60477502500R CG5	3865234	C146	CRR82505003000R CG5	3887535	C147	CSH15001000 WG	2832935	C54
CPHB2121 CM1	2824447	C67	CRR60477502500R CM1	3848272	C146	CRR82505003000R CM1	3784320	C147	CSH1500625 WG	2832947	C54
CPMT32505LF CG5	2821519	C67	CRR605610002500R CG5	3887223	C146	CRR82507503000R CG5	3887536	C147	CSH1500750 WG	2832941	C54
CPMT3251LF CG5	2821499	C67	CRR605610002500R CM1	3831527	C146	CRR82507503000R CM1	3794279	C147	CSH1500750 WG	2832941	C54
CPMT3251LF CM1	2821494	C67	CRR605612502500R CG5	3887224	C146	CS412	1852181	A22	CSH1625156 WG	2832868	C54
CPMT3252LF CG5	2821484	C67	CRR60562502500R CG5	3887226	C146	CSBI16518757L WG	2832365	C10	CSH1625187 WG	3493266	C54
CPMW21505FST WBH25U	3883239	B78	CRR60562502500R CM1	3789907	C146	CSBI16518757R WG	2832371	C10	CSH1625250 WG	2832856	C54
CPMW2151FST WDN25U	3883137	B78	CRR60563752500R CG5	3887227	C146	CSBI180187255L WG	2832623	C10	CSH1625312 WG	2832851	C54
CPMW3251FST WDN25U	3883140	B78	CRR60563752500R CM1	3789908	C146	CSBI180187255R WG	2832617	C10	CSH1625375 WG	2832844	C54
CPMW71505FST WDN25U	3883340	B78	CRR60565002500R CG5	3836946	C146	CSBI18037515R WG	2832607	C12	CSH1750156 WG	2832905	C54
CPMW7151FST WBH25U	3883240	B78	CRR60565002500R CM1	3747336	C146	CSBI18037555L WG	2832602	C12	CSH1750187 WG	2832898	C54
CPMW7151FST WDN25U	3883139	B78	CRR60567502500R CG5	3760526	C146	CSBI18037555R WG	2832596	C12	CSH1750250 WG	2832893	C54
CPT20052L CG5	2824474	C74	CRR60567502500R CM1	3734026	C146	CSBI18050015R WG	2832589	C12	CSH1750312 WG	2832885	C54
CPT20052L CM1	2824481	C74	CRR606310002500R CG5	3761678	C146	CSBI18050055L WG	2832583	C12	CSH1750375 WG	2832879	C54
CPT20052R CG5	2824516	C74	CRR606310002500R CM1	3745290	C146	CSBI18050055R WG	2832577	C12	CSH1750500 WG	2832874	C54
CPT20052R CM1	2824523	C74	CRR606312502500R CG5	3887495	C146	CSBI1817250L WG	3559639	C10	CSKNL164DMX5 WG	3093282	A18
CRDPN162DV WG	3871495	A22	CRR606312502500R CM1	3741440	C146	CSBI1817255R WG	2832559	C10	CSKNR164DMX5 WG	3093281	A18
CRDPN163DV WG	3871496	A22	CRR60632502500R CG5	3862230	C146	CSBI1817255R WG	2832553	C10	CSKPR10CA3 WG	3870437	A56-57
CRDPN164DV WG	3871498	A22	CRR60632502500R CM1	3811342	C146	CSBI20337510R WG	2832547	C12	CSM22156 WG	2832838	C55
CRDPN203DV WG	3871497	A22	CRR60633752500R CG5	3887496	C146	CSBI20337515R WG	2832535	C12	CSM221787 WG	2832832	C55
CRDPN204DV WG	3871499	A22	CRR60633752500R CM1	3792274	C146	CSBI20337550R WG	2832529	C12	CSM22250 WG	2832827	C55
CRGLP162DV WG	3871501	A22	CRR60633752500R CM1	3855161	C146	CSBI20350010R WG	2832503	C12	CSM22312 WG	2832820	C55
CRGLP163DV WG	3871503	A22	CRR60635002500R CG5	3762603	C146	CSBI20350015L WG	2832494	C12	CSM22375 WG	2832813	C55
CRGLP164DV WG	3871507	A22	CRR60635002500R CM1	3762603	C146	CSBI20350055L WG	2832488	C12	CSM22500 WG	2832809	C55
CRGLP203DV WG	3871505	A22	CRR60637502500R CG5	3761677	C146	CSBI20350055R WG	2832488	C12	CSMI187250R WG	2832353	C49
CRGLP204DV WG	3871509	A22	CRR60637502500R CM1	3742753	C146	CSBI2035005R WG	2832467	C12	CSMI205030R WG	2832348	C49
CRGRP162DV WG	3871500	A22	CRR607010002500R CG5	3753956	C146	CSBI20350300R WG	2832463	C10	CSMM5640R WG	2831054	C50
CRGRP163DV WG	3871502	A22	CRR607012502500R CG5	3887498	C146	CSBI205030R WG	2832454	C10	CSMM6760R WG	2831048	C50
CRGRP164DV WG	3871506	A22	CRR607012502500R CM1	3811383	C146	CSBI205035L WG	2832448	C10	CSP1250010R WG	2832297	C43
CRGRP203DV WG	3871504	A22	CRR60702502500R CG5	3887499	C146	CSBI205035R WG	2832442	C10	CSP125001225R WG	2832319	C43
CRGRP204DV WG	3871508	A22	CRR60702502500R CM1	3836520	C146	CSBI20503751255R WG	2832429	C12	CSP1250015L WG	2832337	C43
CRR40172502500R CG5	3887198	C145	CRR60703752500R CG5	3887500	C146						

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CSSPR12CA4 WG	3870429	A56-57	CUG505002500R CM1	3886870	C148	DCGW21505EM WBH25P	3883901	B79	DNMA442 TN5105	3779372	B22
CSWM 035 040	3287987	A61, A63, A65	CUG506210002500R CG5	3886871	C148	DCGW21505S0415C WBH10P	3883528	B79	DNMA442 TN5120	3558534	B22
CSWM 040 050	3287988	A61, A63, A65, A67, A71, A73	CUG506212502500R CM1	3886872	C148	DCGW21505S0415C WBH10P	3883945	B79	DNMA443 TN5105	3779423	B22
CSWM 060 050	3287989	A45, A47, A49, A51, A53, A55, A57, A59, A61, A63, A65, A67, A69, A71, A73	CUG506212502500R CG5	3886973	C148	DCGW2151FST WDN25U	3898761	B79	DNMA443 TN5120	3558535	B22
CSWM 080 050	3287990	A45, A47, A49, A51, A53, A55, A57, A59, A61, A67, A69, A71	CUG506210002500R CM1	3886974	C148	DCGW2151S0415C WBH10P	3883529	B79	DNMA443S0420MT WBK45U	3883229	B81
CSWM 100 080	3287991	A47, A49, A53, A55	CUG606210002500R CM1	3886976	C148	DCGW2151S0415C WBH10P	3883946	B79	DNMG32525 TN2000	2563431	F13
CT11 WG	2832635	C35-36, C38-39, C104	CUG606212502500R CG5	3886977	C148	DCGW2151S0415M WBH25P	3883586	B79	DNMG3312 TN5105	3795478	B22
CT15 WG	2832641	C35-36, C38-39, C43, C46, C48, C104	CUG606212502500R CM1	3886978	C148	DCGW2151S0415M WBH25P	3883330	B79	DNMG3312 TN5120	3559541	B22
CTAPR082B WG	2951286	A20	CUG612510002500R CG5	3886982	C148	DCGW3251FST WDN25U	3898762	B79	DNMG3312 TN7105	3883806	B22
CTEPR123B WG	2951287	A20	CUG612510002500R CM1	3857662	C148	DCGW3251S0415M WBH25P	3883902	B79	DNMG3312 TN7110	3650176	B22
CTCPN443 WG	2951288	A20	CUG612512502500R CG5	3886983	C148	DCGW3251S0415MT WBH10C	3883487	B79	DNMG3312 TN7115	3683920	B22
CTEPR123B WG	2951289	A20	CUG612512502500R CM1	3886984	C148	DCGW3251S0415MT WBH10P	3883530	B79	DNMG3312 TN7125	3875140	B22
CTEPR163D WG	2951290	A20	CUG612515003000R CG5	3886985	C148	DCGW3251S0415MT WBH10U	3883947	B79	DNMG3312 TN8025	2022207	B22
CTFPL12CA3 WG	3870428	A58-59	CUG612515003000R CM1	3886986	C148	DCGW3251S0415MT WBH25U	3898684	B79	DNMG33122 TN115	2022212	B22
CTFPR10A2 WG	3870427	A58-59	CUG806210003000R CG5	3886985	C148	DCGW3251S0415MT WBK45U	3898680	B79	DNMG33122 TN5105	3795479	B22
CTFPR12CA3 WG	3870426	A58-59	CUG806210003000R CM1	3886986	C148	DCGW3252S0415M WBH25P	3883903	B79	DNMG33222 TN5120	3548184	B22
CTFPR16CA3 WG	3870425	A58-59	CUG806215003000R CG5	3886987	C148	DCGW3252S0415M WBH10C	3883488	B79	DNMG33222 TN7105	3883807	B22
CTFPR20CA4 WG	3870424	A58-59	CUG806215003000R CM1	3886988	C148	DCGW3252S0415MT WBH10P	3883531	B79	DNMG33222 TN7110	3649246	B22
CTGPL123B WG	2951291	A21	CUG809310003000R CG5	3886989	C148	DCGW3252S0415MT WBH10U	3883948	B79	DNMG33222 TN7115	3642374	B22
CTGPR123B WG	2951292	A21	CUG809310003000R CM1	3886989	C148	DCGW3252S0415MT WBH10U	3883948	B79	DNMG33222 TN7125	3684579	B22
CTH5001252750 WG	2898757	C109	CUG809315003000R CG5	3886990	C148	DCGW3252S0415MT WBK45U	3883223	B79	DNMG33222 TN8025	2022216	B22
CTH5001872750 WG	2898756	C109	CUG809315003000R CM1	3886990	C148	DCMT3251 HK1500	2563563	F12	DNMG33222 TTI15	2022221	B22
CTH5002502750 WG	2898755	C109	CUG809315003000R CG5	3886991	C148	DCMT3251 THM-X	2563573	F12	DNMG33248 TN8025	2022222	B23
CTH5003122750 WG	2898754	C109	CUG809315003000R CM1	3886992	C148	DCMT3251 TN2000	2576427	F12	DNMG33249 TN7110	3662882	B23
CTH500352750 WG	2898753	C109	CUG812510003000R CG5	3886993	C148	DCMT3252 HK1500	2563459	F12	DNMG33249 TN7115	3639200	B23
CTH6251252750 WG	2898752	C109	CUG812510003000R CM1	3886994	C148	DCMT3252 THM-X	2563479	F12	DNMG33249 TN7125	3873535	B23
CTH6251872750 WG	2898751	C109	CUG812515003000R CG5	3886995	C148	DCMT3252 TN2000	2563474	F12	DNMG33249 TN7135	3781768	B23
CTH6252502750 WG	2898750	C109	CUG812515003000R CM1	3886996	C148	DCMT3252MU TN2000	2562499	F12	DNMG33249 TN8025	2022233	B23
CTH6253122750 WG	2898749	C109	CUGA402010002500R CG5	3783144	C149	DCM21505S0420MT WBH25U	3883241	B80	DNMG3325 TN2000	2563408	F13
CTH6253752750 WG	2898748	C109	CUGA402010002500R CM1	3886997	C149	DCM21505S0420MT WBH25U	3883253	B80	DNMG3325 TN4000	2563403	F13
CTH7501252750 WG	2898747	C109	CUGA40205002500R CG5	3766685	C149	DCM2151FST WDN25U	3883142	B79	DNMG3325 TN5120	3595942	B23
CTH7501872750 WG	2898746	C109	CUGA40205002500R CM1	3666810	C149	DCM2151S0420MT WBH25U	3883256	B79	DNMG3325 TN2000	2992805	F13
CTH7502502750 WG	2898745	C109	CUGA403010002500R CG5	3886998	C149	DCM3251 THM-X	2563318	F12	DNMG3325 TN7105	3883195	B24
CTH7503122750 WG	2898744	C109	CUGA403010002500R CM1	3800420	C149	DCM3251 WBK45U	3883224	B79	DNMG3325 TN8025	2024955	B22
CTH7503752750 WG	2898743	C109	CUGA40305002500R CG5	3784481	C149	DCM3251FST WDN25U	3883122	B79	DNMG33348 TN8025	2022238	B23
CTH7505002750 WG	2898742	C109	CUGA40305002500R CM1	3886999	C149	DCM3251S0420MT WBH25U	3883249	B80	DNMG33349 TN7125	3875161	B23
CTHM123270 WG	3897868	C109	CUGA40305002500R CG5	3887000	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7135	3781768	B23
CTHM12470 WG	3897869	C109	CUGA40305002500R CM1	3887001	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN8025	2022233	B23
CTHM12640 WG	3897870	C109	CUGA40305002500R CG5	3766686	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33348 TN8025	2022238	B23
CTHM12790 WG	3897871	C109	CUGA40305002500R CM1	3887002	C149	DCM3252S0420MT WBK45U	3883224	B79	DNMG33348 TN8025	2022238	B23
CTHM12950 WG	3897872	C109	CUGA40305002500R CG5	3887003	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7125	3875161	B23
CTHM163270 WG	3897883	C109	CUGA40305002500R CM1	3887004	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7105	3795512	B22
CTHM16470 WG	3897884	C109	CUGA40305002500R CG5	3887005	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN7115	3662837	B22
CTHM16640 WG	3897885	C109	CUGA40305002500R CM1	3766686	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33349 TN7125	3795512	B22
CTHM16790 WG	3897886	C109	CUGA40305002500R CG5	3887006	C149	DCM3252S0420MT WBK45U	3883224	B79	DNMG33349 TN8025	2024955	B22
CTHM16950 WG	3897887	C109	CUGA40305002500R CM1	3887007	C149	DCM3251FST WDN25U	3883122	B79	DNMG33348 TN8025	2022238	B23
CTHM2012770 WG	3897888	C109	CUGA40305002500R CG5	3887008	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7125	3875161	B23
CTHM203270 WG	3897889	C109	CUGA40305002500R CM1	3887009	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN7135	3781768	B23
CTHM20470 WG	3897890	C109	CUGA40305002500R CG5	3887010	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33348 TN8025	2022238	B23
CTHM20640 WG	3897891	C109	CUGA40305002500R CM1	3887011	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7105	3795512	B22
CTHM20790 WG	3897892	C109	CUGA40305002500R CG5	3887012	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7115	3662837	B22
CTHM20950 WG	3897893	C109	CUGA40305002500R CM1	3887013	C149	DCM3252S0420MT WBK45U	3883224	B79	DNMG33349 TN7125	3875161	B23
CTP32262590647R WG	2828101	C45	CUGA40305002500R CG5	3887014	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7135	3781768	B23
CTR21253751500R CG5	3783149	C158	CUGA40305002500R CM1	3887015	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN8025	2024955	B22
CTR21253751500R CM1	3747935	C158	CUGA40305002500R CG5	3887016	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN8025	2024955	B22
CTR31873752000R CG5	3766869	C158	CUGA40305002500R CM1	3887017	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN7105	3795512	B22
CTR31873752000R CM1	3745077	C158	CUGA40305002500R CG5	3887018	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33349 TN7115	3662837	B22
CTR3187502000R CG5	3892319	C158	CUGA40305002500R CM1	3887019	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7125	3875161	B23
CTR3187502000R CM1	3747345	C158	CUGA40305002500R CG5	3887020	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7135	3781768	B23
CTR425010002500R CG5	3892320	C158	CUGA40305002500R CM1	3887021	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN8025	2024955	B22
CTR425010002500R CM1	3747346	C158	CUGA40305002500R CG5	3887022	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33349 TN7105	3795512	B22
CTR42505002500R CG5	3892321	C158	CUGA40305002500R CM1	3887023	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7115	3662837	B22
CTR42505002500R CM1	3745717	C158	CUGA40305002500R CG5	3887024	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7125	3875161	B23
CTR531212502500R CG5	3892322	C158	CUGA40305002500R CM1	3887025	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN7135	3781768	B23
CTR531212502500R CM1	3794283	C158	CUGA40305002500R CG5	3887026	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33349 TN8025	2024955	B22
CTR53127502500R CG5	3892323	C158	CUGA40305002500R CM1	3887027	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN7105	3795512	B22
CTR53127502500R CM1	3782843	C158	CUGA40305002500R CG5	3887028	C149	DCM3251S0420MT WBH25U	3883233	B80	DNMG33349 TN7115	3662837	B22
CTR637512502500R CG5	3783150	C158	CUGA40305002500R CM1	3887029	C149	DCM3252FST WDN25U	3883143	B79	DNMG33349 TN7125	3875161	B23
CTR637512502500R CM1	3745078	C158	CUGA40305002500R CG5	3887030	C149	DCM3252S0420MT WBH25U	3883252	B80	DNMG33349 TN7135	3781768	B23
CTR6375502500R CG5	3892324	C158	CUGA40305002500R CM1	3887031	C149	DCM3251FST WDN25U	3883122	B79	DNMG33349 TN8025	2024955	B22
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DNMG442 TN2000	2393014	F13	DNMG443SL TN8025	2028003	B25	FCBI25045R WG	2829897	C27	FSBI20362555R WG	2830380	C23
DNMG442 TN4000	2560235	F13	DNMG44448 TN8025	2025824	B23	FCBI2505001250R WG	2829869	C33	FSBI25040L WG	3896210	C19
DNMG442 TN5105	3795487	B22	DNMG44449 TN7115	3663113	B23	FCBI2505001255L WG	2829863	C33	FSBI25040R WG	3893699	C19
DNMG442 TN5120	3559547	B22	DNMG44449 TN7125	3875105	B23	FCBI2505001255R WG	2829857	C33	FSBI25045L WG	2830364	C19
DNMG442 TN7110	3662883	B22	DNMG4445 TN4000	2561209	F13	FCBI250500250R WG	2829851	C33	FSBI25045R WG	2830358	C19
DNMG442 TN7115	3640166	B22	DNMG4445 TN5120	3559551	B23	FCBI250500255R WG	2829847	C33	FSBI2505001250R WG	2830347	C23
DNMG442 TN7135	3782047	B22	DNMG4445 TN7110	3662937	B23	FCBI25060R WG	2829892	C27	FSBI2505001255R WG	2830335	C23
DNMG4422 TN5105	3795488	B22	DNMG4445 TN7115	3640657	B23	FCBI2506251250R WG	2829841	C33	FSBI250500750R WG	2830329	C23
DNMG4422 TN5120	3548185	B22	DNMG4445 TN7125	3873558	B23	FCBI2506251255L WG	2829835	C33	FSBI250500755L WG	2830324	C23
DNMG4422 TN6010	2955755	B22	DNMG4445 TN7135	3781728	B23	FCBI2506251255R WG	2829828	C33	FSBI250500755R WG	2830312	C23
DNMG4422 TN6025	2956093	B22	DNMG4445 TN8025	2012004	B23	FCBI250625250R WG	2829817	C33	FSBI2506251250L WG	3383045	C23
DNMG4422 TN7105	3883809	B22	DNMM44265 TN7110	3650195	B25	FCBI250625255R WG	2829811	C33	FSBI2506251255R WG	2830296	C23
DNMG4422 TN7110	3650177	B22	DNMM44265 TN7115	3639137	B25	FCBI25065L WG	2829885	C27	FSBI250625750L WG	3327103	C23
DNMG4422 TN7115	3639363	B22	DNMM44265 TN7125	3684638	B25	FCBI25065R WG	2829881	C27	FSBI250625755L WG	2830320	C23
DNMG4422 TN7125	3684647	B22	DNMM44265 TN7135	3781762	B25	FCBI31240L WG	2829804	C27	FSBI250625755R WG	2830284	C23
DNMG4422 TN8025	2011774	B22	DNMM44265 TN8025	2012019	B25	FCBI31240R WG	2829799	C27	FSBI31240R WG	2830272	C19
DNMG4422 TT115	2011786	B22	DNMM44365 TN7110	3663167	B25	FCBI31245L WG	2829793	C27	FSBI31245L WG	2830270	C19
DNMG4424 TN7110	3649254	B22	DNMM44365 TN7115	3639354	B25	FCBI31245R WG	2829787	C27	FSBI31245R WG	2830260	C19
DNMG4424 TN7125	3745326	B22	DNMM44365 TN7125	3684646	B25	FCBI312500150R WG	2829751	C33	FSBI31250010R WG	2830227	C23
DNMG4424 TN7135	3781789	B22	DNMM44365 TN7135	3781811	B25	FCBI312500155L WG	2829745	C33	FSBI312500155R WG	2830245	C23
DNMG4424 TT15	2011801	B22	DNMM44365 TN8025	2022281	B25	FCBI312500155R WG	2829740	C33	FSBI31250015L WG	2830222	C23
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DNMG44248 TN8025	2011823	B23	DNMM44465 TN7125	3875159	B25	FCBI31250031255R WG	2829722	C33	FSBI312625155R WG	2830189	C23
DNMG44249 TN2000	2422430	F13	DNMM44465 TN8025	2022285	B25	FCBI31260R WG	2829777	C27	FSBI31262515R WG	2830185	C23
DNMG44249 TN7105	3883196	B23	DNMP431SM TN6010	3348294	B25	FCBI312625150R WG	2829716	C33	FSBM5212125L WG	3890856	C25
DNMG44249 TN7110	3649256	B23	DNMP431SM TN8025	2904955	B25	FCBI312625155L WG	2829709	C33	FSBM5212125R WG	2829533	C25
DNMG44249 TN7115	3636915	B23	DNMP432SM TN6010	3348293	B25	FCBI312625155R WG	2829704	C33	FSBM5212255R WG	3890857	C25
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DNMG44249 TN7135	3781803	B23	DNMP433SM TN8025	2904955	B25	FCBI31262531255R WG	2829686	C33	FSBM6100L WG	3896211	C21
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DNMG4425 TN2000	2561293	F13	DNMP441SM TN8025	2031739	B25	FCBI31265R WG	2829764	C27	FSBM61005L WG	3896212	C21
DNMG4425 TN4000	2561288	F13	DNMP442SM TN6010	2955796	B25	FCBM5100L WG	3896035	C30	FSBM61005R WG	2829566	C21
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DNMG4425 TN7110	3662891	B23	DNMS432FST WDN25J	2028018	B25	FCBM51005L WG	3896037	C30	FSBM6612195L WG	2829501	C25
DNMG4425 TN7115	3639292	B23	DNMP443SM TN6010	2955797	B25	FCBM51005R WG	3896038	C30	FSBM6612195R WG	2829508	C25
DNMG4425 TN7125	3684640	B23	DNMP443SM TN8025	2956131	B25	FCBM5312250R WG	2829339	C34	FSBM6612320R WG	3890858	C25
DNMG4425 TN7135	3781761	B23	DNMS431FST WDN25J	2028020	B25	DNMP443SM TN8025	2829344	C34	FSBM6612325R WG	3890859	C25
DNMG4425 TN8025	2011860	B23	DNMS432FST WDN25J	3898733	B81	FCBM5312255L WG	2829350	C34	FSBM6616190R WG	3890860	C25
DNMG442AP TN6010	2955765	B23	DNMX454T0820 CW5025	2952129	B53	FCBM5312255R WG	2829350	C34	FSBM6616195R WG	2829429	C25
DNMG442AP TN6025	2956102	B23	DPGW21505EC WBH25P	3883582	B82	FCBM5312510L WG	3896068	C34	FSBM6616320L WG	3890861	C25
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DNMG442CT TN7110	3649195	B24	DPGW2151S0415C WBH25P	3883583	B82	FCBM5316515R WG	3896071	C34	FSBM81005R WG	2829548	C21
DNMG442CT TN7115	3639196	B24	DPGW2151S0415C WBH25P	3883583	B82	FCBM61520L WG	3896030	C30	FSBM821250R WG	2829472	C25
DNMG442CT TN7125	3745841	B24	DPGW2151S0415M WBH25P	3883349	B82	FCBM61520R WG	3896031	C30	FSBM8212380L WG	2829442	C25
DNMG442CT TN8025	2027985	B24	DPGW2152S0415C WBH25P	3883587	B81	FCBM61525L WG	2829385	C30	FSBM8212380R WG	2829448	C25
DNMG442FW TN5105	3795489	B24	DPGW2152S0415M WBH25P	3883350	B82	FCBM61525R WG	2829390	C30	FSBM8212385R WG	2829459	C25
DNMG442FW TN8025	2954716	B24	DPGW3251EMT WBK45U	3898681	B82	FCBM6612320R WG	2829309	C34	FSBM8216380R WG	2829408	C25
DNMG442M TN5105	3795490	B24	DPGW3251FST WDN25J	3898765	B82	FCBM6612325L WG	2829319	C34	FSBM8216385R WG	3890863	C25
DNMG442M TN8025	2954725	B24	DPGW3251FWST WDN25J	3898767	B82	FCBM6612325R WG	2829323	C34	FSI25062512560R WG	2830177	C51
DNMG442SL TN7110	3653580	B25	DPGW3251S0415M WBH25P	3883351	B82	FCBM6612630R WG	3896072	C34	FSI2506257560R WG	2830171	C51
DNMG442SL TN7115	3640668	B25	DPGW3251S0415MT WBH10U	3883952	B82	FCBM6612635R WG	3896083	C34	FSI3126251560R WG	2830161	C51
DNMG442SL TN7125	3745820	B25	DPGW3251S0415MT WBH25P	3898687	B82	FCBM6616320R WG	3896084	C34	FSI31262593760R WG	2830155	C51
DNMG442SL TN8025	2027989	B25	DPGW3252S0415M WBH25P	3883909	B82	FCBM6616325L WG	3896085	C34	FSI62560R WG	2830143	C51
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DNMG443 TN7135	3781819	B22	E08LSEL2 W	2892521	E48	FCBM81520R WG	2829356	C30	GCBIW18763L WG	2827749	C38
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DNMG4432 TN5120	3559550	B22	E10LSEL3 W	2892553	E48	FCBM81525R WG	2829368	C30	GCBIW25063L WG	2827740	C38
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DNMG4438 TN8025	2011921	B23	ENG452T0820 CW2015	2952612	B54	FCBM8212795R WG	2829279	C34	GCBIW51523R WG	3896040	C39
DNMG4439 TN7105	3883197	B23	ENG453T0820 CW2015	2952613	B54	FCBM8216380R WG	3896086	C34	GCBIW61523L WG	2827705	C39
DNMG4439 TN7110	3649257	B23	ENG454T0820 CW2015	2952614	B54	FCBM8216385L WG	3896087	C34	GCBIW61523R WG	2827711	C39
DNMG4439 TN7115	3639232	B23	ENGX454T0820 CW5025	2952130	B54	FCBM8216385R WG	3897086	C34	GCBIW7560R WG	3897012	C39
DNMG4439 TN7125	3873544	B23	FBIT WG	2830497	C104	FCBM8216790R WG	3896095	C34	GCBIW7560R WG	2827699	C39
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GSBW31243R WG	2828145	C35	KLM33	1099649	A45, A49, A51, A53	LSM124450011870R WG	2820937	C50	MCLNL856D WG	3851317	A9
GSBMW51003L WG	2828130	C36	KLM33L	1021543	A55	LSM12445008280R WG	2820944	C50	MCLNR103D WG	3851300	A9
GSBMW51003R WG	2828134	C36	KLM34L	1021565	A55	LSSL123D W	2968588	E45	MCLNR123B WG	3851301	A9
GSBMW61003L WG	2828116	C36	KLM43	1021535	A45, A47, A49, A51, A53	LSSL163D W	2968589	E45	MCLNR124B WG	2951304	A9
GSBMW61003R WG	2828122	C36	KLM46	1021537	A45, A47, A49, A55	LSSL164D W	2968590	E45	MCLNR12CA4 WG	3870410	A46-47
GSBMW81003L WG	3886548	C36	KLM46S	1021569	A45, A47, A49, A51, A53	LSSR123D W	2968591	E45	MCLNR163C WG	3851302	A9
GSBMW81003R WG	3886549	C36	KLM54	1099650	A49, A51	LSSR163D W	2968592	E45	MCLNR164C WG	2951305	A9
GSP1375625150R WG	2828196	C43	KLM58	1021539	A55	LSSR204D W	2968593	E45	MCLNR164D WG	2953418	A9
GSP137562515225R WG	2828310	C43	KLM68	1021541	A47, A49, A55	LSSR203D W	2968594	E45	MCLNR165C WG	2953419	A9
GSP1375625155L WG	2828275	C43	KNUX160405L11 TN2000	2556877	F13	LTM16 WG	2820981	C50, C104	MCLNR165D WG	2953420	A9
GSP1375625155R WG	2828281	C43	KNUX160405L11 TN4000	2556873	F13	MB010062L CG5	3885960	C101	MCLNR166D WG	2953421	A9
GSP150075020R WG	2828203	C43	KNUX160405L11 TTS	2556885	F13	MB010062L CM1	3885959	C101	MCLNR16CA4 WG	3870409	A46-47
GSP15007502225R WG	2828295	C43	KNUX160405R11 TN2000	2556948	F13	MB010062R CG5	2836098	C101	MCLNR204D WG	2953422	A9
GSP150075025R WG	2828269	C43	KNUX160405R11 TN4000	2556944	F13	MB010062R CM1	2836085	C101	MCLNR205D WG	2953453	A9
GSPM101638225L WG	3897894	C44	KNUX160405R11 TTS	2556960	F13	MB030187L CG5	3885961	C101	MCLNR206D WG	2953454	A9
GSPM101638225R WG	2827688	C44	KNUX160410L11 TN2000	2556856	F13	MB030187L CM1	3885962	C101	MCLNR20CA4 WG	3870408	A46-47
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GSPM1016385R WG	3025010	C44	KNUX160410R11 TN2000	2556928	F13	MB030187R CM1	2836069	C101	MCLNR245E WG	3851305	A9
GSPM131651225L WG	3897896	C44	KNUX160410R12 TN4000	2556908	F13	MB062187L CG5	3885983	C101	MCLNR246D WG	2953455	A9
GSPM131651225R WG	3897897	C44	KNUX160410R12 TN4000	2556908	F13	MB062187L CM1	3885984	C101	MCLNR246E WG	3851306	A9
GSPM1316515L WG	3896052	C44	KNUX160415R12 TN4000	2556892	F13	MB062187R CG5	2836423	C101	MCLNR25CA6 WG	3870407	A46-47
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HNUH321425		G10	KUAM31	1020813	A45, A47, A49, A51, A53, A55, A57, A59, A61, A67, A69, A71, A73	MB094500L CG5	3885990	C101	MDJNL164D WG	2953457	A10
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MRGNR204D WG	3851363	A12	MT15660F2R CM1	2836182	C103	NASL082D W	3636534	D40, E16	NG2M080RK TN6025	3607291	D50-D52
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MS1155	1021341	A23-24, A36-37, A61, A63, A67, A69, A71, A73	MTFNL123B WG	2951329	A16	NASR103B W	3636532	D40, E16	NG2M150RK TN6010	3606673	D50-D52
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MS1157	1099644	A36, A61, A67, A69	MTFNL163D WG	3851342	A16	NB2R THM	3607064	D59	NG2M170RK TN6010	3607379	D50-D52
MS1158	1021375	A23	MTFNL16CA3 WG	3871305	A54-55	NB3L THM	3607017	D59	NG2M195RK TN6010	3606829	D50-D52
MS125	1020975	A59	MTFNL204D WG	3851343	A16	NB3R THM	3607019	D59	NG2M195RK TN6025	3607417	D50-D52
MS1321	1021007	A22	MTFNL20CA4 WG	3871304	A54-55	NDC310RDL75 TN6025	3636565	E32	NG2M200RK TN6010	3607100	D50-D52
MS1933	1099614	A61, A63, A65	MTFNL245D WG	3851344	A16	NDC3115VR75 TN6010	3636550	E31	NG2M200RK TN6025	3607071	D50-D52
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MS326	1059844	D14	MTFNR164D WG	2951331	A16	NDC8115VR75M TN6010	3636552	E31	NG2M225RK TN6025	3607411	D50-D52
MS364	1021143	A46-49, A52-55	MTFNR16CA3 WG	3871302	A54-55	NDC88VR75M TN6010	3636548	E31	NG2M250RK TN6025	3607324	D50-D52
MSDNN083 WG	2953473	A13	MTFNR204D WG	3851338	A16	NEL062 W	3637525	D41, E17	NG2M250RK TN6010	3606916	D50-D52
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MSRNL16CA4 WG	3870346	A50-51	MTGNR16CA3 WG	3871295	A54-55	NER123B W	3632133	D41, E17	NG3062RK TN7110	3607628	D50-D52
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NGD2M250RK TN6025	3607504	D53	NGP3M250L TN6010	3606973	D54	NR3047L TN6025	3607479	D57	NR4M250R TN6025	3607486	D56
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NGD3062LK TN6025	3607451	D53	NGP3M250R TN6010	3606981	D54	NR3062LK TN6010	3607408	D58	NRD3031L TN6010	3607085	D58
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NSR245D W.....	3637540	D38, E14	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2824819	C41	RCMT1204M043 TN8025.....	2028168	B27
NSR246D W.....	3637520	D39, E15	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825633	C42	RCMT1204M043 TN8025.....	2028168	B27
NSR853D W.....	3637496	D38, E14	QCBI50083L WG.....	2825318	C38	QSI3756251560R WG.....	3896088	C42	RCMT1204M043 TN7110.....	3650173	B27
NSR854D W.....	3637526	D39, E15	QCBI50083R WG.....	2825324	C38	QSI3756251560R WG.....	2825621	C42	RCMT1204M043 TN7115.....	3875141	B27
NSR864E W.....	3637534	D39, E15	QCBI50083R WG.....	2825324	C38	QSI3756251560R WG.....	2825614	C42	RCMT1204M043 TN7125.....	3875141	B27
NSRDH122B W.....	3637547	D40, E16	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825605	C42	RCMT1204M043 TN7135.....	3781731	B27
NSRDH163C W.....	3637499	D40, E16	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825594	C42	RCMT1204M043 THM-FX.....	2563694	F14
NSRDH163D W.....	3637528	D40, E16	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825587	C42	RCMX1204M0 TN2000.....	2563689	F14
NSRDH203D W.....	3637511	D40, E16	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825963	C104	RCMX1204M0 TN4000.....	2576428	F14
NSRDH204D W.....	3637530	D40, E16	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825952	C104	RCMX2006M0 THM-X.....	2261854	F14
NST1.....	3669071	A22	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 THM-X.....	2398337	F14
NST2.....	3669072	A22	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TTR-X.....	2563657	F14
NST3.....	3669183	A22	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN5120.....	3558426	B28
NSUL124C W.....	3641702	E18	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN7105.....	3883395	B28
NSUL164D W.....	3641701	E18	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN7110.....	3649239	B28
NSUR124C W.....	3641698	E18	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN7115.....	3639370	B28
NSUR164D W.....	3637545	E18	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN7125.....	3684627	B28
NT1L TN6010.....	3636551	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TN7135.....	3781764	B28
NT1L TN6025.....	3636555	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2006M0 TTR-X.....	2563635	F14
NT2L TN6010.....	3607675	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TN5120.....	3558427	B28
NT2L TN6025.....	3607835	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TN7110.....	3653595	B28
NT2LK TN6010.....	3607674	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TN7115.....	3640666	B28
NT2LK TN6025.....	3607833	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TN7125.....	3875108	B28
NT2R TN6010.....	3607647	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TN7135.....	3782071	B28
NT2R TN6025.....	3607843	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TTR.....	2028196	B28
NT2RK TN6010.....	3607651	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX2507M0 TTR-X.....	2563606	F14
NT2RK TN6025.....	3607837	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMX3209M0 TN7115.....	3640156	B28
NT3L TN6010.....	3607532	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG3204D CW3020.....	3869749	B55
NT3L TN6025.....	3607828	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG33T0820 CW2015.....	2952615	B55
NT3LK TN6010.....	3607645	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG43T0420 CW3020.....	3869750	B55
NT3LK TN6025.....	3607828	E25	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG43T0820 CW2015.....	2952616	B55
NT3R TN6010.....	3607530	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG43T0820 CW5025.....	2952131	B55
NT3R TN6025.....	3607825	E26	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG45T0420 CW3020.....	3869751	B55
NT3RCK TN6010.....	3607649	E27	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG45T0820 CW2015.....	2952617	B55
NT3RCK TN6025.....	3607838	E27	QCBI50085R WG.....	2825272	C28	QSI3756251560R WG.....	2825941	C35, C37-39, C104	RCMG45T0820 CW5025.....	2952133	B55
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SNMG432 TTS	2559262	F15	SNMG6425 TN8025	2013356	B31	SNMP432SM TN8025	2028462	B32	SPU533 THM	2028565	B34
SNMG43222 TN5105	3795497	B30	SNMG643 THM-X	2559191	F15	SNMP432SM TN6010	2955799	B32	SPU533 TTM	2028566	B34
SNMG43222 TN5120	3559559	B30	SNMG643 TN2000	2559186	F15	SNMP433SM TN6025	2956133	B32	SPU533 TTR	2028567	B34
SNMG43222 TN6010	2955758	B30	SNMG643 TN4000	2576283	F15	SNMP433SM TN8025	2028464	B32	SPU533 TTM	2025962	B34
SNMG43222 TN6025	2956095	B30	SNMG643 TN7135	3871792	B30	SNMP542SM TN6025	2956134	B32	SPU633 THM	2028568	B34
SNMG43222 TN7110	3663164	B30	SNMG643 TTR-X	2559201	F15	SNMP542SM TN8025	2028466	B32	SPU633 TTM	2028569	B34
SNMG43222 TN7125	3745853	B30	SNMG643 TTS	2559206	F15	SNMP543SM TN6025	2956135	B32	SPU633 TTR	2028570	B34
SNMG43222 TN8025	2013091	B30	SNMG6435 TN2000	2561427	F15	SNMP543SM TN8025	2028468	B32	SPU634 THM-X	2561892	F16
SNMG4324 TN7115	3641798	B30	SNMG6435 TN4000	2561421	F15	SNMP544SM TN6025	2956136	B32	SPU634 TTS	2561907	F16
SNMG4324 TN7125	3875153	B30	SNMG6435 TN5120	3559581	B31	SNMP544SM TN8025	2028469	B32	SPU634 TTM	2026013	B34
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SVBN163 WG	2951377	A24	TCMT3251MU TN5120	3558315	B36	TDHH130805L C65	2828541	C69	TNMG3314 TN7125	3873540	B37
TBHB1308X C25	2828641	C77	TCMT3251MU TN6010	2955789	B36	TDHH130805L C66	2828529	C69	TNMG3314 TN7110	3650196	B37
TBHB1308X C65	2828556	C77	TCMT3251MU TN6025	2956125	B36	TDHH130805L TN7	2828508	C69	TNMG3314 TN7115	3662847	B37
TBHB1308X C66	2828652	C77	TCMT3251MU TN7105	3883401	B35	TDHH130805L TN7	2828508	C69	TNMG3314 TN7125	3875151	B37
TBHB1308X CM1	2828648	C77	TCMT3251MU TN7110	3653579	B36	TDHH130805R C65	2828547	C69	TNMG3314 TN7135	3781745	B37
TBHB2150 C25	2824302	C77	TCMT3251MU TN7115	3639112	B36	TDHH130805R CM1	2828523	C69	TNMG3314 TN7135	3781745	B37
TBHB2150 C65	2824266	C77	TCMT3251MU TN7125	3745324	B36	TDHH13081 C65	2828386	C69	TNMG3314 TTS	2559720	F17
TBHB2150 C66	2824309	C77	TCMT3251MU TN7135	3781699	B35	TDHH13081 C66	2828494	C69	TNMG3314 TTX	2028705	B37
TBHB3205 C65	2821406	C77	TCMT3252 THM	2028624	B35	TDHH13081 C66	2828484	C69	TNMG3322 TN2000	2560969	F17
TCGT215052 TN8025	2026170	B35	TCMT3252 TN5120	3558436	B35	TDHH13081 CM1	2828472	C69	TNMG3322 TN5105	3795503	B37
TCGT21505AL1 HWK10	2006990	B49	TCMT3252 TN7105	3883402	B35	TDHH13081 CM1	2828472	C69	TNMG3322 TN5120	3559588	B37
TCGT21505MU TN5120	3558312	B35	TCMT3252 TN7110	3649268	B35	TDHH13081 C66	2828484	C69	TNMG3322 TN6010	2955761	B37
TCGT21505MU TN7115	3639356	B35	TCMT3252 TN7115	3636914	B35	TDHH13081 C66	2828484	C69	TNMG3322 TN6025	2956098	B37
TCGT21505MU TN8025	2496756	B35	TCMT3252 TN7125	3684585	B35	TDHH13081 CM1	2828472	C69	TNMG3322 TN7105	3883203	B37
TCGT2151AL1 HWK10	2006991	B49	TCMT3252 TN7135	3781699	B35	TDHH13081 TN7	2828460	C69	TNMG3322 TN7110	3650196	B37
TCGT32505AL1 HWK10	2006992	B49	TCMT3252 TTR	2028627	B35	TDHH13081R C65	2828499	C69	TNMG3322 TN7115	3662847	B37
TCGT3251AL1 HWK10	2007003	B49	TCMT325241 TN7115	3641799	B35	TDHH13081R C66	2828494	C69	TNMG3322 TN7125		

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TNMG3325 TN4000	2225731	F18	TNMG5425 TN7135	3781897	B38	TPG323F WDN25U	3898723	B86	TPHH21505R CG5	2823812	C70
TNMG3325 TN5120	3559590	B38	TNMG5435 TN7110	3662881	B38	TPG323T0420 CW2015	2952713	B59	TPHH2151 C2	2823846	C71
TNMG3325 TN7105	3883207	B38	TNMG5435 TN7125	3745323	B38	TPG323T0820 CW5025	2952156	B59	TPHH2151 CG5	2823858	C71
TNMG3325 TN7115	3639136	B38	TNMG5435 TN7135	3781750	B38	TPG431F WDN25U	3898724	B86	TPHH2151 CG6	2823851	C71
TNMG3325 TN7125	3745846	B38	TNMG5445 TN7125	3684637	B38	TPG432F WDN25U	3898725	B86	TPHH2151 CM1	2823826	C71
TNMG3325 TN7135	3782066	B38	TNMG5465 TN7135	3782056	B38	TPGA2151 THM	2015081	B40	TPHH2151 CM5	2823819	C71
TNMG3325 TN8025	2014345	B38	TNMM33265 TN7115	3662850	B39	TPGA2152 THM	2031786	B40	TPHH2151L CG5	2823753	C70
TNMG332AP TN6010	2955769	B38	TNMM33265 TN7125	3873551	B39	TPGR322 TN7135	3781900	B40	TPHH2151L CG6	2823739	C70
TNMG332AP TN6025	2956106	B38	TNMM33265 TN7135	3781902	B39	TPGT21505HP CG5	2823605	C71	TPHH2151L CM1	2823724	C70
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TNMG332AP TN7115	3662834	B38	TNMM33365 TN8025	2014635	B39	TPGT2151HP CG5	2823592	C71	TPHH2151R CG5	2823760	C70
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TNMG332F TN1000	2580611	F18	TNMM33465 TN8025	2014649	B39	TPGT3251HP CM1	2821539	C71	TPHH2152L CG6	2823681	C70
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TNMG43148 TN7125	3873567	B37	TNMP433SM TN6025	2956140	B39	TPHB2152 CG6	2824071	C70	TPMR221 TN7135	3781793	B40
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TPU322 TN4000	2562765	F19	VCGT333AL3 HWK15	2022489	B50	WNMG4324 TN7125	3684631	B44			
TPU322 TN5120	3559654	B41	VCGT4358AL1 HWK10	2026313	B50	WNMG4324 TN8025	2015094	B44			
TPU322 TN7110	3649250	B41	VCGT4358AL3 HCK10	2002505	B50	WNMG43248 TN8025	2026164	B44			
TPU322 TN7115	3639135	B41	VCGT4358AL3 HWK15	2002506	B50	WNMG43249 TN2000	2560872	F21			
TPU322 TN7125	3684632	B41	VCMT3251 THM-X	2563826	F20	WNMG43249 TN7105	3883219	B44			
TPU322 TTM	2015327	B41	VCMT3251 TN2000	2576429	F20	WNMG43249 TN7110	3649235	B44			
TPU322 TTR	2028832	B41	VCMT3252 HK1500	2563773	F20	WNMG43249 TN7115	3636917	B44			
TPU322 TTR-X	2562796	F19	VCMT3252 TN2000	2563785	F20	WNMG43249 TN7125	3684603	B44			
TPU322 TTS	2562802	F19	VCMT3252 TN4000	2563780	F20	WNMG43249 TN7135	3781722	B44			
TPU323 THM	2028833	B41	VCMT3252 TN5120	3558442	B42	WNMG43249 TN8025	2015106	B44			
TPU323 THM-X	2562730	F19	VCMW221FST WDN25U	3883147	B88	WNMG4325 HK1500	2561712	F21			
TPU323 THMF-X	2562725	F19	VCMW3305FST WDN25U	3883146	B88	WNMG4325 TN2000	2561722	F21			
TPU323 TN5120	3559655	B41	VNGA331FST WDN25U	3898736	B89	WNMG4325 TN4000	2561717	F21			
TPU323 TN7125	3873553	B41	VNGA331S0420MT WBH10C	3883502	B89	WNMG4325 TN5120	3548187	B45			
TPU323 TTM	2028834	B41	VNGA331S0425MT WBH10P	3883538	B89	WNMG4325 TN7105	3883410	B45			
TPU323 TTR	2028835	B41	VNGA331S0425MT WBH10U	3883965	B89	WNMG4325 TN7110	3650194	B45			
TPU323 TTS	2562745	F19	VNGA331S0425MT WBH25P	3883894	B89	WNMG4325 TN7115	3639279	B45			
TPU432 TN7110	3662956	B41	VNGA331S0425MT WBH25U	3898707	B89	WNMG4325 TN7125	3745319	B45			
TPU432 TN7115	3662852	B41	VNGA331T0820 CW2015	2952545	B59	WNMG4325 TN7135	3781755	B45			
TPU432 TN7125	3875137	B41	VNGA332FST WDN25U	3898737	B89	WNMG4325 TN8025	2015118	B45			
TPU432 TN7135	3782067	B41	VNGA332S0420MT WBH10C	3883503	B89	WNMG432AP TN6010	2955771	B45			
TPU432 TTM	2028839	B41	VNGA332S0425MT WBH10P	3883539	B89	WNMG432AP TN6025	2956108	B45			
TPU433 THM	2028843	B41	VNGA332S0425MT WBH10U	3883966	B89	WNMG432AP TN7115	3639283	B45			
TPU433 THM-X	2562700	F19	VNGA332S0425MT WBH25P	3883896	B89	WNMG432AP TN7125	3875136	B45			
TPU433 TN5120	3559656	B41	VNGA332S0425MT WBH25U	3898708	B89	WNMG432AP TN8025	2497074	B45			
TPU433 TN7125	3684639	B41	VNGA332T0820 CW2015	2952546	B59	WNMG432FW TN5105	3795508	B46			
TPU433 TN7135	3782068	B41	VNGA332T0820 CW5025	2952198	B59	WNMG432FW TN8025	2954734	B46			
TPU433 TTM	2028846	B41	VNGA333T0820 CW2015	2952547	B59	WNMG432MW TN5105	3795509	B46			
TPU433 TTR	2028847	B41	VNGA432T0820 CW2015	2952548	B59	WNMG432MW TN7115	3662849	B46			
TPU433 TTR-X	2562705	F19	VNMG12T304 TN2000	2556742	F20	WNMG432MW TN8025	2954740	B46			
TPU433 TTS	2562710	F19	VNMG12T304 TN4000	2556737	F20	WNMG432SL TN7115	3642389	B46			
TPU434 TTM	2028848	B41	VNMG12T308 HK1500	2556713	F20	WNMG432SL TN7125	3873550	B46			
TPU451 TTM	2026092	B41	VNMG12T308 TN2000	2556722	F20	WNMG432SL TN8025	2028929	B46			
TPUR322L TTM	2022748	B41	VNMG12T308 TN5120	3559600	B43	WNMG4334 TN7110	3662892	B44			
TPUR322R TTM	2017766	B41	VNMG33122 TN7110	3663143	B43	WNMG4334 TN7115	3642386	B44			
VBGW221FST WDN25U	3898774	B88	VNMG33222 TN7110	3663120	B43	WNMG4334 TN8025	2015146	B44			
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VBGW331S0415M WBH25P	3883913	B88	VNMP332SM TN6010	3348301	B43	WNMG43349 TN7105	3883816	B44			
VBGW331S0415MT WBH10P	3883536	B88	VNMP332SM TN7110	3662874	B43	WNMG43349 TN7110	3649259	B44			
VBGW331S0415MT WBH10U	3883963	B88	VNMS331FST WDN25U	3898738	B89	WNMG43349 TN7115	3639288	B44			
VBGW331S0415MT WBH25U	3898690	B88	VNMS332FST WDN25U	3898739	B89	WNMG43349 TN7125	3745327	B44			
VBGW332S0415M WBH25P	3883914	B88	VNGA431FST WDN25U	3898740	B89	WNMG43349 TN7135	3781735	B44			
VBGW332S0415MT WBH10C	3883491	B88	VNGA431S0425MT WBH10U	3883967	B89	WNMG43349 TN8025	2015171	B44			
VBGW332S0415MT WBH10P	3883537	B88	VNGA432FST WDN25U	3898741	B89	WNMG4335 HK1500	2561661	F21			
VBGW332S0415MT WBH10U	3883964	B88	VNGA432S0420MT WBH10C	3883504	B89	WNMG4335 TN2000	2561686	F21			
VBGW332S0415MT WBH25U	3898691	B88	VNGA432S0425MT WBH10U	3883968	B89	WNMG4335 TN5120	3548188	B45			
VBMT331 THM	2028860	B42	WNMG432T0820 CW5025	2952199	B60	WNMG4335 TN7105	3883220	B45			
VBMT331 TN2000	2556792	F19	VNGA433T0820 CW5025	2952200	B60	WNMG4335 TN7110	3649263	B45			
VBMT331 TN4000	2556787	F19	VNGA434T0820 CW5025	2952201	B60	WNMG4335 TN7115	3639193	B45			
VBMT331 TN5120	3558439	B42	WNGX453T0820 CW5025	2952157	B60	WNMG4335 TN7125	3745302	B45			
VBMT331 TN7105	3883405	B42	WNMA432 TN5105	3779433	B44	WNMG4335 TN7135	3781810	B45			
VBMT331 TN7110	3649209	B42	WNMA432 TN5120	3558543	B44	WNMG4335 TN8025	2015194	B45			
VBMT331 TN7115	3639110	B42	WNMA433 TN5105	3779434	B44	WNMG433AP TN6010	2955772	B45			

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Metalcutting Safety

IMPORTANT SAFETY INSTRUCTIONS

Read before using the tools in this catalog!

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 catalog 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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TURNING

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